



ROSEAL[®] S.A.

Mechanical seals



GENERAL DESCRIPTION

ROSEAL Co. Odorheiu Secuiesc is a SME specialized in manufacturing sealing systems, aiming permanently to fulfill the market-driven requirements for new and innovative performance products. Since 1981, activities include research, design, production and marketing of mechanical and magnetofluidic seals, manufacturing specific spare parts of various materials and services. Roseal Co. is developing and manufacturing carbographitic materials, superaluminous ceramics, elastomers and PTFE for spare parts. Over the years a large number of specific mechanical seals and components have been designed, built and tested, which currently solve concrete cases of chemical, petrochemical and nuclear power industry. ROSEAL Co. has integrated management systems (ISO 9001-2008 quality assurance, environmental management ISO 14001-2005 and Occupational Health and Safety Management SR – ISO OHSAS 18001-2007) and is licensed for Nuclear Quality Management Systems, Class 1, ASME Code, Section III, Subsection NCA, art. 4000 and for ISCIR according to NPSM-2008.

In this context, ROSEAL Co. became a member and even a founding member of the Romanian Association for Promotion of Magnetic Fluids, Romanian Atomic Forum - ROMATOM, Association of researchers, designers, manufacturers and exporters of circulation pumps in Romania (APPR), etc.

Being highly receptive to new technologies, ROSEAL Co. have developed long-term S&T cooperation with national Research&Development institutes and high ranked universities from Romania.

The company team has gained research experience by participating and leading several national research projects (15 national projects).

Among the most important achievements obtained in collaboration with Romanian Academy – Timisoara Branch, Center for Fundamental and Advanced Technical Research, Laboratory of Magnetic Fluid is the synthesis of magnetic nanoparticles, nanofluids and nano-micro structured composite magnetizable fluids even at micropilot scale with excellent quality, used in various long-term (~ 5 years) sealing systems.

Advanced research have been performed for achieving polymeric and carbographitic heat-proof materials with increased life-time for seal gaskets exposed to radiation. Research results were also disseminated through numerous scientific papers, posters, patents and innovations.

Since 1991, the company opened several Commercial Sales Representative Offices in Romania and abroad, as well.

The economical outcomes of the Roseal Co. lead to win many times the first place of the Regional and National Top Companies of the Chamber of Commerce since 1996 up to now.



PARTNERS

SNN Co. Subs. CNE Cernavoda
 Nimb Consmetal Ltd. Cernavoda
 Elcomex Ica Co. Cernavoda
 Argos Co. Cernavoda
 CNU Co. Subs. Feldioara

RAAN

Subs. Romag Termo Drobeta Tr. Severin
 Subs. Romag Prod Drobeta Tr. Severin

OMV Petrom Co.

Subs. Arpechim Comuna Bradu
 Subs. Petrobrazi
 Electrocentrale Co. Bucharest
 CET Iasi Co. Iasi
 Termoelectrica Co. Subs. Electrocentrale Braila
 Complexul Energetic Oltenia Co. Subs. Electrocentrale Craiova
 Complexul Energetic Craiova Co. Subs. Electrocentrale Craiova
 Electroservice Ltd. Craiova
 Rominserv Ltd. Bucharest Working Point Rompetrol Petromidia
 Radet București
 Chimcomplex Co. Borzesti
 Energy Bio Chemicals Co. Subs. Carom Onesti
 Amurco Ltd. Bacau
 Hidroelectrica Co. Subs. Hidrocentrale
 Portile de Fier Drobeta Tr. Severin
 Hidrocentrale Tg.-Jiu
 Azomures Co. Tg. Mures
 Michelin Romania Co. Working Point Anvelope Zalau
 Petrotel-Lukoil Co. Ploiesti
 Neptun Co. Campina
 Purolite Ltd. Victoria
 UPE Romania Ltd. Fagaras
 Novus Ltd. Constanta
 INCDT Comoti Bucharest
 Tar Mv Ltd. Iasi
 Rafo Co. Onesti
 Mecdrum Util Ltd. Iasi
 Oltchim Co. Rm-Valcea
 Ucm Co. Resita
 Ga-Pro-Co Chemicals Co. Savinesti
 Confind Ltd. Campina
 Rarul Co. Campulung Moldovenesc
 Inter Expres Ltd. Campulung Muscel
 Antibiotice Co. Iasi
 Terpena Ltd. Orastie

CERTIFICATE

GUVERNUL ROMANIEI
COMISIA NATIONALA PENTRU CONTROLUL
ACTIVITATILOR NUCLEARE
 Bd. Libertatii nr. 14, Bucuresti 5, CP 42-4
 Telefon:(021) 316 04 25
 Fax: (021) 317 38 87

AUTORIZATIE
PENTRU SISTEMUL DE
MANAGEMENT AL CALITATII IN DOMENIUL NUCLEAR
 Nr. 11 - 070

In temeiul Art. 8 si Art. 24 din Legea Nr. 111/1996 privind desfasurarea in siguranta reglementarea, autorizarea si controlul activitatilor nucleare, republicata, cu modificarile si completarile ulterioare, a nomenclor CNCAN privind sistemele de management al calitatii, ca urmare a analizei documentatiilor prezentate in Anexa nr. 01, Capitolul I.

Constatand ca sunt indeplinite prevederile legale,

COMISIA NATIONALA PENTRU CONTROLUL ACTIVITATILOR NUCLEARE

AUTORIZAZIA
SISTEMUL DE MANAGEMENT AL CALITATII AL
S.C. ROSEAL S.A.
 din Odorheiu Secuiesc, str. Nicolae Bălcescu, nr. 5/A, judetul Harghita,
 persoana juridica inregistrata la Oficiul Registrului Comertului de pe langa Tribunalul
 Harghita, cu codul unic de inregistrare 520616,
 pentru activitati de

FABRICARE SI SERVICII
in domeniul nuclear

in conformitate cu documentatia prezentata, reglementarile CNCAN pentru managementul calitatii in domeniul nuclear, clasa 1 de aplicare gradata acordata sistemului de management al calitatii si codul ASME, sectiunea III, subseciunea NCA, art. 4002, limitele, conditiile si documentele din anexa nr. 01, care face parte integranta din prezenta autorizatie.

Raspunderea privind stabilirea si dezvoltarea sistemului de management al calitatii revine unitatii autorizate.

Intra in vigoare la data de: 14.12.2011
 Expira la data de: 13.12.2013

PRESEDINTE,
 VAJDA Borbala

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GUVERNUL ROMANIEI
COMISIA NATIONALA PENTRU CONTROLUL
ACTIVITATILOR NUCLEARE
 Bd. Libertatii nr. 14, Bucuresti 5, CP 42-4
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 Fax: (021) 317 38 87

AUTORIZATIE
PENTRU SISTEMUL DE
MANAGEMENT AL CALITATII IN DOMENIUL NUCLEAR
 Nr. 11 - 071

In temeiul Art. 8 si Art. 24 din Legea Nr. 111/1996 privind desfasurarea in siguranta reglementarea, autorizarea si controlul activitatilor nucleare, republicata, cu modificarile si completarile ulterioare, a nomenclor CNCAN privind sistemele de management al calitatii, ca urmare a analizei documentatiilor prezentate in Anexa nr. 01, Capitolul I.

Constatand ca sunt indeplinite prevederile legale,

COMISIA NATIONALA PENTRU CONTROLUL ACTIVITATILOR NUCLEARE

AUTORIZAZIA
SISTEMUL DE MANAGEMENT AL CALITATII AL
S.C. ROSEAL S.A.
 din Odorheiu Secuiesc, str. Nicolae Bălcescu, nr. 5/A, judetul Harghita,
 persoana juridica inregistrata la Oficiul Registrului Comertului de pe langa Tribunalul
 Harghita, cu codul unic de inregistrare 520616,
 pentru activitati de

PROIECTARE
in domeniul nuclear

in conformitate cu documentatia prezentata, reglementarile CNCAN pentru managementul calitatii in domeniul nuclear, limitele, conditiile si documentele din anexa nr. 01, care face parte integranta din prezenta autorizatie.

Raspunderea privind stabilirea si dezvoltarea sistemului de management al calitatii revine unitatii autorizate.

Intra in vigoare la data de: 14.12.2011
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PRESEDINTE,
 VAJDA Borbala

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ISCR **CEOC**

INSPECTIA DE STAT PENTRU CONTROLUL CAZANELOR,
RECIPIENTELOR SUB PRESIUNE SI INSTALATIILOR DE RIDICAT
I.S.C.I.R. ROMANIA

AUTORIZATIE nr. N-13-01

Atestă faptul că:

ROSEAL S.A.
 str. Nicolae Bălcescu nr. 5/A, municipiul Odorheiu Secuiesc, jud. Harghita
 R.C.: J19/31/1991 C.U.I.: 526618

are stabilit și aplică un sistem de management al calitatii în conformitate atât cu standardele internaționale aplicabile cât și cu cerințele tehnice specifice din domeniul nuclear, de clasificare nr. 1, 2 și 3 și de clasă nucleară I, în ceea ce privește proiectarea și echiparea care rulează sub presiune din instalațiile nucleare, de clasă nucleară I, 2 și 3 și de clasă nucleară I, în ceea ce privește proiectarea și echiparea.

Fabricare și montare de componente ale inelului sub presiune aferente sistemelor de etanșare pentru pompe, cu următorii parametri:
 P_{max} = 12,0 MPa, D_{ext} = 500 mm, T_{max} = + 5°C, T_{min} = + 500°C;
 Fabricare prin prelucrări mecanice ale componentelor de conducte (flânguri tip teuri, coturi, capace), cu următorii parametri:
 P_{max} = 40,0 MPa, D_{ext} = 500 mm, T_{max} = + 5°C, T_{min} = + 500°C.

In conformitate cu PV nr. 776/2008 și Protocolul nr. 776/1002, încheiate la data de 10.01.2013.

Au fost efectuate în data de 10.01.2013 de către reprezentantul ISCR, Probe formate de către S.C. ROSEAL S.A. Odorheiu Secuiesc, din scopul de a demonstra că acestea au capacitățile necesare pentru fabricarea, montarea, prelucrarea și garantarea componentelor și echipamentelor menționate. În conformitate cu cerințele standardelor internaționale și cerințele tehnice și cu cerințele legale aplicabile în domeniu, înregistrate în România.

ISCR are în calitate de organizație internațională de acreditare în domeniul proiectării și fabricării, montării și garanției pentru România, competențele și echipamentele necesare, cu respectarea prevederilor Protocolului.

NOTA: Personalul tehnic de specialitate este controlat în Anexa la prezenta document.

AUTORIZAT: 09 ianuarie 2013
 DATA EMITERII: 11 ianuarie 2013

EXPIRĂ: 09 ianuarie 2015

INSPECTOR DE STAT ȘEF
 Ing. Ion Răducanu

I.S.C.I.R. ROMANIA - Adresa Str. Ștefan Bălcescu nr. 47-49, Cod Postal 520014, București

Call-Center: 112, 842, 840

ALLO CERT **ACCREDIA**
 EFQM Member

CERTIFICATE
ALL CERT SYSTEMS
 certifies that

Quality Management System
 established, implemented and maintained in

S.C. ROSEAL S.A.
 Headoffice: Str. Nicolae Bălcescu, Nr. 5/A, Odorheiu Secuiesc, Jud. Harghita
 in the following operational units:
 Str. Aerogarii, Nr. 22, Bl. III/15, Sc. A, Ap. 2, Sector 1, Bucuresti

complies with the requirements of
SR EN ISO 9001: 2008 (ISO 9001:2008)
 for the following activities:

research, design, production and sale of mechanical and liquid magnetical-seals and specific parts manufactured of graphitic carbon materials, high aluminium content ceramics, elastomers and metallic; provision of services in the field of mechanical and liquid-magnetical seals; technical-commercial representation

Certificate Series C Number: 01016 Issue date: 15th of April 2008 (R 05th of April 2011)
 Valid up to: 04th of April 2014

General Manager: Monica Piscaru

CODE: F-4.2.03, Rev. 3 RELEASED AT: 02.08.2010

ALLO CERT **EFQM Member**

CERTIFICATE
ALL CERT SYSTEMS
 certifies that

Occupational Health and Safety Management Systems
 established, implemented and maintained in

S.C. ROSEAL S.A.
 Headoffice: Str. Nicolae Bălcescu, Nr. 5/A, Odorheiu Secuiesc, Jud. Harghita
 in the following operational units:
 Str. Aerogarii, Nr. 22, Bl. III/15, Sc. A, Ap. 2, Sector 1, Bucuresti

complies with the requirements of
OHSAS 18001:2007 (SR OHSAS 18001:2008)
 for the following activities:

research, design, production and sale of mechanical and liquid magnetical-seals and specific parts manufactured of graphitic carbon materials, high aluminium content ceramics, elastomers and metallic; provision of services in the field of mechanical and liquid-magnetical seals; technical-commercial representation

Certificate Series S Number: 00440 Issue date: 15th of April 2008 (R 05th of April 2011)
 Valid up to: 04th of April 2014

General Manager: Monica Piscaru

CODE: F-4.2.03, Rev. 3 RELEASED AT: 02.08.2010

ALLO CERT **ACCREDIA**
 EFQM Member

CERTIFICATE
ALL CERT SYSTEMS
 certifies that

Environmental Management System
 established, implemented and maintained in

S.C. ROSEAL S.A.
 Headoffice: Str. Nicolae Bălcescu, Nr. 5/A, Odorheiu Secuiesc, Jud. Harghita
 in the following operational units:
 Str. Aerogarii, Nr. 22, Bl. III/15, Sc. A, Ap. 2, Sector 1, Bucuresti

complies with the requirements of
SR EN ISO 14001: 2005 (ISO 14001:2004)
 for the following activities:

research, design, production and sale of mechanical and liquid magnetical-seals and specific parts manufactured of graphitic carbon materials, high aluminium content ceramics, elastomers and metallic; provision of services in the field of mechanical and liquid-magnetical seals; technical-commercial representation

Certificate Series M Number: 00525 Issue date: 15th of April 2008 (R 05th of April 2011)
 Valid up to: 04th of April 2014

General Manager: Monica Piscaru

CODE: F-4.2.03, Rev. 1 RELEASED AT: 02.08.2010

Manufacturing Program

According to ISO - 9001 :

- Standardized mechanical seals
- Mechanical seals for special request
- Magnetic fluid rotating seals
- Agitator seals
- Axial feedthroughs
- Rubber bellow mechanical seals
- Auxiliary equipment for sealing systems
- Spare parts for mechanical seals
- Wear and corrosion resistant spares of hard carbon, ceramics, carbide, PTFE and elastomers

Services

- Engineering mechanical sealing systems and solutions for normal and special requests
- Competent consultation concerning sealing problems
- High qualified technical assistance for mounting, operation and maintenance of sealing systems
- Training operating and maintaining personnel
- Development of mechanical and magnetic fluid seal systems
- Typification of sealing systems according to current international standards.

Applications

Mechanical seals are used practically in all industrial fields, with a large range of applications, where different liquids are pumped or mixed :

- chemical and petrochemical industry
- pharmaceutical industry
- textile industry
- pulp and paper industry
- food industry
- conventional and nuclear power plants
- thermal engines
- domestic applications
- mining
- water supply and treatment
- machine building
- pump manufactory

Technical Information Concerning Selection, Mounting and Operation of Mechanical Seals

Important issues

In order to obtain the best operation of mechanical seals it is necessary to permanently keep a thin fluid film between the sliding faces in order to avoid dry running. This requirement is conditioned by a suitable selection of the sealing system composed by a mechanical seal and accessories and by adequate assembling, operation and maintenance of the outfit, equipped with the mechanical sealing system.

Sealing System Selection

The following parameters must be taken into consideration:

- pressure range
- temperature range
- physical and chemical properties of the sealed media
- dynamic conditions
- security requirements

Supervision of the technical possibilities of mechanical seals according to pressure, temperature and sliding velocity limits.

Selection of the constructional seal type.

Selection of materials for different seal component parts.

Remark

It is recommended to select the simplest solution of the construction.

Good quality materials improve the mechanical seal performance.

Development of sealing systems and selection of appropriate auxiliary components are essential for obtaining the right operating parameters due to their high influence on the operating conditions. Selecting the most efficient solution of the sealing systems from economical and safety considerations is an extremely complex issue due to the iterative character of the selecting process. We recommend to consult our specialist engineers, having wide experiences.

Mounting Conditions

Shaft conditions

Elastomer or PTFE bellow

Shaft size tolerance: $\pm 0,05$ mm

Shaft max. ovalness: $\pm 0,015$ mm

Surface finish: $6 \div 12 \mu\text{m}$ (Ra)

“O” ring or “V” ring

Shaft size tolerance: $\pm 0,05$ mm

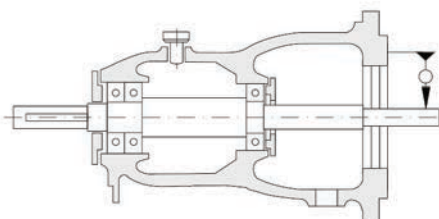
Shaft max. ovalness : $\pm 0,025$ mm

Surface finish : $1 \div 2,5 \mu\text{m}$ (Ra) Ground and polished, free from machine marks

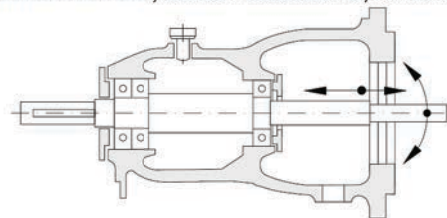
Pump Conditions

1. The shaft should be straight with a maximum full indicator movement of 0,05 mm.

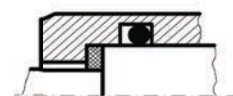
2. Shaft runout of the seal should not exceed 0,05 mm. Bearing replacement is recommended after 8000 - 10000 hours.



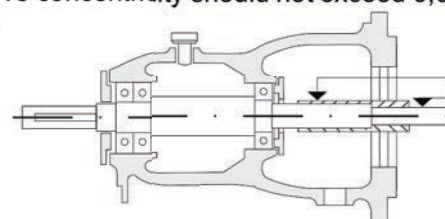
3. Shaft bearing clearances should not allow lateral and axial shaft movements, which exceeds 0,08 mm.



4. For sealing sleeves it is recommended to use a secondary radial sealing with an “O” ring beside the flat axial sealing.

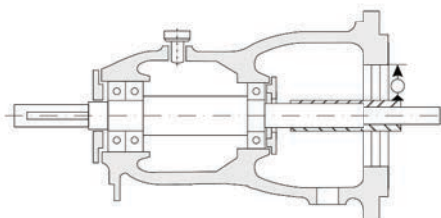


5. The sleeve concentricity should not exceed 0,05 mm to the shaft.

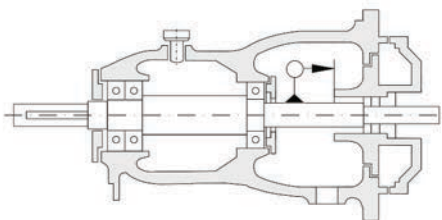


Technical Information Concerning Selection, Mounting and Operation of Mechanical Seals

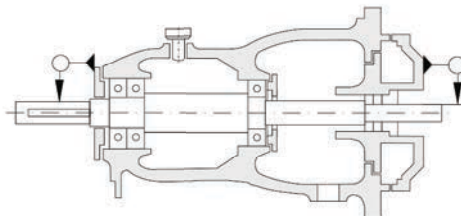
6. The normal clearance between the shaft and a stationary seat is 0.4 to 0.8 mm. Thus, the concentricity of the housing or cover in which the secondary sealing ring is mounted in relation to the [shaft] protective sleeve must be below 0.1 to 0.8 mm.



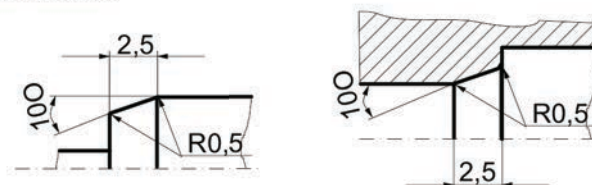
7. The slipping surfaces of the stationary seat must stand as perpendicular as possible with the shaft and the tolerance of the shaft should not exceed 0,1 mm.



8. After mounting coupling parts, running accuracy of the shaft shall be below 0.08 mm, which must be respected throughout the operation.



9. There should be no sharp edges on the shaft shoulders, grooves or borings. These can cause component stuck during mounting. Edges should be made blunt according to standards.



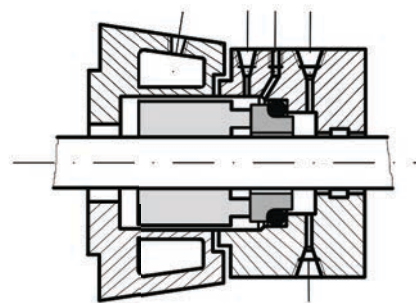
10. The fitting tolerance on the installed length should normally be taken as +/- 0,5 mm.

Mounting Instructions

Steps for mounting:

1. Check the fitting dimensions, surface quality especially of the contact area with secondary seals as well as the shaft bearing, the axial, radial shaft movements and runouts. Check the shaft deviation from perpendicularity to the cover of the surface of the stationary seal ring.
2. Reparations of the equipment before assembly in order to ensure the prescribed mounting conditions and operating parameters.
3. Accurate mounting to avoid damage of sliding surfaces and the secondary seal surface. Never wet sliding surfaces with lubricant but always mount them completely dry.
4. Testing the sealing function in static conditions.

5. Care must be taken to the concentricity, check again the runout of the shaft.
6. For cooling the stuffing box a cooler media is used. Ventilation, leakage, closing and the filling with coolant and barrier fluid must be checked.

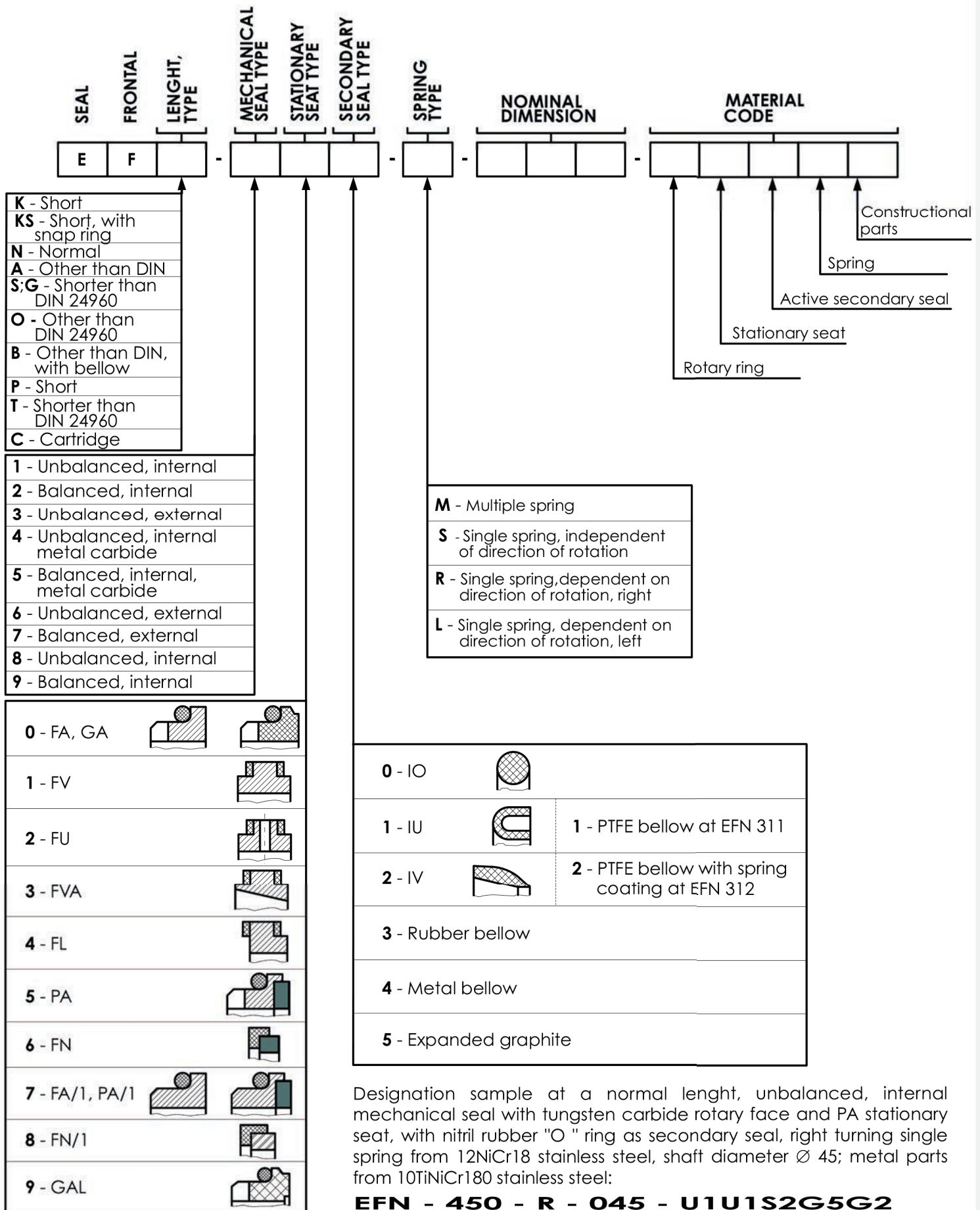


Maintenance

In order to avoid dry running which may cause damages to the seals, care must be taken to keep a permanent fluid film between the sliding faces.

It is required to respect all operating instructions and parameters regarding to pressure and temperature limits and to the sealing system accessories, considering to the hydraulic forces which ensure contact between the sliding faces.

Mechanical Seal Designation



Material Code

Face Materials

CODE DIN	CODE ROSEAL®	
		Carbons
	B1	Carbon - resin bonded
B	B14	Carbon - resin impregnated
A	B17	Carbon - antimony impregnated
		Plastics
Y	Y1	PTFE + 20% Glass fibre filled
Y	Y2	PTFE + 25% Graphite filled
		Metals
G	G1	Stainless steel ionic nitrated
E	G10	Stainless steel (40 C 130) - 12% Cr
		Metal Carbides
U	U1	Tungsten carbide
Q	U2	Silicon carbide
		Metal Oxide
V	V1	Al ₂ O ₃ - 89%
	V2	Basalt

Secondary Seal Components

CODE DIN	CODE ROSEAL®	
		Plastics
T	T1	PTFE pure
T	Y2	PTFE + 25% Graphite filled
		Elastomers
S	S1	Silicone rubber
P	S2	Nitrile rubber (perbunan)
V	S3	Fluoro carbon rubber (viton)
E	S4	Ethylene propylene rubber (EPDM)
		Special
M	S5	Rubber, PTFE - coated
	S6	Spring, PTFE - coated
		Carbon
Y	B5	Expanded graphite

Spring Materials

CODE DIN	CODE ROSEAL®	
G	G3	W1.4401
F	G5	W1.4310

Metal Bellow Materials

CODE DIN	CODE ROSEAL®	
G	G1	W1.4571
G	G2	W1.4541
G	G8	W1.4306
G	G9	W1.4435

Construction Materials

CODE DIN	CODE ROSEAL®			
G	G1	Stainless steel austenitic	10TiMoNiCr175	W1.4571
G	G2	Stainless steel austenitic	10TiNiCr180	W1.4541
G	G3	Stainless steel austenitic with Cr,Ni,Mo		W1.4401
	G4	Stainless steel		W1.4617
F	G5	Stainless steel austenitic	12NiCr180	W1.4310
	G6	Stainless steel		W1.4408
D	G7	Quality carbon steel	OLC 45	-
F	G8	Stainless steel austenitic - ferritic	2NiCr185	W1.4306
G	G9	Stainless steel	2MoNiCr175	W1.4435
E	G10	Stainless steel martensitic - ferritic	40C130	W1.4034
E	G11	Stainless steel	20C130	W1.4021
E	G12	Stainless steel martensitic	90VMoCr180	W1.4112
E	G13	Stainless steel martensitic	35MoCr165	W1.4112

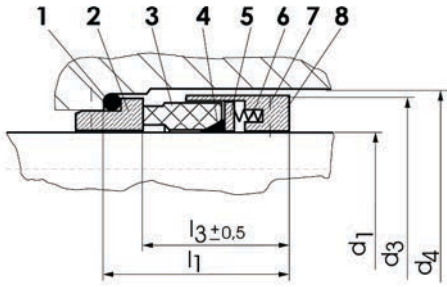
Mechanical Seal, Short Length, Unbalanced, Internal, Multiple Spring DIN 24960

Operating Limits



$d = 16 \dots 100$ mm (up to 240 mm on request), $p = 8$ bar (16 bar),
 $t = -15 \dots 180^\circ\text{C}$, $v_g = 15$ m/s.

Resistance to chemicals and abrasive media depends on the material combination.

EFK-102-M



- 1 - "O" ring
- 2 - Stationary seat
- 3 - Rotary face
- 4 - "O" ring
- 5 - Thrust ring
- 6 - Spring
- 7 - Set screw
- 8 - Housing

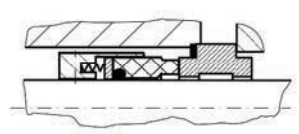
-  **EFK - 100 - M - 045 - B14V1S2G5G1**
-  **EFK - 452 - M - 045 - U1U1T1G5G1**

Constructive Variants

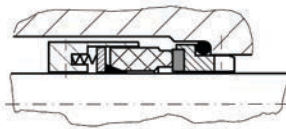
EFK - 102 - M



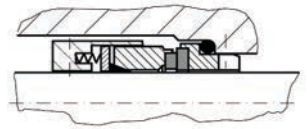
EFK - 110 - M



EFK - 152 - M

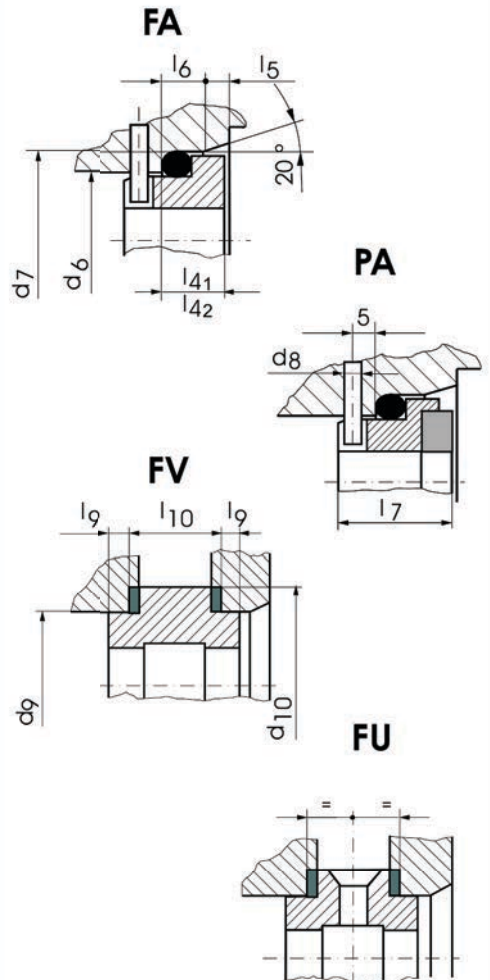


EFK - 452 - M



Dim.	d ₁	d ₃	d ₄	d ₆	d ₇	d ₈	d ₉	d ₁₀	l ₃	l ₄₁	l ₄₂	l ₅	l ₆	l ₇	l ₉	l ₁₀
nom.	h6			H11	H8		H8									
016	16	26	28	23	27	3	34	45	27	8	8,6	1,5	4	15	3	12
018	18	32	34	27	33	3	37	48	28	9,5	10,1	2	5	17	3	12
020	20	34	36	29	35	3	37	49	28	9,5	10,1	2	5	17	3	12
022	22	36	38	31	37	3	38	51	28	9,5	10,1	2	5	17	3	12
024	24	38	40	33	39	3	42	54	30,5	9,5	10,1	2	5	17	3	12
025	25	39	41	34	40	3	42	54	30,5	9,5	10,1	2	5	17	3	12
028	28	42	44	37	43	3	46	61	33	9,5	10,2	2	5	17	5,5	15
030	30	44	46	39	45	3	49	61	33	9,5	10,2	2	5	17	5,5	15
032	32	46	48	42	48	3	51	66	33	9,5	10,2	2	5	17	5,5	15
033	33	47	49	42	48	3	54	69	33	9,5	10,2	2	5	17	5,5	15
035	35	49	51	44	50	3	54	69	33	9,5	10,2	2	5	17	5,5	15
038	38	54	58	49	56	4	57	72	35	10	11,2	2	6	18	5,5	15
040	40	56	60	51	58	4	62	77	35	10	11,2	2	6	18	5,5	15
043	43	59	63	54	61	4	67	82	35	10	11,2	2	6	18	5,5	15
045	45	61	65	56	63	4	67	82	35	10	11,2	2	6	18	5,5	15
048	48	64	68	59	66	4	70	85	35	10	11,2	2	6	18	5,5	15
050	50	66	70	62	70	4	72	87	35	12,5	13,25	2,5	6	20	5,5	15
053	53	69	73	65	73	4	80	98	35	12,5	13,25	2,5	6	20	8	18
055	55	71	75	67	75	4	80	98	35	12,5	13,25	2,5	6	20	8	18
058	58	78	83	70	78	4	85	103	40	12,5	13,25	2,5	6	20	8	18
060	60	80	85	72	80	4	85	103	40	12,5	13,3	2,5	6	20	8	18
063	63	83	88	75	83	4	90	108	40	12,5	13,3	2,5	6	20	8	18
065	65	85	90	77	85	4	90	108	40	12,5	13,3	2,5	6	20	8	18
068	68	88	93	81	90	4	95	113	45	15	15,3	2,5	7	22	8	18
070	70	90	95	83	92	4	95	113	45	15	15,4	2,5	7	22	8	18
073	73	97	102	86	95	4			45	15	15,4	2,5	7	22		
075	75	99	104	88	97	4	100	118	45	15	15,4	2,5	7	22	8	18
080	80	104	109	95	105	4	105	123	45	15	15,9	3	7	22,5	7,5	19
085	85	109	114	100	110	4	110	128	45	15	15,9	3	7	22,5	7,5	19
090	90	114	119	105	115	4	115	133	50	15	15,9	3	7	22,5	7,5	19
095	95	119	124	110	120	4	120	138	50	15	15,9	3	7	22,5	7,5	19
100	100	124	129	115	125	4	125	143	50	15	15,9	3	7	22,5	7,5	19

Stationary Seat



$$l_3 + l_{41} = l_1 \quad / \text{DIN 24960}$$

l₄₁ with IP secondary seal (PTFE)

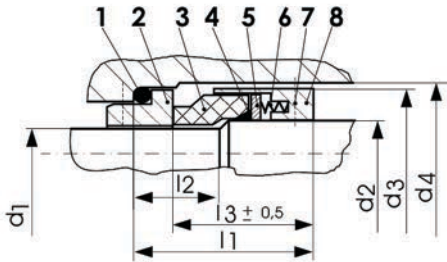
l₄₂ with IO secondary seal (elastomer)

Mechanical Seal, Short Length, Balanced, Internal, Multiple Spring DIN 24960

Operating Limits

d = 16 ... 105 mm (up to 240 on request), p = 25 bar (40 bar), t = -15...180°C, vg = 15 m/s.
 Resistance to chemicals and abrasive media depends on material combination.

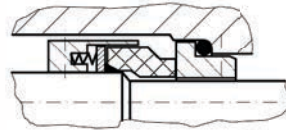
EFK-202-M



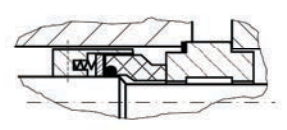
- 1- "O" ring
- 2- Stationary seat
- 3- Rotary face
- 4- "O" ring
- 5- Thrust ring
- 6- Spring
- 7- Set screw
- 8- Housing

Constructive Variants

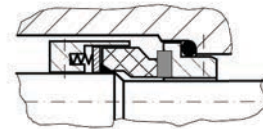
EFK 202 - M



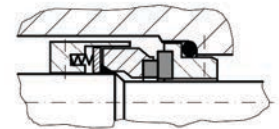
EFK 210 - M




EFK 252 - M



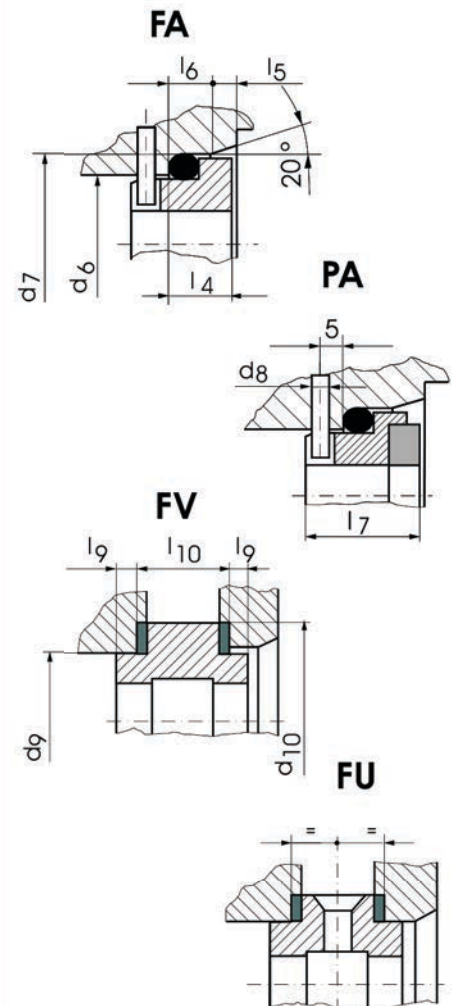
EFK 552 - M



-  EFK - 200 - M - 045 - B14V1S2G5G1
-  EFK - 552 - M - 045 - U1U1T1G5G1

Dim. nom.	d ₁	d ₂ h6	d ₃	d ₄	d ₆ H11	d ₇ H8	d ₈ H8	d ₉ H8	d ₁₀	l ₂	l ₃	l ₄ *	l ₅	l ₆	l ₇	l ₉	l ₁₀
016	16	20	34	36	23	27	3	34	45	18	34,5	8	1,5	4	15	3	12
018	18	22	36	38	27	33	3	37	48	20	35,5	9,5	2	5	17	3	12
020	20	24	38	40	29	35	3	37	49	20	35,5	9,5	2	5	17	3	12
022	22	26	40	42	31	37	3	38	51	20	35,5	9,5	2	5	17	3	12
024	24	28	42	44	33	39	3	42	54	20	38	9,5	2	5	17	3	12
025	25	30	44	46	34	40	3	42	54	20	38	9,5	2	5	17	3	12
028	28	33	47	49	37	43	3	46	61	20	40,5	9,5	2	5	17	5,5	15
030	30	35	49	51	39	45	3	49	61	20	40,5	9,5	2	5	17	5,5	15
032	32	38	54	58	42	48	3	51	66	20	40,5	9,5	2	5	17	5,5	15
033	33	38	54	58	42	48	3	54	69	20	40,5	9,5	2	5	17	5,5	15
035	35	40	56	60	44	50	3	54	69	20	40,5	9,5	2	5	17	5,5	15
038	38	43	59	63	49	56	4	57	72	23	42,5	10	2	6	18	5,5	15
040	40	45	61	65	51	58	4	62	77	23	42,5	10	2	6	18	5,5	15
043	43	48	64	68	54	61	4	67	82	23	42,5	10	2	6	18	5,5	15
045	45	50	66	70	56	63	4	67	82	23	42,5	10	2	6	18	5,5	15
048	48	53	69	73	59	66	4	70	85	23	42,5	10	2	6	18	5,5	15
050	50	55	71	75	62	70	4	72	87	25	45	12,5	2,5	6	20	5,5	15
053	53	58	78	83	65	73	4	80	98	25	45	12,5	2,5	6	20	8	18
055	55	60	80	85	67	75	4	80	98	25	45	12,5	2,5	6	20	8	18
058	58	63	83	88	70	78	4	85	103	25	50	12,5	2,5	6	20	8	18
060	60	65	85	90	72	80	4	85	103	25	50	12,5	2,5	6	20	8	18
063	63	68	88	93	75	83	4	90	108	25	50	12,5	2,5	6	20	8	18
065	65	70	90	95	77	85	4	90	108	25	50	12,5	2,5	6	20	8	18
068	68	73	97	102	81	90	4	95	113	28	50	15	2,5	7	22	8	18
070	70	75	99	104	83	92	4	95	113	28	55	15	2,5	7	22	8	18
075	75	80	104	109	88	97	4	100	118	28	55	15	2,5	7	22	8	18
080	80	85	109	114	95	105	4	105	123	28	55	15	3	7	23	7,5	19
085	85	90	114	119	100	110	4	110	128	28	60	15	3	7	23	7,5	19
090	90	95	119	124	105	115	4	115	133	28	60	15	3	7	23	7,5	19
095	95	100	124	129	110	120	4	120	138	28	60	15	3	7	23	7,5	19
100	100	105	129	134	115	125	4	125	143	28	60	15	3	7	23	7,5	19

Stationary Seat



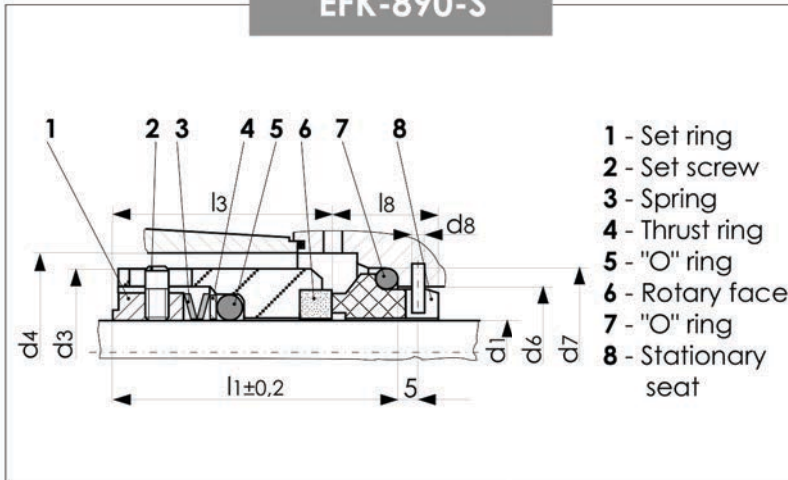
$l_3 + l_4 = l_1$ / (DIN24960)
 l_4 * with IP secondary seal (PTFE)

Mechanical Seal, Short Length, Unbalanced, Single Spring DIN 24960

Operating Limits

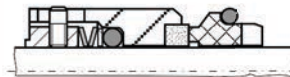
$d = 16 \dots 100 \text{ mm}$, $p = 16 \text{ bar (25 bar)}$, $t = -80 \dots 180^\circ\text{C}$, $v_g = \text{max. } 20 \text{ m/s}$
 Resistance to chemicals and to erosion depends on the material combination.

EFK-890-S

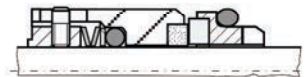


Constructive Variants

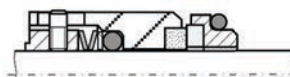
EFK 800-S



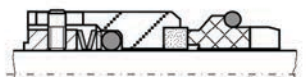
EFK 850-S



EFK 870-S



EFK 890-S

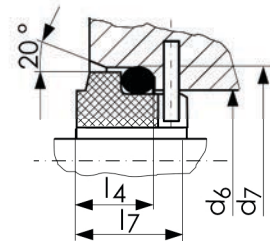


EFK - 890 - S - 035 - U1B14S1G5G1

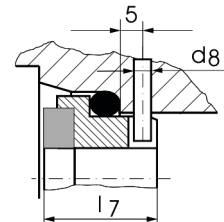
Dim. nom.	d_1 h6	d_3 max	d_4 min	d_6 H11	d_7 H8	d_8	l_1	l_2	l_{10}	l_3	l_4	l_7	l_8
016	16	26	28	23	27	3	32	6,6	9	23,4	8,6	15	17,5
018	18	32	34	27	33	3	35,5	7,5	10	25,4	10,1	17	19,5
020	20	34	36	29	35	3	35,5	7,5	10	25,4	10,1	17	19,5
022	22	36	38	31	37	3	35,5	7,5	10,5	25,4	10,1	17	19,5
024	24	38	40	33	39	3	37,5	7,5	10,5	27,4	10,1	17	19,5
025	25	39	41	34	40	3	40	7,5	10,5	29,9	10,1	17	19,5
028	28	42	44	37	43	3	42,5	7,5	10,5	32,3	10,2	17	19,5
030	30	44	46	39	45	3	42,5	7,5	10,5	32,3	10,2	17	19,5
032	32	46	48	42	48	3	42,5	7,5	10,5	32,3	10,2	17	19,5
033	33	47	49	42	48	3	42,5	7,5	10,5	32,3	10,2	17	19,5
035	35	49	51	44	50	3	42,5	7,5	10,5	32,3	10,2	17	19,5
038	38	54	58	49	56	4	44	9	11,5	32,8	11,2	18	22
040	40	56	60	51	58	4	44	9	11,5	32,8	11,2	18	22
043	43	59	63	54	61	4	44	9	11,5	32,8	11,2	18	22
045	45	61	65	56	63	4	44	9	11,5	32,8	11,2	18	22
048	48	64	68	59	66	4	44	9	11,5	32,8	11,2	18	22
050	50	66	70	62	70	4	45	9,5	11,5	31,75	13,25	20	22,5
053	53	69	73	65	73	4	45	11	14	31,75	13,25	20	22,5
055	55	71	75	67	75	4	45	11	14	31,75	13,25	20	22,5
058	58	78	83	70	78	4	50,5	11	14	37,25	13,25	20	22,5
060	60	80	85	72	80	4	50,5	11	14	37,2	13,3	20	22,5
063	63	83	88	75	83	4	52,5	11	14	39,2	13,3	20	22,5
065	65	85	90	77	85	4	52,5	11	14	39,2	13,3	20	22,5
068	68	88	93	81	90	4	52,5	11,3	14	37,2	15,3	22	25,5
070	70	90	95	83	92	4	54	11,3	14	38,6	15,4	22	25,5
075	75	99	104	88	97	4	59	11,3	14	43,6	15,4	22	25,5
080	80	104	109	95	105	4	59	12	15	43,1	15,9	22,5	25,5
085	85	109	114	100	110	4	59	14	17	43,1	15,9	22,5	25,5
090	90	114	119	105	115	4	60,5	14	17	44,6	15,9	22,5	25,5
095	95	119	124	110	120	4	60,5	14	17	44,6	15,9	22,5	24,5
100	100	124	129	115	125	4	60,5	14	17	44,6	15,9	22,5	24,5

Stationary Seat

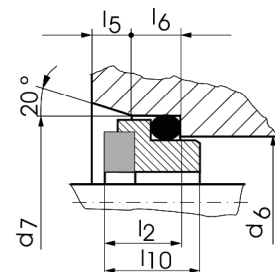
GA



PA



PA/1

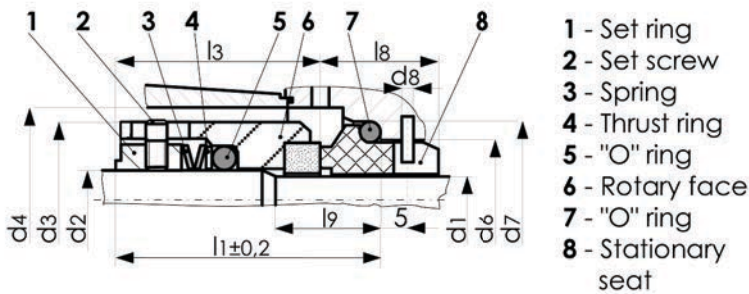


Mechanical Seal, Short Length, Balanced, with Single Spring DIN 24960

Operating Limits

$d = 16 \dots 100 \text{ mm}$, $p = 25 \text{ bar (40 bar)}$, $t = -80 \dots 180^\circ\text{C}$, $v_g = \text{max. } 20 \text{ m/s}$
 Resistance to chemicals and to erosion depends on the material combination.

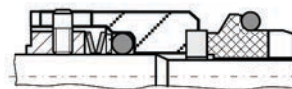
EFK-990-S



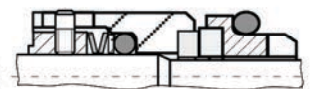
- 1 - Set ring
- 2 - Set screw
- 3 - Spring
- 4 - Thrust ring
- 5 - "O" ring
- 6 - Rotary face
- 7 - "O" ring
- 8 - Stationary seat

Constructive Variants

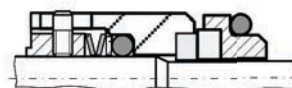
EFK 900-S



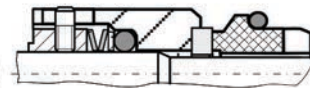
EFK 950-S



EFK 970-S



EFK 990-S

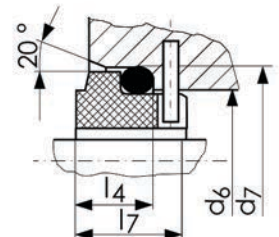


EFK - 990 - S - 035 - U1B14S1G5G1

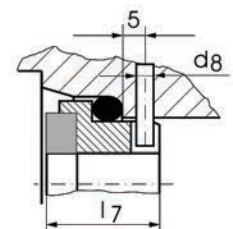
Dim.nom.	d ₁ h ₆	d ₂	d ₃ max	d ₄ min	d ₆ H11	d ₇ H8	d ₈	l ₁	l ₉	l ₃	l ₄	l ₂	l ₇	l ₁₀	l ₈
016	16	20	34	36	23	27	3	42	18	31	8,6	6,6	17	9	17,5
018	18	22	36	38	27	33	3	44	20	31,5	10,1	7,5	17	10	19,5
020	20	24	38	40	29	35	3	45	20	32,5	10,1	7,5	17	10	19,5
022	22	26	40	42	31	37	3	45	20	32,5	10,1	7,5	17	10,5	19,5
024	24	28	41	44	33	39	3	46	20	33,5	10,1	7,5	17	10,5	19,5
025	25	30	44	46	34	40	3	47,5	20	35	10,1	7,5	17	10,5	19,5
028	28	33	47	49	37	43	3	47,5	20	35	10,2	7,5	17	10,5	19,5
030	30	35	49	51	39	45	3	47,5	20	35	10,2	7,5	17	10,5	19,5
032	32	38	54	58	42	48	3	47,5	20	35	10,2	7,5	17	10,5	19,5
033	33	38	54	58	42	48	3	47,5	20	35	10,2	7,5	17	10,5	19,5
035	35	40	56	60	44	50	3	48,5	20	36	10,2	7,5	17	10,5	19,5
038	38	43	59	63	49	56	4	51	23	36	11,2	9	18	11,5	22
040	40	45	61	65	51	58	4	51	23	36	11,2	9	18	11,5	22
043	43	48	64	68	54	61	4	51	23	36	11,2	9	18	11,5	22
045	45	50	66	70	56	63	4	51	23	36	11,2	9	18	11,5	22
048	48	53	69	73	59	66	4	51	23	36	11,2	9	18	11,5	22
050	50	55	71	75	62	70	4	53,5	25	38	13,25	9,5	20	11,5	22,5
053	53	58	78	83	65	73	4	57,5	25	42	13,25	11	20	14	22,5
055	55	60	80	85	67	75	4	57,5	25	42	13,25	11	20	14	22,5
058	58	63	83	88	70	78	4	58,5	25	43	13,25	11	20	14	22,5
060	60	65	85	90	72	80	4	58,5	25	43	13,3	11	20	14	22,5
063	63	68	88	93	75	83	4	58,5	25	43	13,3	11	20	14	22,5
065	65	70	90	95	77	85	4	58,5	25	43	13,3	11	20	14	22,5
070	70	75	99	104	83	92	4	61,5	28	43	15,4	11,3	22	14	25,5
075	75	80	104	109	88	97	4	61,5	28	43	15,4	11,3	22	14	25,5
080	80	85	109	114	95	105	4	61,5	28	43	15,9	12	22,5	15	25,5
085	85	90	114	119	100	110	4	61,5	28	43	15,9	14	22,5	17	25,5
090	90	95	119	124	105	115	4	62	28	43,5	15,9	14	22,5	17	25,5
095	95	100	124	129	110	120	4	62	28	44,5	15,9	14	22,5	17	24,5
100	100	105	129	134	115	125	4	62	28	44,5	15,9	14	22,5	17	24,5

Stationary Seat

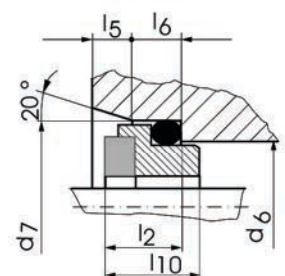
GA



PA



PA/1

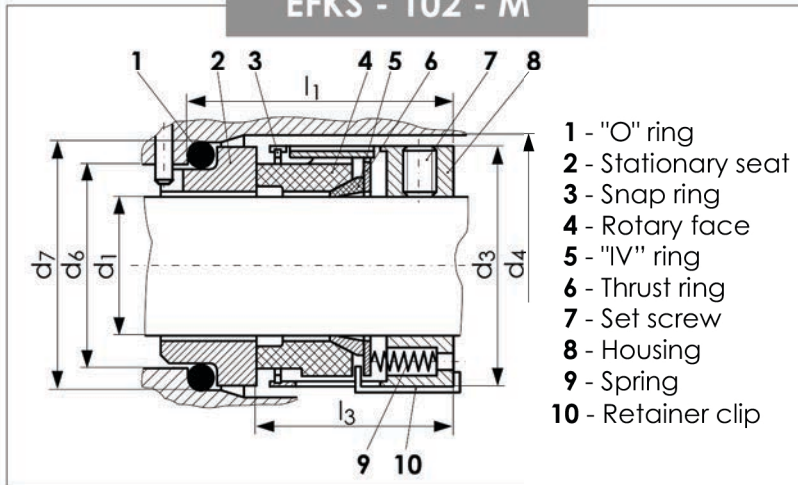


Mechanical Seal, Short Length, Unbalanced, Internal, Multiple Spring DIN 24960

Operating limits

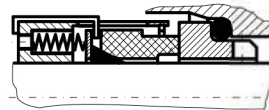
$d = 16...100\text{mm}$ (up to 100mm on request), $p = \text{max. } 8\text{bar}$ (16bar), $t = -15...180^\circ\text{C}$, $v_g = \text{max. } 15\text{ m/s}$
 Resistance to chemicals and abrasive media depends on material combination.

EFKS - 102 - M

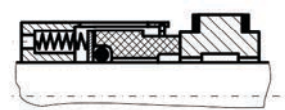


Constructive variants

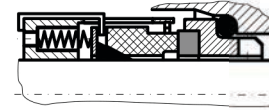
EFKS 102 - M



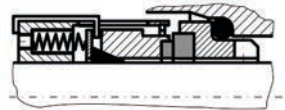
EFKS 110 - M



EFKS 152 - M



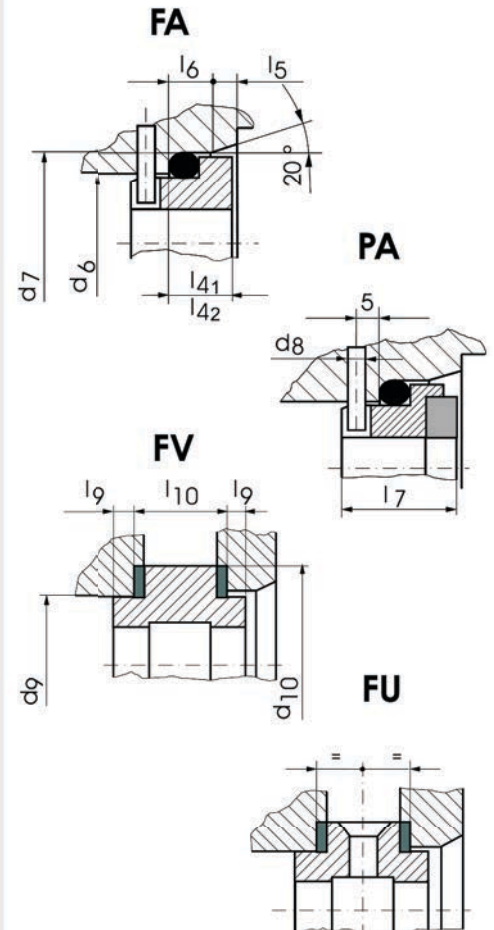
EFKS 452 - M



EFKS - 102 - M - 045 - B14V1T1G5G1

Dim.	d_1	d_3	d_4	d_6	d_7	d_8	d_9	d_{10}	l_3	l_{41}	l_{42}	l_5	l_6	l_7	l_9	l_{10}
nom.	h_6			H11	H8		H8									
016	16	26	28	23	27	3	34	45	27	8	8,6	1,5	4	15	3	12
018	18	32	34	27	33	3	37	48	28	9,5	10,1	2	5	17	3	12
020	20	34	36	29	35	3	37	49	28	9,5	10,1	2	5	17	3	12
022	22	36	38	31	37	3	38	51	28	9,5	10,1	2	5	17	3	12
024	24	38	40	33	39	3	42	54	30,5	9,5	10,1	2	5	17	3	12
025	25	39	41	34	40	3	42	54	30,5	9,5	10,1	2	5	17	3	12
028	28	42	44	37	43	3	46	61	33	9,5	10,2	2	5	17	5,5	15
030	30	44	46	39	45	3	49	61	33	9,5	10,2	2	5	17	5,5	15
032	32	46	48	42	48	3	51	66	33	9,5	10,2	2	5	17	5,5	15
033	33	47	49	42	48	3	54	69	33	9,5	10,2	2	5	17	5,5	15
035	35	49	51	44	50	3	54	69	33	9,5	10,2	2	5	17	5,5	15
038	38	54	58	49	56	4	57	72	35	10	11,2	2	6	18	5,5	15
040	40	56	60	51	58	4	62	77	35	10	11,2	2	6	18	5,5	15
043	43	59	63	54	61	4	67	82	35	10	11,2	2	6	18	5,5	15
045	45	61	65	56	63	4	67	82	35	10	11,2	2	6	18	5,5	15
048	48	64	68	59	66	4	70	85	35	10	11,2	2	6	18	5,5	15
050	50	66	70	62	70	4	72	87	35	12,5	13,25	2,5	6	20	5,5	15
053	53	69	73	65	73	4	80	98	35	12,5	13,25	2,5	6	20	8	18
055	55	71	75	67	75	4	80	98	35	12,5	13,25	2,5	6	20	8	18
058	58	78	83	70	78	4	85	103	40	12,5	13,25	2,5	6	20	8	18
060	60	80	85	72	80	4	85	103	40	12,5	13,3	2,5	6	20	8	18
063	63	83	88	75	83	4	90	108	40	12,5	13,3	2,5	6	20	8	18
065	65	85	90	77	85	4	90	108	40	12,5	13,3	2,5	6	20	8	18
068	68	88	93	81	90	4	95	113	37,5	15	15,3	2,5	7	22	8	18
070	70	90	95	83	92	4	95	113	45	15	15,4	2,5	7	22	8	18
073	73	97	102	86	95	4			45	15	15,4	2,5	7	22		
075	75	99	104	88	97	4	100	118	45	15	15,4	2,5	7	22	8	18
080	80	104	109	95	105	4	105	123	45	15	15,9	3	7	22,5	7,5	19
085	85	109	114	100	110	4	110	128	45	15	15,9	3	7	22,5	7,5	19
090	90	114	119	105	115	4	115	133	50	15	15,9	3	7	22,5	7,5	19
095	95	119	124	110	120	4	120	138	50	15	15,9	3	7	22,5	7,5	19
100	100	124	129	115	125	4	125	143	50	15	15,9	3	7	22,5	7,5	19

Stationary seat



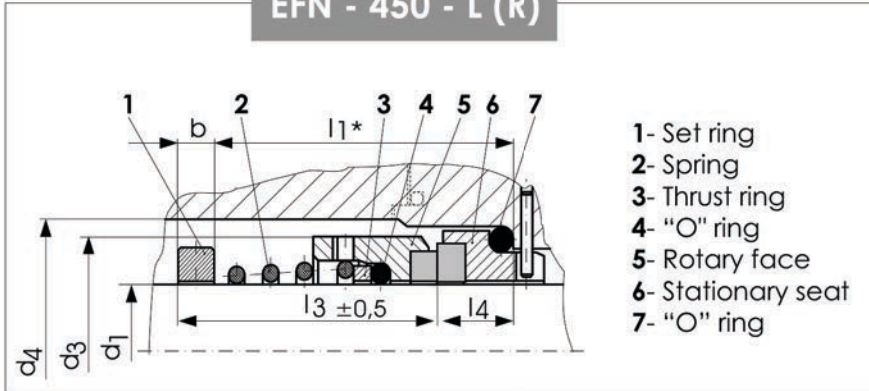
$l_3 + l_4 = l_1$ / DIN 24960
 l_{41} with **IP** secondary seal (PTFE)
 l_{42} with **IO** secondary seal (elastomer)

Mechanical Seal, Normal Length, Unbalanced, Single Spring DIN 24960




Operating Limits

d = 15 ... 100 mm (up to 240 mm on request), p = max. 10 bar, t = -15 ... 180°C, vg = 15 m/s
 Resistance to chemicals and abrasive media depends on the material combination.

EFN - 450 - L (R)



- 1- Set ring
- 2- Spring
- 3- Thrust ring
- 4- "O" ring
- 5- Rotary face
- 6- Stationary seat
- 7- "O" ring

-  **EFN - 100 - L - 045 - G1B14T1G5G1**
-  **EFN - 400 - L - 045 - B14V1T1G5G1**
-  **EFN - 450 - L - 045 - U1U1T1G5G1**

Dim. nom.	d ₁ h6	d ₃	d ₄	d ₆ H11	d ₇ H8	d ₈	l ₁ *	l ₃	l ₄ **	l ₅	l ₆	l ₇	l ₂	l ₁₀	b
015	15	25	26	21	25	3	40	32,4	7,6	1,5	4	14	6,6	9	10
016	16	26	28	23	27	3	40	31,4	8,6	1,5	4	15	6,6	9	12
018	18	31	34	27	33	3	45	34,9	10,1	2	5	17	7,5	10	12
019	19	32	34	27	33	3	45	34,9	10,1	2	5	17	7,5	10	12
020	20	34	36	29	35	3	45	34,9	10,1	2	5	17	7,5	10	10
022	22	36	38	31	37	3	45	34,9	10,1	2	5	17	7,5	10,5	10
024	24	38	40	33	39	3	50	39,9	10,1	2	5	17	7,5	10,5	15
025	25	39	41	34	40	3	50	39,9	10,1	2	5	17	7,5	10,5	12
026	26	39	41	34	40	3	50	39,9	10,1	2	5	17	7,5	10,5	12
028	28	42	44	37	43	3	50	39,8	10,2	2	5	17	7,5	10,5	12
030	30	44	46	39	45	3	50	39,8	10,2	2	5	17	7,5	10,5	12
032	32	46	48	42	48	3	55	44,8	10,2	2	5	17	7,5	10,5	15
033	33	47	49	42	48	3	55	44,8	10,2	2	5	17	7,5	10,5	15
035	35	49	51	44	50	3	55	44,8	10,2	2	5	17	7,5	10,5	15
038	38	54	58	49	56	4	55	43,8	11,2	2	6	18	9	11,5	10
040	40	56	60	51	58	4	55	43,8	11,2	2	6	18	9	11,5	10
043	43	59	63	54	61	4	60	48,8	11,2	2	6	18	9	11,5	10
045	45	61	65	56	63	4	60	48,8	11,2	2	6	18	9	11,5	10
048	48	64	68	59	66	4	60	48,8	11,2	2	6	18	9	11,5	10
050	50	66	70	62	70	4	60	46,75	13,25	2,5	6	20	9,5	11,5	10
053	53	69	73	65	73	4	60	56,75	13,25	2,5	6	20	11	14	10
055	55	71	75	67	75	4	70	56,75	13,25	2,5	6	20	11	14	10
058	58	78	83	70	78	4	70	56,75	13,25	2,5	6	20	11	14	10
060	60	79	85	72	80	4	70	56,7	13,3	2,5	6	20	11	14	10
063	63	83	88	75	83	4	70	56,7	13,3	2,5	6	20	11	14	10
065	65	85	90	77	85	4	80	66,7	13,3	2,5	6	20	11	14	12
068	68	88	93	81	90	4	80	64,7	15,3	2,5	7	22	11,3	14	12
070	70	90	95	83	92	4	80	64,6	15,4	2,5	7	22	11,3	14	12
075	75	98	104	88	97	4	80	64,6	15,4	2,5	7	22	11,3	14	12
080	80	100	109	95	105	4	90	74,1	15,9	3	7	22,5	12	15	12
090	90	114	119	105	115	4	90	74,1	15,9	3	7	22,5	14	17	12
100	100	124	129	115	125	4	90	74,1	15,9	3	7	22,5	14	17	12

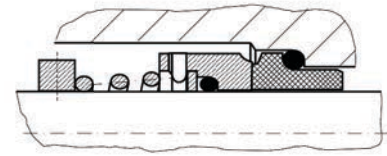
l₁* with FA or PA stationary seat

l₄** with IO ring

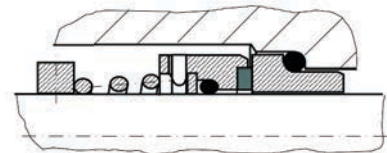
Constructive Variants

According to the construction and stationary seat has been developed the following constructive variants:

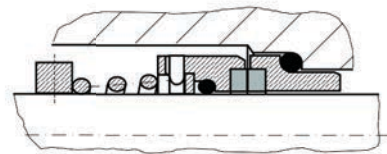
EFN 100 - L (R)



EFN 400 - L (R)

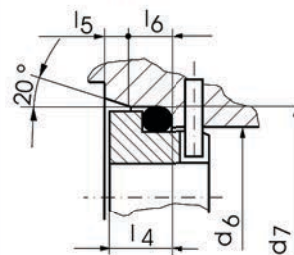


EFN 450 - L (R)

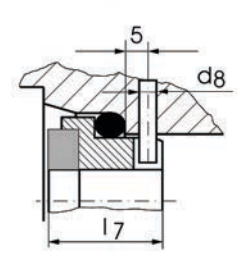


Stationary Seat

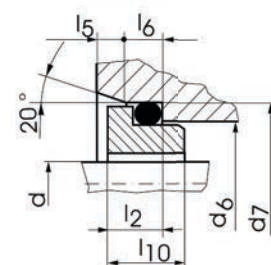
FA



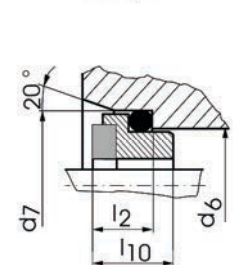
PA



FA/1



PA/1

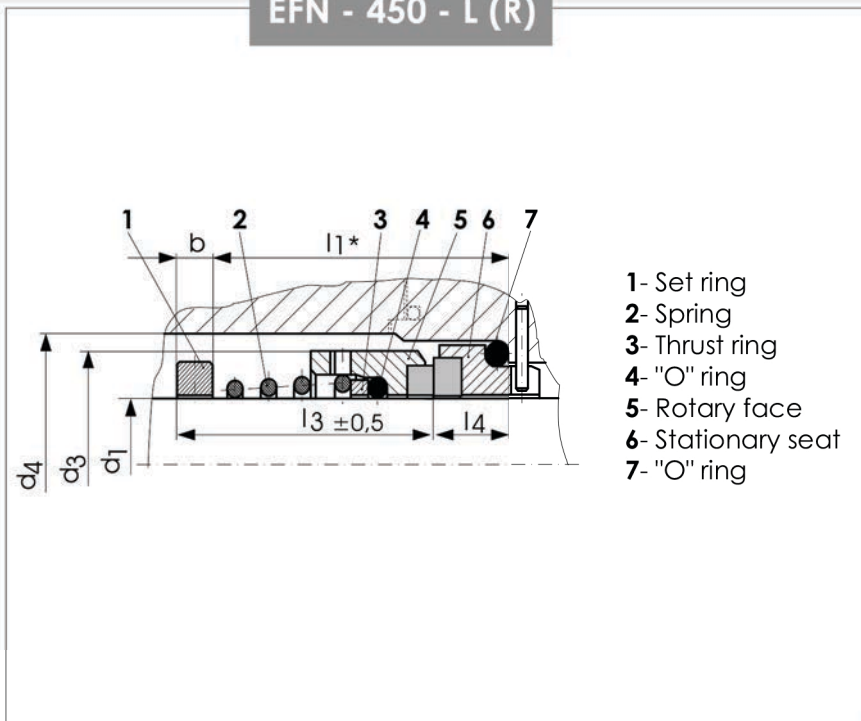


Mechanical Seal, Normal Length, Unbalanced, Single Spring DIN 24960

Operating Limits

$d = 15 \dots 100$ mm (up to 240 mm on request), $p = \text{max. } 10$ bar, $t = -15 \dots 180^\circ\text{C}$, $v_g = 15$ m/s
 Resistance to chemicals and abrasive media depends on the material combination.

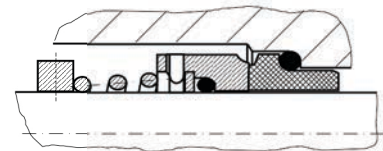
EFN - 450 - L (R)



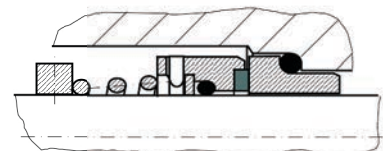
Constructive Variants

According to the construction and stationary seat has been developed the following constructive variants:

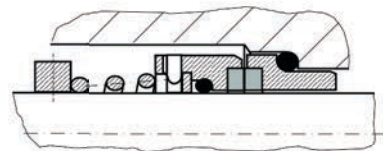
EFN 100 - L (R)






EFN 400 - L (R)

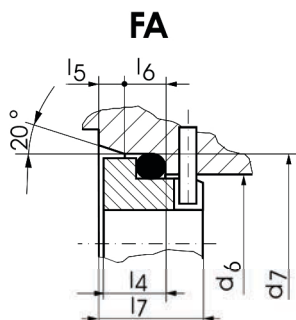


EFN 450 - L (R)

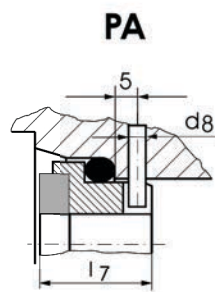


-  EFN - 100 - L - 2" - G1B14T1G5G1
-  EFN - 400 - L - 2" - B14V1T1G5G1
-  EFN - 450 - L - 2" - U1U1T1G5G1

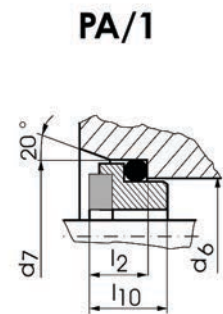
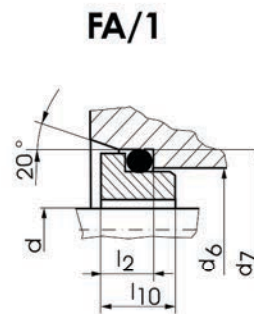
Stationary seat



l_1^* with FA or PA stationary seat



l_4^{**} with IO ring



Seals for Shaft with Inch Size

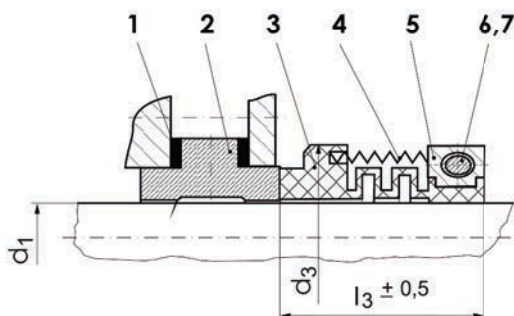
Nominal dimensions		d_1	d_3	d_4	d_6	d_7	d_8	l_1	l_3	l_4^{**}	l_5	l_6	l_7	l_2	l_{10}
Inch	mm	h6			H11	H8									
1"	25,4	25,4	39	41	34	40	3	50	39,9	10,1	2	5	17	7,5	10,5
1 1/4"	31,75	31,75	46	48	42	48	3	55	44,8	10,2	2	5	17	7,5	10,5
1 1/2"	38,1	38,1	54	58	49	56	4	55	43,8	11,2	2	6	18	9	11,5
1 3/4"	44,45	44,45	61	65	56	63	4	60	48,8	11,2	2	6	18	9	11,5
2"	50,8	50,8	66	70	62	70	4	60	46,75	13,25	2,5	6	20	9,5	11,5
2 1/2"	63,5	63,5	83	88	75	83	4	70	56,7	13,3	2,5	6	20	11	14

Mechanical Seal, Normal Length with PTFE Bellows, Unbalanced, External DIN 24960

Operating Limits

$d = 20 \dots 100$ mm (up to 240 mm on request), $p = \max. 8$ bar (16 bar), $t = -15 \dots 180^\circ\text{C}$, $v_g = \max. 15$ m/s
 Resistance to chemicals and to erosion depends on the material combination.

EFN - 311 - M



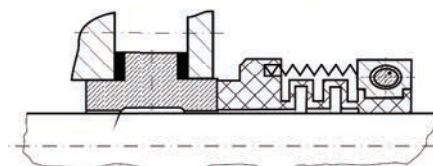
- 1 - "IL" ring
- 2 - Stationary seat
- 3 - Rotary face bellow
- 4 - Spring
- 5 - Collar
- 6 - Set screw
- 7 - Screw nut

EFN - 311 - M - 045 - Y1V1T1G5G1

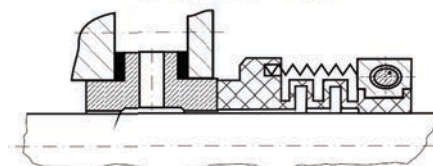
Dim.nom.	d_1 h6	d_2	d_3	d_9 H8	d_{10}	l_1	l_3	l_9	l_{10}	l_{11}
016	16	6	45	34	45	2	38	3	12	23
018	18	6	47	37	48	2	38	3	12	23
020	20	6	49	37	49	2	38	3	12	23
022	22	6	51	38	51	2	38	3	12	23
024	24	6	53	42	54	2	38	3	12	23
025	25	6	54	42	54	2	38	3	12	23
028	28	6	57	46	61	2	38	5,5	15	26
030	30	6	61	49	61	2	40	5,5	15	26
032	32	6	63	51	66	2	40	5,5	15	26
033	33	6	64	54	69	2	40	5,5	15	26
035	35	6	66	54	69	2	40	5,5	15	26
038	38	6	69	57	72	2	40	5,5	15	26
040	40	6	71	62	77	2	40	5,5	15	26
043	43	6	74	67	82	2	40	5,5	15	26
045	45	6	76	67	82	2	40	5,5	15	26
048	48	6	79	70	85	2	40	5,5	15	26
050	50	6	81	72	87	2	40	5,5	15	26
053	53	8	84	80	98	2	40	8	18	32
055	55	8	86	80	98	2	40	8	18	32
058	58	8	89	85	103	2	40	8	18	32
060	60	8	91	85	103	2	40	8	18	32
063	63	8	94	90	108	2	40	8	18	32
065	65	8	96	90	108	2	40	8	18	32
068	68	8	102,5	95	113	2	45,5	8	18	32
070	70	8	104,5	95	113	2	45,5	8	18	32
073	73									
075	75	8	109,5	100	118	2	45,5	8	18	32
080	80	8	114,5	105	123	2,5	45,5	7,5	19	33
085	85	8	119,5	110	128	2,5	45,5	7,5	19	33
090	90	8	124,5	115	133	2,5	45,5	7,5	19	33
095	95	8	129,5	120	138	2,5	45,5	7,5	19	33
100	100	8	134,5	125	143	2,5	45,5	7,5	19	33

Constructive Variants

EFN 311 - M

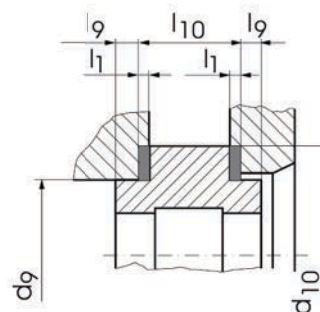


EFN 321 - M

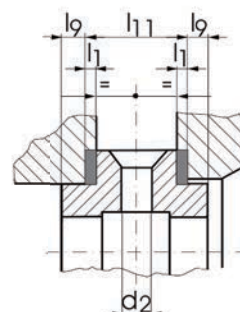


Stationary seat

FV



FU

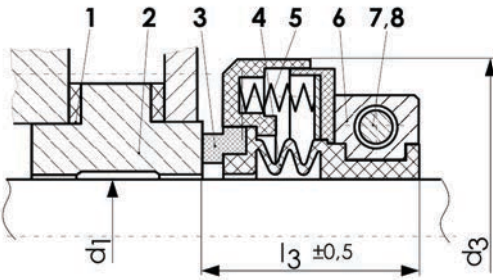


Mechanical Seal, Normal Length with PTFE Bellows, Unbalanced, External

Operating limits

$d = 20...105\text{mm}$ (up to 240mm on request), $p = \text{max. } 8\text{bar}$ (16bar), $t = -15...180^{\circ}\text{C}$, $vg = \text{max. } 15\text{ m/s}$
 Resistance to chemicals and to erosion depends on the material combination.

EFN - 312 - M



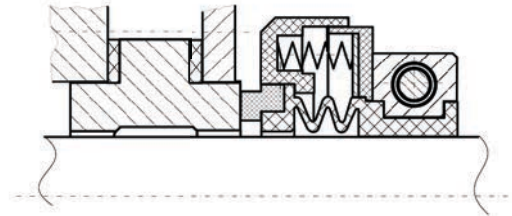
- 1 - "L"-ring
- 2 - Stationary seat
- 3 - Rotary face
- 4 - Bellow
- 5 - Spring
- 6 - Collar
- 7 - Set screw
- 8 - Screw nut

EFN - 312 - M - 045 - B14VIT1G5G1

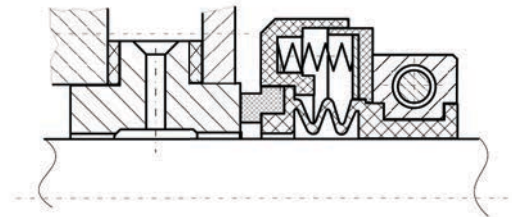
Dim.nom.	d_1 h6	d_3	d_9 H8	d_{10}	l_3	l_9	l_{10}
016	16	55	34	45	38	3	12
018	18	55	37	48	38	3	12
020	20	58	37	49	38	3	12
022	22	58	38	51	38	3	12
024	24	62	42	54	38	3	12
025	25	62	42	54	38	3	12
028	28	68	46	61	38	5,5	15
030	30	71	49	61	40	5,5	15
032	32	71	51	66	40	5,5	15
033	33	74	54	69	40	5,5	15
035	35	74	54	69	40	5,5	15
038	38	80	57	72	40	5,5	15
040	40	85	62	77	40	5,5	15
043	43	88	67	82	40	5,5	15
045	45	88	67	82	40	5,5	15
048	48	93	70	85	40	5,5	15
050	50	93	72	87	40	5,5	15
053	53	108	80	98	40	8	18
055	55	112	80	98	40	8	18
058	58	115	85	103	40	8	18
060	60	115	85	103	40	8	18
063	63	118	90	108	40	8	18
065	65	121	90	108	40	8	18
068	68	123	95	113	45,5	8	18
070	70	123	95	113	45,5	8	18
073							
075	75	131	100	118	45,5	8	18
080	80	150	105	123	45,5	7,5	19
085	85	156	110	128	45,5	7,5	19
090	90	163	115	133	45,5	7,5	19
095	95	163	120	138	45,5	7,5	19
100	100	169	125	143	45,5	7,5	19

Constructive variants

EFN 312 - M

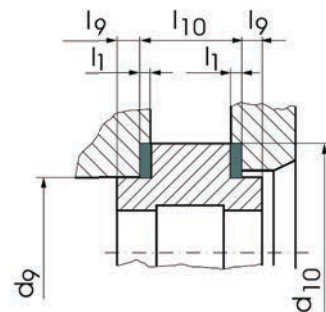


EFN 322 - M

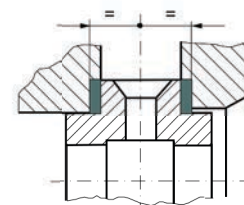


Stationary seat

FV



FU

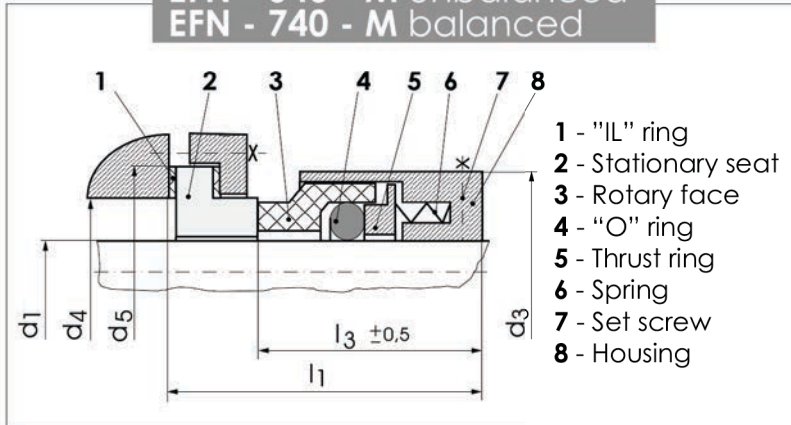



Mechanical Seal, Normal Length, Balanced and Unbalanced, External, Multiple Spring

Operating limits

d = 24...100mm (over 100mm on request), p= max. 8bar (16 bar)/EFN 640 25 bar (40 bar)/EFN 740
 t = -15...180°C, vg = max. 15 m/s
 Resistance to chemicals and abrasive media depends on material combination.

EFN - 640 - M unbalanced
EFN - 740 - M balanced



 **EFN - 640 - M - 045 - B14V1S1G5G1**

Dim.nom.	d ₁	d ₃	d ₄	d ₅	d ₉	d ₁₀	l ₁	l ₃	l ₉	l ₁₀
	h6		min.		H8		± 0.5			
016	16	30	32	45	34	45	53,5	35	3	12
018	18	36	34	47	37	48	53,5	35	3	12
020	20	38	36	49	37	49	53,5	35	3	12
022	22	39	38	51	38	51	53,5	35	3	12
024	24	42	40	54	42	54	56,5	38	3	12
025	25	44	41	54	42	54	56,5	38	3	12
028	28	46	44	58	46	61	56,5	38	5,5	15
030	30	47	46	61	49	61	56,5	38	5,5	15
032	32	49	48	61	51	66	56,5	38	5,5	15
033	33	54	49	61	54	69	56,5	38	5,5	15
035	35	56	51	62	54	69	56,5	38	5,5	15
038	38	59	58	70	57	72	56,5	38	5,5	15
040	40	61	60	73	62	77	56,5	38	5,5	15
042	42	61	62	73			56,5	38		
043	43	64	63	80	67	82	56,5	38	5,5	15
045	45	66	65	80	67	82	56,5	38	5,5	15
048	48	69	68	83	70	85	56,5	38	5,5	15
050	50	71	70	83	72	87	56,5	38	5,5	15
053	53	78	73	89	80	98	56,5	38	8	18
055	55	80	75	96	80	98	56,5	38	8	18
058	58	83	78	98	85	103	56,5	38	8	18
060	60	85	85	99	85	103	59,5	38	8	18
063	63	88	88	102	90	108	59,5	38	8	18
065	65	90	90	108	90	108	59,5	38	8	18
068	68	97	93	111	95	113	67,5	41	8	18
070	70	98	95	112	95	113	67,5	41	8	18
075	75	104	104	117	100	118	67,5	41	8	18
080	80	108	109	125	105	123	67,5	41	7,5	19
085	85	114	114	128	110	128	67,5	41	7,5	19
090	90	118	119	134	115	133	67,5	41	7,5	19
095	95	123	124	137	120	138	67,5	41	7,5	19
100	100	128	129	144	125	143	67,5	41	7,5	19

Constructive variants

According to the stationary seat has been developed the following constructive variants:

EFN 610 and 710 -with **FV** stationary seat



EFN 620 and 720 -with **FU** stationary seat



EFN 630 and 730 -with **FVA** stationary seat

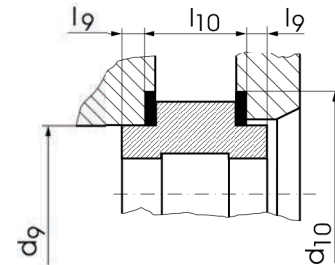


EFN 640 and 740 -with **FL** stationary seat

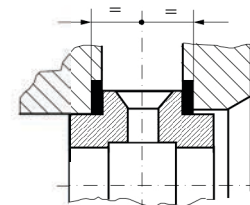


Stationary seat

FV



FU



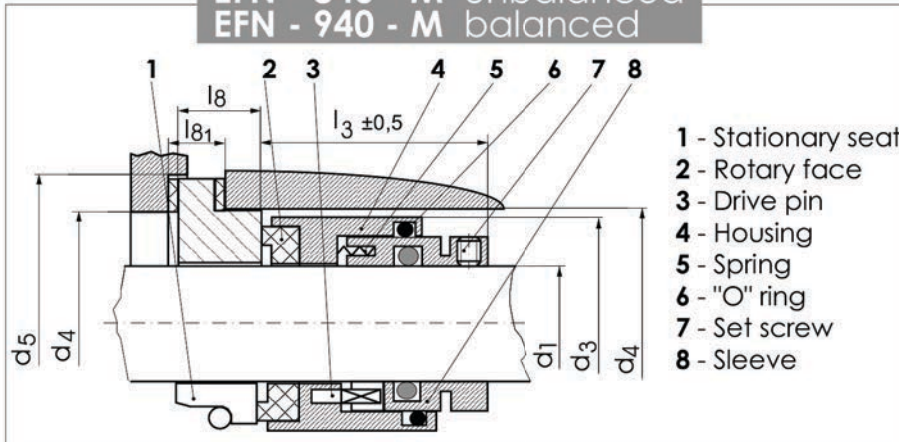
Mechanical Seal, Normal Length, Balanced and Unbalanced, Internal, Multiple Spring

Operating Limits

$d = 18...110$ mm (over 110 mm on request), $p = \text{max. } 8\text{bar}$ (16bar) for **EFN 840**, 25 bar (40 bar) for **EFN 940**,
 $t = -15...180^{\circ}\text{C}$, $v_g = \text{max. } 15\text{m/s}$

Resistance to chemicals and to erosion depends on the material combination.

EFN - 840 - M unbalanced
EFN - 940 - M balanced



- 1 - Stationary seat
- 2 - Rotary face
- 3 - Drive pin
- 4 - Housing
- 5 - Spring
- 6 - "O" ring
- 7 - Set screw
- 8 - Sleeve

Constructive Variants

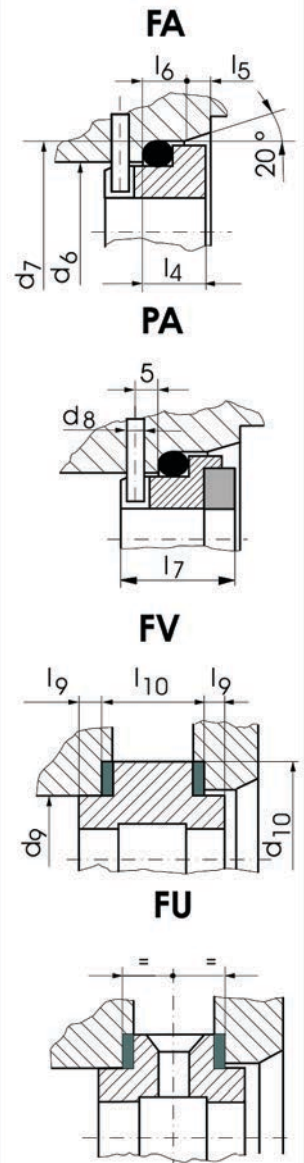
According to the stationary seat has been developed the following constructive variants:

- EFN 800** and **EFN 900** - with stationary seat type **FA**
- EFN 810** and **EFN 910** - with stationary seat type **FV**
- EFN 820** and **EFN 920** - with stationary seat type **FU**
- EFN 830** and **EFN 930** - with stationary seat type **FVA**
- EFN 840** and **EFN 940** - with stationary seat type **FL**
- EFN 850** and **EFN 950** - with stationary seat type **PA**

 **EFN - 840 - M - 035 - B14V1S1G5G1**

Dim. nom.	d ₁	d ₃	d ₄	d ₅	d ₆	d ₇	d ₈	d ₉	d ₁₀	l ₃	l ₄	l ₅	l ₆	l ₇	l ₈	l ₈₁	l ₉	l ₁₀
018	18	32	34	47	27	33	3	37	48	35	9,5	2	5	17	17	12,9	3	12
020	20	34	36	49	29	35	3	37	49	35	9,5	2	5	17	17	12,9	3	12
022	22	36	38	51	31	37	3	38	51	35	9,5	2	5	17	17	12,9	3	12
024	24	38	40	54	33	39	3	42	54	35	9,5	2	5	17	17	12,9	3	12
025	25	39	41	54	34	40	3	42	54	35	9,5	2	5	17	17	12,9	3	12
028	28	42	44	58	37	43	3	46	61	35	9,5	2	5	17	17	12,9	5,5	15
030	30	44	46	61	39	45	3	49	61	35	9,5	2	5	17	17	12,9	5,5	15
032	32	46	48	61	42	48	3	51	66	40	9,5	2	5	17	17	12,9	5,5	15
033	33	48	49	61	42	48	3	54	69	40	9,5	2	5	17	17	12,9	5,5	15
035	35	49	51	62	44	50	3	54	69	40	9,5	2	5	17	17	12,9	5,5	15
038	38	54	58	70	49	56	4	57	72	40	10	2	6	18	17	12,9	5,5	15
040	40	56	60	73	51	58	4	62	77	40	10	2	6	18	17	12,9	5,5	15
043	43	59	63	80	54	61	4	67	82	40	10	2	6	18	17	12,9	5,5	15
045	45	61	65	80	56	63	4	67	82	40	10	2	6	18	17	12,9	5,5	15
048	48	64	68	83	59	66	4	70	85	40	10	2	6	18	17	12,9	5,5	15
050	50	66	70	83	62	70	4	72	87	40	12,5	2,5	6	20	17	12,9	8	18
053	53	69	73	89	65	73	4	80	98	40	12,5	2,5	6	20	17	12,9	8	18
055	55	71	75	96	67	75	4	80	98	40	12,5	2,5	6	20	17	12,9	8	18
060	60	77	85	99	72	80	4	85	103	40	12,5	2,5	6	20	20	15,9	8	18
065	65	83	90	108	77	85	4	90	108	40	12,5	2,5	6	20	20	15,9	8	18
070	70	88	95	112	83	92	4	95	113	40	15	2,5	7	22	25	20,9	8	18
075	75	94	104	117	88	97	4	100	118	40	15	2,5	7	22	25	20,9	8	18
080	80	100	109	125	95	105	4	105	123	40	15	3	7	22,5	25	20,9	7,5	19
085	85	104	114	128	100	110	4	110	128	40	15	3	7	22,5	25	20,9	7,5	19
090	90	110	119	134	105	115	4	115	133	40	15	3	7	22,5	25	20,9	7,5	19
095	95	113	124	137	110	120	4	120	138	40	15	3	7	22,5	25	20,9	7,5	19
100	100	120	129	144	115	125	4	125	143	40	15	3	7	22,5	25	20,9	7,5	19
105	105	124	126,6	147	120	130	5	130	147	44,5	15	3	7	22,5	25,4	21,5	7,5	19
110	110	129	139	157	128,5	142	5	136	155	44,5	18	3	7	28	25	20,9	7,5	20

Stationary Seat

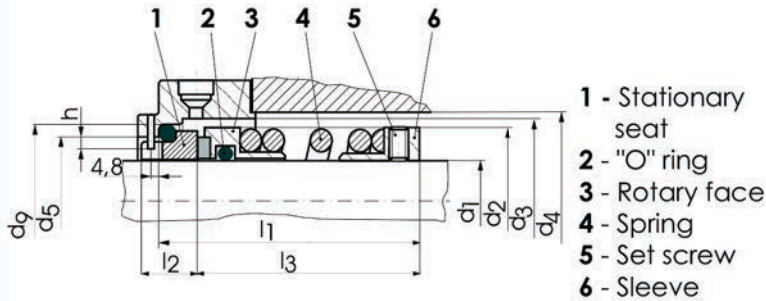


Mechanical Seal, Unbalanced, Internal, Single Spring

Operating limits

$d = 20...120$ mm (over 120 on request), $p = \text{max. } 10\text{bar}$ (16 bar), $t = -15...180^{\circ}\text{C}$, $v_g = \text{max. } 20\text{m/s}$
 Resistance to chemicals and abrasive media depends on material combination.

EFA - 400 - R(L)

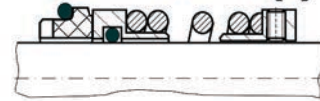


- 1 - Stationary seat
- 2 - "O" ring
- 3 - Rotary face
- 4 - Spring
- 5 - Set screw
- 6 - Sleeve

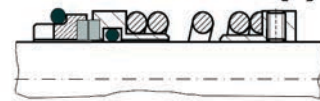
Constructive variants

According to the construction and the stationary seat has, been developed the following constructive variants:

EFA - 100 - R (L)



EFA - 450 - R (L)

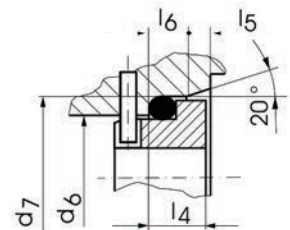


EFA - 400 - R -035 - B14V1S1G5G1

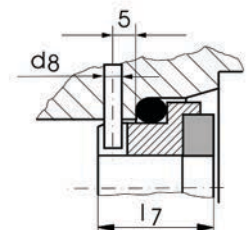
Dim. nom.	d ₁	d ₂	d ₃	d ₄	d ₅ +0,12 0	d ₆ H11	d ₇ H8	d ₈ H8	d ₉ H8	h	l ₁	l ₂	l ₃	l ₄	l ₅	l ₆	l ₇
020	20	34,5	37	42	29,06	29	35	3	33,32	-	44	11	37,3	10,1	2	5	17
022	22	37	39	44		31	37	3					37,3	10,1	2	5	17
024	24	40	42	46		33	39	3					40	10,1	2	5	17
025	25	41	43	48	33,83	34	40	3	39,67	-	49	12	40	10,1	2	5	17
028	28	44	46	51		37	43	3					40	10,2	2	5	17
030	30	45,5	48	53	38,61	39	45	3	44,45	-	51	12	41,6	10,2	2	5	17
032	32	47,5	50	55		42	48	3					41,6	10,2	2	5	17
033	33	48,5	51	56		42	48	3					41,6	10,2	2	5	17
035	35	50	53	60	43,46	44	50	4	49,2	-	57	12	48	10,2	2	5	17
038	38	53,7	56	63	46,26	49	56	4	52,38	-	57	12	48	11,2	2	6	18
040	40	55	58	65	48,13	51	58	4	53,97	-	57	12	48	11,2	2	6	18
043	43	58,5	60	68		54	61	4					48	11,2	2	6	18
045	45	60	62	75	52,96	56	63	4	58,72	-	57	12	48	11,2	2	6	18
048	48	64	67	78		59	66	4					48	11,2	2	6	18
050	50	66	69	80	59,33	62	70	4	65,07	4,2	68	16	59,1	13,25	2,5	6	20
053	53	69	71	83		65	73	4					59,1	13,25	2,5	6	20
055	55	71	73	85	64,01	67	75	4	69,85	4,2	70	16	60,7	13,25	2,5	6	20
058	58	74,5	77	88		70	78	4					60,7	13,25	2,5	6	20
060	60	77	81	90	70,36	72	80	4	76,2	4,2	73	16	63,8	13,3	2,5	6	20
063	63	80	84	93		75	83	4					63,8	13,3	2,5	6	20
065	65	82	86	95	75,21	77	85	4	80,97	4,2	76	16	67	13,3	2,5	6	20
068	68	85	89	98		81	90	4					67	15,3	2,5	7	22
070	70	87	91	100	79,88	83	92	4	85,72	4,2	76	16	67	15,4	2,5	7	22
073	73	90	94	103		86	95	4					67	15,4	2,5	7	22
075	75	91,5	97	105	84,73	88	97	4	90,47	4,2	81	16	71,8	15,4	2,5	7	22
080	80	99,5	102	110	92,58	95	105	4	98,42	5,4	87	16	78,1	15,9	3	7	23
085	85	105,5	108	117	98,93	100	110	4	104,77	5,4	87	16	78,1	15,9	3	7	23
090	90	110,5	115	122	103,8	105	115	4	109,52	5,4	87	16	78,1	15,9	3	7	23
095	95	115,5	119	127	108,5	110	120	4	114,3	5,4	92	16	82,9	15,9	3	7	23
100	100	120	124	132	113,3	115	125	4	119,07	5,4	92	16	82,9	15,9	3	7	23
105	105	128	132	140	121,2	120	130	5	127	6,6	98	16	89,2	18	2	10	23
110	110	133	137	148	126	129	142	5	131,77	6,6	98	16	89,2	18	2	10	28
115	115	137,5	142	150	130,7	134	147	5	136,52	6,6	98	16	89,2	18	2	10	28
120	120	144	147	158	137	139	152	5	142,87	6,6	105	16	95,5	18	2	10	28

Stationary seat

FA



PA

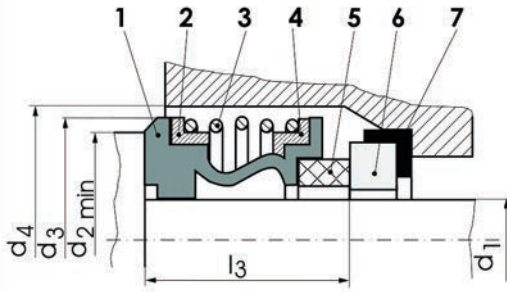


Mechanical Seal, Unbalanced, with Rubber Bellow

Operating limits

$d = 10...100$ mm, $p = \text{max. } 8...10$ bar, $t = -20...120^{\circ}\text{C}$, $v_g = \text{max. } 10\text{m/s}$
 Resistance to chemicals and abrasive media depends on material combination.

EFS-163-S



- 1-Rubber bellow
- 2-Thrust ring
- 3-Spring
- 4-Thrust ring
- 5-Rotary face
- 6-Stationary seat
- 7-Secondary seal

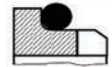
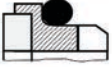



EFS - 173 -S - 022 - U1U1S2G5G1

Dim. nom.	d_1^* h8	$d_{2\text{min}}$	d_3	d_4	d_6^* H11	d_7^* H8	d_8^*	l_2	l_3	l_4	l_5	l_6	l_7	l_{10}
010	10	20,5	22,5	24	17	21	3	6,6	14,5		1,5	4		9
012	12	22,5	25	26	19	23	3	6,6	15		1,5	4		9
014	14	26,5	28,5	30	21	25	3	6,6	17		1,5	4		9
015	15	26,5	28,5	30	21	25	3	6,6	17	7,6	1,5	4	15	9
016	16	26,5	28,5	30	23	27	3	6,6	17	8,6	1,5	4	17	9
018	18	29	32	33	27	33	3	7,5	19,5	10,1	2	5	17	10
019	19	29	32	33	27	33	3	7,5	19,5	10,1	2	5	17	10
020	20	33	37	38	29	35	3	7,5	21,5	10,1	2	5	17	10
022	22	33	37	38	31	37	3	7,5	21,5	10,1	2	5	17	10,5
024	24	38	42,5	44	33	39	3	7,5	22,5	10,1	2	5	17	10,5
025	25	38	42,5	44	34	40	3	7,5	23	10,1	2	5	17	10,5
028	28	44	49	50	37	43	3	7,5	26,5	10,2	2	5	17	10,5
030	30	44	49	50	39	45	3	7,5	26,5	10,2	2	5	17	10,5
032	32	46	53,5	55	42	48	3	7,5	27,5	10,2	2	5	17	10,5
033	33	46	53,5	55	42	48	3	7,5	27,5	10,2	2	5	17	10,5
035	35	50	57	59	44	50	3	7,5	28,5	10,2	2	5	17	10,5
038	38	53	59	61	49	56	4	9	30	11,2	2	6	18	11,5
040	40	55	62	64	51	58	4	9	30	11,2	2	6	18	11,5
043	43	58	65,5	67	54	61	4	9	30	11,2	2	6	18	11,5
045	45	60	68	70	56	63	4	9	30	11,2	2	6	18	11,5
048	48	63	70,5	74	59	66	4	9	30,5	11,2	2	6	18	11,5
050	50	65	72	77	62	70	4	9,5	30,5	13,25	2,5	6	20	11,5
053	53	70	78,5	81	65	73	4	11	33	13,25	2,5	6	20	14
055	55	72	81	83	67	75	4	11	35	13,25	2,5	6	20	14
058	58	75	82	88	70	78	4	11	37	13,25	2,5	6	20	14
060	60	79	88,5	91	72	80	4	11	38	13,3	2,5	6	20	14
065	65	84	93,5	96	77	85	4	11	40	13,3	2,5	6	20	14
068	68	88	96,5	100	81	90	4	11,3	40	15,3	2,5	7	22	14
070	70	90	99,5	103	83	92	4	11,3	40	15,4	2,5	7	22	14
075	75	95	107	110	88	97	4	11,3	40	15,4	2,5	7	22	14
080	80	100	112	116	95	105	4	12	40	15,9	3	7	22,5	15
085	85	107	120	124	100	110	4	14	41	15,9	3	7	22,5	17
090	90	114	127	131	105	115	4	14	45	15,9	3	7	22,5	17
095	95	119	132	136	110	120	4	14	46	15,9	3	7	22,5	17
100	100	124	137	140	115	125	4	14	47	15,9	3	7	22,5	17

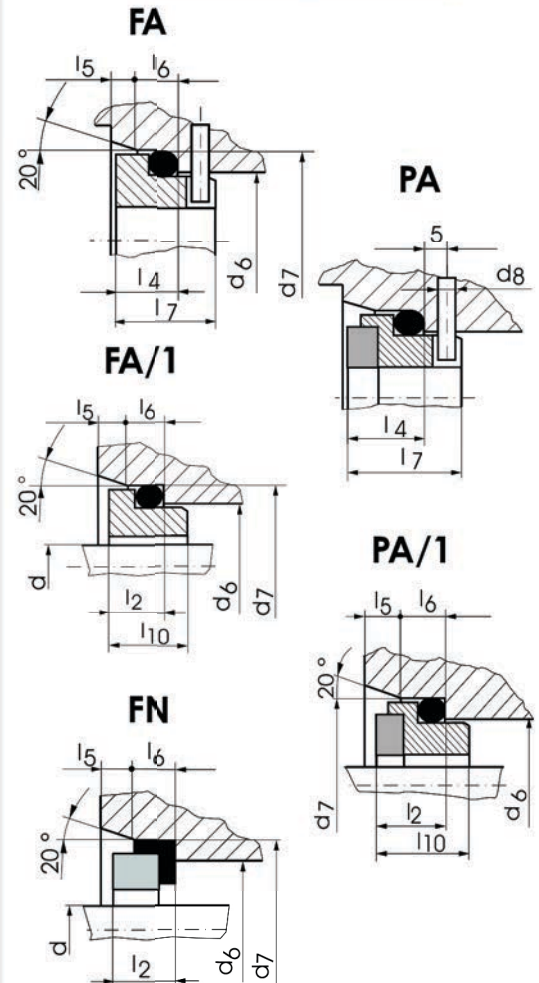
The diameters marked with * are conform to DIN 24960

Constructive variants

According to the stationary seat has ben developed the following constructive variants:

- EFS 103 - S** with **FA** stationary seat 
 - EFS 153 - S** with **PA** stationary seat 
 - EFS 163 - S** with **FN** stationary seat 
 - EFS 173 - S** with **PA/1** stationary seat 
- or FA/1 

Stationary seat



$$l_3 + l_4 \leq l_1 / \text{DIN 24960}$$

$$l_3 + l_2 < l_1 / \text{DIN 24960}$$

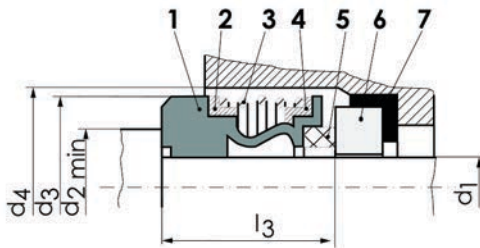
l_4 with "IO" ring

Mechanical Seal, Unbalanced with Rubber Bellow

Operating Limits

$d = 10 \dots 100 \text{ mm}$, $p = 8 \text{ bar (10)}$, $t = -20 \dots 120^\circ\text{C}$, $v_g = \text{max. } 10 \text{ m/s}$
 Resistance to chemicals and to erosion depends on the material combination.

EFG-163-S



- 1 - Rubber bellow
- 2 - Thrust ring
- 3 - Spring
- 4 - Thrust ring
- 5 - Rotary face
- 6 - Stationary seat
- 7 - Secondary seal

Constructive Variants

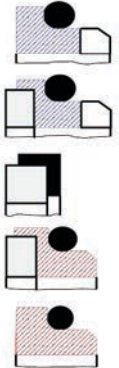
According to the stationary seat has been developed the following constructive variants:

EFG- 103 - S with stationary seat type **FA**

EFG- 153 - S with stationary seat type **PA**

EFG- 163 - S with stationary seat type **FN**

EFG- 173 - S with stationary seat type **PA/1** or **FA/1**

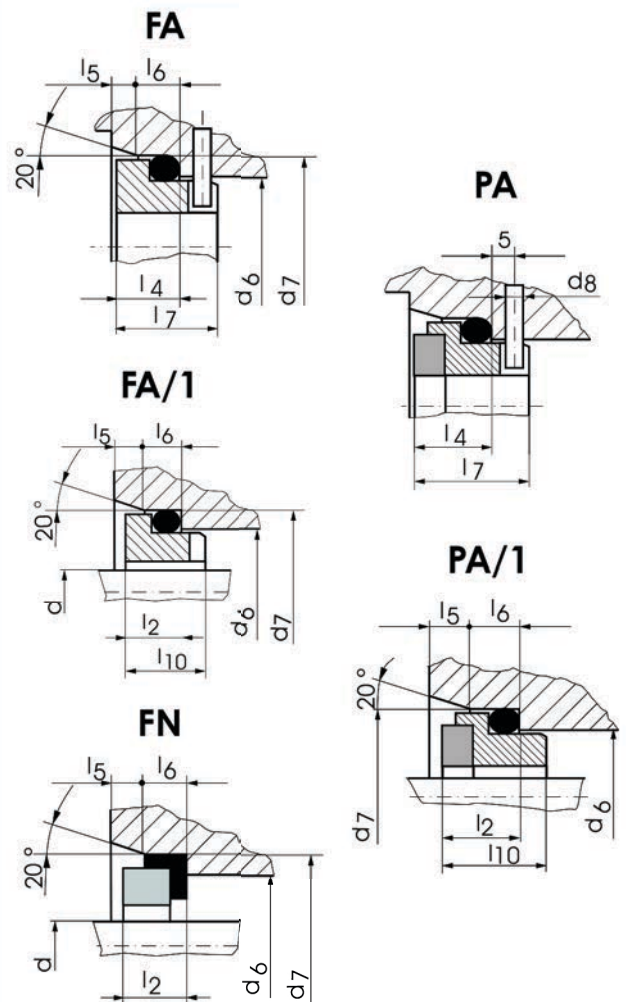


EFG - 173 - S - 022 - U1U1S2G5G1

Dim.nom	d ₁ *	d _{2min}	d ₃	d ₄	d ₆ *	d ₇ *	d ₈	l ₂	l ₃	l ₄	l ₅	l ₆	l ₇	l ₁₀
	h8				H11	H8								
010	10	18	22,5	24	17	21	3	6,6	25,9		1,5	4		9
012	12	20	25	26	19	23	3	6,6	25,9		1,5	4		9
014	14	22	28,5	30	21	25	3	6,6	28,4		1,5	4		9
015	15	22	28,5	30	21	25	3	6,6	28,4	7,6	1,5	4	15	9
016	16	22	28,5	30	23	27	3	6,6	28,4	8,6	1,5	4	17	9
018	18	26	32	33	27	33	3	7,5	30	10,1	2	5	17	10
019	19	28	32	33	27	33	3	7,5	30	10,1	2	5	17	10
020	20	28	37	38	29	35	3	7,5	30	10,1	2	5	17	10
022	22	28	37	38	31	37	3	7,5	30	10,1	2	5	17	11
024	24	32	42,5	44	33	39	3	7,5	32,5	10,1	2	5	17	11
025	25	32	42,5	44	34	40	3	7,5	32,5	10,1	2	5	17	11
028	28	37	49	50	37	43	3	7,5	37	10,2	2	5	17	11
030	30	37	49	50	39	45	3	7,5	35	10,2	2	5	17	11
032	32	41	53,5	55	42	48	3	7,5	35	10,2	2	5	17	11
033	33	41	53,5	55	42	48	3	7,5	47,5	10,2	2	5	17	11
035	35	44	57	59	44	50	3	7,5	35	10,2	2	5	17	11
038	38	47	59	61	49	56	4	9	40	11,2	2	6	18	12
040	40	49	62	64	51	58	4	9	36	11,2	2	6	18	12
043	43	53	65,5	67	54	61	4	9	36	11,2	2	6	18	12
045	45	55	68	70	56	63	4	9	36	11,2	2	6	18	12
048	48	58	70,5	74	59	66	4	9	36	11,2	2	6	18	12
050	50	60	72	77	62	70	4	9,5	38	13,3	2,5	6	20	12
053	53	63	78,5	81	65	73	4	11	36,5	13,3	2,5	6	20	14
055	55	65	81	83	67	75	4	11	36,5	13,3	2,5	6	20	14
058	58	68	82	88	70	78	4	11	41,5	13,3	2,5	6	20	14
060	60	70	88,5	91	72	80	4	11	41,5	13,3	2,5	6	20	14
065	65	77	93,5	96	77	85	4	11	41,5	13,3	2,5	6	20	14
068	68	80	96,5	100	81	90	4	11,3	41,2	15,3	2,5	7	22	14
070	70	82	99,5	103	83	92	4	11,3	48,7	15,4	2,5	7	22	14
075	75	87	107	110	88	97	4	11,3	48,7	15,4	2,5	7	22	14
080	80	92	112	116	95	105	4	12	48	15,9	3	7	23	15
085	85	97	120	124	100	110	4	14	46	15,9	3	7	23	17
090	90	104	127	131	105	115	4	14	51	15,9	3	7	23	17
095	95	109	132	136	110	120	4	14	51	15,9	3	7	23	17
100	100	114	137	140	115	125	4	14	51	15,9	3	7	23	17

Dimensions with * are according to DIN 24960

Stationary Seat



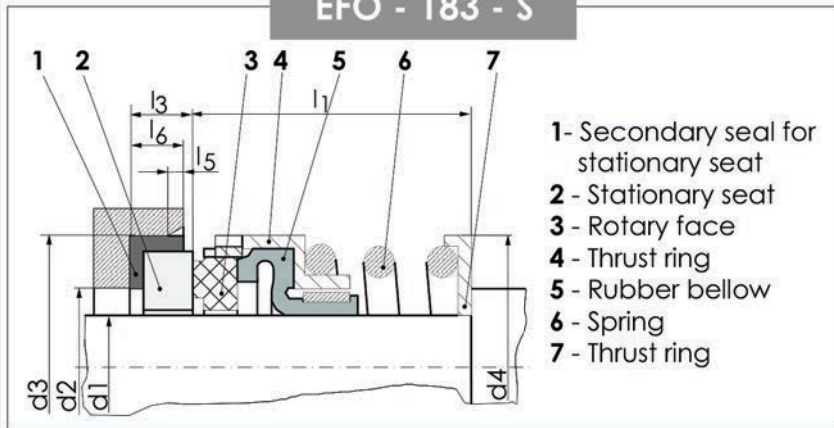
l₄ with "IO" secondary seat

Mechanical Seal, Unbalanced, with Rubber Bellow

Operating limits

$d = 12...75$ mm (over 75 mm on request), $p = \max. 8...10$ bar (16 bar), $t = -20...120^{\circ}\text{C}$, $v_g = \max. 10$ m/s
 Resistance to chemicals and abrasive media depends on material combination.

EFO - 183 - S








- 1- Secondary seal for stationary seat
- 2- Stationary seat
- 3- Rotary face
- 4- Thrust ring
- 5- Rubber bellow
- 6- Spring
- 7- Thrust ring

 **EFO - 183 - S -045 - B14V1S2G5G1**

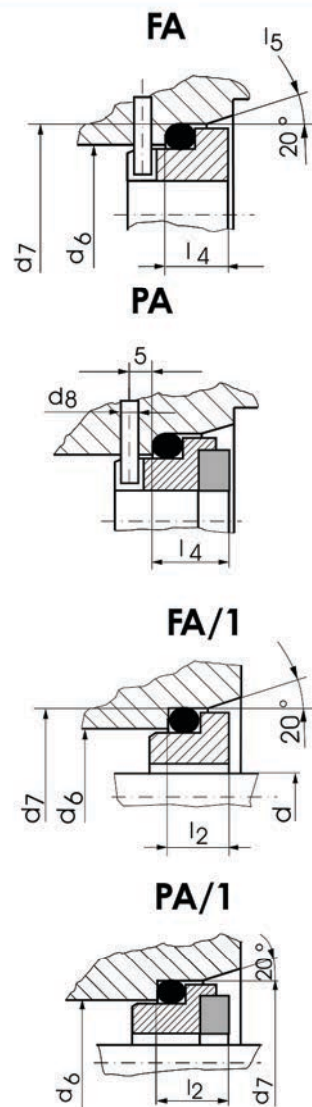
Constructive variants

According to the stationary seat has been developed the following constructive variants:

- EFO 103 - S** with FA stationary seat 
- EFO 153 - S** with PA stationary seat 
- EFO 173 - S** with PA/1  or FA/1 
- EFO 183 - S** with FN/1 stationary seat 

Dim.	d_1	d_2	d_3	d_4	d_6	d_7	l_1	l_3	l_6	l_2	l_4	l_5
nom.	± 0.05	± 0.15	± 0.05	± 0.15	H11	H8	± 0.5					
012	12	20	27,8	21,7			25	9	7,5			1
013	13	20	27,8	23,8			25	9	7,5			1
014	14	23	30,95	24,5			25	10,5	9			1,5
016	16	23	30,95	26,65	23	27	25	10,5	9	6,6	8,6	1,5
018	18	26	34,15	30,35	27	33	25	10,5	9	7,5	10,1	1,5
020	20	27	35,7	31,75	29	35	25	10,5	9	7,5	10,1	1,5
022	22	29	37,3	33,55	31	37	25	10,5	9	7,5	10,1	1,5
024	24	32	40,5	38,3	33	39	25	10,5	9	7,5	10,1	1,5
025	25	32	40,5	38,3	34	40	25	10,5	9	7,5	10,1	1,5
028	28	38	47,55	42,2	37	43	33	12	10,5	7,5	10,2	2
030	30	39	50,8	43,95	39	45	33	12	10,5	7,5	10,2	2
032	32	39	50,8	45,7	42	48	33	12	10,5	7,5	10,2	2
033	33	46	54	49,1	42	48	33	12	10,5	7,5	10,2	2
035	35	46	54	49,1	44	50	33	12	10,5	7,5	10,2	2
038	38	46	57,15	52,4	49	56	33	12	10,5	9	11,2	2
040	40	49	60,35	55,7	51	58	33	12,7	10,5	9	11,2	2
042	42	52	63,5	61,2			40,3	12,7	10,5			2
043	43	52	63,5	61,2	54	61	40,3	12,7	10,5	9	11,2	2
045	45	52	63,5	61,2	56	63	40,3	12,7	10,5	9	11,2	2
048	48	55	66,7	64,35	59	66	40,3	12,7	10,5	9	11,2	2
050	50	58	69,85	67,35	62	70	41	13,5	12	9,5	13,25	2
053	53	62	73,05	70,65	65	73	41	13,5	12	11	13,25	2
055	55	65	76,2	71,65	67	75	41	13,5	12	11	13,25	2
058	58	68	79,4	78,4	70	78	41	13,5	12	11	13,25	2
060	60	68	79,4	78,4	72	80	41	13,5	12	11	13,3	2
063	63	71	82,55	81,1	75	83	41	13,5	12	11	13,3	2
065	65	78	92,1	84,3	77	85	49	16	14,5	11	13,4	2
068	68	81	95,25	89,65	81	90	49	16	14,5	11,3	15,3	2
070	70	81	95,25	89,65	83	92	49	16	14,5	11,3	15,4	2
075	75	88	101,6	96,8	88	97	52	15	14,5	11,3	15,4	2

Stationary seat



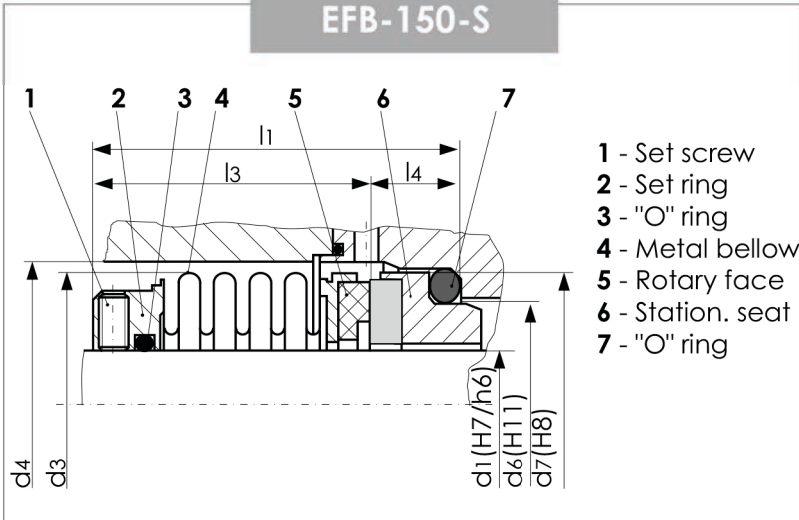
Mechanical Seal with Metal Bellow, Unbalanced, Internal

Operating Limits

$d = 16 \dots 90 \text{ mm}$, $p = \text{max } 8 \text{ bar}$, $t = -15 \dots 180^\circ\text{C}$, $v_g = \text{max. } 15 \text{ m/s}$

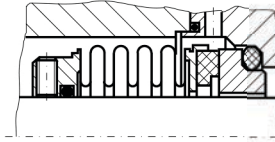
Resistance to chemicals and to erosion depends on the material combination.

EFB-150-S

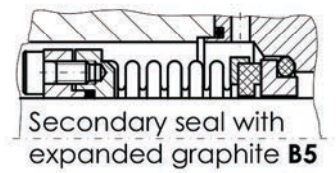


Constructive Variants

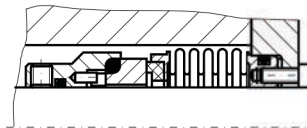
EFB - 170 - S



EFB - 175 - S



EFB - 800 - S



EFB - 870 - S



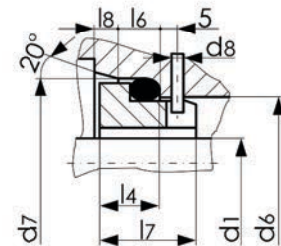
EFB - 170 - S - 070 - B14V1S1G1G1

Dim. nom.	d1* h6	d3	d4	d6* H11	d7* H8	d8*	l1	l3	l4	l5	l6	l7	l8
016	16	27	29	23	27	3	45	31,5	13,5	14,5	4	20	1,5
018	18	38	40	27	33	3	45	31,5	13,5	14,5	5	20	2
020	20	38	40	29	35	3	45	31,5	13,5	14,5	5	20	2
022	22	38	40	31	37	3	45	31,5	13,5	14,5	5	20	2
024	24	38	40	33	39	3	49	35,7	13,3	14,3	5	19,8	2
025	25	39	41	34	40	3	48,5	35,5	13	14	5	19,5	2
028	28	45,5	47,5	37	43	3	50	37,5	12,5	13,5	5	19	2
030	30	45,5	47,5	39	45	3	49,3	37,3	12	13	5	18,5	2
032	32	45,5	48	42	48	3	54,6	42,6	12	13	5	18,5	2
033	33	53	55	42	48	3	56,1	44,1	12	13	5	18,5	2
035	35	53	55	44	50	3	55,7	43,7	12	13	5	18,5	2
038	38	53	58	49	56	4	55,9	42,9	13	14	6	19,5	2
040	40	53	60	51	58	4	55,9	42,5	13	14	6	19,5	2
043	43	60	63	54	61	4	56,8	43,8	13	14	6	19,5	2
045	45	63	65	56	63	4	56,4	43,4	13	14	6	19,5	2
048	48	76	78	59	66	4	61	48	13	14	6	19,5	2
050	50	76	78	62	70	4	60,6	47,1	13,5	14,5	6	20	2,5
053	53	76	78	65	73	4	63,6	50,1	13,5	14,5	6	20	2,5
055	55	90	92	67	75	4	68,6	55,1	13,5	14,5	6	20	2,5
058	58	90	92	70	78	4	68,1	54,6	13,5	14,2	6	20	2,5
060	60	90	92	72	80	4	66,8	53,3	13,5	14,2	6	20	2,5
063	63	90	92	75	83	4	66,6	53,1	13,5	14,2	6	20	2,5
065	65												
068	68	100	102	81	90	4	70,4	56,9	13,5	14,2	7	22	2,5
070	70	100	102	83	92	4	70,1	56,6	13,5	14,2	7	22	2,5
075	75	100	104	88	97	4	68,4	54,9	13,5	14,2	7	22	2,5
080	80	110	112	95	105	4	68,6	55,1	13,5	14,2	7	22	3
085	85	110	114	100	110	4	68,2	54,7	13,5	14,2	7	22,5	3
090	90	110	119	105	115	4	67,7	54,2	13,5	14,2	7	22,5	3

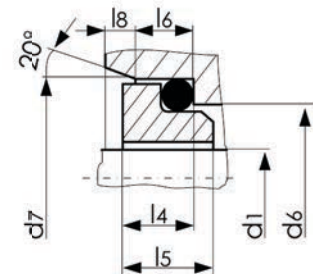
Dimensions with * are according to DIN 24960

Stationary Seat

Long Stationary Seat



Short Stationary Seat



Nominal Dimension	Tolerances for l 3
Ø16 ... Ø30	+0,8 0
Ø32 ... Ø65	+1 0
Ø68 ... Ø90	+1,5 -0,5

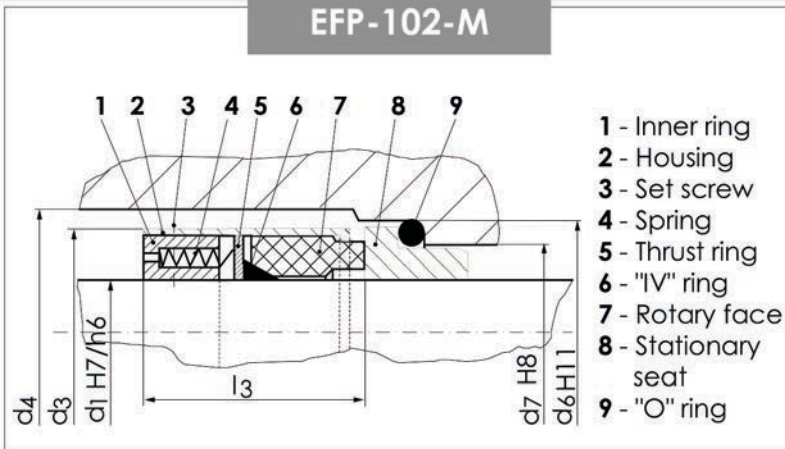
Mechanical Seal, Short Length, Unbalanced, Multiple Spring DIN 24960

Operating Limits

$d = 16 \dots 100$ mm (up to 240 mm on request), $p = 8$ bar (16 bar),
 $t = -15 \dots 180^\circ\text{C}$, $v_g = 15$ m/s.

Resistance to chemical and to erosion depends on the material combination.

EFP-102-M



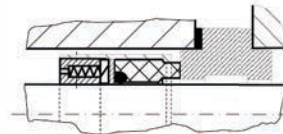
- 1 - Inner ring
- 2 - Housing
- 3 - Set screw
- 4 - Spring
- 5 - Thrust ring
- 6 - "IV" ring
- 7 - Rotary face
- 8 - Stationary seat
- 9 - "O" ring

EFP - 102 - M - 045 - B14VIT1G5G1

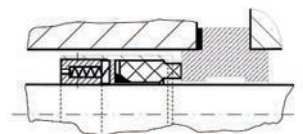
Dim. nom.	d ₁ h ₆	d ₃	d ₄	d ₆ H11	d ₇ H8	d ₈ H8	d ₉	d ₁₀	l ₃	l ₄₁	l ₄₂	l ₅	l ₆	l ₇	l ₉	l ₁₀
016	16	26	28	23	27	3	34	45	27	8	8.6	1.5	4	15	3	12
018	18	32	34	27	33	3	37	48	28	9.5	10.1	2	5	17	3	12
020	20	34	36	29	35	3	37	49	28	9.5	10.1	2	5	17	3	12
022	22	36	38	31	37	3	38	51	28	9.5	10.1	2	5	17	3	12
024	24	38	40	33	39	3	42	54	30.5	9.5	10.1	2	5	17	3	12
025	25	39	41	34	40	3	42	54	30.5	9.5	10.1	2	5	17	3	12
028	28	42	44	37	43	3	46	61	33	9.5	10.2	2	5	17	5.5	15
030	30	44	46	39	45	3	49	61	33	9.5	10.2	2	5	17	5.5	15
032	32	46	48	42	48	3	51	66	33	9.5	10.2	2	5	17	5.5	15
033	33	47	49	42	48	3	54	69	33	9.5	10.2	2	5	17	5.5	15
035	35	49	51	44	50	3	54	69	33	9.5	10.2	2	5	17	5.5	15
035	35	50.9	53	44	50	3	54	69	29	9.5	10.2	2	5	17	5.5	15
038	38	54	58	49	56	4	57	72	35	10	11.2	2	6	18	5.5	15
040	40	56	60	51	58	4	62	77	35	10	11.2	2	6	18	5.5	15
043	43	59	63	54	61	4	67	82	35	10	11.2	2	6	18	5.5	15
045	45	61	65	56	63	4	67	82	35	10	11.2	2	6	18	5.5	15
048	48	64	68	59	66	4	70	85	35	10	11.2	2	6	18	5.5	15
050	50	66	70	62	70	4	72	87	35	12.5	13.25	2.5	6	20	5.5	15
053	53	69	73	65	73	4	80	98	35	12.5	13.25	2.5	6	20	8	18
055	55	71	75	67	75	4	80	98	35	12.5	13.25	2.5	6	20	8	18
058	58	78	83	70	78	4	85	103	40	12.5	13.25	2.5	6	20	8	18
060	60	80	85	72	80	4	85	103	40	12.5	13.3	2.5	6	20	8	18
063	63	83	88	75	83	4	90	108	40	12.5	13.3	2.5	6	20	8	18
065	65	85	90	77	85	4	90	108	40	12.5	13.3	2.5	6	20	8	18
068	68	88	93	81	90	4	95	113	37.5	15	15.3	2.5	7	22	8	18
070	70	90	95	83	92	4	95	113	45	15	15.4	2.5	7	22	8	18
075	75	99	104	88	97	4	100	118	45	15	15.4	2.5	7	22	8	18
080	80	104	109	95	105	4	105	123	45	15	15.9	3	7	22.5	7.5	19
085	85	109	114	100	110	4	110	128	45	15	15.9	3	7	22.5	7.5	19
090	90	114	119	105	115	4	115	133	50	15	15.9	3	7	22.5	7.5	19
095	95	119	124	110	120	4	120	138	50	15	15.9	3	7	22.5	7.5	19
100	100	124	129	115	125	4	125	143	50	15	15.9	3	7	22.5	7.5	19

Constructive Variants

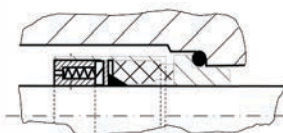
EFP 110 - M



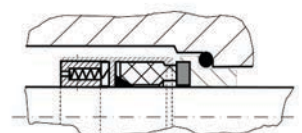
EFP 112 - M



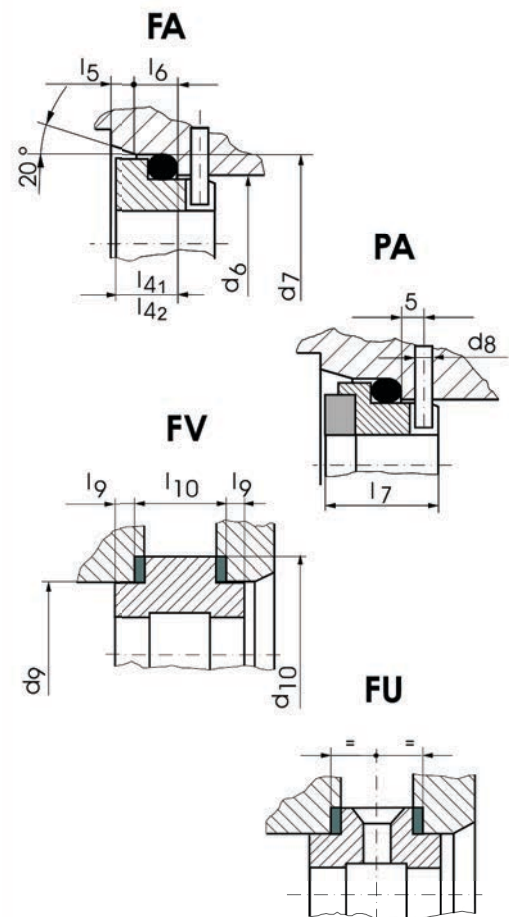
EFP 102 - M



EFP 152 - M



Stationary Seat



$$l_3 + l_{41} = l_1 \quad / \text{DIN 24960}$$

l_{41} with "IP" secondary seal (PTFE)

l_{42} with "IO" secondary seal (elastomer)

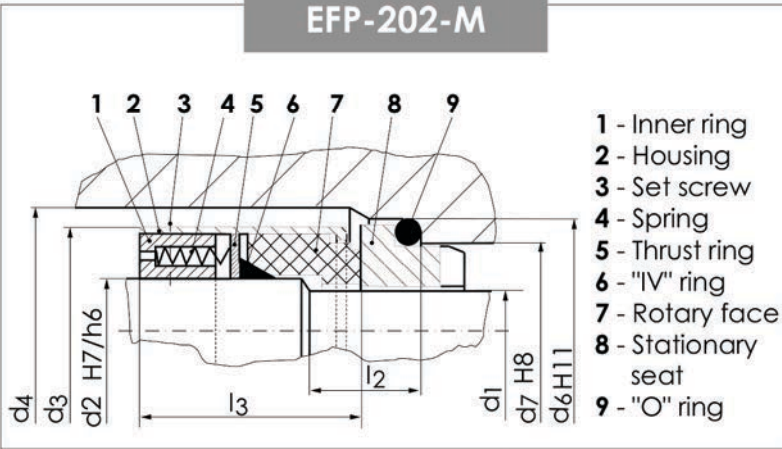
Mechanical Seal, Short Length, Balanced, Multiple Spring DIN 24960

Operating Limits

$d = 16 \dots 100$ mm (up to 240 mm on request), $p = 16$ bar (40 bar),
 $t = -15 \dots 180^\circ\text{C}$, $v_g = 15$ m/s.

Resistance to chemical and to erosion depends on the material combination.

EFP-202-M

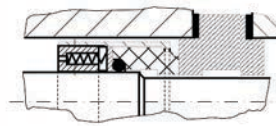


EFP - 202 - M - 045 - B14VIT1G5G1

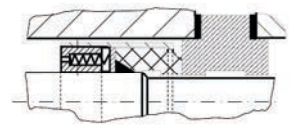
Dim. nom.	d ₁	d ₂	d ₃	d ₄	d ₆	d ₇	d ₈	d ₉	d ₁₀	l ₂	l ₃	l ₄ *	l ₅	l ₆	l ₇	l ₉	l ₁₀
		h ₆		H11	H8	H8	H8	H8									
016	16	20	34	36	23	27	3	34	45	18	34,5	8	1,5	4	15	3	12
018	18	22	36	38	27	33	3	37	48	20	35,5	9,5	2	5	17	3	12
020	20	24	38	40	29	35	3	37	49	20	35,5	9,5	2	5	17	3	12
022	22	26	40	42	31	37	3	38	51	20	35,5	9,5	2	5	17	3	12
024	24	28	42	44	33	39	3	42	54	20	38	9,5	2	5	17	3	12
025	25	30	44	46	34	40	3	42	54	20	38	9,5	2	5	17	3	12
028	28	33	47	49	37	43	3	46	61	20	40,5	9,5	2	5	17	5,5	15
030	30	35	49	51	39	45	3	49	61	20	40,5	9,5	2	5	17	5,5	15
032	32	38	54	58	42	48	3	51	66	20	40,5	9,5	2	5	17	5,5	15
033	33	38	54	58	42	48	3	54	69	20	40,5	9,5	2	5	17	5,5	15
035	35	40	56	60	44	50	3	54	69	20	40,5	9,5	2	5	17	5,5	15
038	38	43	59	63	49	56	4	57	72	23	42,5	10	2	6	18	5,5	15
040	40	45	61	65	51	58	4	62	77	23	42,5	10	2	6	18	5,5	15
043	43	48	64	68	54	61	4	67	82	23	42,5	10	2	6	18	5,5	15
045	45	50	66	70	56	63	4	67	82	23	42,5	10	2	6	18	5,5	15
048	48	53	69	73	59	66	4	70	85	23	42,5	10	2	6	18	5,5	15
050	50	55	71	75	62	70	4	72	87	25	45	12,5	2,5	6	20	5,5	15
053	53	58	78	83	65	73	4	80	98	25	45	12,5	2,5	6	20	8	18
055	55	60	80	85	67	75	4	80	98	25	45	12,5	2,5	6	20	8	18
058	58	63	83	88	70	78	4	85	103	25	50	12,5	2,5	6	20	8	18
060	60	65	85	90	72	80	4	85	103	25	50	12,5	2,5	6	20	8	18
063	63	68	88	93	75	83	4	90	108	25	50	12,5	2,5	6	20	8	18
065	65	70	90	95	77	85	4	90	108	25	50	12,5	2,5	6	20	8	18
068	68	73	97	102	81	90	4	95	113	28	50	15	2,5	7	22	8	18
070	70	75	99	104	83	92	4	95	113	28	55	15	2,5	7	22	8	18
075	75	80	104	109	88	97	4	100	118	28	55	15	2,5	7	22	8	18
080	80	85	109	114	95	105	4	105	123	28	55	15	3	7	23	7,5	19
085	85	90	114	119	100	110	4	110	128	28	60	15	3	7	23	7,5	19
090	90	95	119	124	105	115	4	115	133	28	60	15	3	7	23	7,5	19
095	95	100	124	129	110	120	4	120	138	28	60	15	3	7	23	7,5	19
100	100	105	129	134	115	125	4	125	143	28	60	15	3	7	23	7,5	19

Constructive Variants

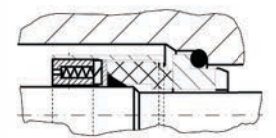
EFP 210 - M



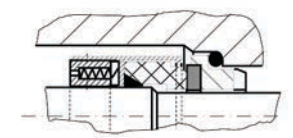
EFP 212 - M



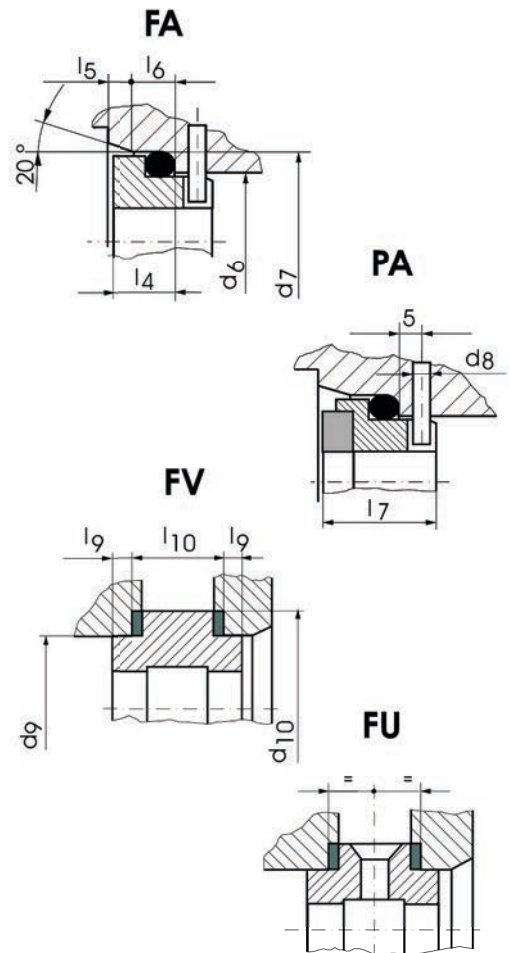
EFP 202 - M



EFP 252 - M



Stationary Seat



$$l_3 + l_4 = l_1 \quad / \text{DIN 24960}$$

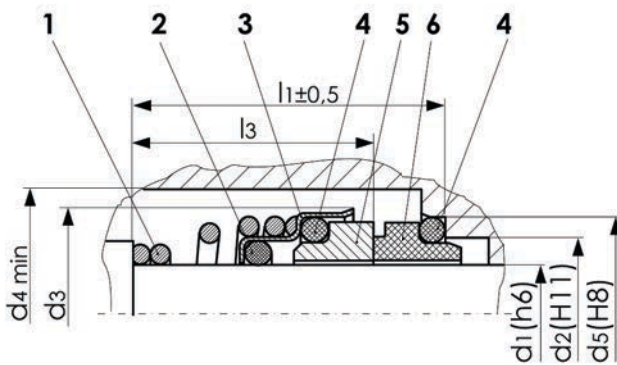
* l_4 with "IP" secondary seal (PTFE)

Mechanical Seal, Unbalanced, Single Spring

Operating limits

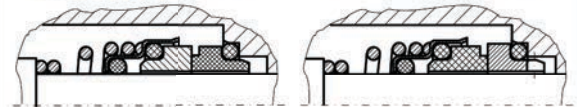
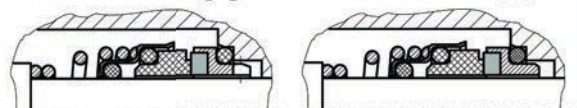
$d = 10...35\text{mm}$ (over 35mm on request), $p = \text{max. } 10\text{bar}$ (16bar), $t = -20...180^\circ\text{C}$, $v_g = \text{max. } 20\text{ m/s}$
 Resistance to chemicals and abrasive media depends on material combination.

EFT - 100 - R(L)

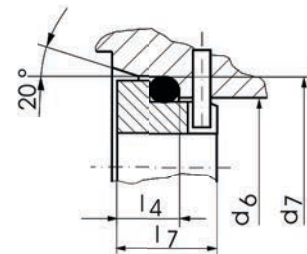
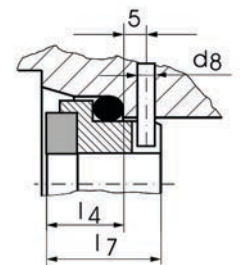
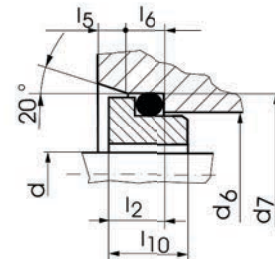
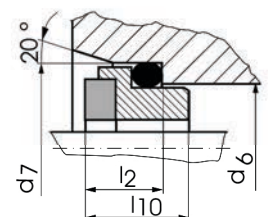


- 1 - Spring
- 2 - "O" ring
- 3 - Housing
- 4 - "O" ring
- 5 - Rotary face
- 6 - Stationary seat

Constructive variants

EFT-100-R(L)
EFT-100-R(L)

EFT-150-R(L)
EFT-170-R(L)


Stationary seat

FA

PA

FA/1

PA/1


EFT - 100 - R(L) -025 - V1B14S4G5G1

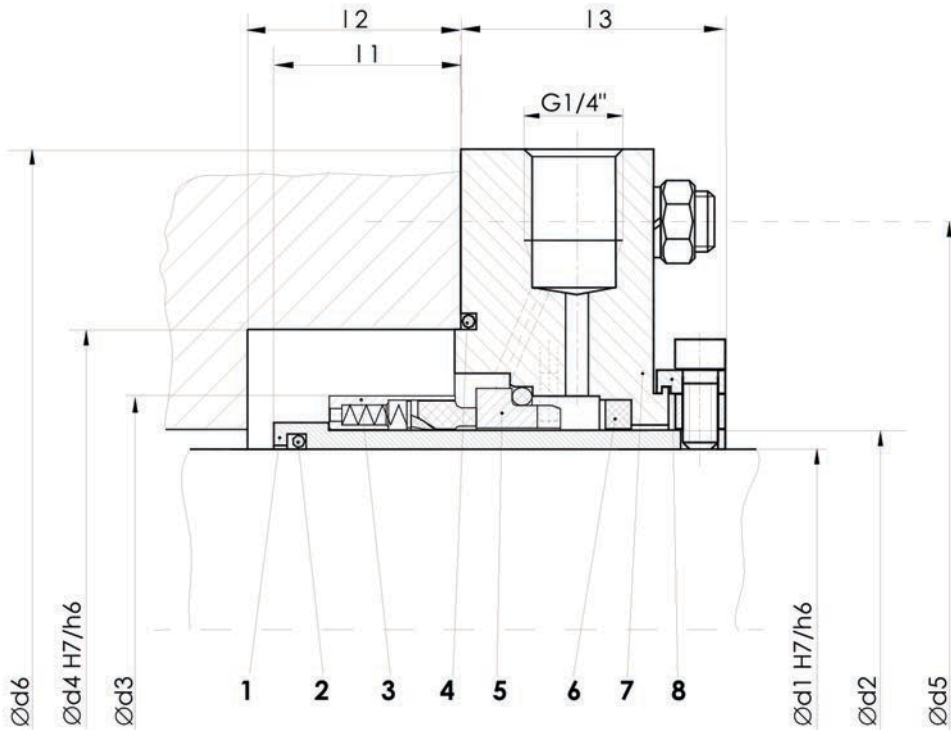
Dim nom	d ₁ h6	d ₂ H11	d ₃	d ₄	d ₅ H8	d ₆ H11	d ₇ H8	l ₁	l ₂	l ₃	l ₄	l ₇	l ₈	l ₁₀
010	10	14	19,5	22	18,1	17	21	20,5	6,6	15			5,5	9
011	11	16,5	22,5	25	20,6			23,5		18			5,5	9
012	12	16,5	22,5	25	20,6	19	23	23,5	6,6	18			5,5	9
013	13	19	24,5	28	23,1			28		22			6	
014	14	19	24,5	28	23,1	21	25	28	6,6	22			6	9
015	15	21	29	32	26,9	21	25	29	6,6	22	7,6	15	7	9
016	16	21	29	32	26,9	23	27	30	6,6	23	8,6	17	7	9
017	17	21	29	32	26,9			30		23			7	
018	18	25	32,5	36	30,9	27	33	32	7,5	24	10,1	17	8	10
019	19	25	32,5	36	30,9	27	33	33	7,5	25	10,1	17	8	10
020	20	25	32,5	36	30,9	29	35	33	7,5	25	10,1	17	8	10
022	22	30	37,5	42	35,4	31	37	33	7,5	25	10,1	17	8	10,5
024	24	30	37,5	42	35,4	33	39	35	7,5	27	10,1	17	8	10,5
025	25	33	40	45	38,2	34	40	35,5	7,5	27	10,1	17	8,5	10,5
028	28	38	46	51	43,3	37	43	38	7,5	29	10,2	17	9	10,5
030	30	38	46	51	43,3	39	45	39	7,5	30	10,2	17	9	10,5
032	32	38	46	51	43,3	42	48	39	7,5	30	10,2	17	9	10,5
035	35	45	50	55	53,5	44	50	50,5	7,5	39	10,2	17	11,5	10,5

CARTRIDGE SEAL

Operating Limits

$d = 16...100\text{mm}$ (over 100 mm on request), $p = \text{max. } 8 \text{ bar}$ (16 bar), $t = -15...-180\text{ }^\circ\text{C}$, $vg = \text{max. } 15\text{m/s}$
 Resistance to chemicals and to erosion depends on the material combination.

EFC-100-M

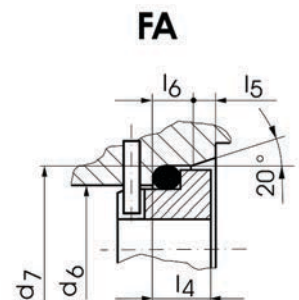


- 1 - Sleeve
- 2 - "O" ring
- 3 - Mechanical seal
- 4 - "O" ring
- 5 - Stationary seat
- 6 - Labyrinth seal
- 7 - Flange
- 8 - Assembly clips
(remove after installation)

EFC - 100 - M -033 - B14V1S1G5G1

Dim. nom.	d_1	d_2	d_3	d_4	d_5	d_6	l_1	l_2	l_3
032	32	38	54	65	100	125	49	51	42
033	33	38	54	65	100	125	49	51	42
038	38	43	59	78	110	135	49	51	42
048	48	53	69	80	118	140	50	52	42,5
060	60	68	88	110	170	200	54	56	43,5

Stationary Seat



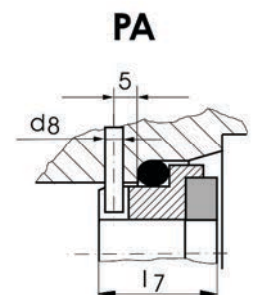
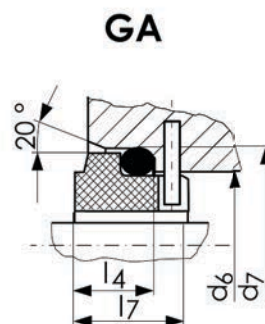
Cartridge seals are mechanical seals completely mounted in one assembly.

The advantage is a very simple mounting in the pump, and seal tightening at working length guaranteed by production.

The flange is equipped with all the orifices necessary for seal cooling and flushing.

The uttered seal can be standardized or special, simple or double, unbalanced or balanced one. On special request the seal is made according to customers' existing dimensions.

Variant showed on the drawing nearby is with type EFK seal, which presents the advantage of interchangeable pieces and easy supply with new spare parts from stock.

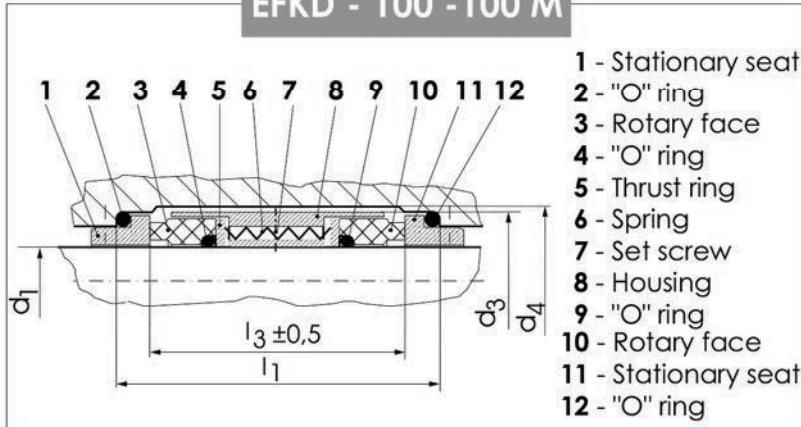


Double Acting Mechanical Seal DIN 24960

Operating Limits

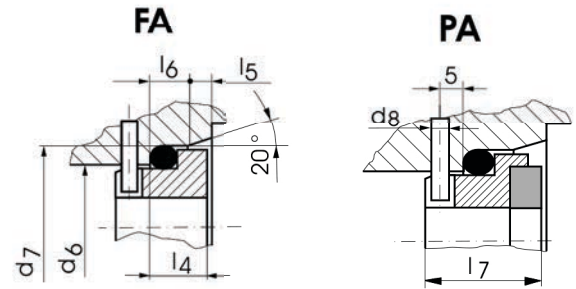
d = 18...100 mm (up to 240 mm on request), p = max. 16 bar (25bar), t = -15...180°C, vg = 15m/s
 Resistance to chemicals and abrasive media depends on the material combination.

EFKD - 100 - 100 M



- 1 - Stationary seat
- 2 - "O" ring
- 3 - Rotary face
- 4 - "O" ring
- 5 - Thrust ring
- 6 - Spring
- 7 - Set screw
- 8 - Housing
- 9 - "O" ring
- 10 - Rotary face
- 11 - Stationary seat
- 12 - "O" ring

Stationary Seat



l_4 with IP secondary seal, PTFE
 $l_3 + 2 l_4 < 2 l_1$ / DIN 24960

EFKD - 100 - 100 - M - 045 - B14G1TIG5G1B14G1T1

Dim.nom.	d ₁	d ₃	d ₄	d ₆	d ₇	d ₈	l ₃ *	l ₄ *	l ₅	l ₆	l ₇
	h6			H11 H8							
018	18	32	34	27	33	3	42	9,5	2	5	17
020	20	34	36	29	35	3	42	9,5	2	5	17
022	22	36	38	31	37	3	42	9,5	2	5	17
024	24	38	40	33	39	3	42	9,5	2	5	17
025	25	39	41	34	40	3	42	9,5	2	5	17
028	28	42	44	37	43	3	43	9,5	2	5	17
030	30	44	46	39	45	3	43	9,5	2	5	17
032	32	46	48	42	48	3	43	9,5	2	5	17
033	33	47	49	42	48	3	43	9,5	2	5	17
035	35	49	51	44	50	3	43	9,5	2	5	17
038	38	54	58	49	56	4	49	10	2	6	18
040	40	56	60	51	58	4	50	10	2	6	18
043	43	59	63	54	61	4	50	10	2	6	18
045	45	61	65	56	63	4	50	10	2	6	18
048	48	64	68	59	66	4	50	10	2	6	18
050	50	66	70	62	70	4	48	12,5	2,5	6	20
053	53	69	73	65	73	4	48	12,5	2,5	6	20
055	55	71	75	67	75	4	48	12,5	2,5	6	20
058	58	78	83	70	78	4	61	12,5	2,5	6	20
060	60	80	85	72	80	4	61	12,5	2,5	6	20
063	63	83	88	75	83	4	60	12,5	2,5	6	20
065	65	85	90	77	85	4	60	12,5	2,5	6	20
068	68	88	93	81	90	4	61	15	2,5	7	22
070	70	90	95	83	92	4	62	15	2,5	7	22
075	75	99	104	88	97	4	62	15	2,5	7	22
080	80	104	109	95	105	4	62,5	15	3	7	22,5
085	85	109	114	100	110	4	62,5	15	3	7	22,5
090	90	114	119	105	115	4	62,5	15	3	7	22,5
095	95	119	124	110	120	4	60,5	15	3	7	22,5
100	100	124	129	115	125	4	60,5	15	3	7	22,5

Designation

1 2 3 4 - 5 6 7 - 8 9 10 - 11 -
 - 12 13 14 - 15 16 17 18 19 20 21 22

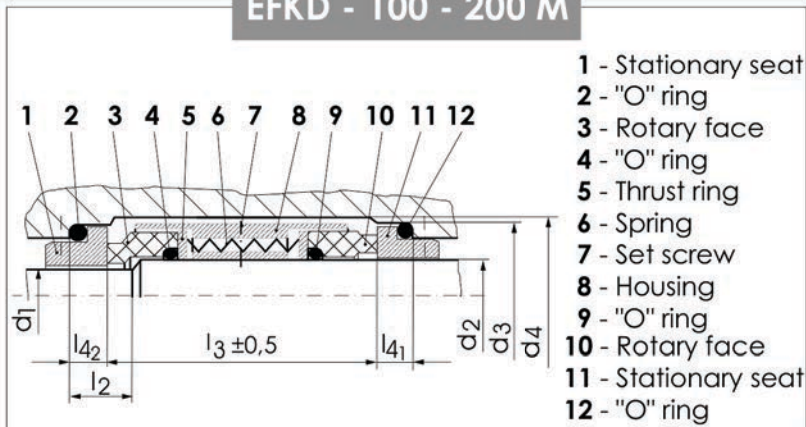
- 1 - Seal
- 2 - Frontal
- 3 - Length, Type
- 4 - Seal type - double
- 5 - Seal type - product side
- 6 - Stationary seat type - product side
- 7 - Secondary seal type - product side
- 8 - Seal type - atmosphere side
- 9 - Stationary seat type - atmosphere side
- 10 - Secondary seal type - atmosphere side
- 11 - Type of spring (single or multiple)
- 12 } - Nominal dimension of the seal
- 13 }
- 14 }
- 15 - Material code rotary ring - product side
- 16 - Material code stationary seat - prod. side
- 17 - Material code secondary seal - prod. side
- 18 - Material code springs
- 19 - Material code of constructional parts
- 20 - Material code rotary ring - atmosphere side
- 21 - Material code stationary seat - atm. side
- 22 - Material code secondary seal - atm. side

Double Acting Mechanical Seal DIN 24960

Operating Limits

d = 18...100 mm (up to 240 mm on request), p = max. 16bar (25bar), t = -15...180°C, vg = 15m/s
 Resistance to chemicals and abrasive media depends on the material combination.

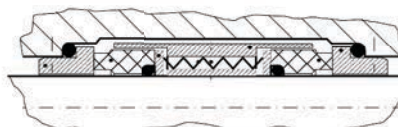
EFKD - 100 - 200 M



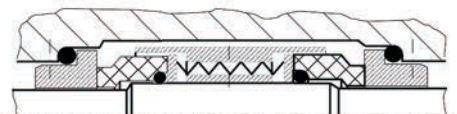
- 1 - Stationary seat
- 2 - "O" ring
- 3 - Rotary face
- 4 - "O" ring
- 5 - Thrust ring
- 6 - Spring
- 7 - Set screw
- 8 - Housing
- 9 - "O" ring
- 10 - Rotary face
- 11 - Stationary seat
- 12 - "O" ring

Constructive variants

EFKD 100 - 100 M



EFKD 200 - 200 M

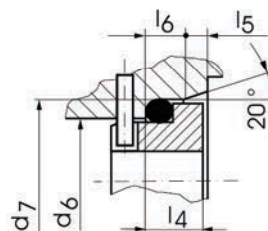


EFKD - 100 - 200 - M -045 - B14G1T1G5G1B14G1T1

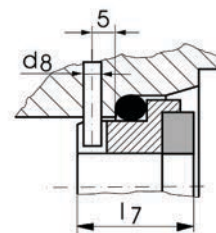
Dim. nom.	d ₁	d ₂	d ₃	d ₄	d ₆	d ₇	d ₈	l ₂	l ₃ *	l ₄₁ *	l ₄₂ *	l ₅	l ₆	l ₇
	h ₆			H11 H8										
018	18	22	36	38	27	33	3	20	49,5	9,5	9,5	2	5	17
020	20	24	38	40	29	35	3	20	49,5	9,5	9,5	2	5	17
022	22	26	40	42	31	37	3	20	49,5	9,5	9,5	2	5	17
024	24	28	42	44	33	39	3	20	50	9,5	9,5	2	5	17
025	25	30	44	46	34	40	3	20	50	9,5	9,5	2	5	17
028	28	33	47	49	37	43	3	20	50,5	9,5	9,5	2	5	17
030	30	35	49	51	39	45	3	20	50,5	9,5	9,5	2	5	17
032	32	38	54	58	42	48	3	20	51,5	10	9,5	2	5	17
033	33	38	54	58	42	48	3	20	51,5	10	9,5	2	5	17
035	35	40	56	60	44	50	3	20	52	10	9,5	2	5	17
038	38	43	59	63	49	56	4	23	57	10	10	2	6	18
040	40	45	61	65	51	58	4	23	57,5	10	10	2	6	18
043	43	48	64	68	54	61	4	23	57,5	10	10	2	6	18
045	45	50	66	70	56	63	4	23	57,5	12,5	10	2	6	18
048	48	53	69	73	59	66	4	23	57,5	12,5	10	2	6	18
050	50	55	71	75	62	70	4	25	58	12,5	12,5	2,5	6	20
053	53	58	78	83	65	73	4	25	60	12,5	12,5	2,5	6	20
055	55	60	80	85	67	75	4	25	60	12,5	12,5	2,5	6	20
058	58	63	83	88	70	78	4	25	70	12,5	12,5	2,5	6	20
060	60	65	85	90	72	80	4	25	70	12,5	12,5	2,5	6	20
063	63	68	88	93	75	83	4	25	72	12,5	12,5	2,5	6	20
065	65	70	90	95	77	85	4	25	66,5	15	12,5	2,5	6	20
068														
070	70	75	99	104	83	92	4	28	72,5	15	15	2,5	7	22
075	75	80	104	109	88	97	4	28	72,5	15	15	2,5	7	22
080	80	85	109	114	95	105	4	28	72,5	15	15	3	7	22,5
085	85	90	114	119	100	110	4	28	72,5	15	15	3	7	22,5
090	90	95	119	124	105	115	4	28	72,5	15	15	3	7	22,5
095	95	100	124	129	110	120	4	28	70,5	15	15	3	7	22,5
100	100	105	129	134	115	125	4	28	70,5	15	15	3	7	22,5

Stationary Seat

FA



PA



*l₄₁ and l₄₂ with IP secondary seal
 *l₃ + l₄₁ + l₄₂ < l_{1U} + l_{1B} / DIN 24960

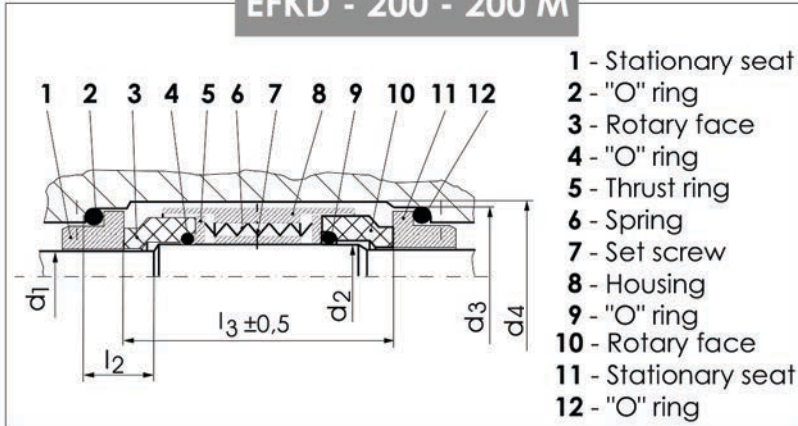
Double Acting Mechanical Seal

DIN 24960


Operating Limits

d = 18...100 mm (up to 240 mm on request), p = 16bar (25bar), t = -15...180°C, vg = 15m/s
 Resistance to chemicals and abrasive media depends on the material combination.

EFKD - 200 - 200 M

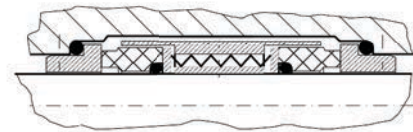


- 1 - Stationary seat
- 2 - "O" ring
- 3 - Rotary face
- 4 - "O" ring
- 5 - Thrust ring
- 6 - Spring
- 7 - Set screw
- 8 - Housing
- 9 - "O" ring
- 10 - Rotary face
- 11 - Stationary seat
- 12 - "O" ring

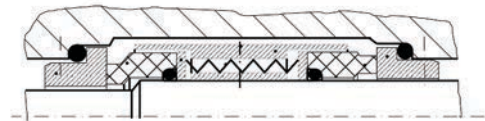

EFKD - 200 - 200 - M -045 - B14G1TIG5G1B14G1T1

Constructive variants

EFKD 100 - 100 M

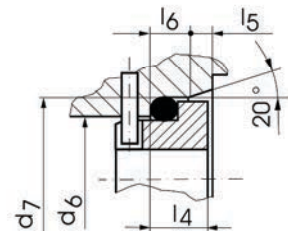
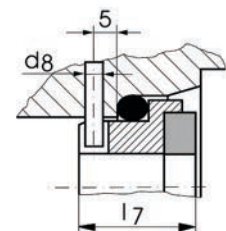


EFKD 100 - 200 M



Dim.nom.	d ₁	d ₂	d ₃	d ₄	d ₆	d ₇	d ₈	l ₂	l ₃ *	l ₄ *	l ₅	l ₆	l ₇
		h6			H11	H8							
018	18	22	36	38	27	33	3	20	57	9,5	2	5	17
020	20	24	38	40	29	35	3	20	57	9,5	2	5	17
022	22	26	40	42	31	37	3	20	57	9,5	2	5	17
024	24	28	42	44	33	39	3	20	58	9,5	2	5	17
025	25	30	44	46	34	40	3	20	58	9,5	2	5	17
028	28	33	47	49	37	43	3	20	58	9,5	2	5	17
030	30	35	49	51	39	45	3	20	58	9,5	2	5	17
032	32	38	54	58	42	48	3	20	60	9,5	2	5	17
033	33	38	54	58	42	48	3	20	60	9,5	2	5	17
035	35	40	56	60	44	50	3	20	61	9,5	2	5	17
038	38	43	59	63	49	56	4	23	65	10	2	6	18
040	40	45	61	65	51	58	4	23	65	10	2	6	18
043	43	48	64	68	54	61	4	23	65	10	2	6	18
045	45	50	66	70	56	63	4	23	65	10	2	6	18
048	48	53	69	73	59	66	4	23	65	10	2	6	18
050	50	55	71	75	62	70	4	25	68	12,5	2,5	6	20
053	53	58	78	83	65	73	4	25	72	12,5	2,5	6	20
055	55	60	80	85	67	75	4	25	72	12,5	2,5	6	20
058	58	63	83	88	70	78	4	25	79	12,5	2,5	6	20
060	60	65	85	90	72	80	4	25	79	12,5	2,5	6	20
063	63	68	88	93	75	83	4	25	84	12,5	2,5	6	20
065	65	70	90	95	77	85	4	25	73	12,5	2,5	6	20
068													
070	70	75	99	104	83	92	4	28	82,5	15	2,5	7	22
075	75	80	104	109	88	97	4	28	82,5	15	2,5	7	22
080	80	85	109	114	95	105	4	28	82,5	15	3	7	22,5
085	85	90	114	119	100	110	4	28	82,5	15	3	7	22,5
090	90	95	119	124	105	115	4	28	82,5	15	3	7	22,5
095	95	100	124	129	110	120	4	28	80,5	15	3	7	22,5
100	100	105	129	134	115	125	4	28	80,5	15	3	7	22,5

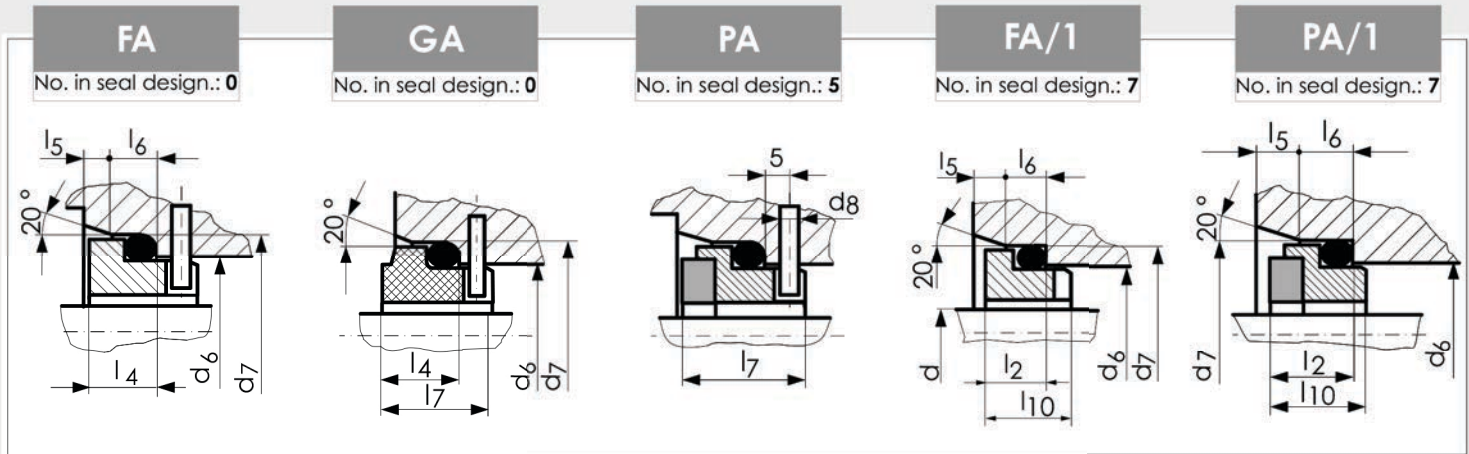
Stationary Seat

FA

PA


*l₄ with "IP" secondary seal

*l₃+2 l₄ < 2 l₁ balanced / DIN 24960

Stationary Seat



 **FA - 045 - G1S3**
  **PA - 045 - U1G1T1**

Designation

GA, FA and FA/1-	1	2	3	-	4	5
PA and PA/1-	1	2	3	-	4	6

FA	PA	Materials	Material Code	DIN	ROSEAL®
1- 2- 3-	1- 2- 3-	Nominal dimension of the seat			
4-	Seat face material code Tungsten carbide U Silicon carbide Q			U1 U2	
4- 5-	House / Seat material code Stainless steel - 18 % Cr G Stainless steel - 12 % Cr E Al ₂ O ₃ - 89 % V			G1,G2 G10 V1	
5- 6-	Secondary Seal material code Silicon rubber S Nitrile rubber P Fluorocarbon rubber (Viton) V Ethylene propylene rubber E Rubber, PTFE coated M Spring, PTFE coated S6 PTFE T		S1 S2 S3 S4 S5 S6 T1		

Note:

The fitting dimensions of the seat house are according to **DIN 24960**

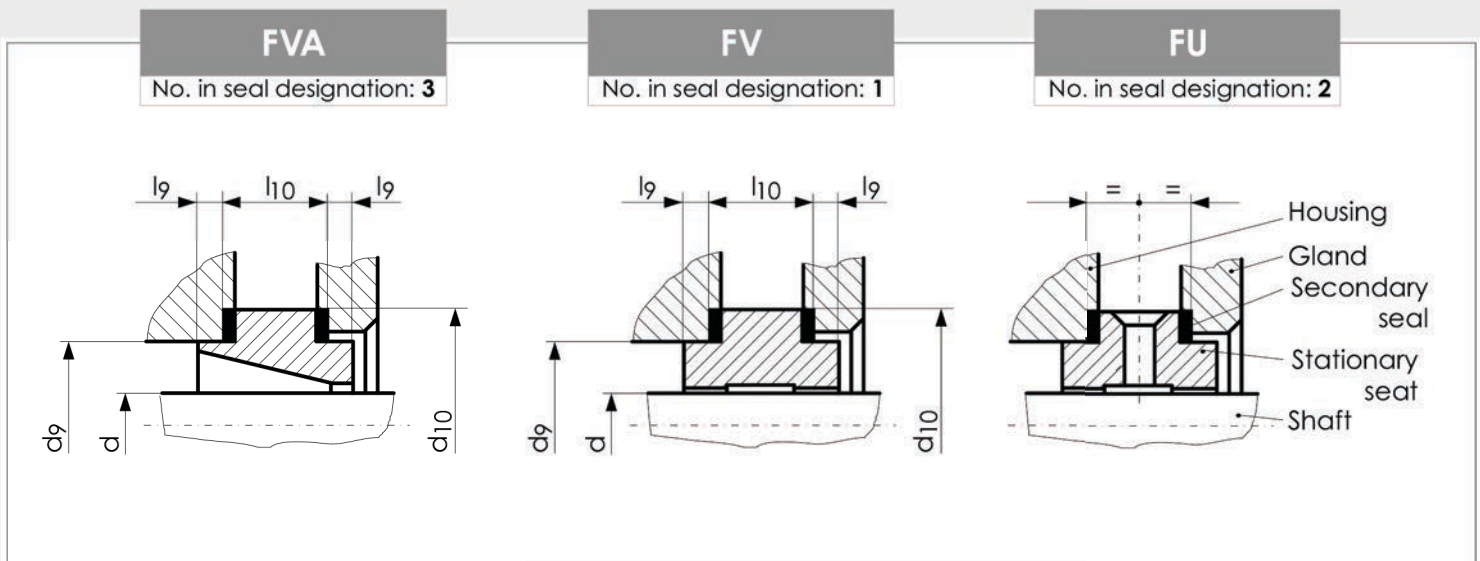
l₄₁ -with **IP** ring

l₄₂ -with **IO** ring

FA - Mono block stationary seat
GA - Mono block carbon stationary seat
PA - Shrink fitted stationary seat
FA/1 - Short, mono block stationary seat
PA/1 - Short, shrink fitted stationary seat

Dim. nom.	d	d ₆	d ₇	d ₈	l ₂	l ₄₁	l ₄₂	l ₅	l ₆	l ₇	l ₁₀
010	10	17	21	3	6,6			1,5	4		9
012	12	19	23	3	6,6			1,5	4		9
014	14	21	25	3	6,6			1,5	4		9
015	15	21	25	3	6,6			1,5	4		9
016	16	23	27	3	6,6	8	8,6	1,5	4	15	9
018	18	27	33	3	7,5	9,5	10,1	2	5	17	10
020	20	29	35	3	7,5	9,5	10,1	2	5	17	10
022	22	31	37	3	7,5	9,5	10,1	2	5	17	10,5
024	24	33	39	3	7,5	9,5	10,1	2	5	17	10,5
025	25	34	40	3	7,5	9,5	10,1	2	5	17	10,5
028	28	37	43	3	7,5	9,5	10,1	2	5	17	10,5
030	30	39	45	3	7,5	9,5	10,2	2	5	17	10,5
032	32	42	48	3	7,5	9,5	10,2	2	5	17	10,5
033	33	42	48	3	7,5	9,5	10,2	2	5	17	10,5
035	35	44	50	3	7,5	9,5	10,2	2	5	17	10,5
038	38	49	56	4	9	10	11,2	2	6	18	11,5
040	40	51	58	4	9	10	11,2	2	6	18	11,5
043	43	54	61	4	9	10	11,2	2	6	18	11,5
045	45	56	63	4	9	10	11,2	2	6	18	11,5
048	48	59	66	4	9	10	11,2	2	6	18	11,5
050	50	62	70	4	9,5	12,5	13,25	2,5	6	20	11,5
053	53	65	73	4	11	12,5	13,25	2,5	6	20	14
055	55	67	75	4	11	12,5	13,25	2,5	6	20	14
058	58	70	78	4	11	12,5	13,25	2,5	6	20	14
060	60	72	80	4	11	12,5	13,3	2,5	6	20	14
063	63	75	83	4	11	12,5	13,3	2,5	6	20	14
065	65	77	85	4	11	12,5	13,3	2,5	6	20	14
068	68	81	90	4	11,3	15	15,3	2,5	7	22	14
070	70	83	92	4	11,3	15	15,4	2,5	7	22	14
073	73	86	95	4	11,3	15	15,4	2,5	7	22	14
075	75	88	97	4	11,3	15	15,4	2,5	7	22	14
080	80	95	105	4	12	15	15,9	3	7	22,5	15
085	85	100	110	4	14	15	15,9	3	7	22,5	17
090	90	105	115	4	14	15	15,9	3	7	22,5	17
095	95	110	120	4	14	15	15,9	3	7	22,5	17
100	100	115	125	4	14	15	15,9	3	7	22,5	17

Stationary Seat



FVA - 045 - V1T1

Designation

FVA -

1	2	3
---	---	---

 -

4	5
---	---

1- }
2- } **Nominal dimension**
3- } **of the seat**

4- Seat material code

Al₂O₃ - 89 %
Stainless steel - 18 % Cr
Stainless steel - 12 % Cr
Other as specified

5- Secondary Seal material code

Silicon rubber
Nitrile rubber
Fluorocarbon rubber
(Viton)
Ethylene propylene rubber
PTFE
PTFE + 25 % graphite filled
Other as specified

Material code
DIN ROSEAL®

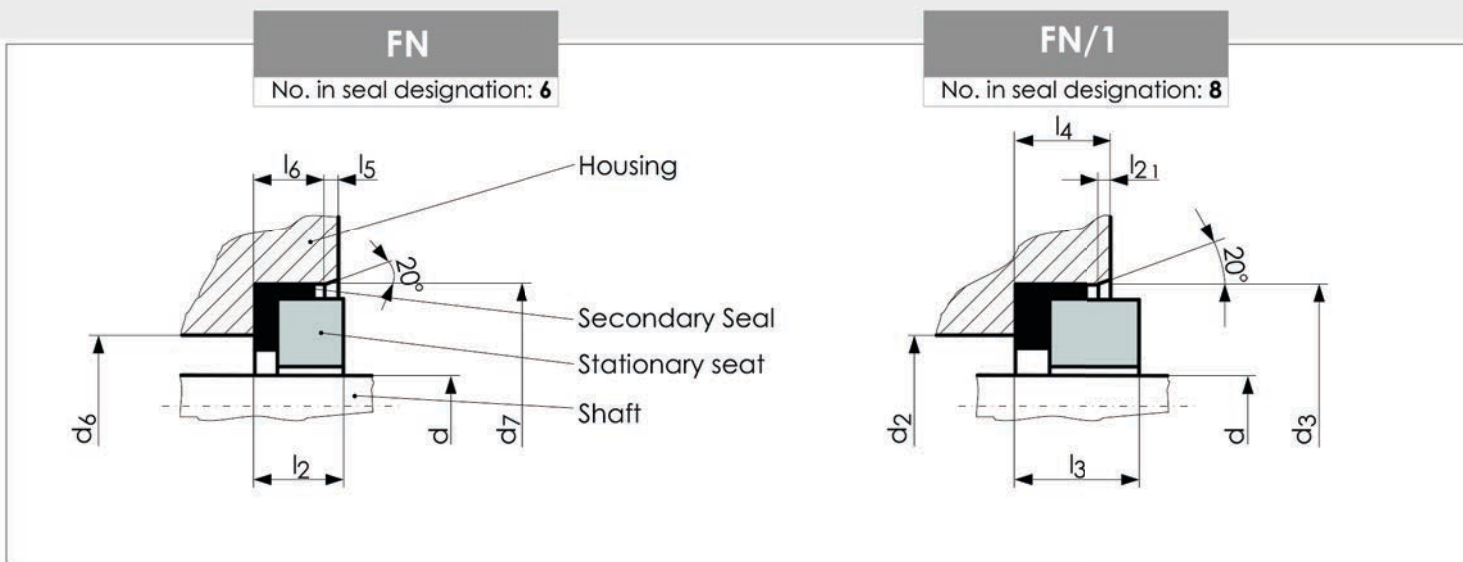
V	V1
G	G1 , G2
E	G10
-	Gx
S	S1
P	S2
V	S3
E	S4
T	T1
Y	Y2
-	Tx


Dim. nom.	d	d ₉	d ₁₀	l ₉	l ₁₀
		H8			
018	18	37	48	3	12
020	20	37	49	3	12
022	22	38	51	3	12
024	24	42	54	3	12
025	25	42	54	3	12
028	28	46	61	5,5	15
030	30	49	61	5,5	15
032	32	51	66	5,5	15
033	33	54	69	5,5	15
035	35	54	69	5,5	15
038	38	57	72	5,5	15
040	40	62	77	5,5	15
043	43	67	82	5,5	15
045	45	67	82	5,5	15
048	48	70	85	5,5	15
050	50	72	87	5,5	15
053	53	80	98	8	18
055	55	80	98	8	18
058	58	85	103	8	18
060	60	85	103	8	18
063	63	90	108	8	18
065	65	90	108	8	18
068	68	95	113	8	18
070	70	95	113	8	18
075	75	100	118	8	18
080	80	105	123	7,5	19
085	85	110	128	7,5	19
090	90	115	133	7,5	19
095	95	120	138	7,5	19
100	100	125	143	7,5	19
105	105	130	147	7,5	19
110	110	136	155	7,5	20

Note:

These stationary seats can be used for internal and also for external mechanical seals.

Stationary Seat



 **FN - 045 U1S2**

 **FN/1 - 022 - V1S4**

Dim. d d₆ d₇ l₂ l₅ l₆
nom. H11 H8

012	12					
013	13					
014	14					
016	16					
018	18					
020	20	29	35	7,5	2	5
022	22	31	37	7,5	2	5
024	24	33	39	7,5	2	5
025	25	34	40	7,5	2	5
028	28	37	43	7,5	2	5
030	30	39	45	7,5	2	5
032	32	42	48	7,5	2	5
033	33	42	48	7,5	2	5
035	35	44	50	7,5	2	5
038	38	49	56	9	2	6
040	40	51	58	9	2	6
042	42					
043	43	54	61	9	2	6
045	45	56	63	9	2	6
048	48	59	66	9	2	6
050	50	62	70	9,5	2,5	6
053	53	65	73	11	2,5	6
055	55	67	75	11	2,5	6
058	58	70	78	11	2,5	6
060	60	72	80	11	2,5	6
063	63					
065	65	77	85	11	2,5	6
068	68	81	90	11,3	2,5	7
070	70	83	92	11,3	2,5	7
075	75	88	97	11,3	2,5	7
080	80	95	105	12	3	7
085	85	100	110	14	3	7
090	90	105	115	14	3	7
095	95	110	120	14	3	7
100	100	115	125	14	3	7

Designation

FN	-	1	2	3	-	4	5
FN/1	-	1	2	3	-	4	5

Material code
DIN **ROSEAL®**

- 1- }
2- } **Nominal dimension**
3- } **of the seat**
- 4- **Seat material code**
 Tungsten carbide U
 Silicon carbide Q
 Stainless steel - 18 % Cr G
 Stainless steel - 12 % Cr E
 Al₂O₃ - 89 % V
- 5- **Secondary seal material code**
 Silicon rubber S
 Nitrile rubber P
 Fluorocarbon rubber (Viton) V
 Ethylene propylene rubber E
 PTFE T

U1
U2
G1,G2
G10
V1

S1
S2
S3
S4
T1

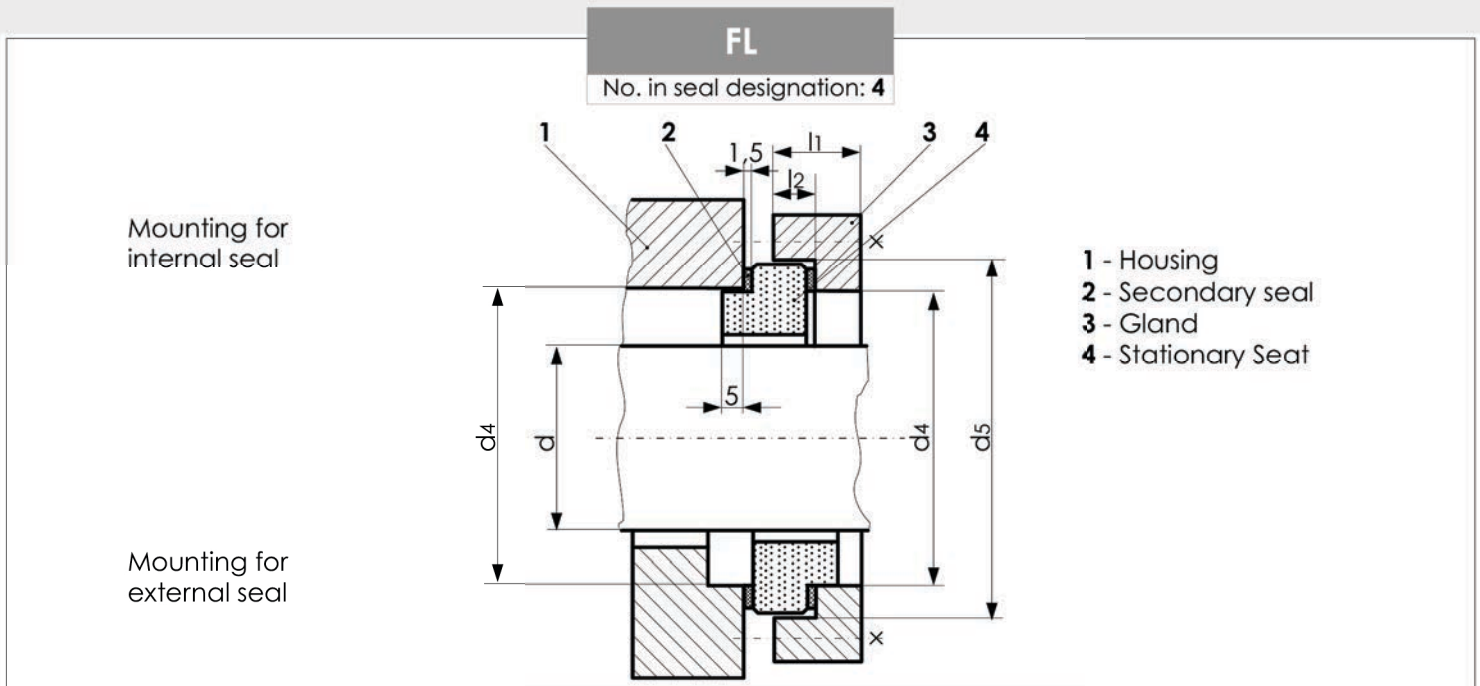

Dim. d d₂ d₃ l₃ l₄ l_{2 1}
nom.

012	12	20	27,8	9	7,5	1
013	13	20	27,8	9	7,5	1
014	14	23	30,95	10,5	9	1,5
016	16	23	30,95	10,5	9	1,5
018	18	26	34,15	10,5	9	1,5
020	20	27	35,7	10,5	9	1,5
022	22	29	37,3	10,5	9	1,5
024	24	32	40,5	10,5	9	1,5
025	25	32	40,5	10,5	9	1,5
028	28	38	47,55	12	10,5	2
030	30	39	50,8	12	10,5	2
032	32	39	50,8	12	10,5	2
033	33	46	54	12	10,5	2
035	35	46	54	12	10,5	2
038	38	46	57,15	12	10,5	2
040	40	49	60,35	12,7	10,5	2
042	42	52	63,5	12,7	10,5	2
043	43	52	63,5	12,7	10,5	2
045	45	52	63,5	12,7	10,5	2
048	48	55	66,7	12,7	10,5	2
050	50	58	69,85	13,5	12	2
053	53	62	73,05	13,5	12	2
055	55	65	76,2	13,5	12	2
058	58	68	79,4	13,5	12	2
060	60	68	79,4	13,5	12	2
063	63	71	82,55	13,5	12	2
065	65	78	92,1	16	14,5	2
068	68	81	95,25	16	14,5	2
070	70	81	95,25	16	14,5	2
075	75	88	101,6	15	14,5	2

Note:

FN used for EFS - 163 - S mechanical seal
FN/1 used for EFO - 183 - S mechanical seal

Stationary Seat



FL - 045 - V1T1

Designation

FL -

1	2	3
---	---	---

 -

4	5
---	---

1- }
2- } **Nominal dimension**
3- } **of the seat**

4- Seat material code

Tungsten carbide	U	U1
Silicon carbide	Q	U2
Stainless steel - 18 % Cr	G	G1,G2
Stainless steel - 12 % Cr	E	G10
Al ₂ O ₃ - 89 %	V	V1

5- Secondary seal material code

Silicon rubber	S	S1
Nitrile rubber	P	S2
Fluorocarbon rubber (Viton)	V	S3
Ethylene propylene rubber	E	S4
PTFE	T	T1
PTFE + 25 % graphite filled	Y	Y2

Material code
DIN **ROSEAL®**

Dim. nom.	d	d ₄	d ₅	l ₁	l ₂
018	18	34	47	13	9
020	20	36	49	13	9
022	22	38	51	13	9
024	24	40	54	13	9
025	25	41	54	13	9
028	28	44	58	13	9
030	30	46	61	13	9,5
032	32	48	61	13	9,5
033	33	49	61	13	9,5
035	35	51	62	13	9,5
038	38	58	70	13	9,5
040	40	60	73	13	9,5
042	42	62	73	13	9,5
043	43	63	80	13	9,5
045	45	65	80	13	9,5
048	48	68	83	16	9,5
050	50	70	83	16	9,5
053	53	73	89	16	9,5
055	55	75	96	19	9,5
058	58	78	99	19	9,5
060	60	85	99	19	9,5
063	63	88	103	19	9,5
065	65	90	108	19	9,5
068	68	93	111	19	9,5
070	70	95	112	24	14,5
075	75	104	117	24	14,5
080	80	109	125	24	14,5
085	85	114	128	24	14,5
090	90	119	134	24	14,5
095	95	124	137	24	14,5
100	100	129	144	24	14,5
105	105	126,6	147	24	14,5
110	110	139	157	24	14,5

Note:

This stationary seat is used for the seals:
EFN - 640, EFN - 740, EFN - 840, EFN - 940.

Radial Mechanical Seals

Operating limits

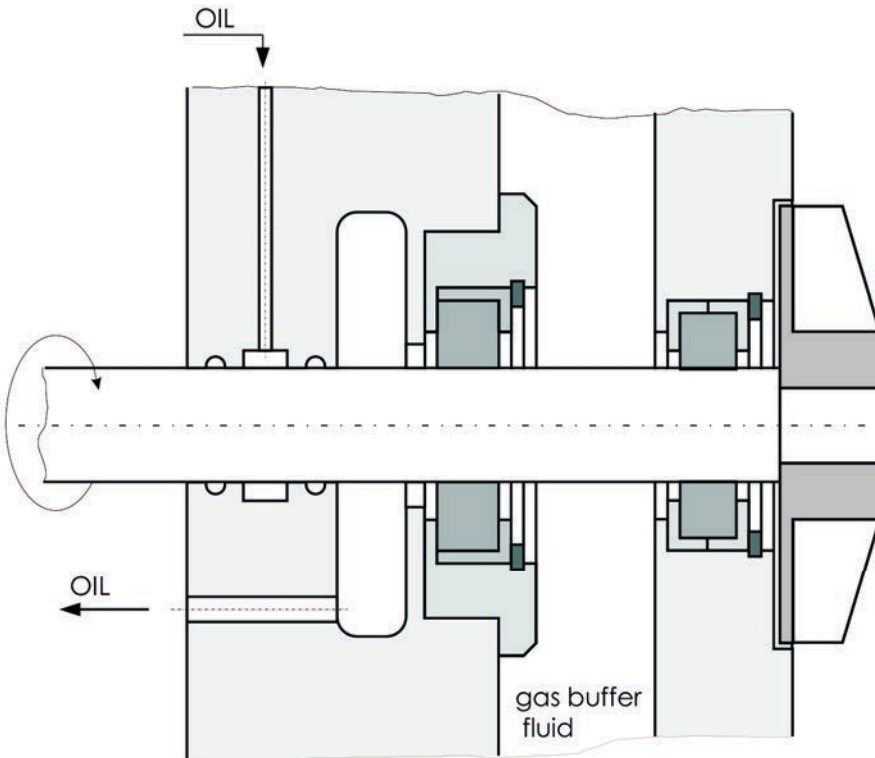
Centrifugal pump for compressed air

Medium: air, gases, oil

Nominal diameter $d = \text{Ø}44,44\text{mm}$; Pressure $p = 2\div 21\text{bar}$

Rotating speed $n = 17000\div 31000\text{rot/min}$; Temperature $t = 65\div 110^\circ\text{C}$;

We produce in other dimensions, too, upon customers' documentation



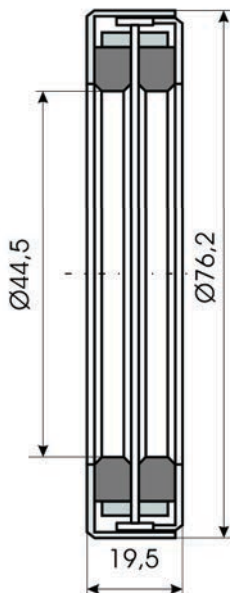
Radial seals are used to seal components in rotation or translation. They can be with or without contact. Carbon material B14 is used for its self lubricating properties and corrosion resistance to the sealed media.

Radial seals are generally shrunk into a metal holder.

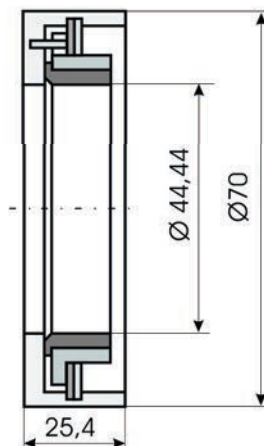
In this case, fit plays are maintained even on the operating temperature, because of the shrinkage stress the carbon ring expands with a little smaller coefficient of thermal expansion than that of the metal holder.

 ER - Ø44,44 B14 G2

Single Radial Seal

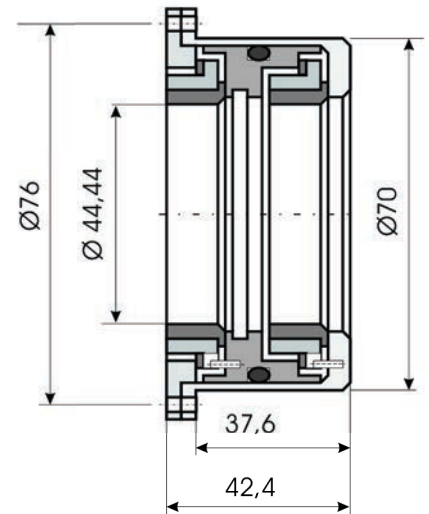


Placed at buffer fluid side



Placed at sealed gas medium side

Double Radial Seal



Mechanical Seals for Agitators

Operating limits

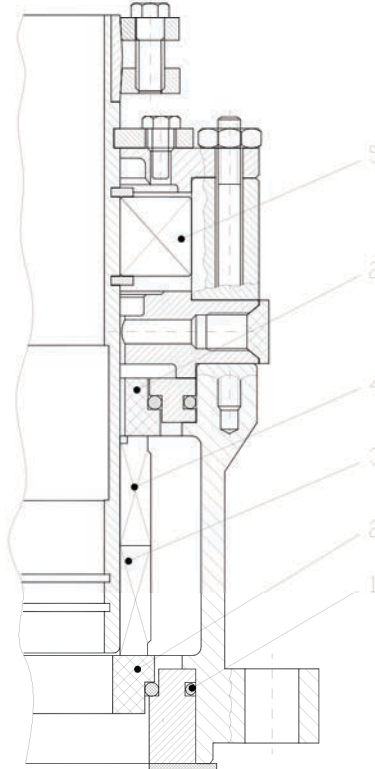
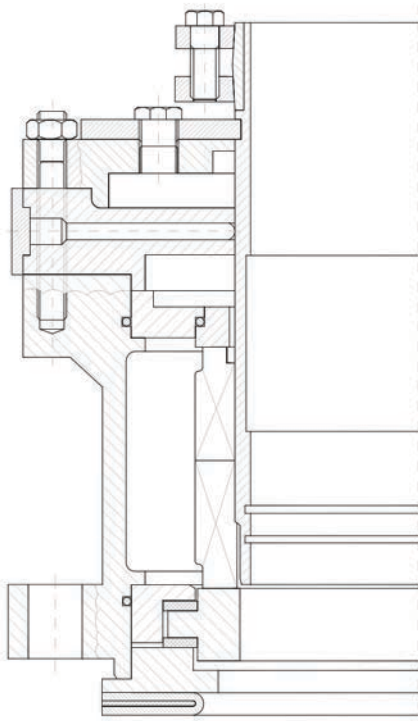
Nominal diameter $d = \varnothing 30 \dots \varnothing 230 \text{mm}$; Buffer fluid pressure $P = \text{max. } 1.6 \text{ bar}$

Rotating speed $n = 300 \text{rot/min}$; Temperature $t = -80 \dots +220^\circ\text{C}$

ERA

U - B

U - U



- 1 - "O" Ring
- 2 - Stationary seat
- 3 - Internal mechanical seal
- 4 - External mechanical seal
- 5 - Bearing

U-B variant: unbalanced external mechanical seal, balanced internal mechanical seal

U-U variant: both mechanical seals are unbalanced

 ERA - LM - A1 - 110 - G2 - UB

Designation

1 2 3 - 4 5 - 6 7 - 8 9 10 - 11 - 12 13

- 1 - Seal
- 2 - Reactor
- 3 - Agitator
- 4 - without bearing
- 5 - with bearing
- 5 - Metallic vessel
- 6, 7 - Type of flange
- 8, 9, 10 - Shaft nominal diameter
- 11 - Material code
- 12 - Balancing type of external mechanical seal
- 13 - Balancing type of internal mechanical seal

CODE

E
R
A
O
L
M
E
A0, A1... D2

U

U or B

Instructions

The Agitator Seals have been developed to equip vessels with constructional and dimensional parameters according to **DIN 28136** and ensure sealing of the mixers rotating shaft to the stationary reactor part.

The following standards must be taken into consideration:

-**STAS 10688-82** and **DIN 28136**: constructional features of the reactor

-**DIN 28137**: reactor flange

-**DIN 28159**: reactor shaft nominal diameter

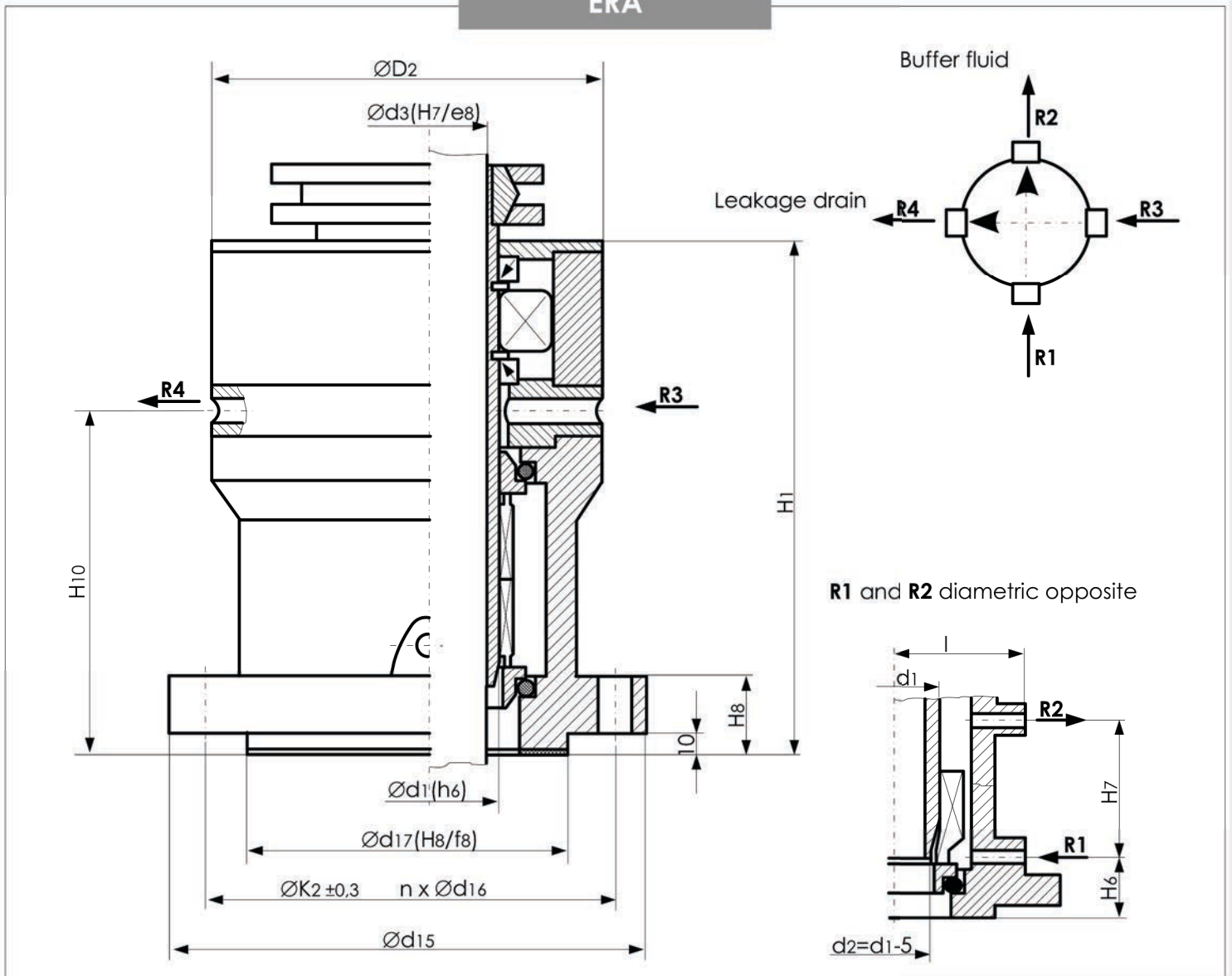
-**DIN 28138**: agitator seal dimensions

The **ERA** Agitator Seals are provided with external buffer fluid circuit, compatible with the media from the vessel.

The selection of the used materials is based on the technological and operational conditions.

The perfect functioning of the agitator seal is essentially dependent on respecting of all requirements concerning shaft and flange deviation tolerances, as well as axial and radial runout resulted from the bearings.

Mechanical Seals for Agitators

ERA

DIN 28137 and DIN 28138 standard dimensions
External and bond dimensions

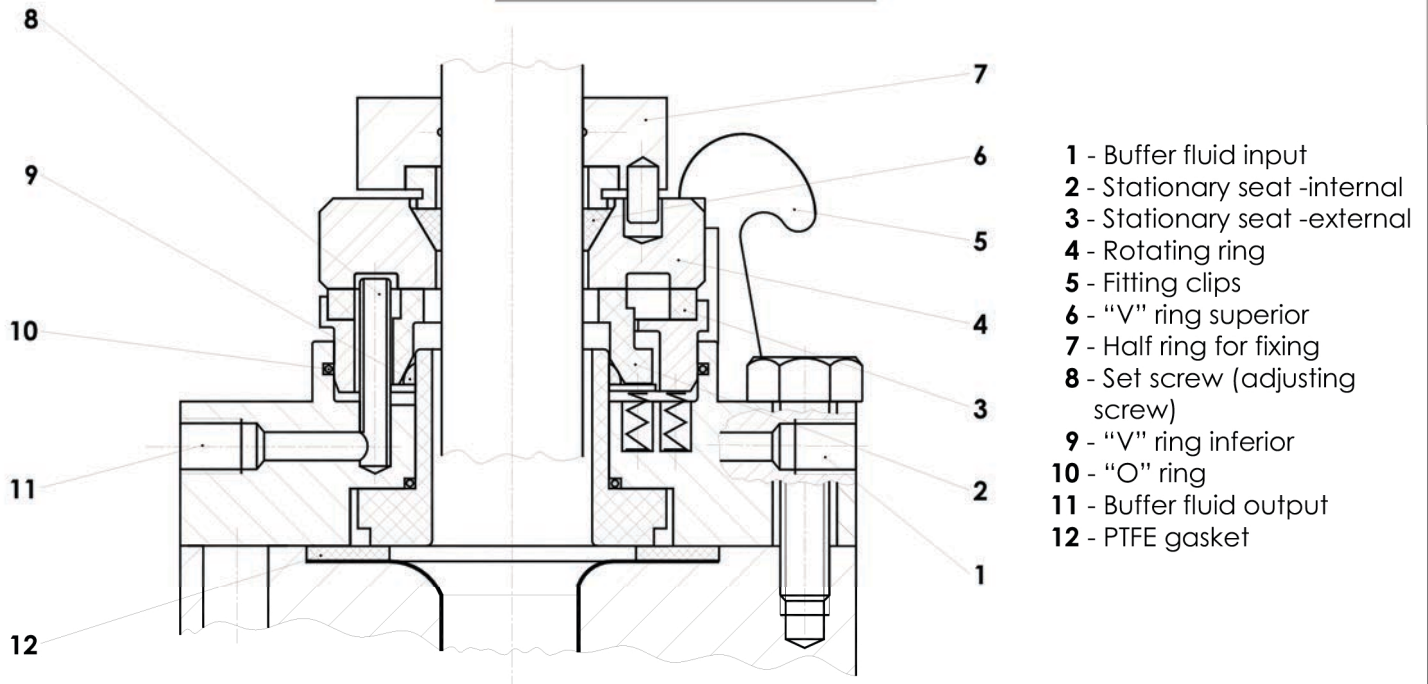
Nom. dim.	d ₃	d ₁₇	K ₂	d ₁₅	d ₁₆	n	d ₁	Flange dims.	Nom. dim.	H ₁	H ₁	H ₆	H ₇	H ₈	H ₁₀	D ₂	l
										without bearing	with bearing						
020	20	110	145	175	18	4	40	125	020	210	245	45	60	35	145	130	70
030	30	110	145	175	18	4	40	125	030	210	245	45	60	35	145	130	70
040	40	110	145	175	18	4	50	125	040	210	245	45	60	35	145	130	70
050	50	176	210	240	18	8	65	200	050	230	280	50	70	35	165	170	87,5
055	55	176	210	240	18	8	75	200	055	240	295	55	70	40	175	200	102,5
060	60	176	210	240	18	8	75	200	060	240	295	55	70	40	175	200	102,5
070	70	176	210	240	18	8	80	200	070	240	295	55	70	40	175	200	102,5
080	80	204	240	275	22	8	95	250	080	275	345	60	80	45	195	260	112,5
090	90	204	240	275	22	8	105	250	090	275	345	60	80	45	195	260	112,5
100	100	234	270	305	22	8	115	300	100	300	385	60	95	45	215	300	130
110	110	234	270	305	22	8	125	300	110	300	385	60	95	45	215	300	130
125	125	260	295	340	22	8	140	300	125	325	415	70	100	50	230	300	150

Coaxial Mechanical Seals For Agitators

Operating Limits

Nominal diameter $d = \varnothing 35 \dots \varnothing 150 \text{mm}$; Pressure of medium $P = \text{max. } 21 \text{ bar}$
 Rotational speed $n = 300 \text{rot/min}$; Temperature $t = -80 \dots 220^\circ\text{C}$

ERA-CO



- 1 - Buffer fluid input
- 2 - Stationary seat -internal
- 3 - Stationary seat -external
- 4 - Rotating ring
- 5 - Fitting clips
- 6 - "V" ring superior
- 7 - Half ring for fixing
- 8 - Set screw (adjusting screw)
- 9 - "V" ring inferior
- 10 - "O" ring
- 11 - Buffer fluid output
- 12 - PTFE gasket

 ERA - OM - A1 - 150 - G1 - CO

Designation

1 2 3 - 4 5 - 6 7 - 8 9 10 - 11 - 12 13

- 1 - Seal
- 2 - Reactor
- 3 - Agitator
- 4 - Without bearing
- 5 - Metallic vessel
- 5 - Enameled vessel
- 6, 7 - Type of flange
- 8, 9, 10 - Shaft nominal diameter
- 11 - Material code
- 12, 13 - Coaxial seal code

CODE

E
R
A
O
M
E
A0, A1... D2
CO

Instructions

The Agitator Seals have been developed to equip vessels with constructional and dimensional parameters according to **DIN 28136** and ensure sealing of the mixers rotating shaft to the stationary reactor part.

The following standards must be taken into consideration:

-**STAS 10688 - 82 and DIN 28136**: constructional features of the reactor

-**DIN 28137**: reactor flange

-**DIN 28159**: reactor shaft nominal diameter

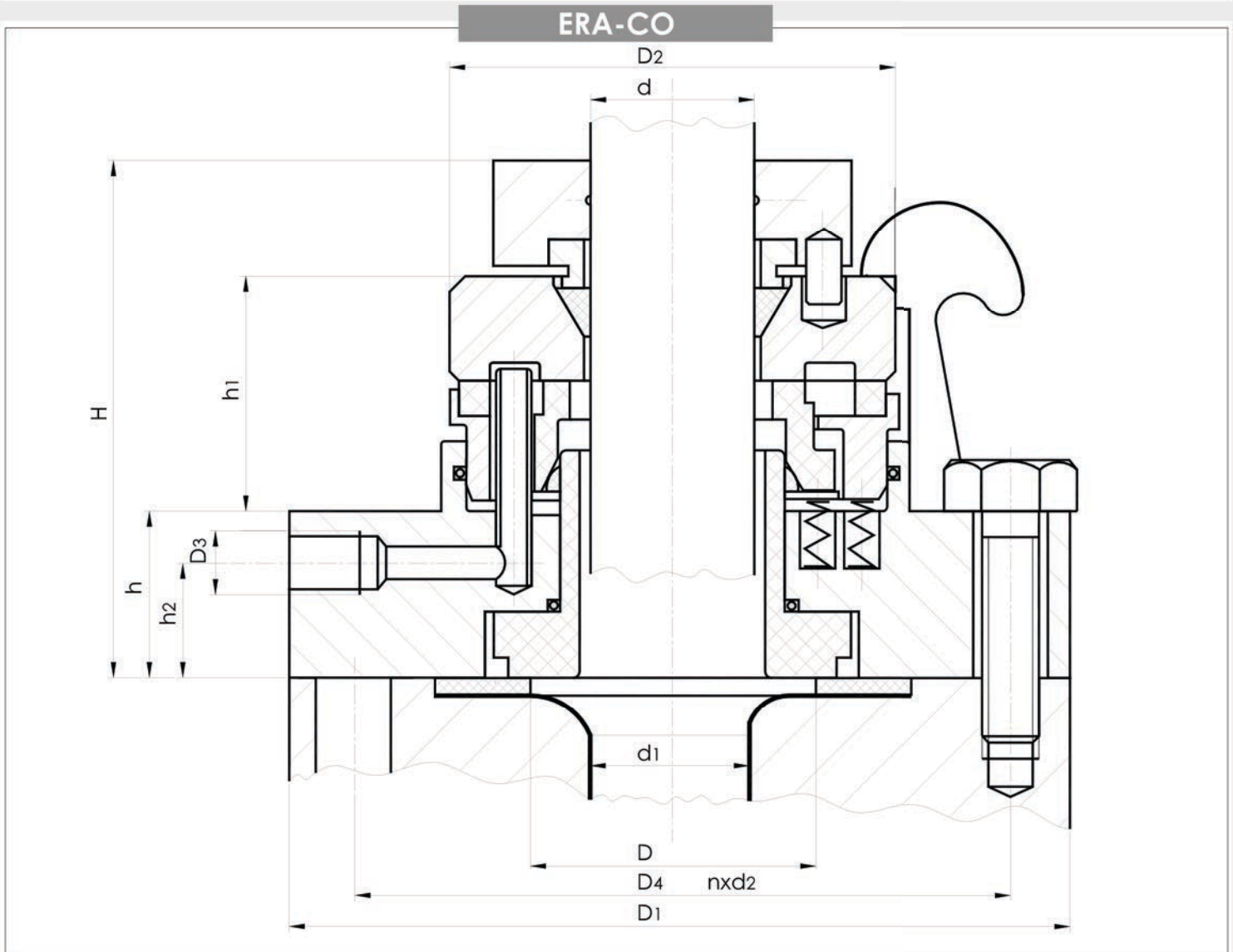
-**DIN 28138**: agitator seal dimensions

The **ERA - CO** Agitator Seals are provided with external buffer fluid circuit, compatible with the media from the vessel.

The selection of the used materials is based on the technological and operational conditions.

The perfect functioning of the agitator seal is essentially dependent on respecting of all requirements concerning shaft and flange deviation tolerances, as well as axial and radial run-out resulted from the bearings.

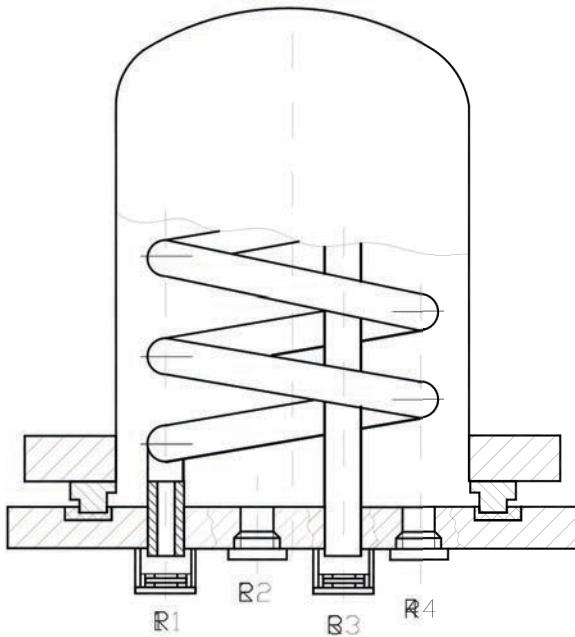
Mechanical Seal for Agitators



Dim. nom.	d	d ₁	D	D ₁	D ₂	H	h	h ₁	h ₂	D ₃	D ₄	nxd ₂	PN [bar]
040	40	42	66	175	102	113	33	52	21	G1/4	150	8x12	21
045	45	53	125	190	138	136	35	66	21	M14	164	8x13	25
050	50	52	70	183	118	116	32	81	21	G1/4	160	8x13	20
060	60	68	140	204	153	136	35	66	21	M14	179	8x13	20
065	65	73	155	219	168	136	35	66	21	M14	194	8x13	20
070	70	83	155	219	168	136	35	66	21	M14	194	8x13	20
075	75	83	155	219	168	136	35	66	21	M14	194	8x13	20
100	100	107,5	190	261	209,5	140	38	70	22	M14	235	8x13	18
110	110	117,5	190	270	219,5	140	38	70	22	M14	245	8x13	18
115	115	122,5	190	276	224,5	140	38	70	22	M14	250	8x13	18
120	120	125	185	295	207	171,5	36	64,5	36	G1/4	260	8x22	21
125	125	132	190	286	235	140	38	70	22	M14	260	8x13	17
130	130	160	251	337	267	176	47	76	31	M16	301,5	6x22	17
140	140	160	251	337	267	176	47	76	31	M16	301,5	6x22	17
150	150	160	251	337	267	176	47	76	31	M16	301,5	6x22	17

Accessories for Sealing Systems

Heat Exchanger



SC

1	2
---	---

 -

3	4
---	---

 -

5	6	7
---	---	---

SC - Literal symbol
1,2 - Code according to specifying study
3,4 - Thermal capacity (6kW, 12 kW)
5,6,7 - Nominal pressure in bar

Function: ensures cooling or heating of buffer fluids and regulation of the optimum operating temperature

Admissible operating pressure : 40 bar cooling coil
 16 bar housing

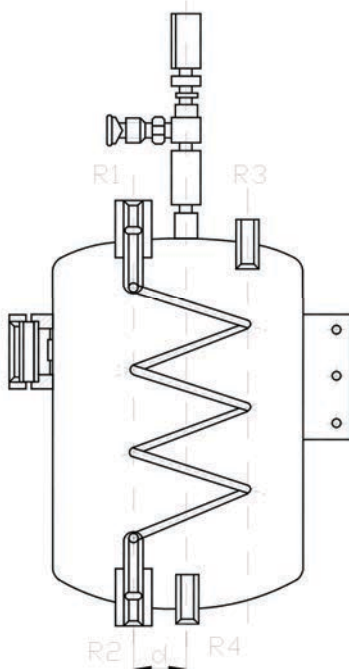
Admissible operating temperature : 200 °C cooling coil
 150 °C housing

Cooling surface effective : 0,07 m² ; 0,14 m² ; 0,28 m²

Operating medium : noncorrosive fluid against the material of the Heat Exchanger

It is manufactured in two variants of material combination : Stainless Steel and Carbon Steel.

Thermosiphon



TS

1	2
---	---

 -

3	4
---	---

 -

5	6	7
---	---	---

TS - Literal symbol
1,2 - Code Roseal
3,4 - Nominal capacity in liters (3l, 6l, 12l)
5,6,7 - Nominal pressure in bar

Application : ensures circulation of the buffer fluid and regulation of pressure and temperature on constant level during operation .

Admissible operating pressure : 16 bar

Admissible operating temperature : 200 °C

Operating medium : noncorrosive fluid against the material of the thermosiphon

Capacity : 3 l, 6 l, 12 l

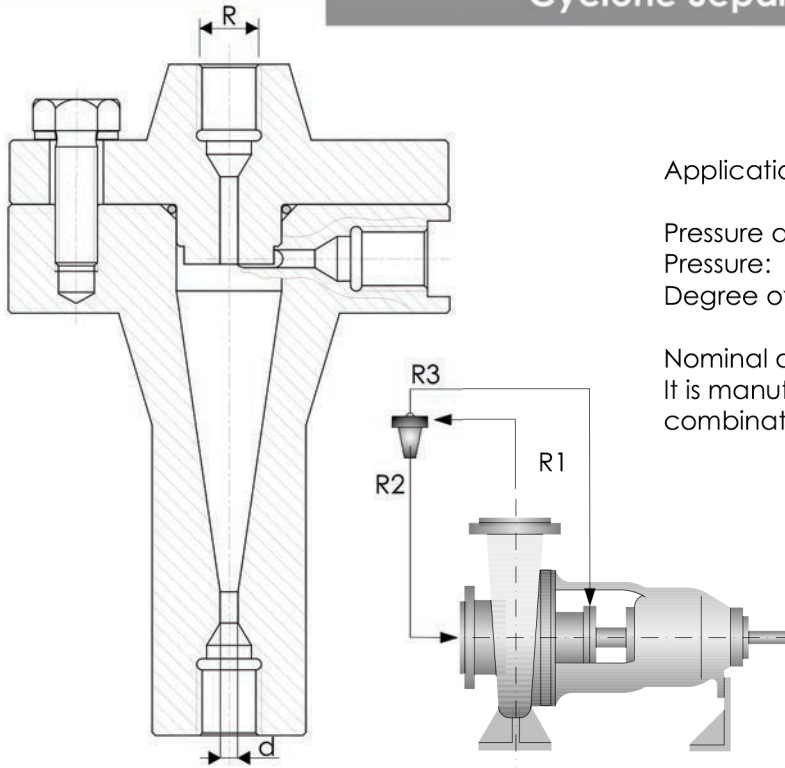
It is manufactured in two variants of material combination : Stainless Steel and Carbon Steel.

Accessories for Buffer Fluid Systems

1 2 3 - 4 5 - 6 7 8


1 - Literal symbol
 2,3 - Code Roseal
 4,5 - Nominal diameter
 6,7,8 - Nominal pressure in bar

Cyclone Separator

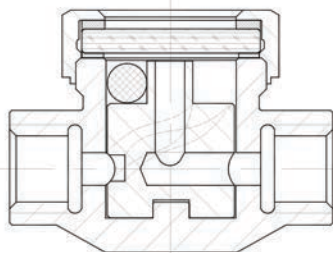


Application: Cyclone Separators are used for separation of abrasive particles from fluids
 Pressure difference : $\Delta p = 1,5 \dots 7,5$ bar
 Pressure: 40 bar max.
 Degree of separation: max. 97 % at $\Delta p = 7$ bar for particle size $10 \mu\text{m}$
 Nominal diameter: 10 mm , 15 mm , 20 mm
 It is manufactured in two variants of material combination: stainless steel and carbon steel.


Tip	R	d
Ciclon 010	M 14x1,5	4 / 4,5 / 5
Ciclon 015	M 20x1,5	5 / 6 / 7
Ciclon 020	M 24x1,5	7 / 8 / 9

 **CL - 35 - 10 - 040**

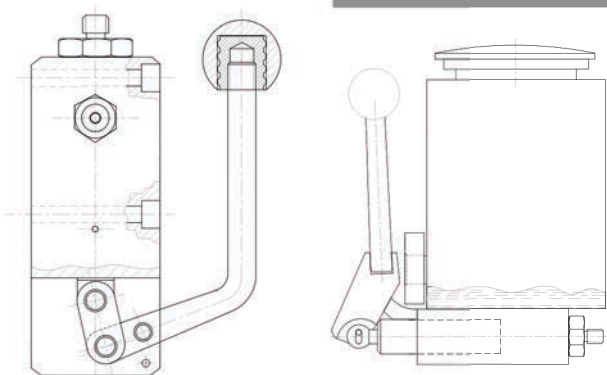
Flow Indicator



Application: ensures control of the fluid flow, in horizontal or vertical mounting
 Nominal pressure: 40 bar
 Operating temperature: max. $200 \text{ }^\circ\text{C}$
 Nominal diameter: 10 mm , 15 mm
 It is manufactured in two variants of material combination: stainless steel and carbon steel.

 **CNO - 35 - 10 - 040**

Refill Pump

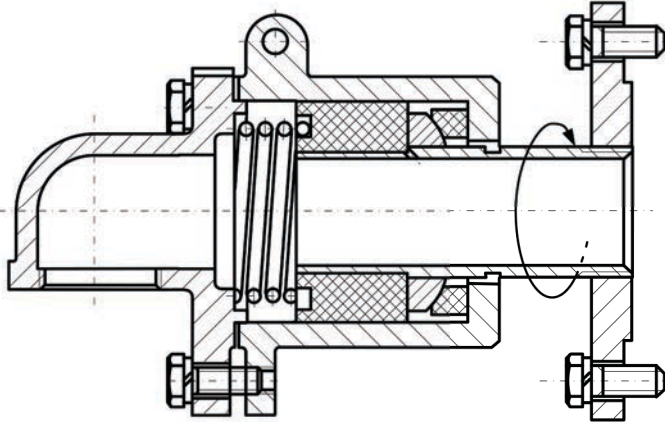


Application: ensures manual refilling of the buffer fluid under the operating pressure
 Operating pressure in housing: max. 40 bar
 Operating temperature in pump: max. $120 \text{ }^\circ\text{C}$
 Manual force at the handle: max. 25 daN
 Nominal flow rate: 0,2 l/min
 Piston stroke: 10 mm
 It is manufactured in two variants: with or without storage vessel

 **PM - 41 - 20 - 040**

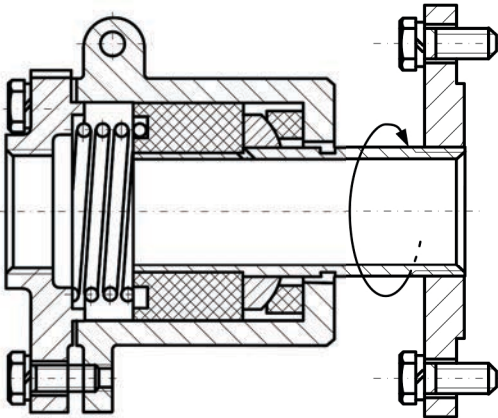
Axial Feeding Heads

Type I



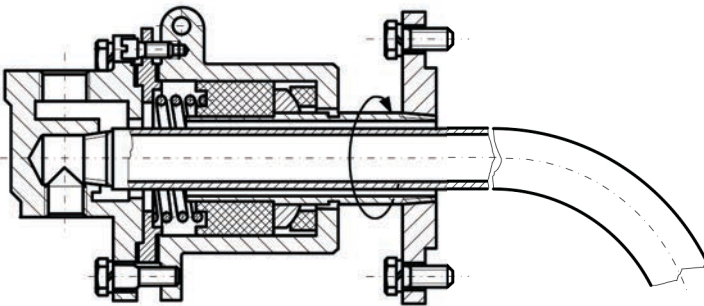
Application: ensures supply or elimination of the heating or cooling fluid in the cylinder of rolls
 Operating medium: water, steam, non corrosive oil against carbon steel, nontoxic, non inflammable
 Temperature: 5 ... 185 °C
 Pressure: 10 bar
 Rotating speed: 600 rot/min
 Nominal dimensions : 1", 1 1/2", 2"

Type II



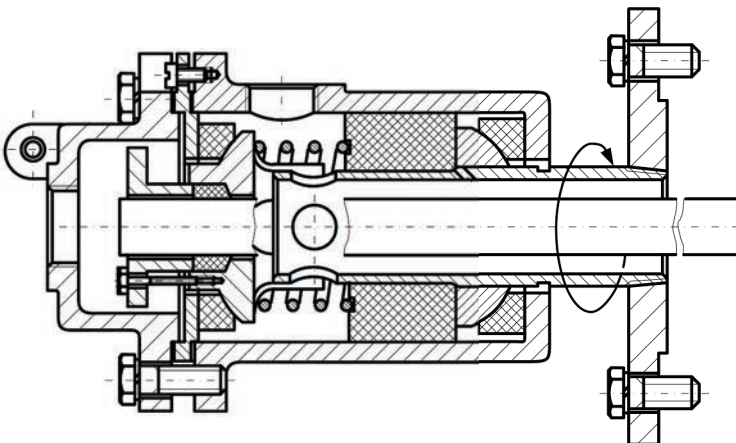
Application: ensures supply or elimination of the heating or cooling fluid in the cylinder of rolls
 Operating medium: water, steam, non corrosive oil against carbon steel, nontoxic, noninflammable
 Temperature: 5 ... 185 °C
 Pressure: 10 bar
 Rotating speed: 600 rot/min
 Nominal dimensions: 1", 1 1/2", 2"

Type III



Application: ensures supply or elimination of the heating or cooling fluid in the cylinder of rolls
 Operating medium: water, steam, non corrosive oil against carbon steel, nontoxic, noninflammable
 Temperature: 5 ... 185 °C
 Pressure: 10 bar
 Rotating speed: 600 rot/min
 Nominal dimensions : 1", 2"

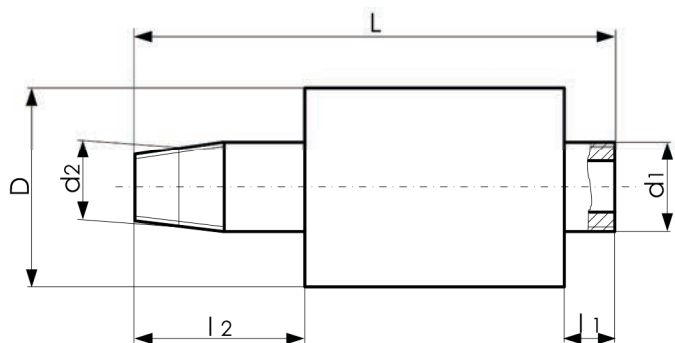
Type IV



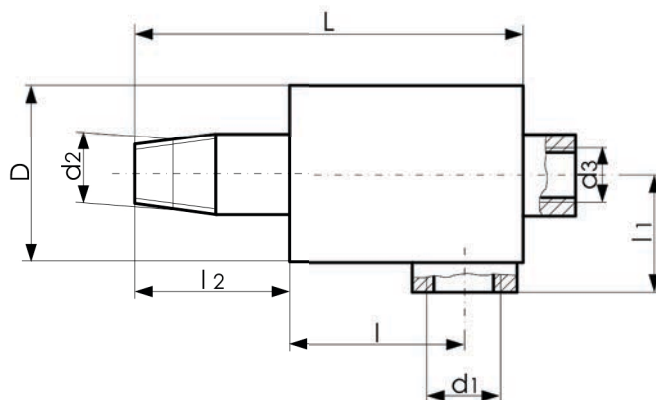
Application: ensures supply or elimination of the heating or cooling fluid in the cylinder of rolls
 Operating medium : water, steam, non corrosive oil against carbon steel, nontoxic, noninflammable
 Temperature: 5 ... 185 °C
 Pressure: 10 bar
 Rotating speed: 600 rot/min
 Nominal dimensions : 2", 3 1/2"

Axial Feeding Heads

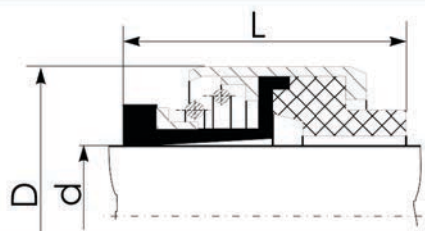
Single circuit axial feeding heads



Double circuit axial feeding heads



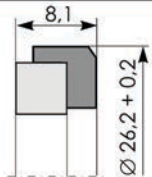
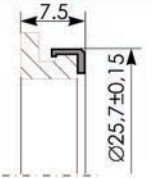
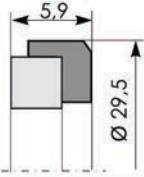
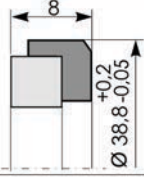
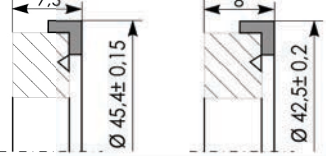
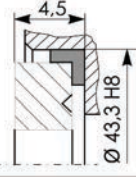
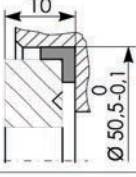
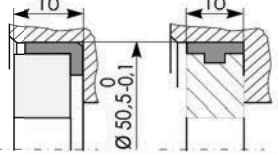
Denomination	Dimensions								Double circuit	Temperature °C	Rotation [min ⁻¹]	Pressure			Rolling bearing
	D [mm]	d ₁ [in]	d ₂ [in]	L [mm]	l ₁ [mm]	l ₂ [mm]	l [mm]	d ₃ [in]				Gas [bar]	Fluid [bar]	Vacuum [mm Hg]	
DR - M 10x1 (R 1/4") R.	28	Rp 1/8	M10x1	77	14	22	48	-	-	120	1000	air 10,5	oil 60	76	*
DR - M 10x1 (R 1/4") R.	28	Rp 1/8	R 1/4	77	14	22	48	-	-	120	1000	air 10,5	oil 60	76	*
DR - R 3/8" L.	45	Rp 3/8	R 3/8	102	22,5	26	52	Rp 1/4	*	175	1000	steam 8,5	water 60	-	*
DA - R 1/2" R. or L.	60	Rp 1/2	R 1/2	102	32,5	32	48	Rp 3/8	*	343	400	steam 17	-	-	-
WR - R 1/2" R.	57	R 3/4	R 1/2	135	17	41	-	-	-	110	2000	-	water 9	-	*
DA - R 3/4" R.	90	Rp 3/4	R 3/4	154	50	48	80	Rp 3/4	*	343	400	steam 17	-	-	-
DA - R 3/4" L.	90	Rp 3/4	R 3/4	154	50	48	80	Rp 1/2	*	343	400	steam 17	-	-	-
WR - R 3/4" R.	65	R 1	R 3/4	140	17	44	-	-	-	110	2000	-	water 9	-	*
DR - M 22x1,5 R.,L.	75	Rp 1/2	M 22x1,5	140	37,5	24	100	-	-	120	3500	air 10	oil 70	76	*
DA - R 1" R. or L.	100	Rp 1	R 1	189	57	60	95	Rp 3/4	*	343	400	steam 17	-	-	-
DR - R 1" L.	82	Rp 1	R 1	170	41	50	83	Rp 3/4	*	175	1000	steam 8,5	water 60	-	*
DA - R 1 1/4" R. or L.	120	Rp 1 1/4	R 1 1/4	215	75	65	100	Rp 1 1/2	*	343	400	steam 17	-	-	-
DA - R 1 1/2" R. or L.	140	Rp 1 1/2	R 1 1/2	237	90	65	123	Rp 1 1/2	*	343	400	steam 17	-	-	-

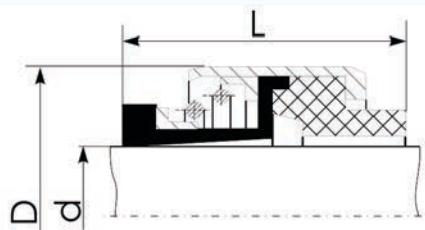


Mechanical Seals with Rubber Bellow

Cooling Fluid Pump for Thermal Engines

Medium: demineralized water + ethylene glycol, 1:1

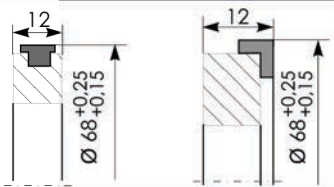
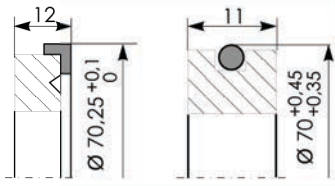
TYPE	Seal Dimensions				Operating Limits				Stationary Seat	Utilization
	D	d	L		Temperature [°C]		Max. pres. [bar]	Max. rotat. [rot./min.]		
			Free	Installed	min.	max.				
EF 11 x 26,2 x 15,6	∅ 24	∅ 11	15,6	13,6	- 40	+120	3	3000		
EF 12 x 26,2 x 15,6	∅ 24	∅ 12								
EF 15 x 25,7 x 12,8	∅ 32	∅ 15	14,5	12,8	- 40	+120	2	7000		Dacia
EF 15 x 29,5 x 12,8	∅ 32	∅ 15	14,5	12,8	- 40	+120	2	7000		Dacia
EF 15 x 38,8 x 12,8	∅ 32	∅ 15	14,5	12,8	- 40	+120	2	7000		Dacia
EF 19 x 45,4 x 13,3	∅ 39	∅ 19	16,7	13,3	- 40	+130	2,5	5000		Man-Saviem
EF 23 x 43,3 x 18	∅ 43	∅ 23	16	13,5	- 40	+100	5	5000		
EF 24 x 47 x 13,5	∅ 47	∅ 24	16	13,5	- 40	+120	3	5000		
EF 25 x 47 x 13	∅ 47	∅ 25	16	13,5	- 40	+120	3	5000		

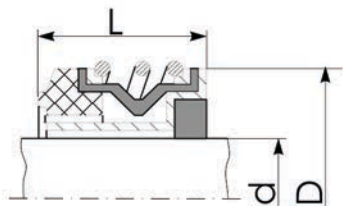


Mechanical Seals with Rubber Bellow

Cooling Fluid Pump for Thermal Engines

Medium: demineralized water + ethylene glycol, 1:1

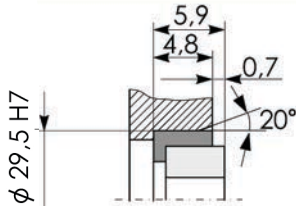
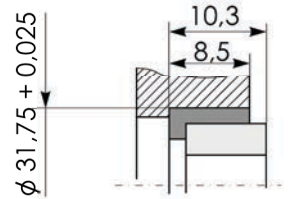
TYPE	Seal Dimensions				Operating Limits				Stationary Seat	Utilization
	D	d	L		Temperature [°C]		Max. pres. [bar]	Max. rotat. [rot./min.]		
			Free	Installed	min.	max.				
EF 40 x 65 x 18	∅ 64,5	∅ 40	21	18	5	90	2,5	3500		Railroad Diesel engine
EF 50 x 85 x 23	∅ 85,6	∅ 50	31	23	5	90	3,5	1750		"ALCO" Diesel engine

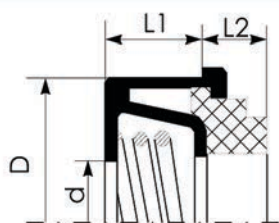


Mechanical Seals with Rubber Bellow

Cooling Fluid Pump for Thermal Engines

Medium: demineralized water + ethylene glycol, 1:1

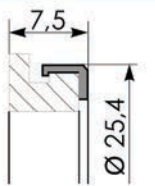
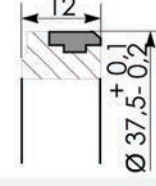
TYPE	Seal Dimensions			Operating Limits				Stationary Seat	Utilization
	D	d	L Installed	Temperature [°C]		Max. pres. [bar]	Max. rotat. [rot./min.]		
				min.	max.				
EF 16 x 29,5 x 18,3	31	15,87 ±0,05	18,3 ±0,3	-20	+120	4	4800		
EF 16 x 31,75 x 18,3	31	15,87 ±0,05	18,3 ±0,3	-20	+120	4	4800		



Mechanical Seals with Rubber Bellow

Cooling Fluid Pump for Thermal Engines

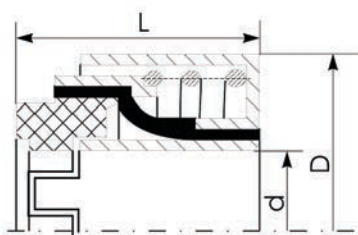
Medium: demineralized water + ethylene glycol, 1:1

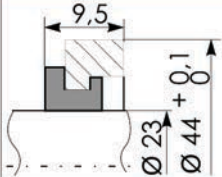
TYPE	Seal Dimensions					Operating Limits				Stationary Seat	Utilization
	D	d	L1	L2		Temperature [°C]		Max. pres. [bar]	Max. rotat. [rot./min.]		
				Free	Installed	min.	max.				
EF 16 x 36 x 15	∅ 36,6 +0,2 0	∅ 17	12,4	5,6	2,6 ± 0,5	- 40	+120	2,5	5000		LADA
EF 17 x 40 x 17	∅ 40 ± 0,33	∅ 21	12,4	6,6 ± 0,5	4,6 ± 0,5	- 40	+120	2	2400		U650
EF 20 x 42,8 x 18	∅ 42 +0,37 +0,06	∅ 21	8,5	10	8 ± 0,4	- 40	+120	2,5	5000		FIAT licence tractor engine

Mechanical Seals with Rubber Bellow

Cooling Fluid Pump for Thermal Engines

Medium: demineralized water + ethylene glycol, 1:1

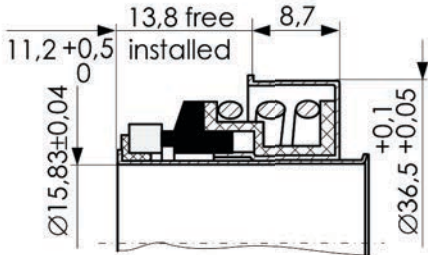
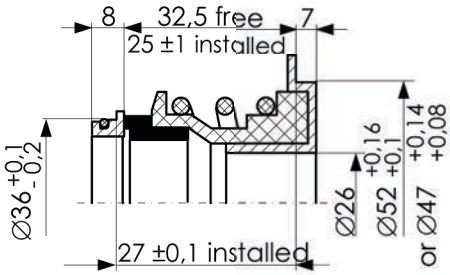
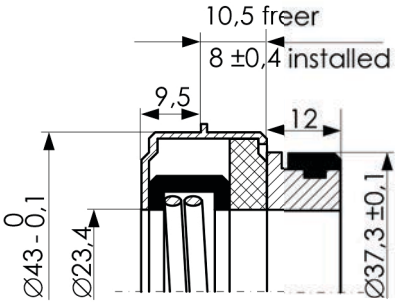


TYPE	Seal Dimensions				Operating Limits				Stationary Seat	Utilization
	D	d	L		Temperature [°C]		Max. pres. [bar]	Max. rotat. [rot./min.]		
			Free	Installed	min.	max.				
EF 52 x 32 x 20	∅ 52 +0,030 +0,011	∅ 32	24	20	- 40 C°	+120 C°	3	3000		D105A M500 MB836 MS83 MB820
EF 57 x 32 x 22	∅ 57 +0,170 0	∅ 32	24	22	- 40 C°	+110 C°	4	3565	-	MTU 331/396

Mechanical Seals with Rubber Bellow

Cooling Fluid Pump for Thermal Engines

Medium: demineralized water + ethylene glycol, 1:1

TYPE	Temperature [°C]		Max. pres. [bar]	Max. rotat. [rot./min.]	Dimensions	Utilization
	min.	max.				
EF 16 x 36,45 x 21	-40	+120	2,5	5500		DACIA ARO Tractors
EF 26 x 52 x 32 EF 26 x 47 x 32	-30	+130	2	5000		RÁBA
EF 22 x 43 x 17,5	-40	+120	2,5	4000		FIAT licence tractor engine

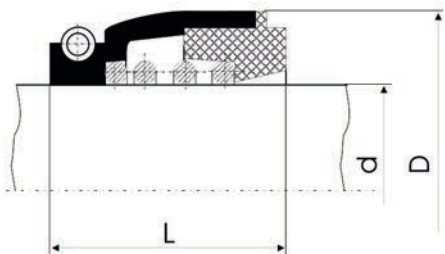
Mechanical Seals with Rubber Bellow

Cooling Fluid Pump for Thermal Engines

Food industry

Medium: demineralized water + ethylene glycol, 1:1

Foodstuffs



TYPE	Seal Dimensions				Operating Limits			
	D	d	L		Temperature [°C]		Max. pres. [bar]	Max. rotat. [rot./min.]
			Free	Installed	min.	max.		
EF 32 x 53 x 26	∅ 53	∅ 32	33.5	26	-10	+110	3	4000
EF 28 x 47 x 22	∅ 47.5	∅ 28	28	22	-10	+110	3	4000

Food industry

Foodstuffs

TYPE	Operating Limits				Seal Dimensions	
	Temperature [°C]		Max. pres. [bar]	Max. rotat. [rot./min.]		
	min.	max.				
EF 32 x 40 x 17	-10	+110	4,8	4000		
EF 32 x 41 x 25	-10	+110	4,8	4000		

Wear and Corrosion Resistant Spare Parts

Carbon materials

S.C. ROSEAL® S.A. produces bushes and rods made of carbon materials, which are used for pieces working in special conditions, such as :

- dry or mixed friction
- in contact with corrosive media
- high mechanical stresses

The main mechanical applications for carbon materials are :

- sealing rings for mechanical seals
- sealing rings for feeder heads
- rings for radial, contact or gap seals
- vanes for rotary compressors and pumps
- rings for radial or axial bearings
- piston rod packing

Metal Oxide

The ceramic material manufactured by **S.C. ROSEAL® S.A.** are from high content aluminum oxide, having high density, hardness, good wear resistance and high compression strength.

These properties make useful for :

- sealing rings for mechanical seals
- household taps, milling balls, pulling rings
- compressor plates
- shafts, axial or radial bearings
- nozzles, pistons
- electric insulator
- vanes for rotary compressors and pumps

PTFE

The PTFE material manufactured by **S.C. ROSEAL® S.A.** is used for:

- sealing rings for mechanical seals
- seat face rings
- secondary seal rings
- PTFE wrapped rubber "O" rings, bellows
- gasket rings, "O" rings reinforced with spring
- plates
- piston rings, distribution valves

Carbides

From Tungsten carbide or Silicon carbide **S.C. ROSEAL® S.A.** manufacture seal face rings .

Elastomers

S.C. ROSEAL® S.A. made silicone, nitrile, fluorocarbon, ethylene propylene elastomers used for:

- secondary seals
- "O" rings
- PTFE wrapped "O" rings
- rubber bellows
- gasket rings

Carbon Materials For Mechanical Applications

Generalities

S.C. ROSEAL® S.A. produces bushes and rods made of carbon materials, which are used for pieces which work in special conditions, such as :

- dry or mixed friction
- in contact with corrosive media
- high mechanical stresses

Carbon materials are used for these applications because of the following properties:

- high mechanical strength
- low wear due to self lubrication
- very good corrosion resistance
- low density
- dimensional stability

The main mechanical applications for carbon materials are :

- sealing rings for mechanical seals
- sealing rings for feeder heads
- rings for radial contact or gap seals
- rings for radial or axial bearings
- vanes for rotary compressors and pumps
- gas compressor packing

Carbon material grades

SYMBOL	BENDING STRESS	COMPRESSION STRESS	MODULE OF ELASTICITY	HARDNESS	APPARENT DENSITY	POROSITY	COEFF. OF THERMAL EXPANSION	COEFF. OF THERMAL CONDUCT.	MATERIAL TYPE
	σ_i	σ_c	E	HB	ρ		$\alpha \times 10^6$	λ	
	[N/mm ²]	[N/mm ²]	[N/mm ²]	5/62,5	[g/cm ³]	%	[1/K]	[W/mK]	
B1	22	50	20000	19	1,65	<1	15...20	2...5	RESIN BONDED
B4	25	35		25	2,05	<1			RESIN BONDED LEAD ADDED
B13	30	65		29	1,55	20			CARBON GRAPHITE NOT IMPREGNATED
B14	35	135	14000	40	1,7	3,5	3...4	5	CARBON GRAPHITE RESIN IMPREGNATED

All physical data are average values.

Carbon Materials for Mechanical Seals

Resin bonded carbon materials, grades B1, B4



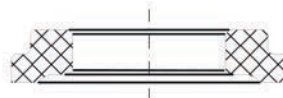
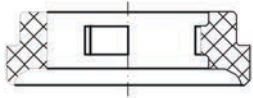
These materials are used in big series and mass productions such as mechanical seals for automotive cooling pumps, because of their pressing to size ability, which means that only the sliding surfaces need machining.

Also half made pieces such as rings, rods, bushes can be produced, which will be machined to the final dimensions.

The using area of resin bonded carbon materials is more limited than that of the baked and impregnated ones, because of their lower mechanical and corrosion resistant properties determined by the resin used as a binder.

They are shown some frequently made sealing rings.

On customers' request other types can be delivered.



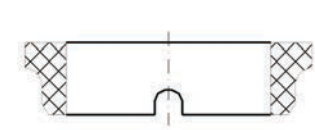
Baked and impregnated carbon materials, grade B14



Because that half made baked pieces are porous, for sealing application they must be impregnated.

The density of the impregnation is diminished with its depth. For this reason sealing rings are impregnated after their machining to the close final dimensions. Thus higher density and lower permeability is assured.

Sealing rings for mechanical seals made of grade B 14 carbon materials are permeability tested with compressed air or nitrogen.



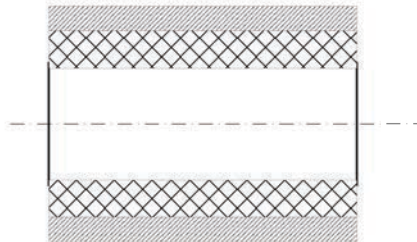
Note: Sealing rings for mechanical seals made of carbon materials, with super-finished sliding surfaces, so they must be handled with care. In comparison with metals, carbon materials are more fragile for which shocks and vibrations must be avoided.

Carbon Materials for Bearings

Bearings are made of impregnated or unimpregnated carbon materials. They are working generally in dry or mixed friction conditions. Mixed friction appears when bearings work in fluids with low hydrodynamic lubricating properties.

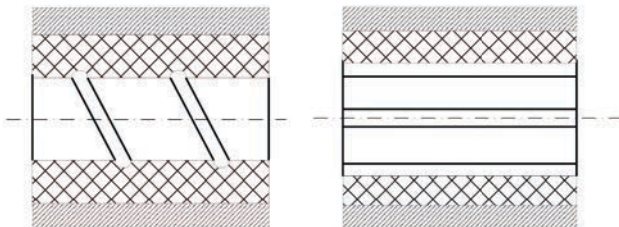
Bearings are produced according to customers' designs.

Radial Bearings with Smooth Bores



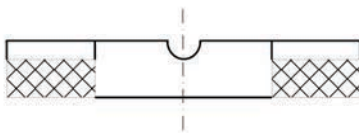
They are used for dry running conditions.
Machining is made in **IT 7, IT 8** tolerance class, having the roughness of the bore $R_a=1\ \mu\text{m}$.

Radial Bearings with Lubricating Grooves



Sometimes for wet running are used bearings with lubricating grooves in the bore. They can have spiral or axial form.

Axial Bearings



The axial bearings generally have facial grooves which help to establish a lubricating film between the bearing faces.

Note:

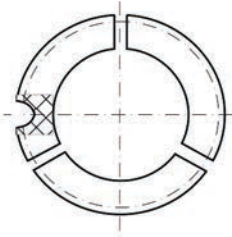
Because of their lower strength and of their brittleness compared with metals, bearings of carbon materials are usually fitted by pressing or shrinking in metal holders. For the bearing play design it is necessary to specify that, because of the shrinking stress up to the shrinkage temperature, the bore of the bearing expands with a coefficient of thermal expansion close to the holders' one.

For shaft material is recommended one as hard as possible.

Carbon Materials for Radial Seals

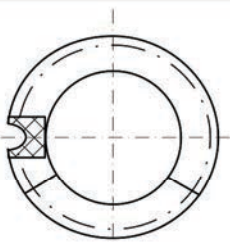
Radial seals are used to seal components in rotation or translation. They can be with or without contact. Carbon material **B14** is used for its self lubricating properties and corrosion resistance to the sealed media. Radial carbon seal rings are usually made from several segments.

Contact Seals



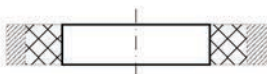
These assures the smallest leakage because of the permanent contact between sealing ring and shaft due to the radial forces which act on segments. The wear is compensated by the decreasing of the gaps between the segments. To increase the efficiency of the seal, more sealing rings with staggered joint gaps can be fitted in the same chamber. The rings are set in the chamber and to one another with pins to prevent rotation.

Gap Seals



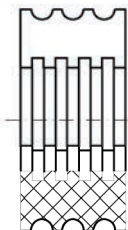
Sealing rings without contact are used in seals where the wear of the rings is expected to be higher. Although they are alike as the contact seals, they are designed in that way, that at the beginning of the working period they work like a contact seal, but after the running in period when the joint gaps disappear, the wear of the bore stops, and a very small gap is established (theoretical zero, practical in accordance with the maximal imperfections of machining and assembly).

One Piece Carbon Gap



One piece carbon gap seals are generally shrunk into a metal holder. In this case, fit plays are maintained even on the operating temperature, because of the shrinkage stress the carbon ring expands with a little smaller coefficient of thermal expansion than that of the metal holder.

Labyrinth Seals

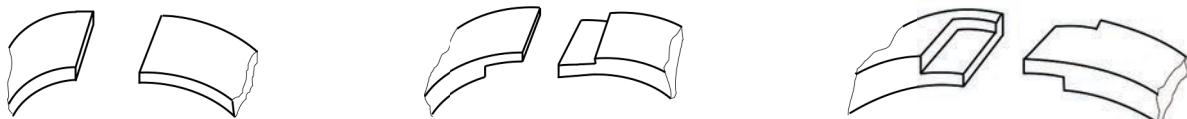


Labyrinth type seals made of carbon materials, present grooves of different forms in the bore of the ring.

Because of the self lubricating property gripping danger is reduced, so a smaller clearance can be kept comparative with other materials.

Segment gap or contact seals are delivered as complete rings. Usually the segments are marked for eliminate the risk of wrong fitting. For keeping the segments together, they have peripheral grooves in which spiral, tension springs are fitted which assures also part of the contact pressure.

According to the functioning requests the end of segments may have different forms, from simple radial split to overlapped ones. Some solutions are shown in following figures:



Carbon Materials for Sealing Rings of Feeder Head Seals

This application is a particular form of the mechanical seals.

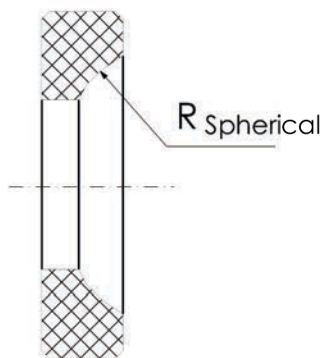
These devices are used to feed or /and to evacuate steam, hot water or cooling water from the rotating cylinders of the rolls.

Because the rotation an oscillatory movement appears too, the friction rings of feeder head seals are so designed to allow the compensations of these motions. Most frequently they have concave respectively convex spherical surfaces of friction.

In feeder heads one of the two sealing ring made of carbon material has also the role of bearing because of it's good frictional properties.

The most commonly used carbon grade is B14. For easier conditions, when temperature is below 100°C, B1 carbon grade can be used too.

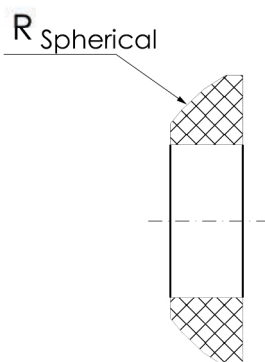
Concave friction ring



These kind of rings are used in feeder heads of our current production.

They are made in different sizes and also according to the customers' documentation.

Convex friction ring



This kind of rings are made on request, according to the customers' documentation.

Carbon Materials for Vanes and Housing Components of Rotary Compressors and Vane Pumps

Carbon materials of **B14** grade are largely used for making vanes and housing components for rotary compressors and vane pumps.

The using area of these machines are various, they offering the best solutions where oil lubrications is not allowed or where metals can't resist to the corrosive action of the media.

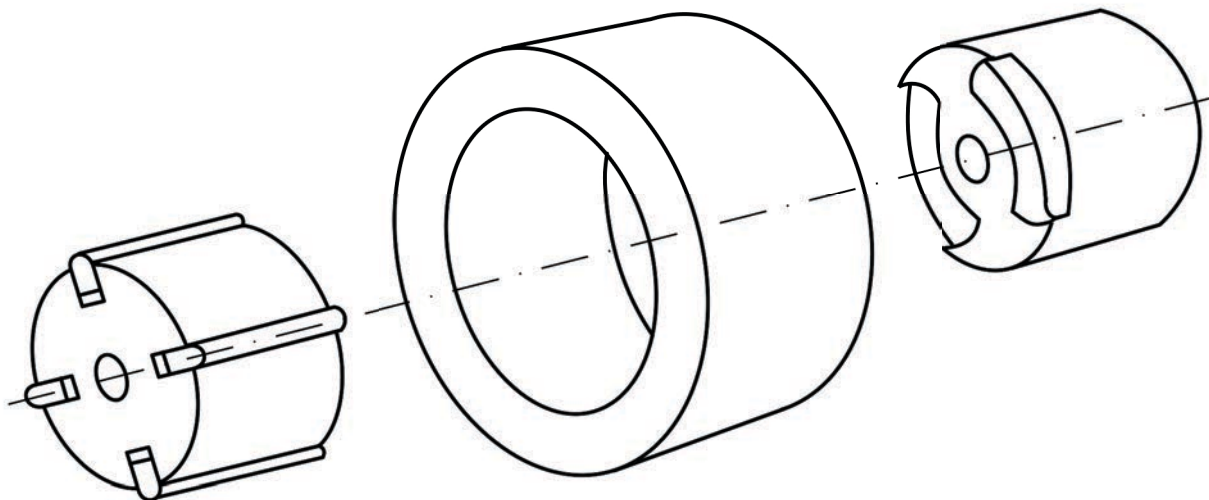
Carbon materials are used for these applications because of the following properties:

- high mechanical strength
- low wear due to self lubrication
- very good corrosion resistance
- low density
- dimensional stability

Vanes are made in tolerances of **IT7**, **IT8**, having their edges slightly rounded and good surface finishing.

Also it is necessary that all the frictional surfaces of slots in the rotors and of housing components to be machined as fine as possible.

Thus the wear of vanes is reduced considerably.

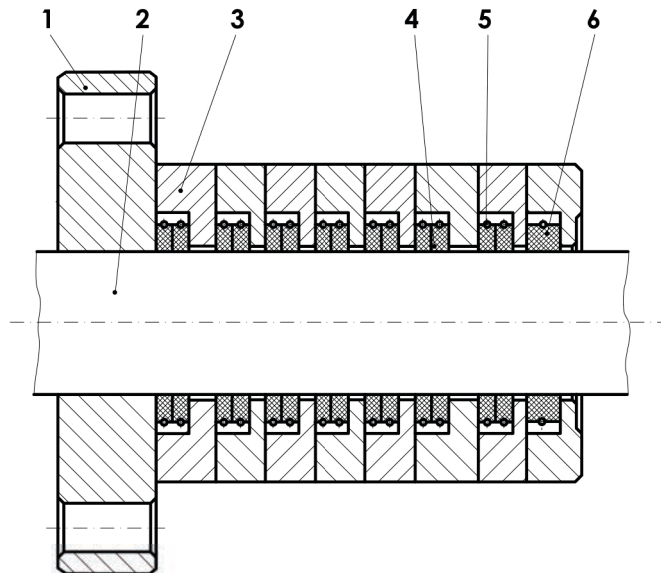


Gas Compressor Packing

Radial seal rings are used for sealing of piston rods of gas compressors. One example it is type **10 GKNA 2** made in USSR.

The carbon seal rings are made from several segments. These assures the smallest leakage because of the permanent contact between sealing ring and piston rod due to the radial forces which act on segments. The wear is compensated by the decreasing of the gaps between the segments.

On request can be made piston rod packing with different sizes.

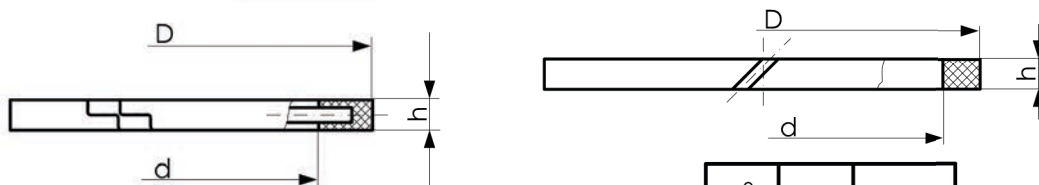


Piston Rod Packing

- 1 - Flange
- 2 - Piston rod
- 3 - Housing
- 4 - Sealing segments
- 5 - Spring
- 6 - Seal ring

The material are carbon or PTFE

Piston ring



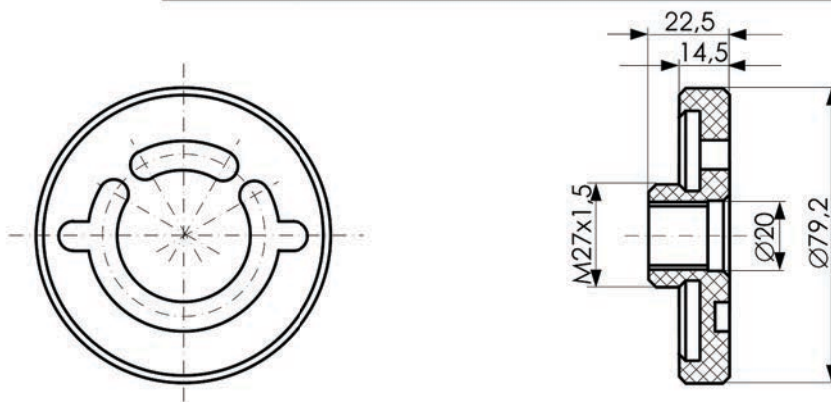
D _{0,-0,1} ⁰	d	h
114	94	7,6 _{0,-0,1} ⁰
110	91	7,6
74	58	6 _{0,-0,1} ⁰

D _{0,-0,1} ⁰	d	h
322,5	298	11,8 _{0,-0,1} ⁰
201	169	19 _{0,-0,1} ⁰
110	93,7	24,2
72	60	10 _{0,-0,1} ⁰

Material:
PTFE+25% graphite

Material code: Y2

Distribution valve



Material: PTFE

Milling Balls

Utilization

Spherical milling bodies, made of high aluminum oxide content are used for milling glazes, white cements, enamels, different abrasives, pigments, dyes, inks, lacquers, atomic fuels, alumina, a. s. o.

Having high density, hardness, good wear resistance and high compression strength, milling balls support very well mechanical shocks and friction during milling.

Due to their run in surface and their low porosity, milling balls can be easy cleaned at the end of the process.

Material Properties

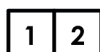
Al₂O₃ content 89%
 Apparent density min. 3,5 g/cm³
 Compression strength min. 1500 MPa
 Hardness Mohs min. 8
 Porosity zero
 Wear depends on milling conditions

Size

Nominal diameter	Weight	Number of balls	Specific surface
inches	kg/pcs	pcs/kg	m ² /kg
1 1/2	0,116 ± 0,004	9	0,0410
1 3/4	0,188 ± 0,004	6	0,0372
2	0,265 ± 0,005	4	0,0324
2 1/2	0,468 ± 0,005	2	0,0253

Codification

Milling Ball



1 = Diameter in inches

2 = ROSEAL® material code

Ceramic Plates for Household Taps

The ceramic valve plates, made of high aluminum content oxide are used for household water taps, for cold and for hot water.

Advantages of Super Aluminous Ceramics

- high grade of hardness
- good wear and corrosion resistance
- super finished closing surfaces

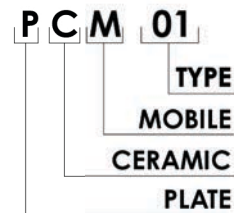
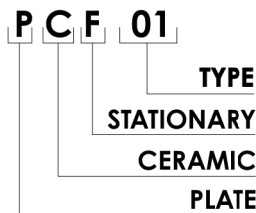
The Advantages of Using Ceramic Plates

- easy handling (Quarter of a turn movement for fully open or fully close)
- tightening independence to tap handling forces
- continuous and permanent running in

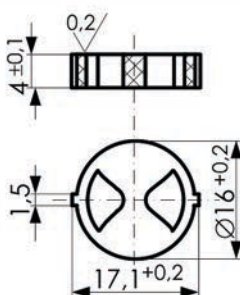
Technical Features

- ROSEAL material code V1
- Al₂O₃ content 89 %
- Apparent density..... 3,5 g/cm³
- Compression strength 1500 MPa
- Hardness Mohs min. 8
- Flatness of active surfaces 0,6 μm
- Roughness of active surfaces (Ra) 0,2 μm

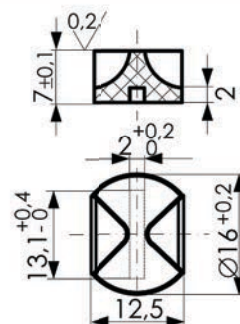
Designation



PCF 01

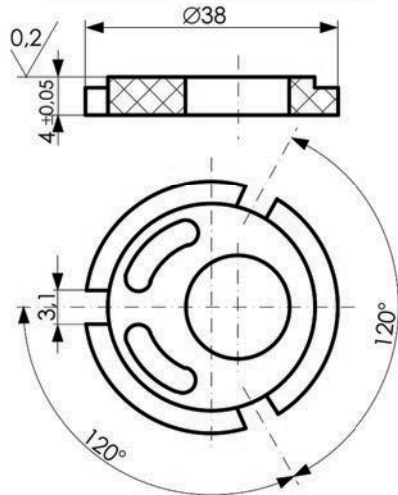


PCM 01

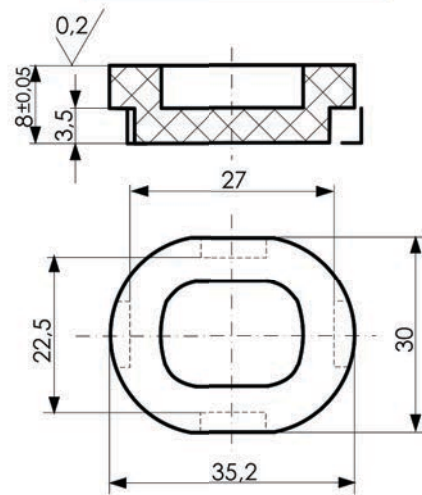


Ceramic Plates for Household Taps

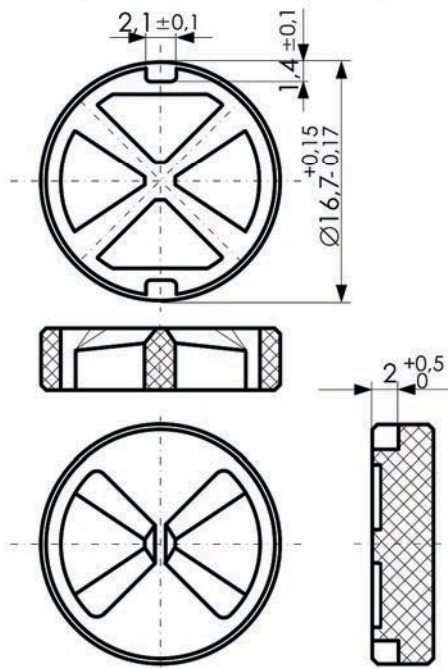
PCF 02



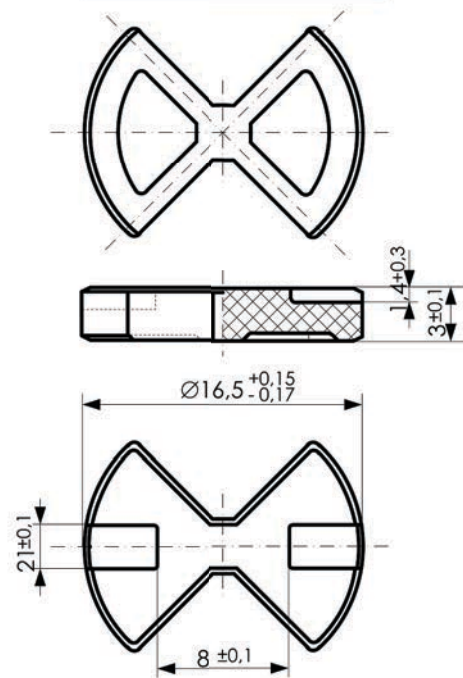
PCM 02



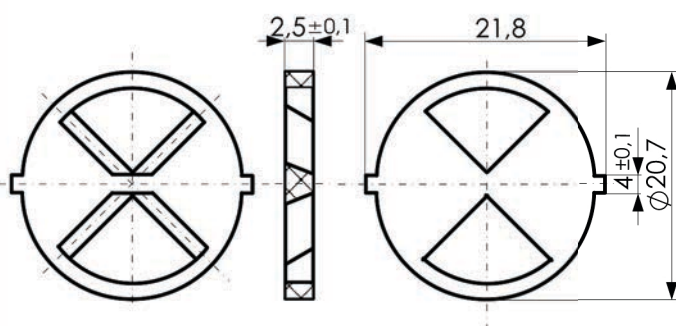
PCF 03



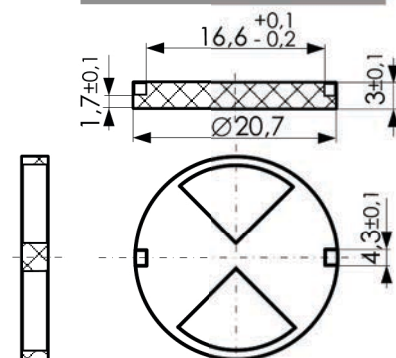
PCM 03



PCF 04

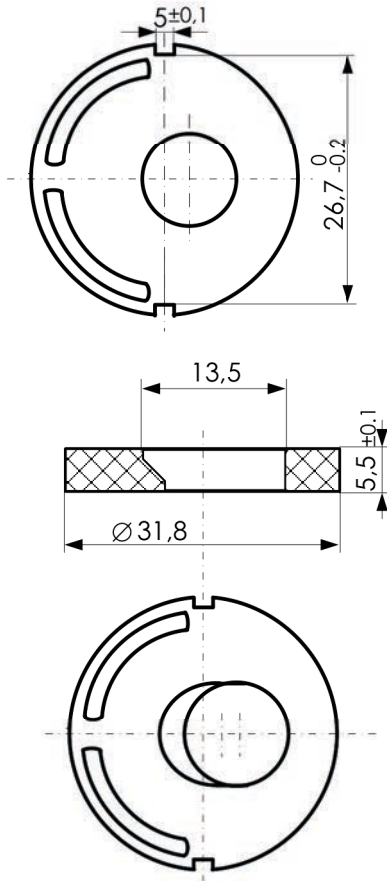


PCM 04

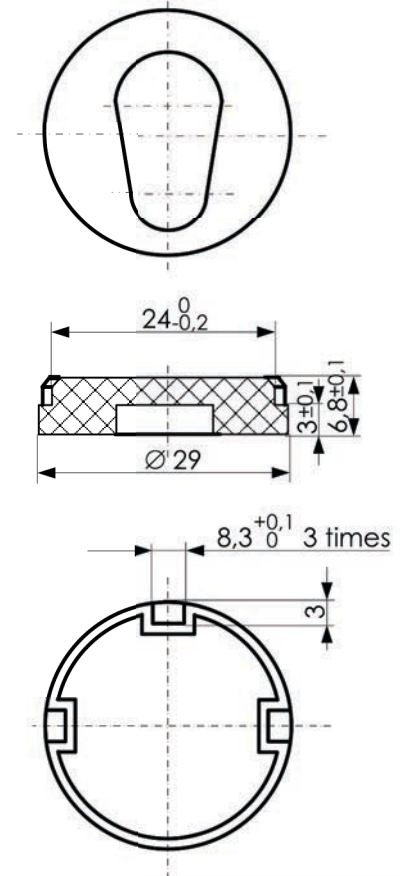


Ceramic Plates for Household Taps

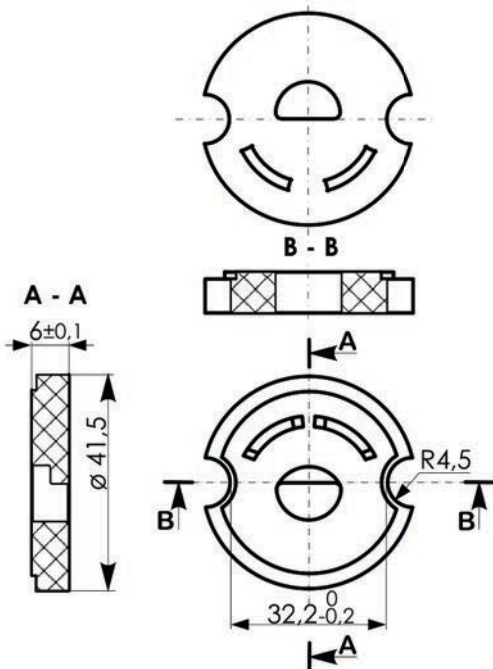
PCF 05



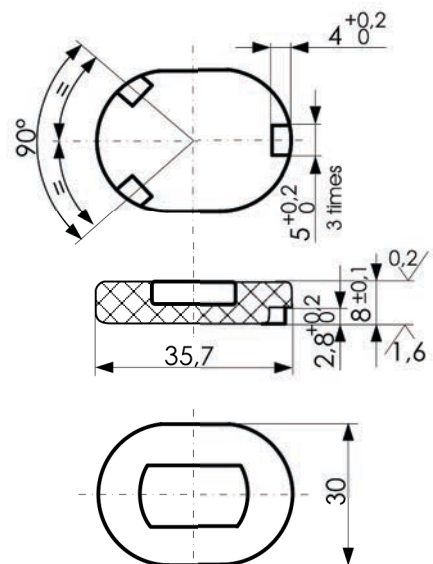
PCM 05



PCF 06

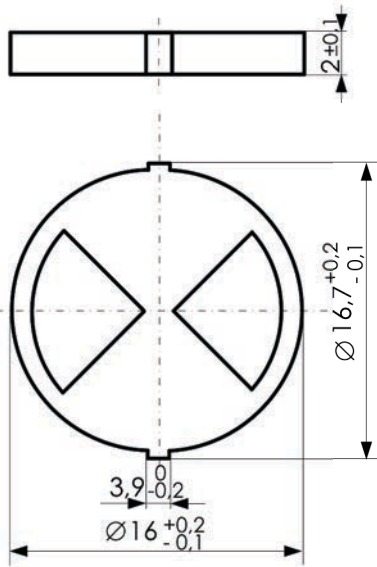


PCM 06

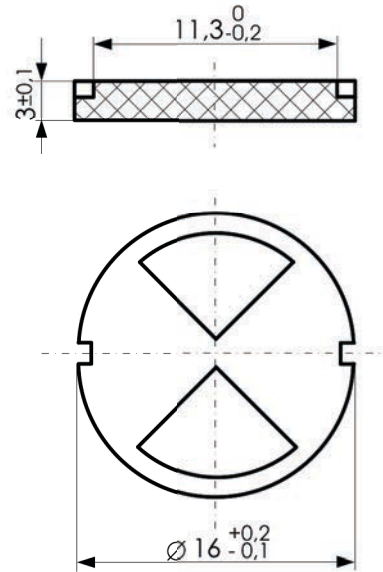


Ceramic Plates for Household Taps

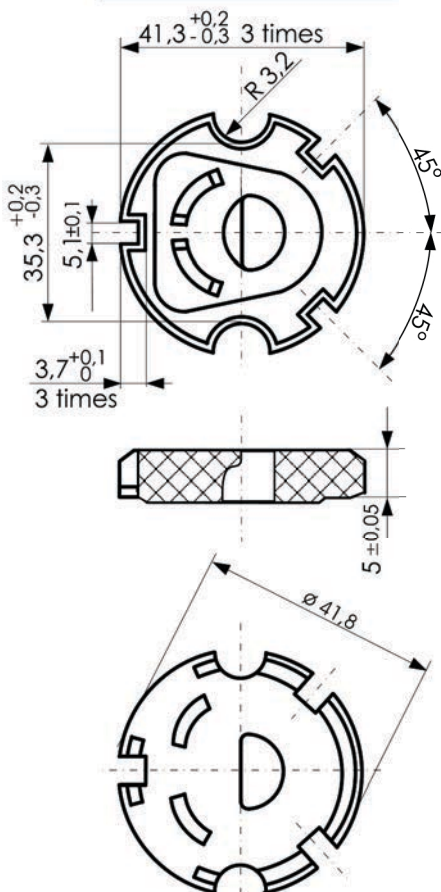
PCF 07



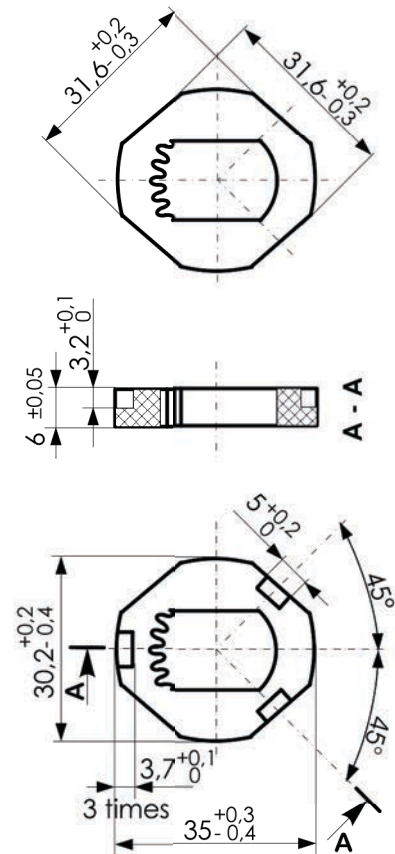
PCM 07



PCF 08

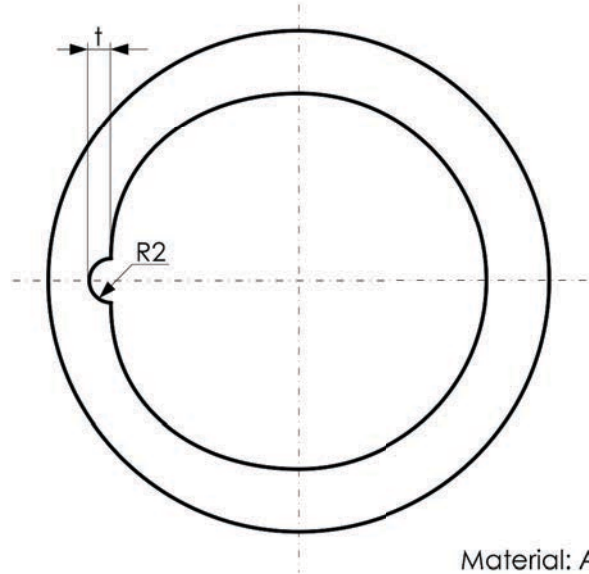
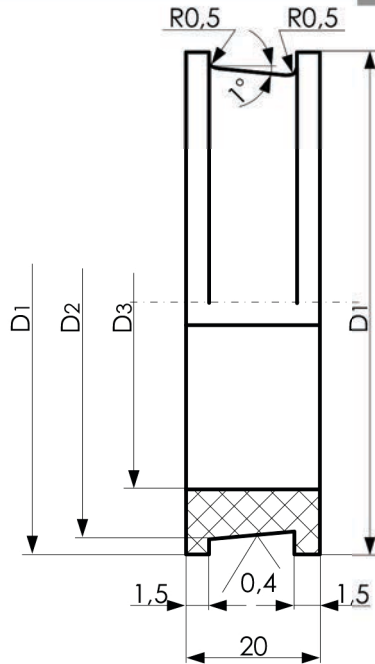


PCM 08



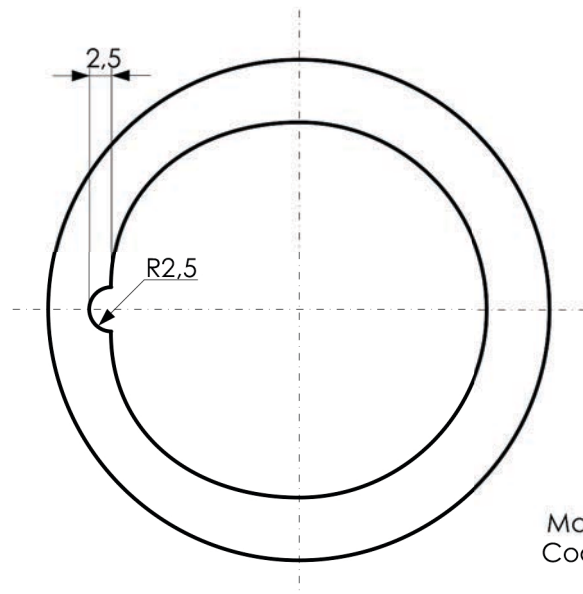
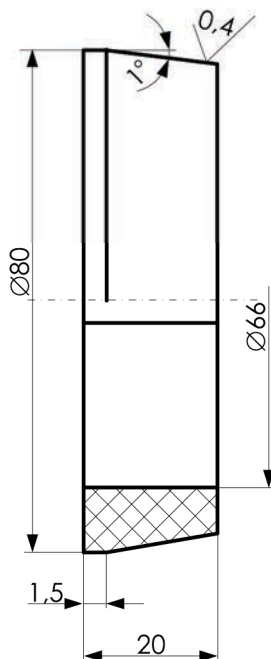
High Aluminum Oxide Content Spare Parts

Pulling Ring



Material: Al₂O₃ - 89 %
 Codification Roseal®: V₁

Denomination	D ₁	D ₂	D ₃	t
Pulling ring I	200	199.8	108	4
Pulling ring II	128	127.8	108	4
Pulling ring III	82	81.8	62	4
Pulling ring VI	52.6	52.4	33	3
Pulling ring V	160.5	160.3	140	4
Pulling ring VI	102.7	102.5	83	4
Pulling ring VII	65.7	65.5	46	4



Material: Al₂O₃ - 89 %
 Codification Roseal®: V₁

Magnetic Liquid Rotary Seals

Generalities

Magnetic liquids, also known as ferrofluids or magnetic fluids, which have recently entered numerous fields of science and technology as new magnetic materials, produced a true revolution in seals sealing technology.

A small quantity of magnetic liquid, which brings together the properties of customary high liquids with those of magnetic materials, offers the possibility to seal rotating shafts, even at high rotation speed, without any leakage.

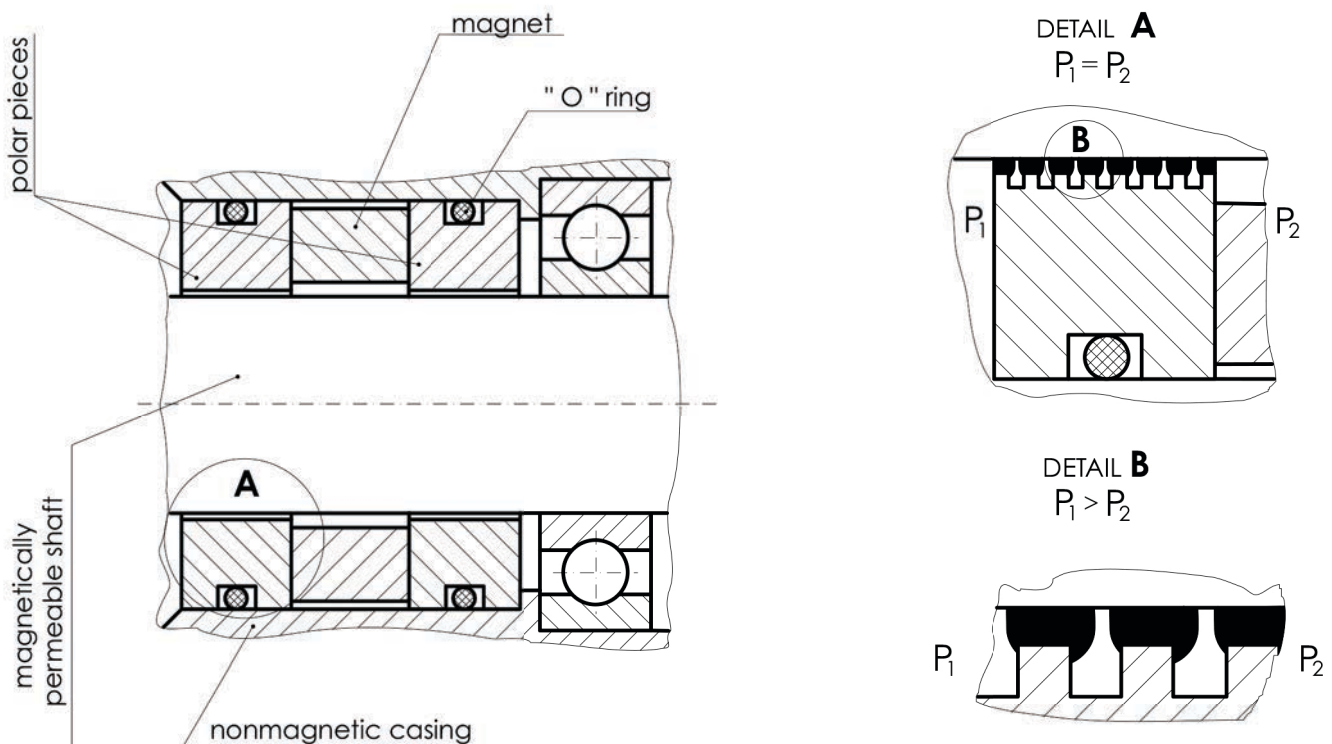
The Principle Of Magnetic Liquid Seals

Among the numerous effects specific to magnetic liquids, such as levitation, self levitation, surface instabilities, movement induced by a rotating magnetic field etc., in the case of magnetic liquid seals the most important is the possibility of positioning of a certain quantity of magnetic liquid by a nonuniform magnetic field. The magnetic force proportional to the field gradient and the liquid magnetization, will maintain the magnetic liquid in the prescribed space, against forces due to gravitation, centrifugal effects or pressure differences.

As it follows from the sketch given below, in the gap between the rotating shaft and the fixed part of the seal, which is included in the magnetic circuit of a permanent magnet, a strongly nonuniform magnetic field is created. The magnetic liquid introduced in the gap will take the form of "O" rings around the shaft, perfectly sealing the space between the parts in relative movement.

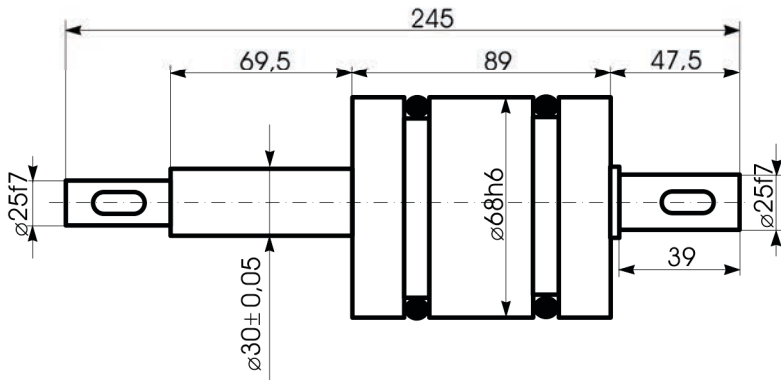
The magnetic liquid seals may be used only for gases. They are unreplaceable in the cases when one need a perfectly tight vacuum feed through or a perfect rotating seal for toxic, radioactive or very expensive gases at moderate pressures.

Sketch Of Magnetic Liquid Sealing Principle



Magnetic Liquid Rotary Seals

Type: ELMS - Ø 30 - CCP - SF 6

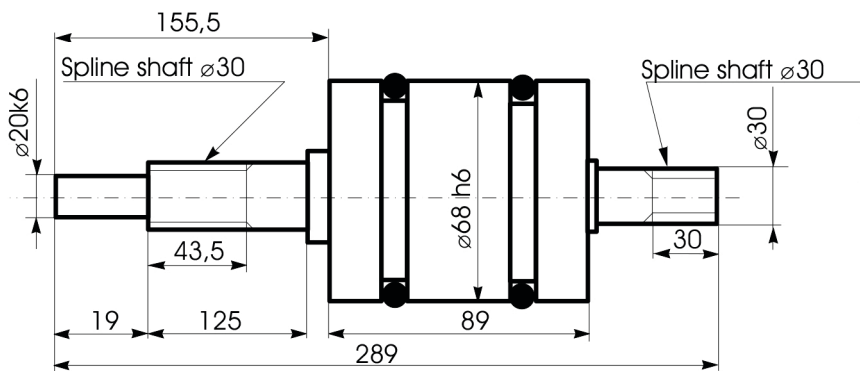


Medium: Sulfur hexafluoride

Ambient Temperature: -33°C ... +70°C

Pressure: 10⁻³ ... 1 bar (6 bar)

Type: ELMI - Ø 30 - C3 - SF 6

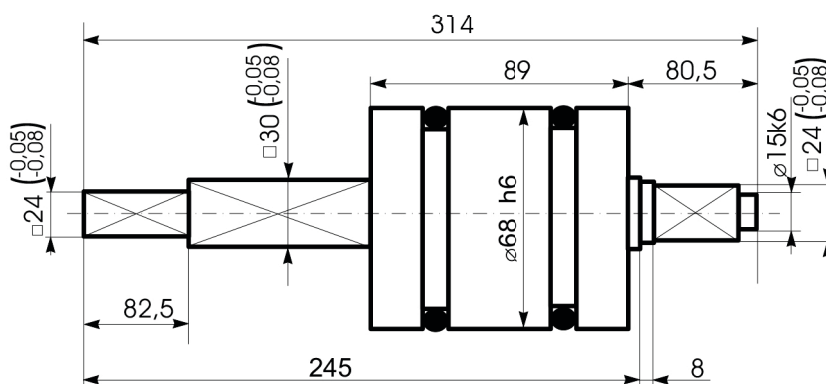


Medium: Sulfur hexafluoride

Ambient Temperature: -33°C ... +70°C

Pressure: 10⁻³ ... 1 bar (6 bar)

Type: ELMI - Ø 30 - Pt - SF 6



Medium: Sulfur hexafluoride

Ambient Temperature: -33°C ... +70°C

Pressure: 10⁻³ ... 1 bar (6 bar)



DATA SHEET

MECHANICAL SEAL

SELLER

S. C. ROSEAL S. A.
Odorheiu Secuiesc

Ref .

Completed by Customer	1	Customer				Data for Equipment Identification							
	2					Type							
	3					Maker							
	4					Installation							
	5	Ref. No.		Date		Department							
	6					Pos .							
	7	Working Data											
8	Fluid			Charact. of Equipment			Material of Equipment						
9	Compos	%		Perm. Duty			Rotor						
10	Solid. Content	Nature		Intermit. Duty			Shaft						
11		%		Flow		m3/h	Shaft sleeve						
12		Av. Part Size		Suction Pressure	max	bar	Connection						
13	Density	kg/m3			min	bar	Housing						
14	Temperature	°C		Discharge Pressure	max	bar	Mechanical Seal Mater.						
15	Vapour	m bar			min	bar	Symbol ROSEAL DIN 24296						
16	Viscosity	c P		NPSH	available	m	Seal ring						
17	Boiling Point	°C			Nec.	m	Seat						
18	Melting Point	°C		Sinking Depth		m	Sec. Seals						
19	Toxic	Flammable	Explosive	Rotation		min ⁻¹	Springs						
20				Shaft		mm	Met. Parts						
Completed by Seller	21	Seal Installation Dimensions						Notice Office					
	22							Name					
	23							A1		Sign			
	24							A2		Date			
	25							B		Selected Seal Symbol			
	26							C		ROSEAL			
	27							D		DIN 24960			
	28							E		Selected materials			
	29							F		Symbol ROSEAL		DIN 24960	
	30							G		Seal ring			
	31							H		Seat			
	32							I		Sec. Seals			
	33							J		Springs			
	34									Met. Parts			
35	Data for Sealing System												
36	API Plan	Sealant		Flushing		Accessories		Spec. Requirement					
37		Fluid		Fluid		Thermosiphon		Quench					
38		Flow rate		Flow rate		Refilling Pump		Flushing					
39		Temp.		Temp.		Flow Indicator		Heating					
40		Pressure		Pressure		Cooler		Circulation					
41	Remarks												
42													
43													
44													
45													



DATA SHEET

AGITATOR SEAL

SELLER

S. C. ROSEAL S. A.
Odorheiu Secuiesc

Ref. No. _____

Completed by the Customer	1	Customer			Data for Equipment Identification		
	2				Type		
	3				Maker		
	4				Installation		
	5	Ref.No.	Date		Department		
	6				Pos.		
	7	Working data					
	8	Fluid		Working Temperature	Working Pressure	Compatible fluid	
	9						
	10	Toxic	Flammable	Explosive	Polymerises.	Cristallises	Abrasive
	11						
	12	Process Cycle Details					
	13						
	14	Shaft Ø	mm			Vessel Flange :	
	15	Rotation	min ⁻¹			Vessel Material:	
	16	Shaft Pos.	Horizontal	Vertical	Shaft Material :		
	17	Shaft Entry	Top	: Bottom	Lining Material :		
	18	Available Services	Water	Steam		Sealant	
Completed by the Seller	19	Installation Dimensions				Notice Office	
	20					Ø d1	Name: _____
	21					Ø d2	Sign: _____
	22					Ø d3	Date: _____
	23					Ø d4	Selected Agitator Seal Symbol:
	24					n	
	25					L1	Product Side Ms Symbol
	26					L2	Seller
	27					L3	DIN 24960
	28					L4	Atmospheric Side MS Symbol:
	29					L5	Seller
	30					L6	DIN
	31					L7	Main Materials
	32					R1	Housing
	33					R2	Sleeve
34		Packing					
35	Data for Sealing System						
36	Sealant	Accessories		Spec. Requirements			
37	Fluid	Thermosiphon		Quench.			
38	Flow rate	Refilling Pump		Flushing			
39	Temperature.	Flow Indicator		Heating			
40	Pressure	Cooler		Cooling			
41	Remarks :						
42							
43							
44							
45							

Romania

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