Inner Values Perfectly Sealed

Mechanical seals for difficult conditions

ADITEC
SEALING TECHNOLOGY
Teamwork guarantees performance!

The range of applications for seals is almost unlimited. As is the scope of advice we give and the products we make.

Markus Böttcher, in-house sales, ADITEC GmbH

To be able to fulfill all our customers' requirements, ADITEC GmbH provides for the development and production of high-quality axial face seals, in some cases using GOETZE technology, as well as offering technical advisory services and distribution of static and dynamic seals from renowned manufacturers. These products are indispensable in mechanical engineering and plant construction, gearbox manufacturing, vehicle construction, medical engineering, pump construction, hydraulic and pneumatic applications, agricultural machinery and dishwashers and washing machines.

Products

- → Elastomer couplings (rubber-metal connections)
- → Flat, fabric, axial face and special seals
- → Seal rings/ceramic/carbon/chrome steel/stainless steel
- → Piston, packing, O, V and X rings
- → Shaft sealing rings (axial and radial sealing rings)

ADITEC GmbH is a Künemund Group company, with its headquarters in Engstingen-Haid. The company combines the development and production of its own seals with advice and sales.

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Content

Delivery Program

The wide product range includes Mechanical Face Seals as well as static and dynamic seals for every need. In case of questions we like to help you with technical advice.

Seals – high tech technology:
→ GOETZE-Industrial Parts with the best manufacturing know-how
Mechanical Face Seals:
→ for pumps-, hydraulics-, chemical apparatus,
→ for high temperatures, chemical agressive substances as well as dry trend
PTFE Seals:
→ for high temperatures, chemical agressive substances as well as dry trend
Mechanical Face Seals:
→ for building industry vehicles with excellent resistance to abrasion
Wiper Seals:
→ to protect seals from dirt particles, with metal insert, inside or outside
V-Rings:
→ on the versions VA/VS/VL/VE or beyond drawing up to bore hole diameter 1200 mm
Rubber/Web-Seals:
→ closed or slitted, with easy installation to the sealing before or against the bearings in steelwork and paper factories
G-Seal Rings:
→ to the sealing of needle roller bearing, performance DINA
O-Rings:
→ to the sealing of multiplex applications
AXIAL-Shaft Seal Ring:
→ to the sealing of bearings, axis and shafts
RADIAL-Shaft Seal Ring:
→ beyond DIN or beyond drawing up to bore hole diameter 1200 mm in NBR, FPM, SI, AC or other materials
Slide Bushings/Shaft Protection bushings:
→ Working as running area/running partner of radial lip seals. (for example gear box shafts etc.)
Piston Rings:
→ for shock absorbers-compressors-hydraulic-vehicle construction
Elastomer Couplings:
→ for absorption of angular displacement and rotary swinging (GIUBO)
Pistons:
→ for all applications also in special design
Assemblies:
→ piston running box & piston rings, installation ready
Rubber-Metal-Bondings:
→ on desire or beyond drawing
Rotary Joints:
→ coolant, hydraulik, air
Statical Seals:
→ for sleeves, flaps, lids, engines and at vehicle constructions, water radiated or punched, beyond drawing
Taper roller bearings:
→ to the sealing of taper roller bearings

Slot rings, Piston-Spear Seals, Packages, Supporting Rings and Roof Cuffs.

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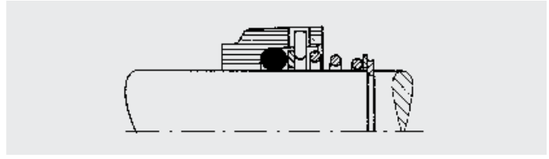
NTN/SNR-Base:
Bearings of all executions and fittings

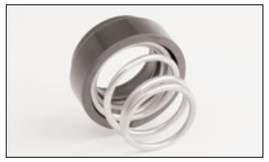
NTN/SNR

Mechanical face seals

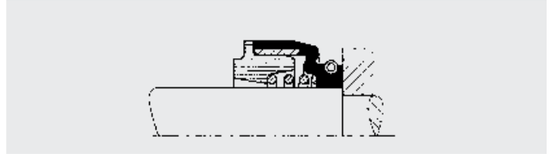
Types (Extract)

Type 76.12

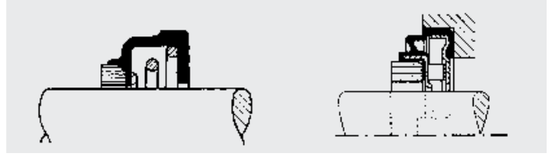


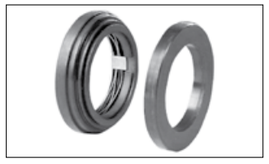


Type 76.53

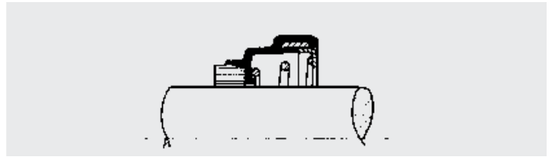


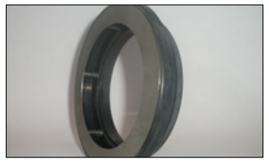
Type 76.60/76.62
Special type for dish washer



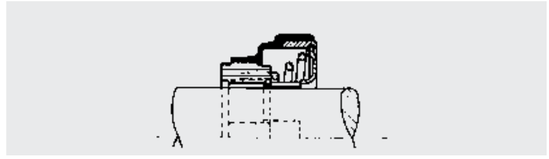


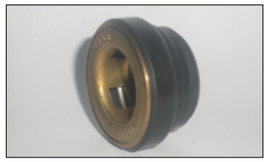
Type 76.61



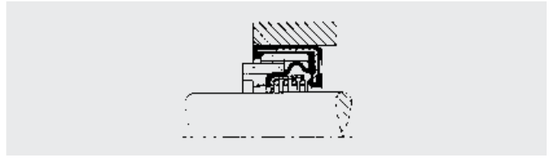


Type 76.66

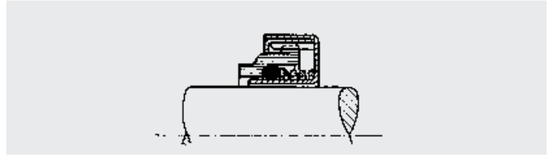


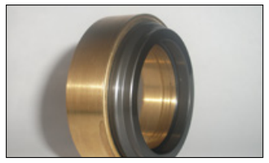


Type 76.68



Type 76.70/76.71

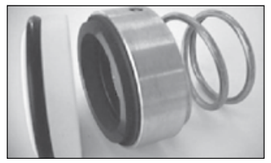




Standard and additional program

Typ ADT – 70.13

Typ ADT – 76.12

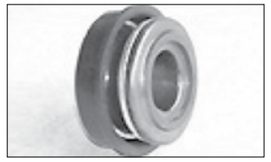


Typ ADT – 76.15

Typ ADT – 76.53

Typ ADT – H 70.70

Typ ADT – 70.550



Typ ADT – 76

Typ ADT – 8RX

Typ ADT – 70.100

Typ ADT – 70.200

Typ ADT – 70.300 A

Typ ADT – 76.73 S

Typ ADT – SLV

Typ ADT – Spezial

Typ ADT – AC

Typ ADT – 76.17 S

Typ ADT – CMP

Typ ADT – DRA

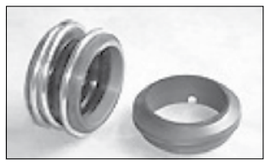
Typ ADT – E8 S

Typ ADT – E9 S

Typ ADT – 76.62

Typ ADT – GL

Typ ADT – E10 S



Typ ADT – 76.57/EB2

Corresponding counter faces on request

Material combinations

Type 76.12 carbon/Al_2O_3/stainless steel

Mechanical face seal for straight shafts, rotating spring
→ Single seal
→ Unbalanced
→ Conical spring
→ Rotating directions clockwise or levorotatory
→ Dependent from shaft rotation direction
→ EN 12756 (DIN 24960)
The mechanical face seals type 76.12 ... are marked by the solid, spring loaded carbon slide ring. This seal gets mainly used in water pumps, heating circulation pumps. This seal type is typically used for simple applications.

Application limits (important reference)
d1 = 6 to 40 mm
p1 = 10 bar
t = -20 to +180 deg.
vg = 15 m/s
Max axial movement ± 1,0 mm

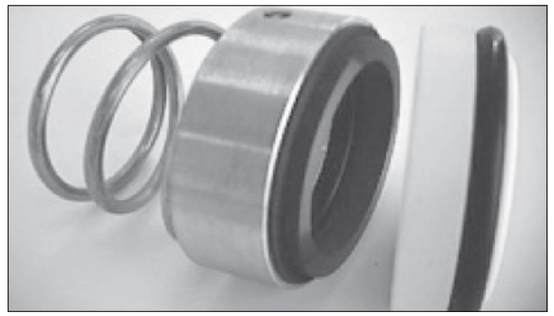
Materials
Slide ring: carbon
Counter face: typical type 76.22-
stainless steel or austenitic CI (DULENIT) or Al_2O_3

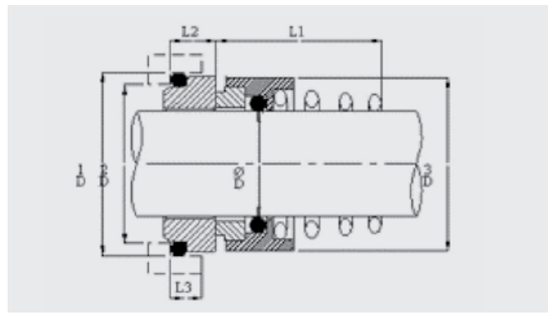
Type 76.15 carbon/Al_2O_3/stainless steel

Mechanical face seal with conical, rotating spring and stainless steel housing
→ single seal
→ unbalanced
→ conical spring
→ rotating directions clockwise or levorotatory
→ Dependent from shaft rotation direction

Application limits
d1 = 10 to 70 mm
p1 = 10 bar
t = -20 to +180 deg.
vg = 20 m/s

Materials
Slide ring: carbon
Counter face: typical type 76.21-/76.22-/76.24-
stainless steel or austenitic CI (DULENIT) or Al_2O_3





Mechanical face seals

Type 76.53 slide ring carbon;
rubber bellow NBR/FPM/EPDM
Counter face **stainless steel**

Application area
→ Chemical Industry
→ Water and sewage technic
→ Soapy water/lye

Features
→ Works standard
→ Rotating with the shaft
→ Single seal; Spring inside; protected by the bellow
→ Unbalanced
→ Independent from rotation direction of the shaft

Application limits (important reference)
d1 = 6 to 70 mm
p1 = 8 bar max.
t = -20 to +180 deg.
vg = 15 m/s

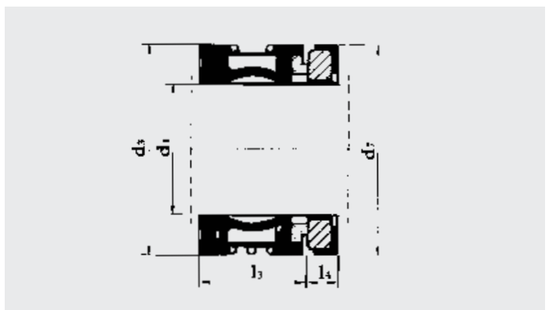
Materials
Slide ring: carbon
Counter face: typical type 76.21-/76.22-/76.24-
stainless steel or austenitic CI (DULENIT) or Al_2O_3

Type 76.57/EB2

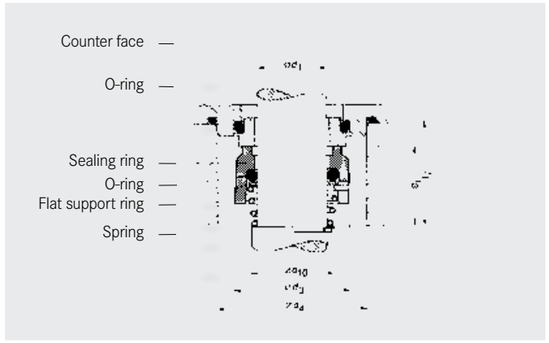
Technical datas
→ Single acting
→ Unbalanced
→ Single spring
→ Bayonet spin protection
→ Independent from direction of rotation

Application limits (important reference)
d1 = 10 to 100 mm
p1 = 16 bar
t = -40 to +140 deg.
vg = 10 m/s

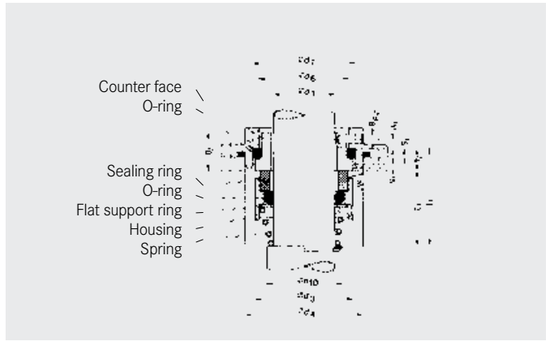
Materials
Slide ring: carbon (Z32); SIC (U42)
Rubber bellow: FPM; EPDM
Other construction materials: stainless steel



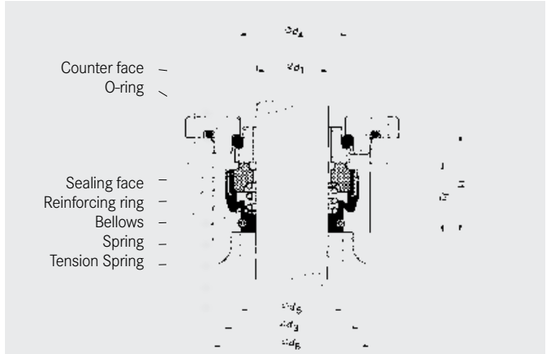
Mechanical Face Seals



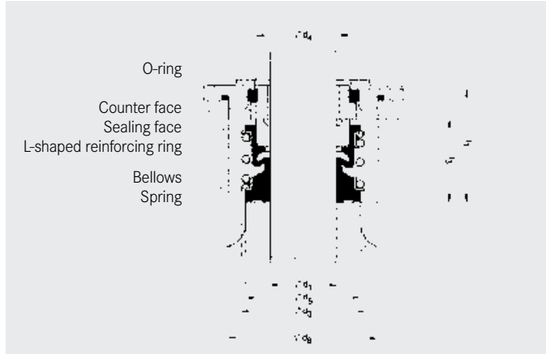
Type 76.12



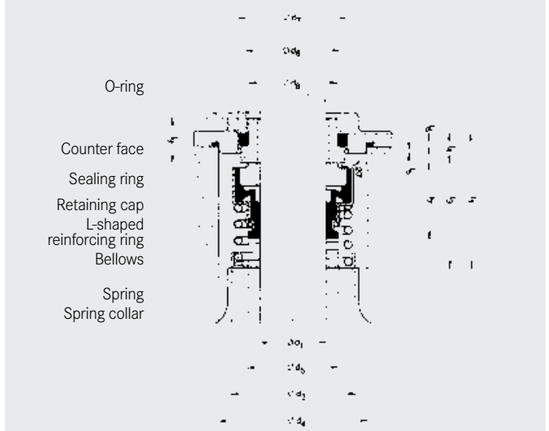
Type 76.15



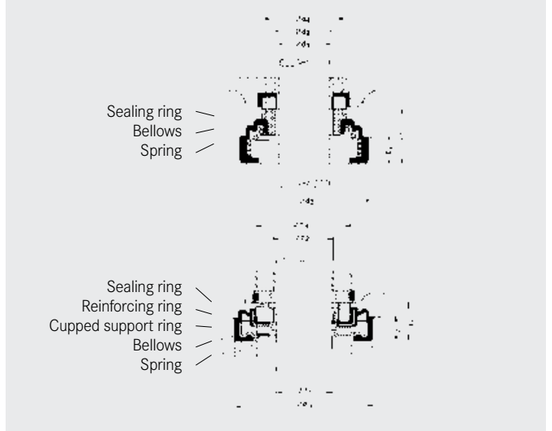
Type 76.53



Type 76.57



Type 76.58



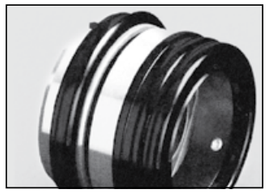
Type 76.62

Mechanical Face Seals

HN 425 STD, Mechanical face seal for steril applications

Single Face seal for steril application, free of dead areas, balanced and independent from direction of rotation.

Application limits
(important reference)
P1 = 20 bar
T = -40 to +200 deg.
Dependent from bellow material
Vg = 15 m/s



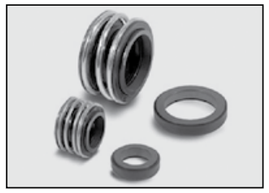
Dimension list

Nominal diam.	d_1	d_3	d_6	d_7	d_8	d_9	l_M	l_{1k}	l_{M3}	l_5	l_6
018	18	32	27	33	3	M4	32,5	37,5	22,5	2	5
020	20	34	29	35	3	M4	32,5	37,5	22,5	2	5
022	22	36	31	37	3	M4	32,5	37,5	22,5	2	5
023	23	38	33	39	3	M5	35	40	25	2	5
025	25	39	34	40	3	M5	35	40	25	2	5
028	28	42	37	43	3	M5	37,5	42,5	27,5	2	5
030	30	44	39	45	3	M5	37,5	42,5	27,5	2	5
032	32	47	42	48	3	M5	37,5	42,5	27,5	2	5
033	33	47	42	48	3	M5	37,5	42,5	27,5	2	5
035	35	49	44	50	3	M5	37,5	42,5	27,5	2	5
038	38	54	49	56	4	M5	40	45	29	2	6
040	40	56	51	58	4	M5	40	45	29	2	6
043	43	59	54	61	4	M5	40	45	29	2	6
045	45	61	56	63	4	M5	40	45	29	2	6
048	48	64	59	66	4	M5	40	45	29	2	6
050	50	66	62	70	4	M5	42,5	47,5	29,5	2,5	6
053	53	69	65	73	4	M5	42,5	47,5	29,5	2,5	6
055	55	71	67	75	4	M6	42,5	47,5	29,5	2,5	6
058	58	78	70	78	4	M6	47,5	52,5	34,5	2,5	6
060	60	80	72	80	4	M6	47,5	52,5	34,5	2,5	6
063	63	83	75	83	4	M6	47,5	52,5	34,5	2,5	6
065	65	85	77	85	4	M6	47,5	52,5	34,5	2,5	6
070	70	90	83	92	4	M6	55	60	40	2,5	7
075	75	99	88	97	4	M8	55	60	40	2,5	7
080	80	104	95	105	4	M8	55	60	39,3	3	7
085	85	109	100	110	4	M8	55	60	39,3	3	7
090	90	114	105	115	4	M8	60	65	44,3	3	7
095	95	119	110	120	4	M8	60	65	44,3	3	7
100	100	124	115	125	4	M8	60	65	44,3	3	7

Type ADT – 76.57/EB2

Pump seal with single spring, independent from direction of rotation, stationary rubber bellow inside.

Application limits
(important reference)
p1 = 12 bar
t = -30 to +200 deg.
vg = 10 m/s



Standard sizes

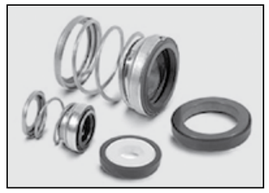
Shaft diameter d1	Housing diameter D3	Seal width without counter face L3
10	22,50	14,50
12	22,00	8,30
12	25,50	15,00
14	28,50	17,00
15	28,50	17,00
16	28,50	17,00
17	32,00	19,50
18	32,00	19,50
19	36,00	21,50
20	36,00	21,50
22	36,00	21,50
24	41,00	22,50
25	41,00	23,00
28	49,00	26,50
30	49,00	26,50
32	53,50	27,50
33	53,50	27,50
35	57,00	28,50
38	59,00	30,00
40	62,00	30,00
43	65,50	30,00
45	68,00	30,00
48	70,50	30,50
50	74,00	30,50
53	78,50	33,00
55	81,00	35,00
58	85,50	37,00
60	88,50	38,00
65	93,50	40,00
68	96,50	40,00
70	99,50	40,00
75	105,00	40,00
80	110,00	40,00

Mechanical Face Seals

Type ADT – 76.58

Pump seal, single spring, independent from rotation direction, stationary rubber manchette inside.

Application limits
(important reference)
p1 = 12 bar
t = -30 to +200 deg.
Dependent from bellow material
vg = 15 m/s



Standard sizes (inch)

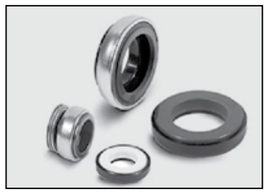
Shaft diameter d1 inch	Shaft diameter d1	Housing diameter D3	Seal width without counter face L3
3/8"	9,525	20,625	28,575
1/2"	12,700	23,800	28,575
5/8"	15,875	26,970	30,150
3/4"	19,050	30,150	30,150
7/8"	22,225	33,325	34,100
1"	25,400	42,850	36,500
1 1/8"	28,575	46,025	38,070
1 1/4"	31,750	49,200	38,070
1 3/8"	34,925	52,375	39,680
1 1/2"	38,100	55,550	39,680
1 5/8"	41,275	63,500	47,625
1 3/4"	44,450	66,675	47,625
1 7/8"	47,625	69,850	50,800
2"	50,800	73,025	50,800

Metric	Metric d1	Metric D2	Metric
d1	10	20	32,50
d1	12	22	32,50
d1	14	24	35,00
d1	16	26	35,00
d1	18	32	37,50
d1	20	34	37,50
d1	22	36	37,50
d1	24	38	40,00
d1	25	39	40,00
d1	28	42	42,50
d1	30	44	42,50
d1	32	46	42,50
d1	35	49	42,50
d1	38	54	45,00
d1	40	56	45,00
d1	45	61	45,00
d1	48	64	45,00
d1	50	66	47,50
d1	55	71	47,50

Type ADT – FA

Water pump seal, independent from direction of rotation, framed spring, for limited space, short working length.

Application limits
(important reference)
p1 = 6 bar
t = -30 to +200 deg.
Dependent from bellow material
vg = 12 m/s

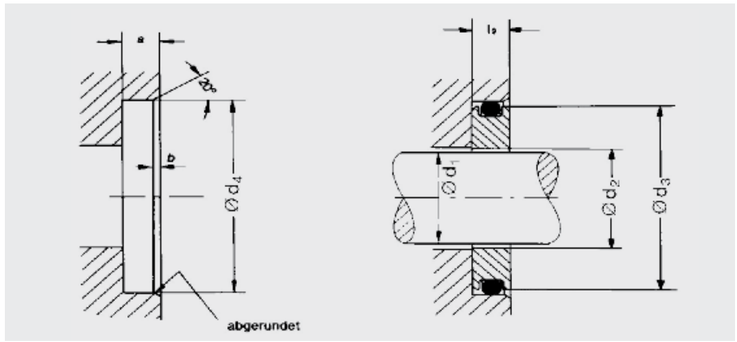


Standard sizes

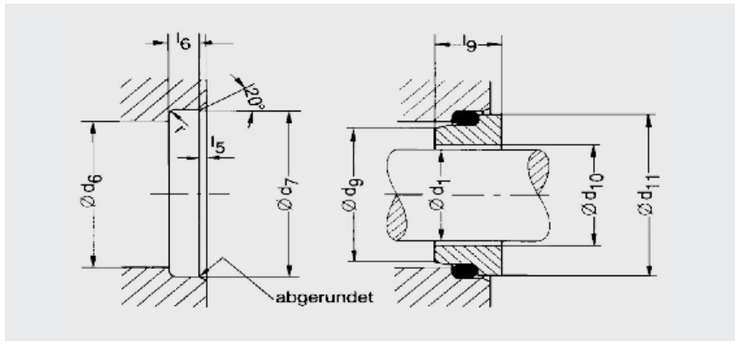
Shaft diameter d1	Housing diameter D3	width seal L3	width incl. Counter face L1
6	18	8,5	12,5
8	18	8,5	12,5
8	18	11	15
8	24	11	16,5
9	24	11	16,5
10	24	11	16,5
11	24	11	16,5
12	24	11	18,5
13	24	13	18,5
12	32	13	21
14	28	12,8	20,5
14	32	13	21
15	32	13	21
16	32	13	21
14	35	13	21
15	35	13	21
16	35	13	21
16	39	13	21
17	39	13	21
18	39	13	21
19	39	13	21
20	39	13	21
20	42	13	21
22	42	13	23
24	47	14	24
25	42	14	24
25	47	14	24
28	54	15	25
30	54	15	25
32	54	15	25
35	60	16	26
38	65	18	30
40	65	18	30
45	70	20	32
50	85	23	38
55	85	23	38
60	105	30	45
70	105	32	47

Counter Face

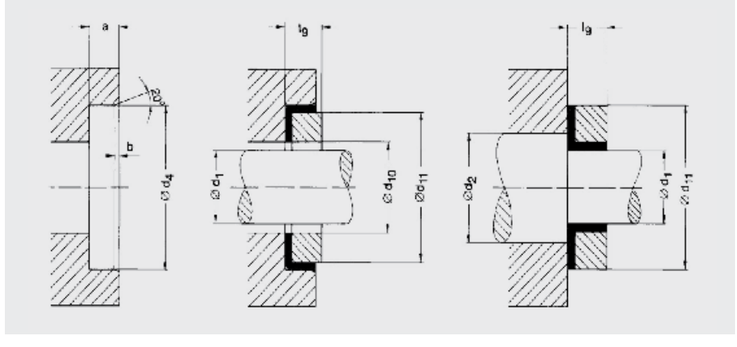
Type 76.21 from stainless steel/stainless CI 1.4086–1.4138/GOETZE-DULENIT

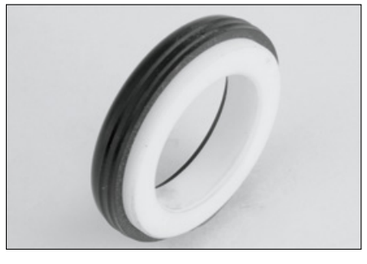


Type 76.22 from stainless steel/stainless CI 1.4086–14138/GOETZE-DULENIT/Al_2O_3



Type 76.24 from stainless steel/stainless CI 1.4086–14138/GOETZE-DULENIT/Al_2O_3





Mechanical Face Seals – Types

Mechanical Face Seal Type 76.53 ...

The seal rotates with the shaft in the pressure chamber irre-spective of the direction of rotation, and is **unbalanced.** With its totally enclosed design and the compression spring locatet outside the medium to be retained, this type is favoured for use in applications where open springs can become clogged with dirt deposits or where ease of access for cleaning the sealing area is required.

Torque transmission between seal ring and bellows is provided by the bonded stiffening ring and between bellows and shaft by an enclosed tension spring ring.

This seal is not suitable for retaining grease and oil, since ist design entails a reduction in the necessary force between shaft and bellows.

Mechanical Face Seal Type 76.55 ...

The seal rotates with the shaft in the pressure chamber irre-spective of the direction of rotation and the standard version is **balanced.**

With its totally closed design and the compression spring located outside the medium to be retained, this type is favoured for use in applications where open springs can become clogged with dirt deposits or where ease of access for cleaning the sealing area is required. The seal is designed as a three-part unit. Torque transmission between shaft and bellow and between bellow and seal ring is provided by the close coils of the compression spring which locates against the seat areas. The seal is al slot-together assembly. Where high-grade face material combinations are used, such as SIC, it is possible to design the seal ring and counter face as identical parts while retaining the housing bore for the counter face.

Mechanical Face Seal Type76.57 ...

The seal rotates with the shaft in the pressure chamber irre-spective of the direction of rotation, and is unbalanced. Torque transmission is effected by way of L-shaped reinforcing rings and springs, with the result that the bellow is subjected to only slight torsional strain. The seal is in the form of al slot-together assembly.

Mechanical Face Seal Type 76.62 ...

Type „S“:
This seal is primarily used for sealing detergent circulation pumps in domestic and industrial dishwashers. it is produced in a three-part slot-together design. The seal is secured in the housing by several coils of a spring location against the clamping region, the seal ring being held in place in the same manner.

Type „W“:
This seal is used predominantly for sealing the drum of industrial as well as domestic washing machines. The seal is secured in the housing by an inlaid L-shaped reinforcing ring, while in the region of the seal ring there is a bonded stiffening ring.

Owing to the frictional moments that may be expected the seal ring is safeguarded against rotating by recesses in which the L-sharped reinforcing ring engages. The waveform ring springs used provide for a very short fitting dimension.

Both types are stationary; counter face rotates with the shaft. On the medium side the seals are enclosed and smooth-faced in order to prevent build-up of remains of food and detergents.

Installation Instructions

Installing the counter face

All sharp edges should be rounded-off to prevent damage to the O-ring during installation and operation. To facilitate assembly, we recommend moistening the outside of the o-ring with a 1:1 mixture of water and denatured alcohol. To ensure an efficient transfer of torque, the housing bore or the O-ring should be free of oil or grease. Take care that the counter face sits properly in the housing bore,
to provide satisfactory contact at the interface.

Installing the face seal

To accomodate the mechanical face seal the bore must be clean and free of transverse scores. We recommend an H8 (ISO) class of fit. This seal is designed to be a press fit in the housing bore, thus ensuring a firm and close fit without the need to adopt additional measures. To facilitate installation and to avoid damaging the sealing surface, the edge of the housing bore should be chamfered a surface roughness for the bore of Rt = 8 -16µm according to DIN 4763. Use mounting tools to install the seals. We recommend moistening the sealing surface of the seal with a 1:1 water/spirit mixture to ease assembly.

Operational Charakteristics

Explanations on sealing, leakage and wear

Many users and operators of mechanical face seals expect zero leakage, or demand a “100% effective seal”. This requirement is physically impossible, nor is it necessary in order to achieve a sufficiently long life expectancy. A sealing problem can be considered satisfactorily solved, if a technically effective seal is obtained, i.e. if the seal does not drip leak.

When stationary, the flat-lapped seal faces only touch each other at certain points. The size of the gap remaining depends on mode of operation, properties of the materials, contact pressure and thermal effects. Even with joint packing, it can be shown that this microscopic gap can lead to leakage. It can, therefore, be assumed that the faces of mechanical seals must also leak, since they are subject to considerably lower surface pressures and have additional hydrostatic and dynamic forces acting between them. Leakage of the sealed medium is, therefore, never equal to zero. The determination of leakage is simply a question of the sensitivity of the measuring method.

Leakage and wear are the two essential characteristics of a mechanical face seal and are affected by the lubricating film in the sealing gap. This phenomenon is similar to the lubrication mechanismes in multisurface plain bearings, with the difference that the absolute rises on the seal faces of mechanical seals are considerably smaller.
At least a few gap zones are filled with fluid because of this lubricating mechanism. Mechanical seals operate, consequently, within the area of boundary or mixed friction. It is ass-umed that the laws of hydrodynamic lubrication apply even for lubricating films of only a few micrometres thickness. Gaps of this magnitude should always be considered particularly large in comparison with the molecular diameters of normal sealed fluids.

The deformation of the seal faces, which is caused by compressive forces, thermal effects and wear, forms hydrostatic and hydrodynamic profiles at the sealing gap. Under ideal conditions, these provide a noncontacting effect at the sealing interface together with a narrow, stable gap, which, consequently leads to leakage. The leakage is very low, however, and many sealed fluids are able to evaporate on the hot surface of the seal ring, because of the low rate of leakage through the gap.

Nevertheless, vaporous leakage can condense on cold machine parts, possibly causing drips to form and giving the impression of an unacceptably high rate of leakage. Residues from the sealed medium appearing at outlet bores would then encourage the impression that leakage was excessive.

It is possible to predetermine the quantity of leakage expected.However, this can only be done for constant operating conditions, because the gap form changes with every change in pressure, speed or temperature. It should be noted that mechanical face seals cannot give complete freedom from leakage. To prevent the escape of pollutants when dealing with environmentally dangerous media, various practical measures can be adopted, e.g. double seal arrangements with neutral buffer fluids to prevent the escape pollutants.

Operational Charakteristics

Axial run-out

An otherwise optimally designed and manufactured mechanical face seal can begin to leak because of excessive axial run-out at the outside diameter of the seal face as a function of speed. The permissible axial run-out specified does not depend on the diameter of the seal face, but on the angular velocity. The running speed certainly increases as the diameter increases, but the angular velocity remains constant. The following relationship applies:

b = w^2 x A
b = acceleration
w = angular velocity
A = axial run out

Operational limits

The operational limit of a mechanical face seal is basically determined by the product **pi x vg,** where **pi** is the maximum operating pressure in bars and **vg** is the peripheral velocity in m/s, measured at a point midway between the centre and periphery of the rotating seal face. The operational limits for pi and vg vary according to the various material combinations.

Materials

GOETZE-Norm DULENIT

Mechanical face seals with seal faces made of carbon materials are exclusively used for sealing pumps which do not handle abrasive liquids.

Counter faces made from the separate-cast dulenit have problem particulary successful in such applications. The structure of this material is austenitic because of the nickel content and has,consequently, satisfactory resistance to corrosion.

Suitable properties are achieved by a special microstructure. The austenitic matrix containing carbides has a certain proportion of graphite in it which ensures good sliding properties. The additional high proportion of chromium carbide in network configuration makes for a high degree of hardness (250 – 350 HB) and is responsible for the good wear resistance properties.

Silicon infiltrated or reaction sintered SiC

is a composite of SiC and metallic silicon. To produce this material a porous parent substance consisting of SiC and carbon is infiltrated with silicon at high temperature. The carbone present in the substance reacts with Si to form SiC. In order to obtain impervious materials, a surplus of silicon must be used in the manufacturing process, with the result that commercial products have a free silicon content of some 6 to 15% by volume, though up to 30% is possible. By employing the technique of infiltration it is possible to produce homogeneous substances which come close to the material properties of pure SiC. The best qualities of this material group in relative terms are obtained with thin-walles parts. The production of thick-walles components is usually associated with a loss of quality, since problems are encounted in uniform infiltration of thick walls (20mm).

Mechanical properties/physical properties of reaction sintered SiC:

Density:	2,7 g/cm^3
Porosity:	16 %
Bending strength:	250 MN/m^2
Modul of elasticity:	360 x 103 MN/m^2

Materials

Carbon graphite

Because of the manufacturing process used, carbon graphite is similar to ceramic materials and is porous. It has a porosity of about 20-30%. This consists of the primary pores in the coke and the secondary pores, which appear during the carbonisation of the binding agents.

Many of the pores are bound together. Parts made from carbon graphite are, therefore, pervious to gases and fluides. By impregnating with resins or metals, gas-tight and leak-proof materials can be produced without losing the good sliding properties.

The range of thermal application is limited by the instability of the cabon in an oxidising atmosphere. The max. permissible working temperatures for parts made form carbon graphite are:

→ in air 400 deg.
→ in steam 650 deg.
→ in carbon dioxide 1000 deg.

For impregnated grades, these limits are correspondinly fixed by the melting or decomposition temperatures of the metals or resins used.

The good resistance to temperature fluctuation can be explained by the low moduls of elasticity, the low coefficient of thermal expansion and the relatively high heat-transfer coefficient. In parts made from carbon graphite, therefore, considerably higher temperature gradients may be tolerated than with metals or other ceramic substances (e.g. matal oxides).

Resin-bonded carbon graphite

The base material of the resign-bonded carbon graphite is the same as for carbon graphite, but carbon solids of this type are bonded with synthetic resins and manufactured by the hot-press method. For resinbonded carbon graphite the binding agent is not carbonized, thus dispensing with the need to impregnate. To improve thermal conductivity, metal powders can be added to resin-bonded carbon graphites.

Resin-bonded carbon graphites have less thermal resistance than carbon graphites – in continous operation up to 150 deg.; for short periods 200 deg.-300 deg. is permissible. Resin-bonded grades of carbon are more sensitive to sudden large temperature changes.

Cemented carbide

Cemented carbides differ according to the hard material used, for example tungsten carbide, titanium carbide, tantalum caride and others. The most common cemented carcide used in mechanical face seals is tungsten carbide with cobalt as binding agent.

Cemented carbide is used for the seal faces of both seal ring and counter face in mechanical seals which seal liquids containing abrasive solid particles. The cemented carbide rings are either pressed into the parts or brazed on. The special characteristics of the cemented carbide/cemented carbide combination are optimum wear resistance, adequate resistance to corrosion and good thermal conductivity. In addition, the lubricating effect of the sealed medium with this combination is sufficient to avoid scuffing at the seal faces. The additional lubrication which is otherwise necessary with metallic sealing material combinations can be dispensed with.

Siliconized graphite

Sealing face and counter face for mechanical face seals are produced from pre-machined carbon rings by reaction with a silicon oxide atmosphere while exposed to a temperature of 1900 deg.–2800 deg., whereupon they change reaction from $SiO + 2C \rightarrow SiC + CO$.

The silicon oxide vapour diffuses into the pores of the carbon ring and reacts with the carbon. The thickness of the siliconized layer is influenced by the type of graphite used and the reaction conditions. Usually a layer thickness of 0.6–1 mm is sufficient. Since rings in this form are not impervious, the pore volume is filled up by suitable impregnation agents and thereby sealed. Parts made from siliconized graphite are resistant to most media and therefore have considerable advantages over tungsten carbide and aluminium oxide. This material is not suitable for dry operating conditions.

Mechanical properties:

Hardness:	80 HRA
Compressive strength:	80 MPa
Modulus of elasticity:	16000 MPa
Bending strength:	34 MPa

It is particulary important to protect the highly sensitive, lapped seal faces from any kind of damage or contamination. Otherwise the seal may not function properly in operation. We recommend wiping the seal faces with a leather cloth just before installation.

Materials

Installing the counter face

To prevent mechanical damage to the O-ring during installation or operation, all edges must be rounded-off in accordance with the list of dimensions. To facilitate installation, we recommend moistening the outside diameter of the O-ring with a 1:1 water/spirit mixture. To ensure an efficient transfer of torque the housing bore or O-ring should be free of oil or grease. When pushing the fragile carbon or ceramic counter face onto the shaft, take particular care to apply pressure uniformly. Care should be taken to install the counter face properly in the housing bore in order to provide satisfactory alignment at the interface.

Installing the face seal

Ends of shafts and shaft shoulders that pass through the seal should be sufficiently rounded-off or chamfered to avoid damaging the O-ring and facilitate installation. If this in not possible, we recommenced using a conical shrunk-on sleeve. Threaded shafts should be designed so that there is enough clearance between the thread and the O-ring to push the seal onto the shaft. Shafts must be free of scores and scratches and should be lightly oiled before assembling the seal.

Material Code

Material Code Mechanical Seals DIN 24960

Face materials

Synthetic carbons
A = carbon, antimony impregnated
B = carbon, resin impregnated
C = electrographite without impregnation
C1 = electrographite, antimony impregnated

Metals
E = Cr-steel
G = CrNiMo-steel
K = metallic hard metal coat (CrNiMo-steel stellited)
M = Hastelloy C4
M1 = Hastelloy B
S = Cr-cast

Carbides
(tungsten carbide U, silicon carbide Q, other carbides J)
U1 = tungsten carbides, Co-bound
U2 = tungsten carbides, Ni-bound
U3 = tungsten carbides, CrNiMo-bound
Q1 = S-SiC
Q2 = Si-SiC
Q3 = SIC-C-Si, compound material
Q4 = C-SiC, surface silicated
J = other carbides

Metal oxides
(ceramics)
V = Al_2O_3
W = CrO_3
X = other metal oxides

Plastics
(PTFE, reomforced Y, other plasitc materials Z)
Y1 = PTFE, glas-fibre reinforced
Y2 = PTFE, carbon-reinoforced
Z = other plastics

Material for secondary seals

Elastomeres
not coated
E = ethylene-prophylene
K = perfluor-rubber
N = chloroprene-rubber
P = nitril-rubber
S = silicone-rubber
V = fluorine-rubber
X = other elastomeres

Elastomeres
coated
M = FPM with double PTFEcoating
M2 = EPDM with double PTFEcoating
M5 = FPM FEP-coated
M6 = VQM FEP-coated

Non-elastomeres
T = PTFE
F = flat gasket (asbestos-free)
Y = other non-elastomeres

Different materials
U = different materials for secondary seals

Material for spring Materials for otherconstructional parts
D = C-steel
E = Cr-steel
F = CrNi-steel
G = CrNiMo-Steel
M = Hastelloy C4
M1 = Hastelloy B
T = other materials

Overview of sizes (sorted by shaft dia)

Art. nbr.	Seal type	Material	Dimensions
6734120699	76.12-0300 RK	NB 6021	6,00 x 14,00 x 10,00
6734115799	76.53-0100 K	NB 6022	6,00 x 18,00 x 10,00
6734150999	76.53-14900 K	FP 6825	6,00 x 18,20 x 10,00
6734140499	76.12-0500 LK	NB 6022	6,50 x 14,50 x 12,00
6734107699	76.53-0200 K	NB 6022	10,00 x 24,00 x 19,00
6734161899	76.62-13300 K	NB 6022	10,60 x 30,00 x 15,00
6734118399	76.17-0200 RK	NB 6022	12,00 x 23,00 x 17,00
6734146999	76.12-8100 LK	NB 6022	12,00 x 22,00 x 17,00
6734103499	76.12-0800 RK	NB 6022	12,00 x 22,40 x 17,00
6734114699	76.12-3100 RK	NB 6022	12,00 x 25,50 x 31,00
6734139499	76.12-8400 RK	FP 7021/K-Geh.	12,00 x 25,50 x 31,00
6734122299	76.53-0300 K	NB 6022	12,00 x 26,00 x 16,00
6734139199	76.69-51400 K	NB 6022	12,00 x 30,00 x 15,00
6734158299	76.68-0100 K	NB 6022	12,80 x 26,00 x 14,00
6734107199	76.71-1100 K	NB 6022	13,50 x 28,00 x 13,00
6734136999	76.12-6300 LK	NB 6022	14,00 x 25,00 x 15,00
6734140999	76.12-6300 RK	NB 6022	14,00 x 25,00 x 15,00
6734110099	76.12-0900 RK	NB 6022	14,00 x 25,00 x 17,00
6734142099	76.12-9700 RK	NB 6022	14,00 x 25,00 x 17,00
6734116099	76.53-0400 K	NB 6022	14,00 x 28,00 x 16,00
6734102499	76.68-0300 K	NB 6022	14,00 x 30,00 x 15,00
6734136499	76.62-6100 K	NB 7021	14,60 x 30,00 x 17,50
6734129199	76.14-0400 RK	NB 6022	15,00 x 23,00 x 25,00
6734137399	76.12-6400 LK	NB 6022	15,00 x 26,00 x 14,00
6734138999	76.12-6400 RK	NB 6022	15,00 x 26,00 x 14,00
6734100599	76.12-1100 RK	NB 6022	15,00 x 27,00 x 17,00
6734113999	76.12-1100 LK	NB 6022	15,00 x 27,00 x 17,00
6734146299	76.12-3600 RK	NB 6022	15,00 x 27,00 x 17,00
6734100799	76.53-0500 K	NB 6022	15,00 x 30,00 x 16,00
6734131499	76.53-7700 K	NB 6022	15,00 x 30,00 x 16,00
6734156199	76.55-15 VSBV	FP 6825	15,00 x 30,60 x 20,00
6734136699	76.68-9100 K	NB 6022	15,80 x 35,00 x 17,50
6734106099	76.14-0500 RK	NB 6022	16,00 x 24,00 x 27,00
6734119399	76.12-1200 RK	FP 6825	16,00 x 27,00 x 19,00
6734107799	76.53-0600 K	NB 6022	16,50 x 33,00 x 18,00
6734144799	76.60-4100 K	NB 6022	16,50 x 30,00 x 15,50
6734139799	76.12-8700 RK	NB 6022	17,00 x 28,00 x 19,00
6734118699	76.68-0500 K	NB 6022	17,00 x 35,00 x 16,00
6734139899	76.68-12100 K	NB 6022	17,00 x 36,45/41,5 x 16,25
6734145099	76.68-5600 K	NB 6022	17,00 x 36,80/39,0 x 15,75
6734115499	76.14-0700 RK	NB 6022	18,00 x 26,00 x 20,00
6734103699	76.12-1400 RK	NB 6022	18,00 x 30,00 x 20,00
6734127299	76.12-1400 LK	NB 6022	18,00 x 30,00 x 20,00
6734155799	76.55-1800 K	NB 6022	18,00 x 34,00 x 18,00
6734100699	76.53-0800 K	NB 6022	18,00 x 36,00 x 18,00
6734108699	76.53-4900 K	NB 6022	18,00 x 36,00 x 18,00
6734140699	76.53-10500 K	EP 7012	18,00/22,0 x 40,00 x 22,00
6734134399	76.53-8300 K	NB 6022	18,00 x 40,00 x 22,00
6734145999	76.53-13600 K	NB 6022	18,00 x 40,00 x 26,00
6734106199	76.14-0800 RK	NB 6022	20,00 x 29,00 x 22,00
6734103599	76.12-1500 RK	NB 6022	20,00 x 32,00 x 22,00
6734128899	76.12-1500 LK	NB 6022	20,00 x 32,00 x 22,00
6734122599	76.17-2600 RK	NB 6022	20,00 x 35,00 x 40,00

Art. nbr.	Seal type	Material	Dimensions
6734102099	76.53-0900 K	NB 6022	20,00 x 38,00 x 18,00
6734133399	76.53-7900 K	NB 6022	20,00 x 38,00 x 18,00
6734123099	76.12-4500 RK	NB 6022	20,50 x 33,50 x 30,70
6734116599	76.68-2700 K	NB 6022	21,00 x 40,00/44,0 x 17,00
6734113699	76.12-1600 RK	NB 6022	22,00 x 35,00 x 20,00
6734101599	76.53-1000 K	NB 6022	22,00 x 40,00 x 20,00
6734140599	76.53-10600 K	EP 7021	22,00 x 40,00 x 20,00
6734143299	76.51-3000 K	FP 7024	22,00 x 40,00 x 20,00
6734107299	76.53-3400 K	NB 6022	22,00 x 40,00 x 22,00
6734127499	76.53-6200 K	NB 6022	22,00 x 40,00 x 24,00
6734109499	76.66-0800 K	NB 6022	22,00 x 42,00 x 21,00
6734102899	76.54-1300 K	NB 6022	22,00 x 45,00 x 26,00
6734133299	76.53-8000 KEP	EP 7021	22,00 x 50,00 x 24,00
6734145699	76.53-14100 K	NB 6022	22,00 x 55,00 x 24,00
6734115399	76.14-1000 LK	NB 6022	24,00 x 33,00 x 37,00
6734107599	76.53-1100 K	NB 6022	24,00 x 43,00 x 20,00
7634105799	76.12-1800 LK	NB 6022	25,00 x 40,00 x 26,00
6734113499	76.12-1800 RK	NB 6022	25,00 x 40,00 x 26,00
6734101099	76.53-1200 K	NB 6022	25,00 x 44,00 x 20,00
6734144899	76.53-1200-32934	NB 6022	25,00 x 44,00 x 20,00
6734124999	76.53-2700 K	NB 6022	25,00 x 44,00 x 24,00
6734123499	76.60-4300 K	NB 6022	26,00 x 45,00 x 18,00
6734109399	76.12-3500 RK	NB 6022	28,00 x 43,00 x 27,00
6734124699	76.12-2000 RK	NB 6022	28,00 x 43,00 x 27,00
6734103299	76.53-1400 K	NB 6022	28,00 x 47,00 x 22,00
6734108499	76.53-2800 K	NB 6022	28,00 x 47,00 x 22,00
6734153799	76.53-17300 K	NB 6022	28,00 x 47,00 x 22,00
6734114299	76.53-11800 K	NB 6022	28,00 x 47,00 x 22,00
6734132199	76.14-1400 LK	NB 6022	30,00 x 43,00 x 42,00
6734115199	76.14-1400 RK	NB 6022	30,00 x 43,00 x 42,00
6734115299	76.14-1000 RK	NB 6022	30,00 x 43,00 x 42,00
6734101399	76.12-2100 LK	NB 6022	30,00 x 47,00 x 28,00
6734113399	76.12-2100 RK	NB 6022	30,00 x 47,00 x 28,00
6734156299	76.53-1500 K	FP 7024	30,00 x 50,00 x 22,00
6734103399	76.53-1500 K	NB 6022	30,00 x 50,00 x 22,00
6734106999	76.53-1500 AK	NB 6022	30,00 x 50,00 x 22,00
6734108799	76.53-1600 K	FP 7024	30,00 x 50,00 x 22,00
6734127699	76.53-6300 K	NB 6022	30,00 x 50,00 x 26,00
6734146399	76.53-13200 K	NB 6022	30,00 x 56,70 x 28,00
6734119799	76.60-1800 K	NB 6022	31,00 x 52,70 x 19,10
6734141099	76.53-5900 K	NB 6022	32,00 x 53,00 x 26,00
6734121199	76.62-4400 K	NB 6022	32,00 x 57,00 x 16,00
6734148799	76.12-U-035 R	NB 6022	35,00 x 49,00 x 32,00
6734118299	76.12-2300 LK	NB 6022	35,00 x 52,50 x 32,00
6734113099	76.12-2300 RK	NB 6022	35,00 x 52,50 x 32,00
6734109199	76.12-3800 RK	NB 6022	35,00 x 52,50 x 32,00
6734146099	76.12-1300 RK	NB 6022	35,00 x 52,50 x 32,00
6734103899	76.53-1700 K	NB 6022	35,00 x 56,50 x 26,00
6734122499	76.53-5600 K	NB 6022	35,00 x 56,50 x 26,00
6734127799	76.53-6400 K	EP 7021	35,00 x 56,50 x 26,00
6734137799	76.53-10100 K	NB 6022	35,00 x 56,50 x 26,00
6734136399	76.53-3000 K	NB 6022	35,00 x 56,00 x 30,00
6734112799	76.60-1900 K	NB 6022	36,05 x 58,30 x 18,00

Mechanical Face Seals

Overview of sizes (sorted by shaft dia)

Art. nbr.	Seal type	Material	Dimensions
6734102399	76.62-0900 K	NB 6022	37,00 x 62,00 x 12,00
6734126099	76.12-2400 RK	NB 6022	38,00 x 56,00 x 35,00
6734100999	76.53-1800 K	NB 6022	38,00 x 59,00 x 26,00
6734138299	76.53-10300 K	NB 6022	38,00 x 59,00 x 30,00
6734114299	76.12-2500 LK	NB 6022	40,00 x 58,00 x 38,00
6734145799	76.12-2500 RK	NB 6022	40,00 x 58,00 x 38,00
6734101999	76.53-1900 K	NB 6022	40,00 x 61,00 x 26,00
6734137499	76.53-9900 K	NB 6022	40,00 x 61,00 x 26,00
6734145899	76.53-12500 K	FP 7501	40,00 x 61,00 x 26,00
6734143799	76.62-8000 K	NB 6022	41,50 x 68,40 x 12,00
6734110199	76.70-1300 K	NB 6022	42,00 x 65,00 x 22,00
6734141899	76.62-7500 K	EP 7021	42,00 x 68,40 x 12,00
6734107999	76.53-2100 K	NB 6022	45,00 x 73,00 x 26,00
6734126899	76.53-6100 K	NB 6022	45,00 x 73,00 x 26,00
6734118499	76.60-2300 K	NB 6022	46,00 x 75,50 x 21,00
6734118899	76.62-1100 K	NB 6022	46,80 x 75,00 x 12,00
6734129499	76.53-3800 K	FP 7024	50,00 x 78,00 x 25,00
6734102999	76.53-2200 K	NB 6022	50,00 x 78,00 x 26,00
6734129499	76.53-6800 K	EP 7021	50,00 x 78,00 x 26,00
6734118999	76.60-2500 K	NB 6022	50,00 x 78,30 x 18,00
6734141499	76.62-7400 K	NB 6022	52,00 x 80,00 x 13,00
6734111499	76.62-1300 K	EP 7021	52,00 x 80,00 x 13,00
6734112299	76.60-2700 K	NB 6022	58,00 x 88,30 x 18,00
6734131999	76.62-5400 K	NB 6022	58,00 x 90,00 x 14,00
6734152399	76.62-5400 K	NB 6022	58,00 x 90,00 x 14,00
6734111199	76.61-1700 K	NB 6022	60,00 x 88,00 x 18,00
6734146699	76.62-9200 K	NB 6022	60,00 x 88,00 x 18,00
6734162399	76.62-9200 K	EP 7021	60,00 x 88,00 x 18,00
6734140899	76.53-9200 K	NB 6022	65,00 x 95,00 x 30,00
6734134199	76.62-5600 K	NB 6022	68,00 x 100,00 x 16,00
6734108299	76.53-2300 K	NB 6022	70,00 x 100,00 x 30,00
6734112699	76.60-3000 K	NB 6022	72,00 x 105,50 x 23,00
6734111999	76.60-3200 K	NB 6022	76,00 x 105,50 x 25,00
6734113899	76.61-1800 K	NB 6022	80,00 x 115,00 x 20,00
6734112699	76.60-3300 K	NB 6022	82,00 x 120,00 x 23,00
6734117399	76.61-1900 K	NB 6022	92,00 x 130,00 x 20,00
6734129599	76.62-5000 K	NB 6022	92,00 x 130,00 x 20,00
6734162199	76.62-6000 K	EP 7021	92,00 x 130,00 x 20,00
6734129699	76.62-5100 K	NB 6022	112,00 x 145,00 x 23,00
6734112499	76.60-3700 K	NB 6022	122,00 x 158,60 x 25,00
6734112599	76.60-3800 K	NB 6022	144,20 x 190,60 x 25,00

They here performed construction forms and dimensions are only a small part of our complete delivery program and please note they are not permanent on stock. Kindly inquire also differing Types and measurements basical!

For mistakes or losts, which can have happened even in spite of best care, ADITEC cannot get made liable for. Same is valid for technical variants because of technical changes and/or supplements. In case of questions, please contact ADITEC Technic

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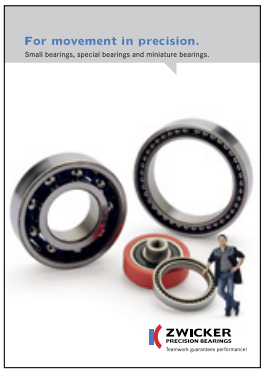

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