DICHTA®

TECHNICAL AND SEALING PRODUCTS

DICHTA®

DICHTA designs, produces and markets shaft seals and sealing products of the highest possible quality using advanced manufacturing techniques and approved quality systems.

With some twenty five years experience, **DICHTA** is now a true world class supplier, serving clients on all continents through offices in Switzerland and Italy in addition to a modern production facility in Italy.

DICHTA manufactures products within the ISO 9001-2000 system to ensure the supply of consistently high quality products with full batch traceability.

With an in-house design team, **DICHTA** is able to produce bespoke solutions with short lead times at realistic prices.
A worldwide distributor network backed by high qualified technical staff ensures that our customers receive the fastest and most reliable service possible to solve even their most demanding applications.

DICHTA®

Rotary shaft seals

Description of standard shaft seal types (in accordance with DIN 3760)

A Rubber covered O.D.,metal insert, sealing lip with garter spring

AS Rubber covered O.D., metal insert, sealing lip with garter spring and additional dust lip

B Outer metal case, sealing lip with garter spring

BS Outer metal case, sealing lip with garter spring and additional dust lip

C Outer metal case with reinforcing metal inner ring, sealing lip with garter spring

CS Outer metal case with reinforcing metal inner ring, sealing lip with garter spring and additional dust lip

Additional types

A - P Reinforced sealing lip for overpressure

AS - P Reinforced sealing lip for overpressure, with additional dust lip

AS - PX Reinforced sealing lip and special metal insert for overpressure, with additional dust lip

A - DUO Twin sealing lip with two garter springs

A- O Sealing lip without spring

A - FL Different spring groove for a better spring retention

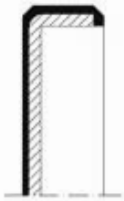
A - LD Sealing lip with hydrodynamic ribs, left rotation

A - RD Sealing lip with hydrodynamic ribs, right rotation

A - WD Sealing lip with bidirectional hydrodynamic ribs

A - X7 Wavy rubber covered O.D., metal insert, sealing lip with garter spring

AS - X7 Wavy rubber covered O.D., metal insert, sealing lip with garter spring and additional dust lip



A - EC End covers

A - TE Rubber covered I.D. and sealing lip on O.D.

B - O Outer metal case, sealing lip without spring

B - TE Inner metal case and sealing lip on O.D.

C - DUO Outer metal case with reinforcing cap, twin sealing lip with two garter springs

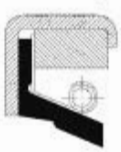
COMBI SEAL
Combination of a shaft seal and an additional seal in polyurethane against soiling in one housing

CASSETTE SEAL
Integrated sealing system: oil seal, wear sleeve and dust protection in one unit.

RADIASEAL
Rotary shaft seal with fabric reinforced outer diameter. See pag 18

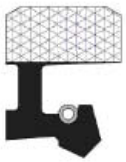
SPLITRING
Rotary shaft seal without metal insert, split. See pag 20

DINA Seal
Rotary shaft seal for needle bearing applications.
See pag 21



C64D Rotary shaft seal for heavy industry.
See pag 22

Additional types

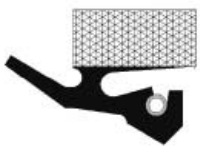


DX7 This seal is designed for use in presence of pressure, up to max 6 Bar. The radial force on the shaft caused by the fluid in pressure is reduced, and as a consequence there is a reduction of temperature.The absence of external metal avoids the possibility to damage the seal housing. This type of seal needs a retaining plate.

AX-7M This seal is designed for use in presence of pressure, up to max 6 Bar. A metallic band is inserted in the back of the seal. It is assembled in open housings and does not need a retaining plate. This profile is flexible and easy to assemble, ensuring stability in the housing.

AX - 3M This seal does not need the retaining plate. The rubber seal has a flexible metal band in its shoulder, which makes it resistant, elastic and easy to install. This seal can be assembled in open housings and has a better resistance for possible misalingnments. The spring is protected.

AX - 3ML Same profile as the AX-3M but this one has a rigid metal case inside the shoulder, instead of the flexible metal band.



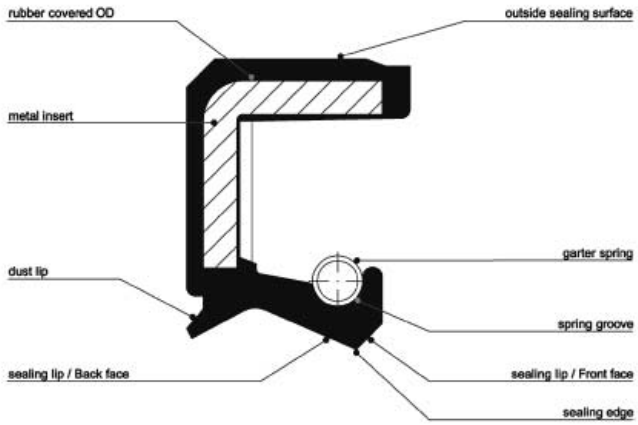
DXVT Produced with a high resistance rubberised fabric back, it allows a higher ring stiffness compared to normal seals. As an alternative solution to avoid shavings pollution in case of underdimensioned or reduced matallic parts.

C59D Interchangeable with Garlock 59 seal, it is mostly used in steel mill plants or wherever a strong seal is necessary. This profile has a flexible rubber sealing lip and a metallic cage back with a finger-spring. The seal withstands a pressure of max 1 Bar.

AX - GL Originally designed to withstand large misalignments of some millimeters in static conditions,this seal can also be used for dynamic seal with limited radial speed. The profile has a metallic cage inside its shoulder, with a spring that ensures the constant load operation.

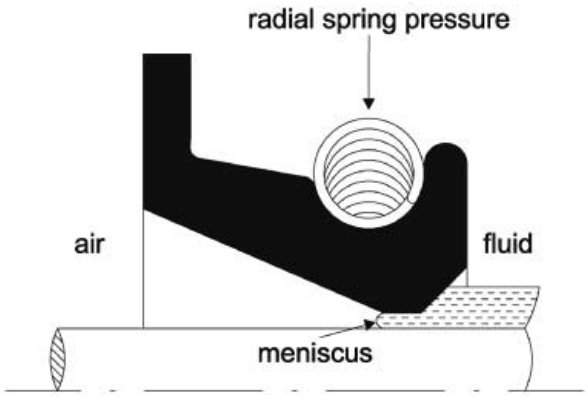
Technical Data

Description of rotary shaft seal



Working Principle

The area between the sealing edge and the shaft is the most important. The sealing effect is achieved by preloading the sealing lip, making its internal diameter slightly smaller than the shaft diameter. The garter spring ensures constant mechanical pressure and maintains the radial force to the shaft, flattening the sealing edge to a defined width. Sealing is provided by the surface tension of the hydrodynamic oil film between the seal flattened area and the shaft.
Oil thickness must be between 1 and 3 µm to avoid leakage. The meniscus acts as an interface between the outside air and the fluid. Any break in the meniscus will result in leakage. This can occur if the shaft contains scratches along the seal path.



Metal Case

The metal insert or case is used to give strength and rigidity to the seal.
Normally it is made of cold rolled steel in accordance with DIN 1624.

To avoid rust or chemical attack, stainless steel can be used.
Chrome Nickel AISI 304 (DIN 1.4301 - V2A)
Chrome Nickel Molybdenum AISI 316 (DIN 1.4401 - V4A).

Garter spring

The garter spring maintains the radial force exerted by the sealing lip around the shaft surface. Normally produced in harmonic spring steel wire SAE 1074 (DIN 17223) or stainless steel wire Chrome Nickel AISI 302 (DIN 1.4300).
For special application also stainless steel springs in AISI 316 (DIN 1.4401 - V4A) are available. All our standard shaft seals produced in FPM compound are fitted with stainless steel springs in AISI 302.

Installation and operation

Shaft

The shaft hardness and surface finish are of primary importance for efficient sealing and for achieving a useful life. Basically the hardness should increase with increasing peripheral speed. According to DIN 3760 minimum hardness required is 45 HRC. At a peripheral speed of 4 m/s the hardness should be 55 HRC and at 10 m/s 60 HRC. Recommended hardness depth: 0.3 mm if shafts are not fully hardened.

Lubrication is also very important.
Surface finish as specified by DIN 3760 must be R_a 0.2 to 0.8 µm, Rz 1 to 5 µm, with R_{MAX} = 6.3 µm. Rougher surfaces generate higher friction, hence higher temperatures. Machining defects and scratches on the shaft must be avoided.

Even very small defects could be sufficient to increase the film thickness, eventually rupturing the meniscus and causing leakage. It is also important to avoid spiral grinding or marks, because they can cause a pumping effect and leakage.

Recommended machining tolerance is ISO h11 according to DIN 3760(see table below).

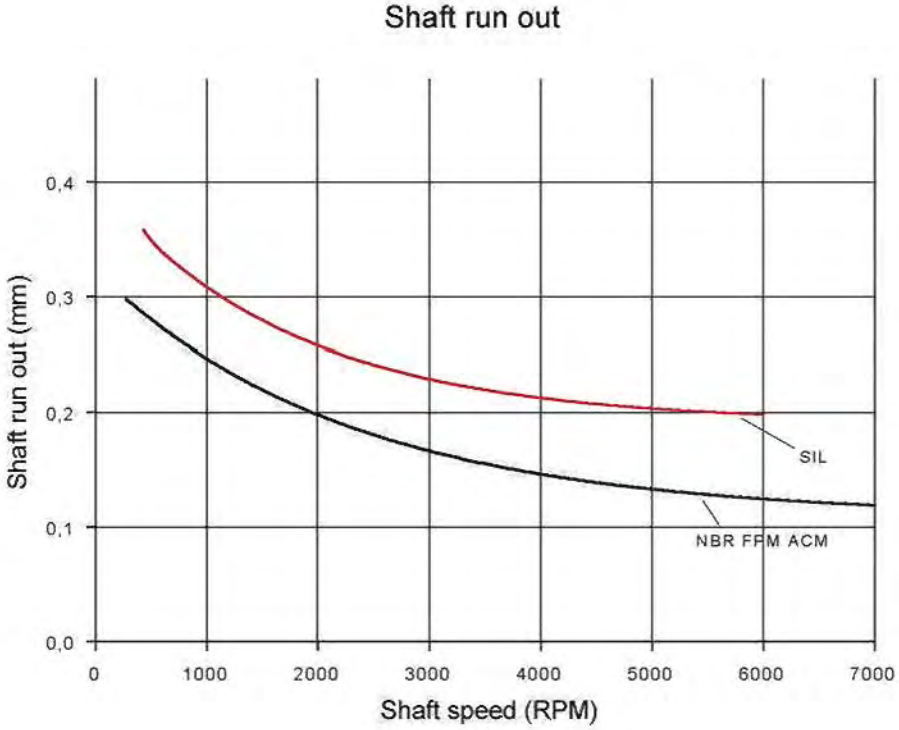
Table 1

Shaft diameter		Tolerance
from	to	h11
6	10	0 - 0,090
10	18	0 - 0,110
18	30	0 - 0,130
30	50	0 - 0,160
50	80	0 - 0,190

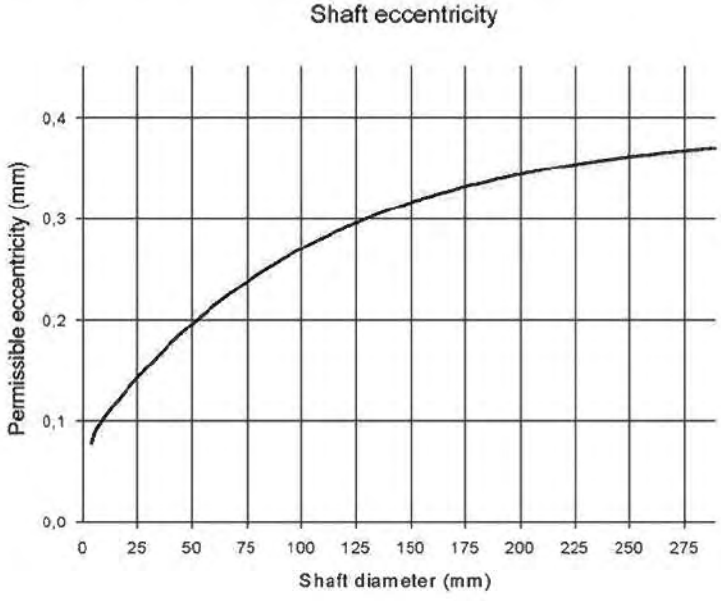
Shaft diameter		Tolerance
from	to	h11
80	120	0 - 0,220
120	180	0 - 0,250
180	250	0 - 0,290
250	315	0 - 0,320
315	400	0 - 0,360

Installation and operation

The best working condition is to have a shaft rotating perfectly centered and concentric to the axis of the rotary shaft seal. Obviously this is not possible and inevitably some shaft run out is always present.
Therefore the sealing lip must compensate for it. The higher the rotation speed is, the smaller can be the permissible shaft run out which can be compensated by the sealing lip, because the inertia of the sealing lip prevents it from following the shaft movements. It is therefore advisable to install the seal immediately adjacent to the bearing and minimize bearing play.



Eccentricity between shaft and housing bore centers must be avoided as much as possible so as to reduce unilateral load (wear) of the sealing lip.



Housing bore

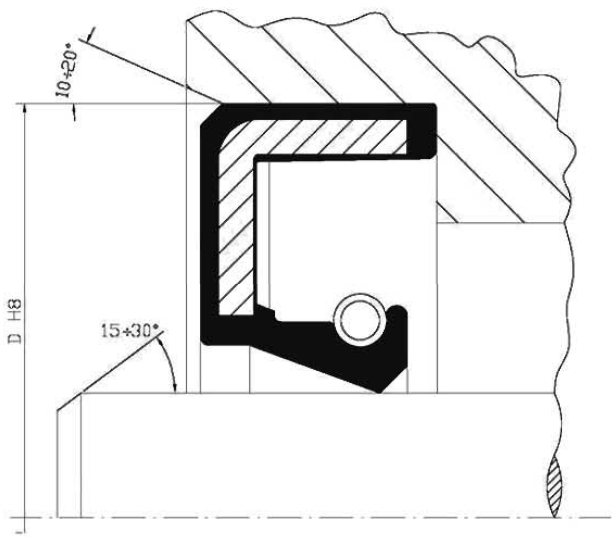
A good press fit of the shaft seal onto the housing bore is vital. The result is a stable installation.

Recommended machining tolerances of the housing bore diameter for rotary shaft seals are ISO H8 according to DIN 3760(see table below).

Bore diameter		Tolerance
from	to	h11
6	10	0 - 0,090
10	18	0 - 0,110
18	30	0 - 0,130
30	50	0 - 0,160
50	80	0 - 0,190

Bore diameter		Tolerance
from	to	h11
6	10	0 - 0,090
10	18	0 - 0,110
18	30	0 - 0,130
30	50	0 - 0,160
50	80	0 - 0,190

The maximum surface roughness of the housing according to DIN 3760 is: Ra 1.6 to 6.3 µm, Rz 10 to 20 µm, with R_{MAX} = 25 µm.
We recommend the use of a shoulder or a spacer ring against which the seal can be located. Should this not be possible one has to pay special attention that the seal is installed perpendicularly to the shaft axis.
To ease installation the entrance of the groove should have a chamfer inclined by 10° - 20°and a depth according to the ring thikness (see figure below). Also the mounting end of the shaft should have a chamfer inclined by 15° - 30°, with rounded and polished edge.



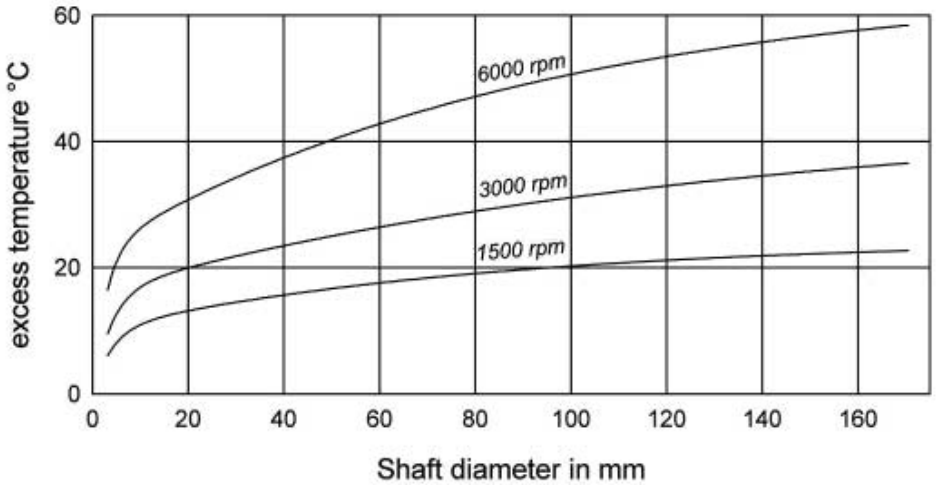
Lubrication

Lubrication is very important for a good function and life of the seal. The sealing lip does not actually run on the shaft directly, but on an oil film, called meniscus.The thickness of the meniscus is usually between 1 - 3 µm, but is affected by many factors such as oil viscosity, shaft surface finish and seal radial load.

The first few hours of operation is called the «bedding-in» time. This is necessary not only for the meniscus to form, but also for the sealing edge to flatten.
During this time limited leakage is possible.

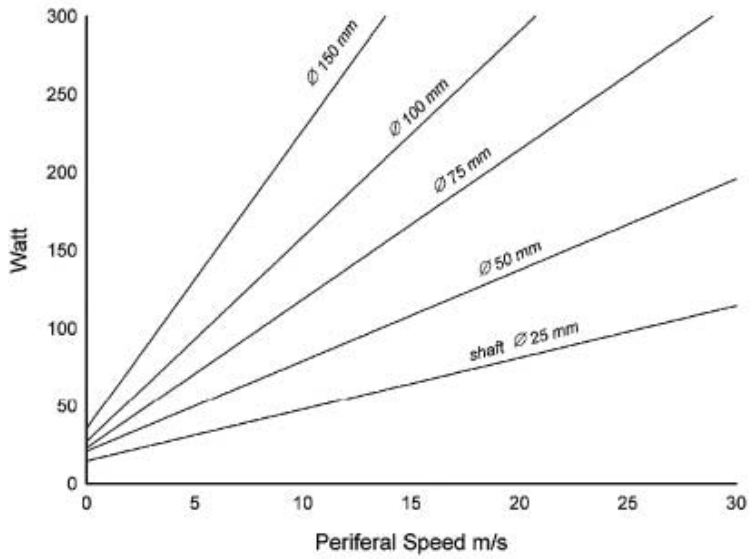
Adequate lubrication strongly reduces friction between sealing lip and shaft and also acts as a coolant to the generated heat. The lower the temperature can be kept, the longer will be the life expectancy of the seal. Should the fluid have poor lubricating capability (water and aqueous solutions), dust lip-type (AS, BS or CS) rotary lip seals must be used. In such a case make sure to fill the space between the two lips with grease. The friction heat also depends on the peripheral speed of the shaft.

Sealing lip frictional heat



Friction not only can be detrimental to the lip material, but also can cause a power loss which could be quite significant if low power is transmitted.

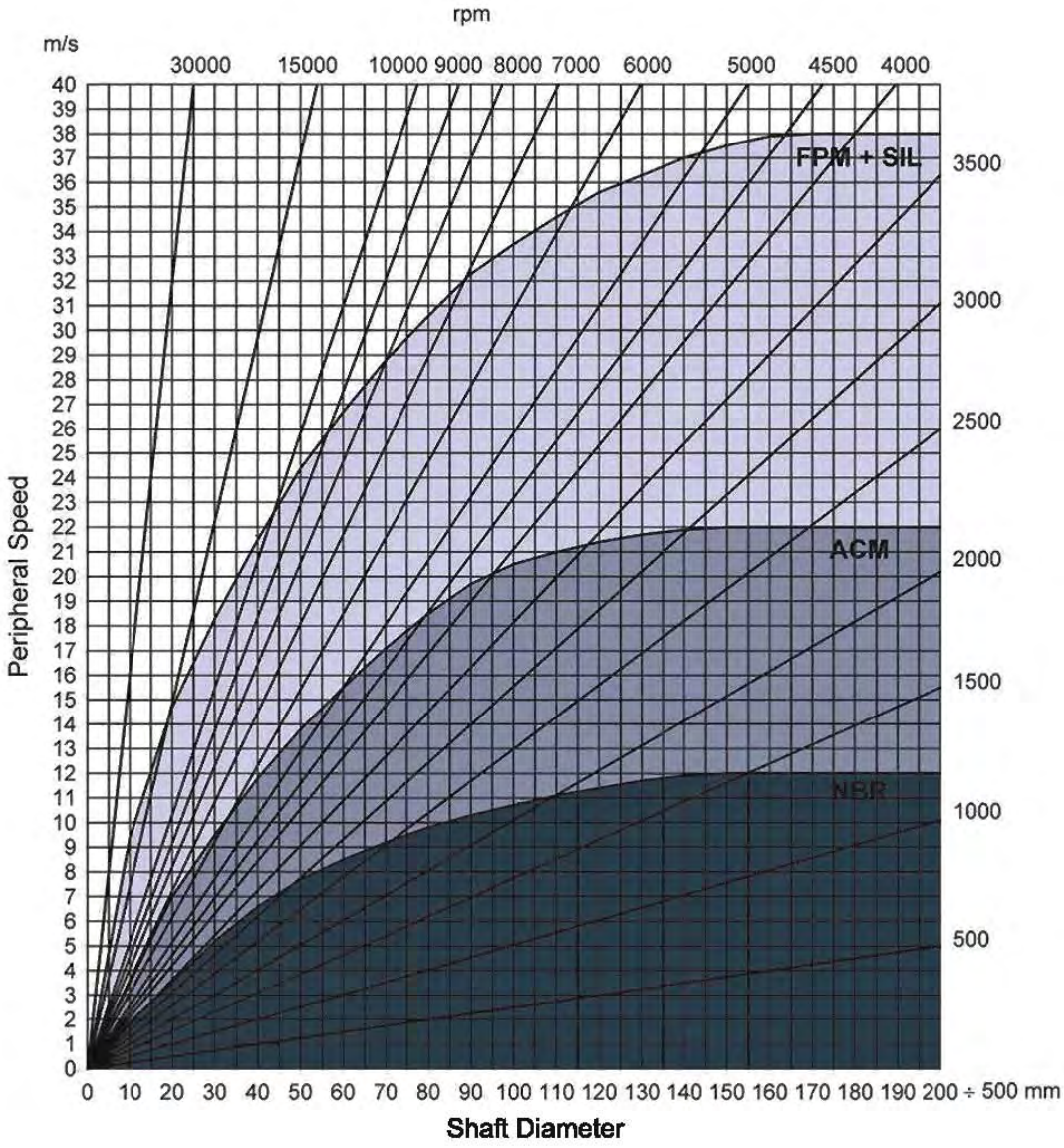
Frictional power loss



Temperature

The temperature on the sealing lip is the medium temperature increased by the temperature caused by frictional heat.
The higher the effective operating temperature is, the faster the ageing of the elastomer will be, thus affecting the performance of the sealing lip and the shaft.
Frictional heat depends on seal design and material, peripheral speed, sealing lip preloading spring force, shaft design and surface finish, lubrication, medium, etc.

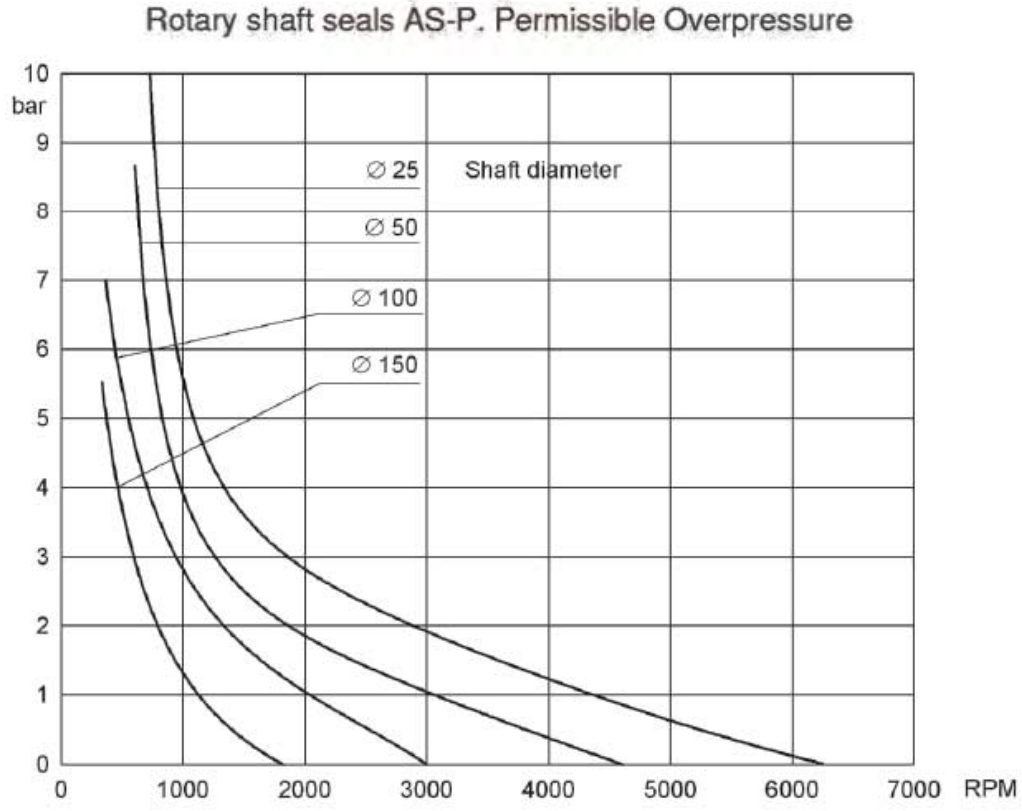
Permessible speeds in pressure-free state to DIN 3760



Pressure

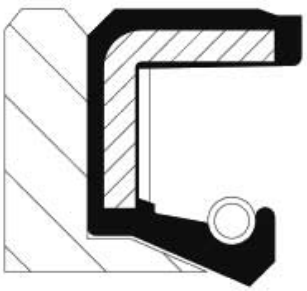
In most applications there is no or little differential pressure. Where the rotary shaft seal is exposed to pressure, however, the sealing lip is pressed against the shaft, thus increasing temperature. In some cases the pressure can even cause overturning of the sealing lip.

Over 0,2 bar at higher peripheral speeds or over 0,5 bar at low peripheral speeds back up rings or special designed rotary shaft seals with stronger sealing lip and supporting metal insert must be used. For the latter we refer to our P-types (e.g. AS-P). Nevertheless permissible overpressures with P-type shaft seals are limited (see diagram below).



On request we can supply shaft seals with special reinforced lip to withstand pressure over the indicated value.

If back up rings are installed, standard rotary shaft seals can be used. However, back up rings increase costs and often the necessary space for installation is not available. Sometimes the use of back up rings is even not possible, since it requires a very accurate fitting as well as very low eccentricity of the shaft.



Specially designed rotary shaft seals (P-types) are therefore preferred, even if more accurate fitting and lower eccentricity of the shaft than normal cases is required.

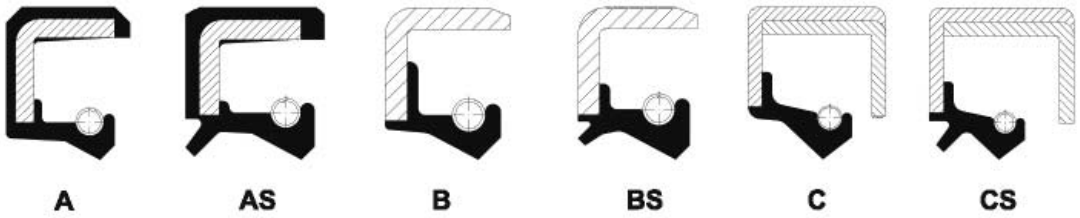
Production and Quality Assurance

Our rotary shaft seals are manufactured according to German Standard DIN 3760 and Quality assurance standards ISO 9001:2000.

All production phases are checked and all measurements are recorded and stored for eventual tracing.

Interference allowance and permissible eccentricity

In accordance with German Standard DIN 3760



Seal outer diameter d_2		Interference allowance (1)		Tolerance on d_2 (2)
		Types A, AS	Types B, BS, C, CS	Types A, AS, B, BS, C, CS
up	to 50	+ 0,30 + 0,15	+ 0,20 + 0,10	0,25
over 50	to 80	+ 0,35 + 0,20	+ 0,23 + 0,13	0.35
over 80	to 120	+ 0,35 + 0,20	+ 0,25 + 0,15	0,50
over 120	to 180	+ 0,45 + 0,25	+ 0,28 + 0,18	0,65
over 180	to 300	+ 0,45 + 0,25	+ 0,30 + 0,20	0,80
over 300	to 500	+ 0,55 + 0,30	+ 0,35 + 0,23	1,00

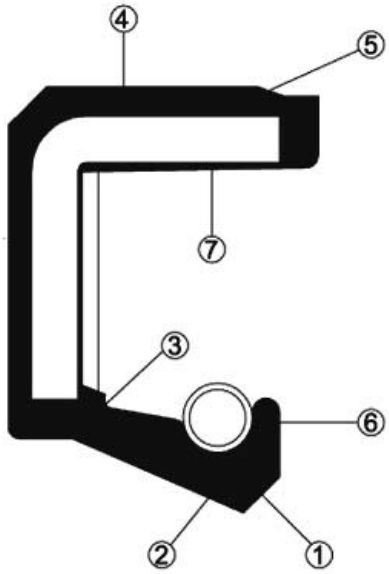
1)The average value for d_2 taken from a number of measurements shall not be greater than the value specified for d_2 plus the interference allowance.

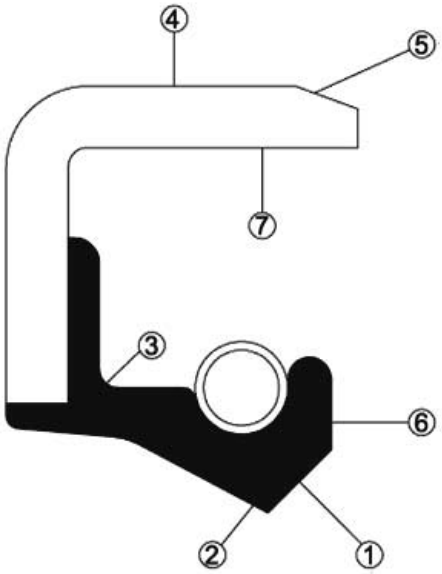
2)The tolerance on d_2 (i.e. $d_2$max - $d_2$min) is to be determined by taking three or more measurements equally spaced around the circumference.

Production and Quality Assurance

Final Inspection Standard

In accordance with our Production Standard and DIN 3761 Part 4.





	Zone	Not permitted	Permitted
1+2	Contact band 1 = Front side 2 = Back side	Breaks in Sealing Edge	No fault permitted
3	Well of seal	Bond failures	
4	Seal O.D.	Faults which will affect the sealing on O.D.	Minor faults provided that at least 2/3 of the O.D. is unbroken at this point
5	Chamfer	Faults which will affect the installation of the seal	
6	Spring retention lip	Shortcomings could cause a break	Small shortages
7	Inside wall	Free burrs	Burrs permitted if bonded or secured to the inside wall

The contact band width of the sealing lip is defined, according to DIN 3761 part 4, as follows:

Shaft diameter		Front band width mm	Back band width mm
Up to	50 mm	0.5	1,2
51 to	120 mm	0,8	1,5
over	121 mm	1	2

Types for special applications

Radiaseal®

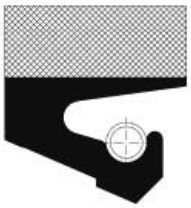
Radiaseal® is a rotary shaft seal with fabric reinforced outer diameter, rubber sealing lip and fitted with garter spring.

Radiaseal® has been designed for use as bearing seal for roll neck application of metal rolling mills, paper mills, heavy duty gear-boxes and for marine applications.

Radiaseal® has several advantages:

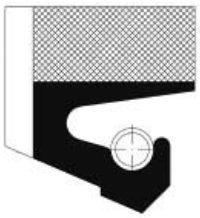
1 Accurate machining of housing bore is not essential.
2 Easy installation.
3 No corrosion problems.
4 Easy replacement.

There are 4 different types of Radiaseal® in both endless or split version.

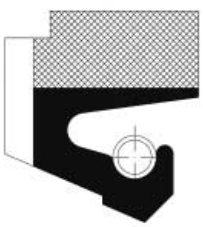


D5 Standard profile

D5S With additional dust lip



D6 With ports in the base, usually twin fitted back to back. An anular groove in the housing allows lubricant to pass around to the sealing lips.



D7 With anular groove in addition to ports, allowing lubricant to pass around to the sealing lips.
Usually twin fitted back to back.

Standard Radiaseal® is produced in NBR elastomer. Upon request it is also available in FPM and with stainless spring AISI 302 (DIN 1.4300).

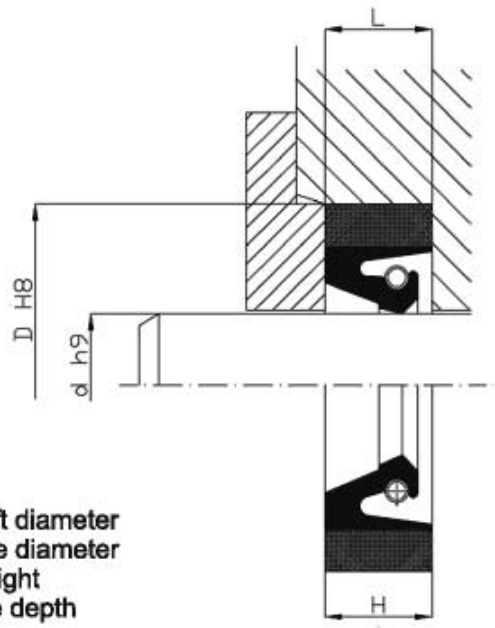
Types for special applications

Installation Instruction

Shaft tolerance ISO h9.
Surface finish roughness Rz 4 micron.
Hardness of the shaft surface 55 HRC or more.

Housing bore tolerance ISO H8.
Surface finish roughness Rz 16 micron.

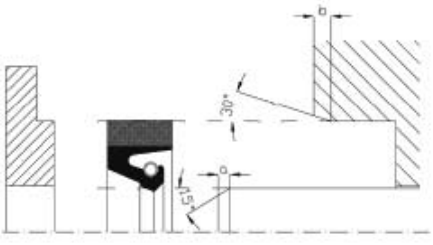
Radiaseal® is manufactured with oversized O.D. and the housing must be provided with retaining plate to give controlled axial compression to the seal, to correctly locate the seal in the housing, ensuring a good sealing on the O.D.

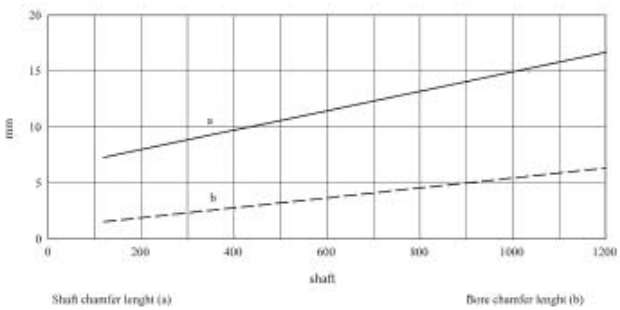


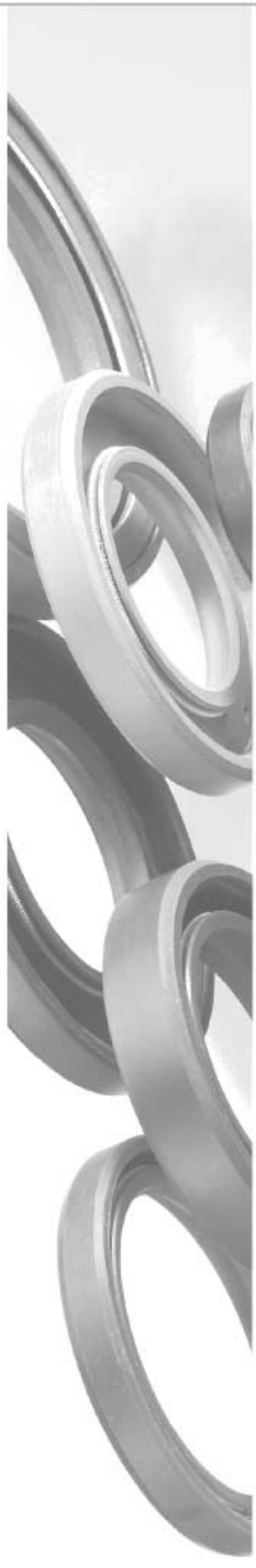
d = nominai shaft diameter
D = nominai bore diameter
H = shaftseal height
L = nominal bore depth

When fitting a split Radiaseal® to horizontal shafts, it should always be fitted with the split at the highest point of the shaft (i.e. remote from the oil).
Where two split Radiaseals® are fitted together, the splits should be staggered at 30° on each side of the top.

The bore entrance and the shaft should be provided with lead-in chamfer to facilitate proper entrance of the seal into the cavity and to avoid lip damage. Length and angle of the chamfers should be according to drawing and table below.







Types for special applications

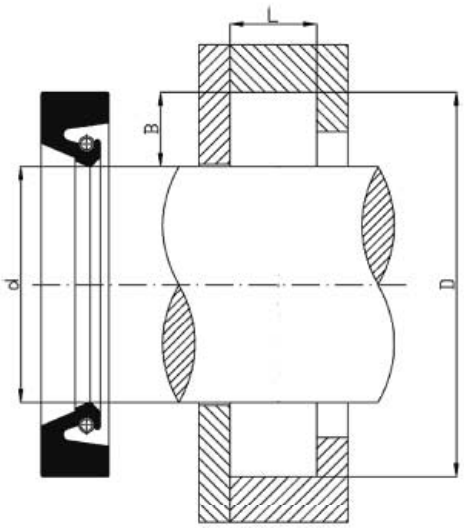
Splitring®

Splitring® is a rotary shaft seal made of only rubber, split, fitted with stainless steel coil garter spring AISI 302 (DIN 1.4300).

Splitring® is used where a standard integral hard shaft seal cannot be fitted due to the presence of flanges or supports.

Splitring® can be also used to avoid high down time costs.

They are produced in standard elastomer NBR.
FPM and SIL elastomers are available upon request.



Installation Instructions

Shaft tolerance ISO h9, surface finish max. roughness Rz 4 micron, hardness of the shaft sealing surface 55 HRC or more.

Housing bore according to table:

Shaft Diam. d	Bore Diam. D Tollerance	Bore Depht L Tollerance
Up to 140 mm	± 0,12	± 0,05
Over 140 up to 200	± 0,15	± 0,07
Over 200 up to 300	± 0,15	± 0,10
Over 300 up to 450	± 0,20	± 0,12
Over 450 mm	± 0,20	± 0,15

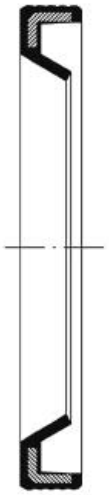
Splitring® should be fitted with the split at the highest point of the shaft and should not be used where static fluid level is higher than the lowest point of the seal.

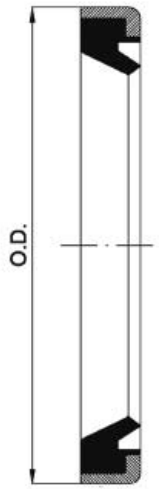
Clean the housing recess and remove all burrs and sharp edges.
Stretch the coil garter spring around the shaft and join it by screwing the conical end into the other and place the Splitring® around the shaft and stretch the spring into the groove on the sealing lip. Tight the Splitring® slightly against the shaft by pressing its outside diameter and insert the seal into the housing bore by starting near to the split and working around the entire periphery until the Splitring® has been entered into the housing. Then push the seal fully home. The housing must be provided with retaining plate to give axial compression to the seal.

Types for special applications

DINA Seal

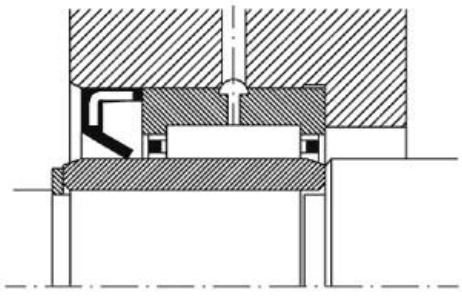
This is a specially designed rotary shaft seal to be used for needle bearing applications. DINA Seal is reinforced with steel insert and has a single thin lip without spring that, together with minimal interference, has low frictional loss.
In order to fit better into the bore, DINA Seal has a wavy rubber outer diameter. DINA Seal can also be supplied with metal O.D.

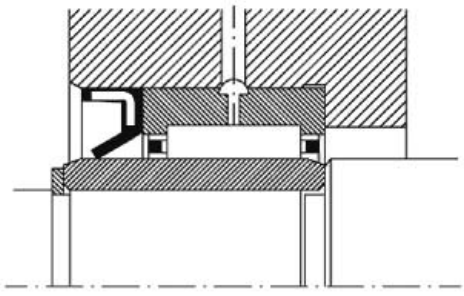




Standard DINA Seal materials are NBR elastomer and Carbon Steel insert.
For special applications FPM and SIL elastomers and/or stainless steel insert are also available upon request.

DINA Seal can be used to prevent lubricant leakage if mounted with the front face near to the needle bearing, or to protect the bearing from dust and dirt if mounted with the back face near to it.

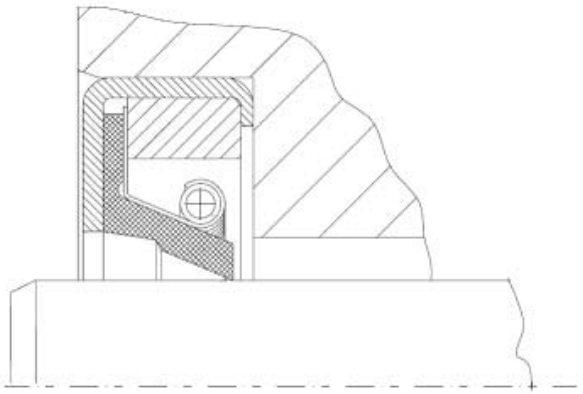




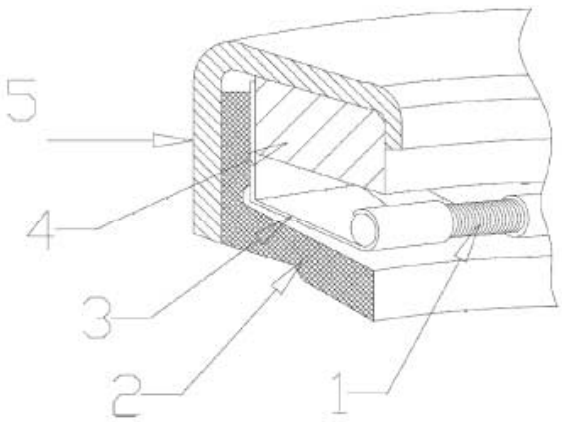
Types for special applications

C64D

C64D shaft seal has been developed specifically for severe operating conditions in heavy industry.
The performance and the life of the seal in these conditions, involving important axial tolerances (shaft tolerances, shaft run out, non eccentricity and bearings clearance), are largely dependant upon the preload of the seal lip on the shaft. C64D shaft seal has a very flexible seal lip with a finger spring/garter spring combination that compensates shaft deviations without the need of changing the lip preload.



Seal construction



1 **Garter spring**
Material: AISI 302
To provide a regulated loading on the sealing lip and enable the sealing element to follow shaft deviations.

2 **Sealing lip**
Elastomer: FPM, NBR, SIL

3 **Stainless steel spring carrier**
Material: ACX 260 AISI 316L 2D
Designed to ensure the spring retention during the installation.
If necessary to permit the removal and refitting of garter spring to provide a predetermined sealing lip preload which will permit the sealing element to follow shaft deflections.

4 **Steel reinforcing ring**
Material: Fe 37
To provide the required rigidity and to ensure an accurate installation of the seal in the groove.

5 **Steel outer ring**
Material: Fe-P04

	FPM	SIL	NBR
TEMPERATURE [°C]	-20 / +220	-60 / +120	-20 / +120
Hardness [°ShA]	75	70	75
Max operating speed [m/s]	≤35	≤25	≤25

Storage and Handling

Some storage precautions must be taken in order to avoid deterioration of the material. Rotary shaft seals should be stored in a dust free and dry atmosphere and they must be kept in their original wrapping which should only be opened just before installation. Samples should be repacked after inspection. Excessive humidity will deteriorate some elastomers as well as cause corrosive damage to metal casing and spring.
Do not drop rotary shaft seals on shelves or boxes, nor hang seals on hooks, wires or nails, since in either case the sealing lip can be damaged. Seals should be stored in a horizontal position.
Seals should be used on a first-in first-out basis to avoid ageing on the shelf. Avoid storage near sources of heat or near electrical equipments that may generate ozone. Also keep away from direct sun light.

Shaft seals interchange table

Dichta types	A	AS	AS-P	A-O	A-DUO	B	BS	C	CS
Simirit-Freudenberg	BA	BASL	BABSL	BAOF	BADUO	B1	B1SL	B2	B2SL
Goetze	827N	827S	827SK	827N0	827D	822N	822S	824N	824S
Kako	DG	DGS	DGSP	DE	DGD	DF	DFS	DFK	DFSK
Simmerwerke	A	ASL		AOF	ADUO	B	BSL	C	CSL
Stefa	CB	CC	CF	CD	CK	BB	BC	DB	DC
Gaco	A	FA		SA	DUPLEX	ABI			
Pioneer Weston	R21	R23		R26	R22	R4	R6	R1	
Paulstra	IE	IEL		IO	IELR	EE	EEL	EEP	
Chicago Rawhide						CRW1	CRWA1	CRWH1	CRWHA1
National	35	32				48	47	45	41
NOK	SC	TC	TCN	VC	DC	SB	TB	SA	TA

DICHTA®

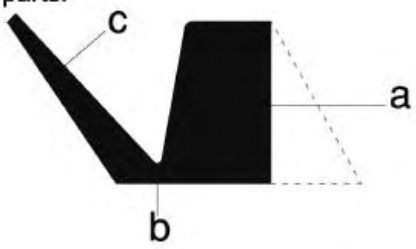
Frontseal®

Rubber V-Rings for axial dynamic sealing

Description

The Frontseal® is an all elastomer axial seal for rotary shafts and bearings. It rotates with the shaft and seals axially against a stationary counterface perpendicular to the shaft. This type of seal has been used widely for several applications and has proved to be reliable and effective against dust, dirt, water and oil splash and other media.

The ring consists of three parts:



a) The seal body, installed with interference to the shaft.
b) The hinge, acting as a sprung connection between the body and the lip.
c) The conical and flexible sealing lip which provides the actual dynamic sealing against the counterface.

The counterface can be the side wall of a bearing, a washer or any housing.

Standard Seal Types

The Frontseal® is manufactured in four standard profiles:

VA It's the most common profile. It has a perpendicular rear face. Wide range of sizes, from 3 to over 2000 mm shafts.

VS Wide body to ensure higher radial force than VA type. Range of sizes from 5 to 199 mm shafts.

VL This seal is intended for applications where available space is narrow. Range of sizes from 110 to over 1200 mm shafts.

VE It's our heavy duty large diameter seal, used for instance in steel mills, paper mills and rolling mills as a dirt/water excluder seal. A clamping band can be used to improve axial fixation. Range of sizes from 300 to over 2000 mm shafts.

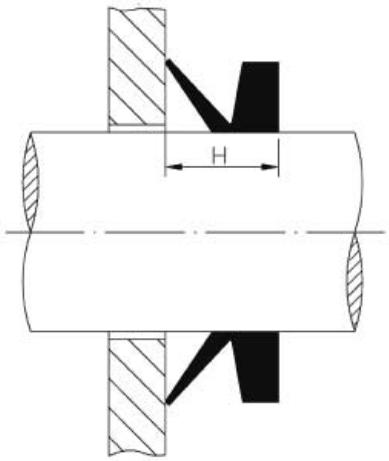
VAX Heavy duty Frontseal®, designed primarily for large high speed bearing arrangements, used for instance in rolling mills and papermaking machine applications. Additionally they can be used as secondary seals for heavy duty applications where the primary seal has to be protected against water and/or particulate contamination. Range of sizes from 200 to over 2000 mm shafts.

Other types, modifications or larger diameters available upon request.

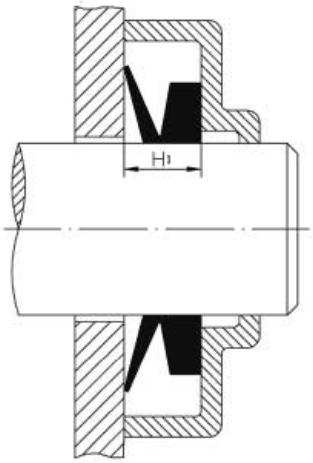
Installation and operation

Fitting

Fitting of the Frontseal® is very simple. The ring must be slightly stretched and pushed along the shaft. It can either be done manually or with a simple tool, in a way that the distance to the counterface can be maintained constant over the circumference using little pressure. The lip of the Frontseal® should be lubricated with a thin film of grease or silicone oil. In case where friction must be reduced, coat the counterface with a low friction agent and do not apply grease to the lip. The shaft should be preferably dry and free from oil and grease.



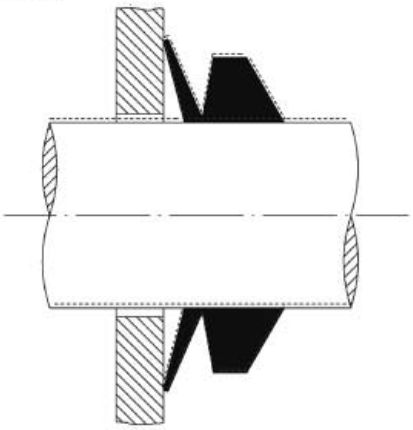
Frontseal® not preloaded



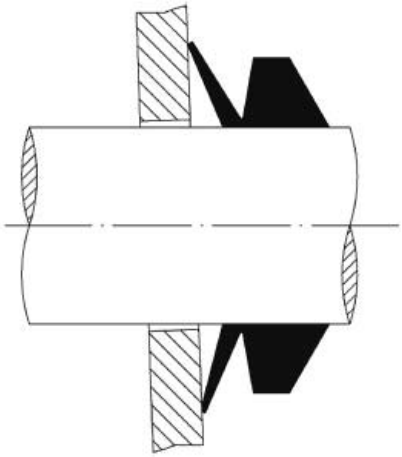
Frontseal® fitted with preloading using a tool

Eccentricity / Misalignment

The V-shape of Frontseal® provides an effective and reliable sealing even with oval section, shaft run-out, eccentricity or shaft misalignment. Sealing is not even affected by a slightly tilted counterface (maximum permissible flatness deviation is usually defined as 0.4 mm per 100mm).



oval and/or eccentrically turning shaft

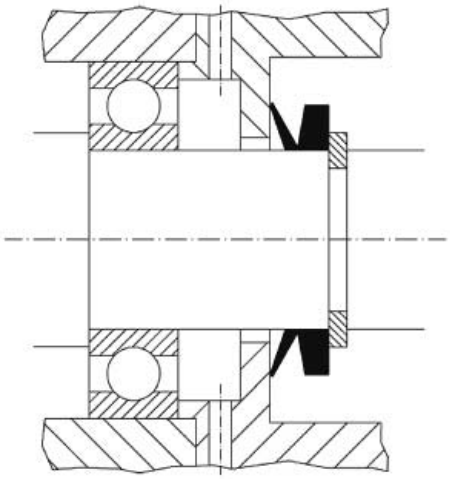


tilted counterface

Installation and operation

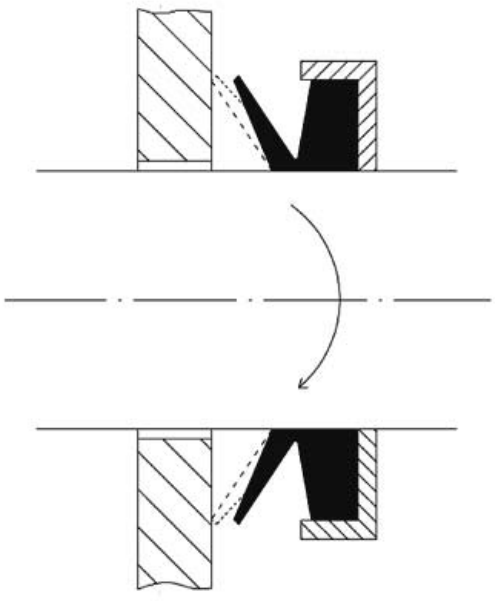
Counterface

The type of counterface is very important for an efficient sealing and for useful life of the seal. The surface must be smooth, free of scratches and sharp peaks.The choice of surface finish depends on the medium to be sealed and on the shaft speed. The choice of counterface material is highly dependant on the medium too. For normal operating conditions, conventional mild steel of min 125 HB is sufficient. With an increase in speed and the presence of abrasive particles, the hardness of the counterface must also be increased.
Surface treatment is suggested for water splash or other corrosive media.



Peripheral speed

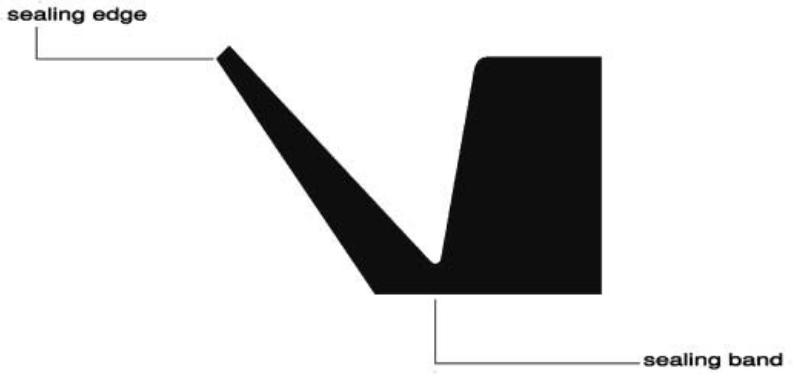
Due to the influence of the centrifugal force, the contact pressure of the lip decreases with increased speed.
At peripheral speed up to 8 m/s the lip of the Frontseal® has a good pressure against the counterface and it has the function of a light contact seal.
Over 8 m/s the seal must be supported axially and above 12 m/s a radial retention is necessary, mounting the Frontseal® in an axial groove or applying an adequate support.



Production and Quality Assurance

Our Frontseal® is manufactured according to Quality Assurance Standards ISO 9001:2000. All production phases are checked and all measurements are recorded and stored for tracing.

Our Frontseal® is individually inspected to ensure that sealing edge and sealing band are free from faults. Also small cracks and shortcomings which could cause a split during installation or operation of the seal are not accepted.

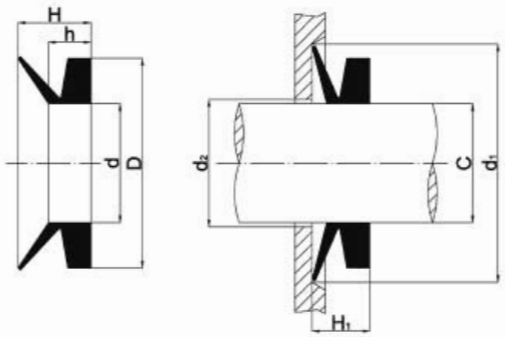


Storage and Handling

Some storage precautions must be taken in order to avoid deterioration of the material. Frontseal® should be stored in a dust free and dry atmosphere and they must be kept in their original envelope which should only be opened just before installation. Samples should be repacked after inspection.
Do not drop Frontseal® on shelves or boxes, nor hang seals on hooks, wires or nails, since in either case the seal can be damaged.
Seals should be stored on a first-in first-out basis to avoid ageing on the shelf. Avoid storage near sources of heat or near electrical equipment that may generate ozone. Also keep away from direct sunlight.
Avoid unnecessary pressure on the lip during storage.

Standard size

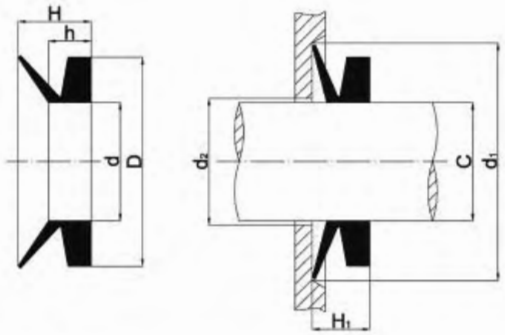
Frontseal® VA



Ref.	Shaft diameter C	Ring dimensions mm d	D	h	H	Mounting dimensions mm d_2	d_1	H_1
VA 3	2,7 - 3,5	2,5	5,5	2,1	3	C + 1	C + 4	2,5 ± 0,3
VA 4	3,5 - 4,5	3,2	7,2	2,4	3,7	C + 1	C + 6	3 ± 0,4
VA 5	4,5 - 5,5	4	8	2,4	3,7	C + 1	C + 6	3 ± 0,4
VA 6	5,5 - 6,5	5	9	2,4	3,7	C + 1	C + 6	3 ± 0,4
VA 7	6,5 - 8	6	10	2,4	3,7	C + 1	C + 6	3 ± 0,4
VA 8	8 - 9,5	7	11	2,4	3,7	C + 1	C + 6	3 ± 0,4
VA 10	9,5 - 11,5	9	15	3,4	5,5	C + 2	C + 9	4,5 ± 0,6
VA 12	11,5 - 13,5	10,5	16,5	3,4	5,5	C + 2	C + 9	4,5 ± 0,6
VA 14	13,5 - 15,5	12,5	18,5	3,4	5,5	C + 2	C + 9	4,5 ± 0,6
VA 16	15,5 - 17,5	14	20	3,4	5,5	C + 2	C + 9	4,5 ± 0,6
VA 18	17,5 - 19	16	22	3,4	5,5	C + 2	C + 9	4,5 ± 0,6
VA 20	19 - 21	18	26	4,7	7,5	C + 2	C + 12	6 ± 0,8
VA 22	21 - 24	20	28	4,7	7,5	C + 2	C + 12	6 ± 0,8
VA 25	24 - 27	22	30	4,7	7,5	C + 2	C + 12	6 ± 0,8
VA 28	27 - 29	25	33	4,7	7,5	C + 3	C + 12	6 ± 0,8
VA 30	29 - 31	27	35	4,7	7,5	C + 3	C + 12	6 ± 0,8
VA 32	31 - 33	29	37	4,7	7,5	C + 3	C + 12	6 ± 0,8
VA 35	33 - 36	31	39	4.7	7.5	C + 3	C + 12	6 ± 0,8
VA 38	36 - 38	34	42	4,7	7,5	C + 3	C + 12	6 ± 0,8
VA 40	38 - 43	36	46	5,5	9	C + 3	C + 15	7 ± 1
VA 45	43 - 48	40	50	5,5	9	C + 3	C + 15	7 ± 1
VA 50	48 - 53	45	55	5,5	9	C + 3	C + 15	7 ± 1
VA 55	53 - 58	49	59	5,5	9	C + 3	C + 15	7 ± 1
VA 60	58 - 63	54	64	5,5	9	C + 3	C + 15	7 ± 1
VA 65	63 - 68	58	68	5,5	9	C + 3	C + 15	7 ± 1
VA 70	68 - 73	63	75	6,8	11	C + 4	C + 18	9 ± 1,2
VA 75	73 - 78	67	79	6,8	11	C + 4	C + 18	9 ± 1,2
VA 80	78 - 83	72	84	6,8	11	C + 4	C + 18	9 ± 1,2
VA 85	83 - 88	76	88	6,8	11	C + 4	C + 18	9 ± 1,2
VA 90	88 - 93	81	93	6,8	11	C + 4	C + 18	9 ± 1,2
VA 95	93 - 98	85	97	6,8	11	C + 4	C + 18	9 ± 1,2
VA 100	98 - 105	90	102	6,8	11	C + 4	C + 18	9 ± 1,2
VA 110	105 - 115	99	113	7,9	12,8	C + 4	C + 21	10,5 ± 1,5
VA 120	115 - 125	108	122	7,9	12,8	C + 4	C + 21	10,5 ± 1,5
VA 130	125 - 135	117	131	7,9	12,8	C + 4	C + 21	10,5 ± 1,5
VA 140	135 - 145	126	140	7,9	12,8	C + 4	C + 21	10,5 ± 1,5
VA 150	145 - 155	135	149	7,9	12,8	C + 4	C + 21	10,5 ± 1,5
VA 160	155 - 165	144	160	9	14,5	C + 5	C + 24	12 ± 1,8
VA 170	165 - 175	153	169	9	14,5	C + 5	C + 24	12 ± 1,8
VA 180	175 - 185	162	178	9	14,5	C + 5	C + 24	12 ± 1,8
VA 190	185 - 195	171	187	9	14,5	C + 5	C + 24	12 ± 1,8
VA 199	195 - 210	180	196	9	14,5	C + 5	C + 24	12 ± 1,8

Standard size

Frontseal® VA

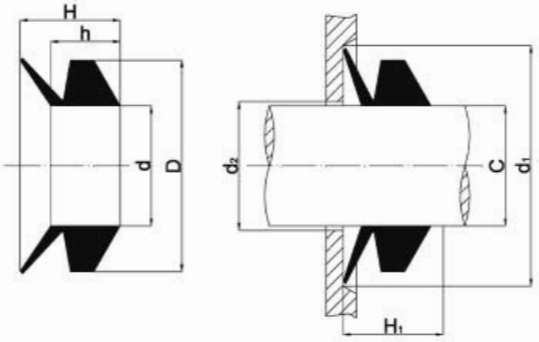


Ref.	Shaft diameter C	Ring dimensions mm d	D	h	H	Mounting dimensions mm d_2	d_1	H_1
VA 200	190 - 210	180	210	14,3	25	C + 10	C + 45	20 ± 4
VA 220	210 - 235	198	228	14,3	25	C + 10	C + 45	20 ± 4
VA 250	235 - 265	225	255	14,3	25	C + 10	C + 45	20 ± 4
VA 275	265 - 290	247	277	14,3	25	C + 10	C + 45	20 ± 4
VA 300	290 - 310	270	300	14,3	25	C + 10	C + 45	20 ± 4
VA 325	310 - 335	292	322	14,3	25	C + 10	C + 45	20 ± 4
VA 350	335 - 365	315	345	14,3	25	C + 10	C + 45	20 ± 4
VA 375	365 - 390	337	367	14,3	25	C + 10	C + 45	20 ± 4
VA 400	390 - 430	360	390	14,3	25	C + 10	C + 45	20 ± 4
VA 450	430 - 480	405	435	14,3	25	C + 10	C + 45	20 ± 4
VA 500	480 - 530	450	480	14,3	25	C + 10	C + 45	20 ± 4
VA 550	530 - 580	495	525	14,3	25	C + 10	C + 45	20 ± 4
VA 600	580 - 630	540	570	14,3	25	C + 10	C + 45	20 ± 4
VA 650	630 - 665	600	630	14,3	25	C + 10	C + 45	20 ± 4
VA 700	665 - 705	630	660	14,3	25	C + 10	C + 45	20 ± 4
VA 725	705 - 745	670	700	14,3	25	C + 10	C + 45	20 ± 4
VA 750	745 - 785	705	735	14,3	25	C + 10	C + 45	20 ± 4
VA 800	785 - 830	745	775	14,3	25	C + 10	C + 45	20 ± 4
VA 850	830 - 875	785	815	14,3	25	C + 10	C + 45	20 ± 4
VA 900	875 - 920	825	855	14,3	25	C + 10	C + 45	20 ± 4
VA 950	920 - 965	865	895	14,3	25	C + 10	C + 45	20 ± 4
VA 1000	965 - 1015	910	940	14,3	25	C + 10	C + 45	20 ± 4
VA 1050	1015 - 1065	955	985	14,3	25	C + 10	C + 45	20 ± 4
VA 1100	1065 - 1115	1000	1030	14,3	25	C + 10	C + 45	20 ± 4
VA 1150	1115 - 1165	1045	1075	14,3	25	C + 10	C + 45	20 ± 4
VA 1200	1165 - 1215	1090	1120	14,3	25	C + 10	C + 45	20 ± 4
VA 1250	1215 - 1270	1135	1165	14,3	25	C + 10	C + 45	20 ± 4
VA 1300	1270 - 1320	1180	1210	14,3	25	C + 10	C + 45	20 ± 4
VA 1350	1320 - 1370	1225	1255	14,3	25	C + 10	C + 45	20 ± 4
VA 1400	1370 - 1420	1270	1300	14,3	25	C + 10	C + 45	20 ± 4
VA 1450	1420 - 1470	1315	1345	14,3	25	C + 10	C + 45	20 ± 4
VA 1500	1470 - 1520	1360	1390	14,3	25	C + 10	C + 45	20 ± 4
VA 1550	1520 - 1570	1405	1435	14,3	25	C + 10	C + 45	20 ± 4
VA 1600	1570 - 1620	1450	1480	14,3	25	C + 10	C + 45	20 ± 4
VA 1650	1620 - 1670	1495	1525	14,3	25	C + 10	C + 45	20 ± 4
VA 1700	1670 - 1720	1540	1570	14,3	25	C + 10	C + 45	20 ± 4
VA 1750	1720 - 1770	1585	1615	14,3	25	C + 10	C + 45	20 ± 4
VA 1800	1770 - 1820	1630	1660	14,3	25	C + 10	C + 45	20 ± 4
VA 1850	1820 - 1870	1675	1705	14,3	25	C + 10	C + 45	20 ± 4
VA 1900	1870 - 1920	1720	1750	14,3	25	C + 10	C + 45	20 ± 4
VA 1950	1920 - 1970	1765	1795	14,3	25	C + 10	C + 45	20 ± 4
VA 2000	1970 - 2020	1810	1840	14,3	25	C + 10	C + 45	20 ± 4

Over 2000 mm available on request

Standard size

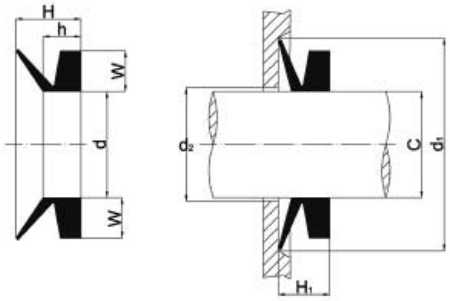
Frontseal® VS



Ref.	Shaft diameter C	Ring dimensions mm d	D	h	H	Mounting dimensions mm d_2	d_1	H_1
VS 5	4,5 - 5,5	4	8	3,9	5,2	C + 1	C + 6	4,5 ± 0,4
VS 6	5,5 - 6,5	5	9	3,9	5,2	C + 1	C + 6	4,5 ± 0,4
VS 7	6,5 - 8	6	10	3,9	5,2	C + 1	C + 6	4,5 ± 0,4
VS 8	8 - 9,5	7	11	3,9	5,2	C + 1	C + 6	4,5 ± 0,4
VS 10	9,5 - 11,5	9	15	5,6	7,7	C + 2	C + 9	6,7 ± 0,6
VS 12	11,5 - 13,5	10,5	16,5	5,6	7,7	C + 2	C + 9	6,7 ± 0,6
VS 14	13,5 - 15,5	12,5	18,5	5,6	7,7	C + 2	C + 9	6,7 ± 0,6
VS 16	15,5 - 17,5	14	20	5,6	7,7	C + 2	C + 9	6,7 ± 0,6
VS 18	17,5 - 19	16	22	5,6	7,7	C + 2	C + 9	6,7 ± 0,6
VS 20	19 - 21	18	26	7,9	10,5	C + 2	C + 12	9 ± 0,8
VS 22	21 - 24	20	28	7,9	10,5	C + 2	C + 12	9 ± 0,8
VS 25	24 - 27	22	30	7,9	10,5	C + 2	C + 12	9 ± 0,8
VS 28	27 - 29	25	33	7,9	10,5	C + 3	C + 12	9 ± 0,8
VS 30	29 - 31	27	35	7,9	10,5	C + 3	C + 12	9 ± 0,8
VS 32	31 - 33	29	37	7,9	10,5	C + 3	C + 12	9 ± 0,8
VS 35	33 - 36	31	39	7,9	10,5	C + 3	C + 12	9 ± 0,8
VS 38	36 - 38	34	42	7,9	10,5	C + 3	C + 12	9 ± 0,8
VS 40	38 - 43	36	46	9,5	13	C + 3	C + 15	11 ± 1
VS 45	43 - 48	40	50	9,5	13	C + 3	C + 15	11 ± 1
VS 50	48 - 53	45	55	9,5	13	C + 3	C + 15	11 ± 1
VS 55	53 - 58	49	59	9,5	13	C + 3	C + 15	11 ± 1
VS 60	58 - 63	54	64	9,5	13	C + 3	C + 15	11 ± 1
VS 65	63 - 68	58	68	9,5	13	C + 3	C + 15	11 ± 1
VS 70	68 - 73	63	75	11,3	15,5	C + 4	C + 18	13,5 ± 1,2
VS 75	73 - 78	67	79	11,3	15,5	C + 4	C + 18	13,5 ± 1,2
VS 80	78 - 83	72	84	11,3	15,5	C + 4	C + 18	13,5 ± 1,2
VS 85	83 - 88	76	88	11,3	15,5	C + 4	C + 18	13,5 ± 1,2
VS 90	88 - 93	81	93	11,3	15,5	C + 4	C + 18	13,5 ± 1,2
VS 95	93 - 98	85	97	11,3	15,5	C + 4	C + 18	13,5 ± 1,2
VS 100	98 - 105	90	102	11,3	15,5	C + 4	C + 18	13,5 ± 1,2
VS 110	105 - 115	99	113	13,1	18	C + 4	C + 21	15,5 ± 1,5
VS 120	115 - 125	108	122	13,1	18	C + 4	C + 21	15,5 ± 1,5
VS 130	125 - 135	117	131	13,1	18	C + 4	C + 21	15,5 ± 1,5
VS 140	135 - 145	126	140	13,1	18	C + 4	C + 21	15,5 ± 1,5
VS 150	145 - 155	135	149	13,1	18	C + 4	C + 21	15,5 ± 1,5
VS 160	155 - 165	144	160	15	20,5	C + 5	C + 24	18 ± 1,8
VS 170	165 - 175	153	169	15	20,5	C + 5	C + 24	18 ± 1,8
VS 180	175 - 185	162	178	15	20,5	C + 5	C + 24	18 ± 1,8
VS 190	185 - 195	171	187	15	20,5	C + 5	C + 24	18 ± 1,8
VS 199	195 - 210	180	196	15	20,5	C + 5	C + 24	18 ± 1,8

Standard size

Frontseal® VL



Ring dimensions
H = 10,5
h = 6,0
W = 6,0

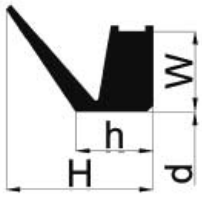
Assembling dimensions
H_1 = B ± 1,5
d_2 max = C + 5
d_1 min = C + 20

Reference	Shaft diameter	d
VL 110	105 - 115	99
VL 120	115 - 125	108
VL 130	125 - 135	117
VL 140	135 - 145	126
VL 150	145 - 155	135
VL 160	155 - 165	144
VL 170	165 - 175	153
VL 180	175 - 185	162
VL 190	185 - 195	171
VL 200	195 - 210	182
VL 220	210 - 233	198
VL 250	233 - 260	225
VL 275	260 - 285	247
VL 300	285 - 310	270
VL 325	310 - 335	292
VL 350	335 - 365	315
VL 375	365 - 385	337
VL 400	385 - 410	360
VL 425	410 - 440	382
VL 450	440 - 475	405
VL 500	475 - 510	450
VL 525	510 - 540	472
VL 550	540 - 565	495
VL 575	565 - 585	517
VL 600	585 - 625	540
VL 650	625 - 675	600
VL 700	675 - 710	630
VL 725	710 - 740	670
VL 750	740 - 775	705
VL 800	775 - 825	745
VL 850	825 - 875	785
VL 900	875 - 925	825
VL 950	925 - 975	865
VL 1000	975 - 1025	910
VL 1050	1025 - 1075	955
VL 1100	1075 - 1125	1000
VL 1150	1125 - 1175	1045
VL 1200	1175 - 1225	1090

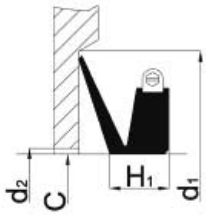
Over 1200 mm available on request

Standard size

Frontseal® VE



Ring dimensions
H= 65
h= 32
W= 30



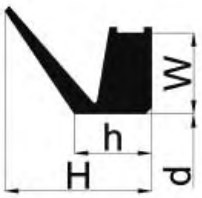
Assembling dimensions
H_1 = 50 ± 12
d_2 max = C + 24
d_1 min = C + 115

Reference	Shaft diameter			d
VE 300	300	-	305	294
VE 305	305	-	310	299
VE 310	310	-	315	304
VE 315	315	-	320	309
VE 320	320	-	325	314
VE 325	325	-	330	319
VE 330	330	-	335	323
VE 335	335	-	340	328
VE 340	340	-	345	333
VE 345	345	-	350	338
VE 350	350	-	355	343
VE 355	355	-	360	347
VE 360	360	-	365	352
VE 365	365	-	370	357
VE 370	370	-	375	362
VE 375	375	-	380	367
VE 380	380	-	385	371
VE 385	385	-	390	376
VE 390	390	-	395	381
VE 395	395	-	400	386
VE 400	400	-	405	391
VE 405	405	-	410	396
VE 410	410	-	415	401
VE 415	415	-	420	405
VE 420	420	-	425	410
VE 425	425	-	430	415
VE 430	430	-	435	420
VE 435	435	-	440	425
VE 440	440	-	445	429
VE 445	445	-	450	434
VE 450	450	-	455	439
VE 455	455	-	460	444
VE 460	460	-	465	448
VE 465	465	-	470	453
VE 470	470	-	475	458
VE 475	475	-	480	463
VE 480	480	-	485	468
VE 485	485	-	490	473
VE 490	490	-	495	478
VE 495	495	-	500	483
VE 500	500	-	505	488
VE 505	505	-	510	493
VE 510	510	-	515	497
VE 515	515	-	520	502
VE 520	520	-	525	507
VE 525	525	-	530	512
VE 530	530	-	535	517
VE 535	535	-	540	521
VE 540	540	-	545	526
VE 545	545	-	550	531
VE 550	550	-	555	536
VE 555	555	-	560	541
VE 560	560	-	565	546
VE 565	565	-	570	550
VE 570	570	-	575	555

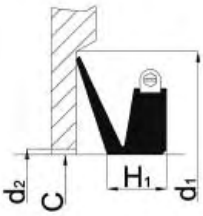
DICHTA®

Standard size

Frontseal® VE



Ring dimensions
H = 65
h = 32
W = 30



Assembling dimensions
$H_1 = 50 \pm 12$
d_2 max = C + 24
d_1 min = C + 115

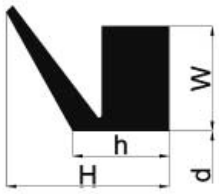
Reference	Shaft diameter			d
VE 575	575	-	580	560
VE 580	580	-	585	565
VE 585	585	-	590	570
VE 590	590	-	600	575
VE 600	600	-	610	582
VE 610	610	-	620	592
VE 620	620	-	630	602
VE 630	630	-	640	612
VE 640	640	-	650	621
VE 650	650	-	660	631
VE 660	660	-	670	640
VE 670	670	-	680	650
VE 680	680	-	690	660
VE 690	690	-	700	670
VE 700	700	-	710	680
VE 710	710	-	720	689
VE 720	720	-	730	699
VE 730	730	-	740	709
VE 740	740	-	750	718
VE 750	750	-	758	728
VE 760	758	-	766	735
VE 770	766	-	774	743
VE 780	774	-	783	751
VE 790	783	-	792	759
VE 800	792	-	801	768
VE 810	801	-	810	777
VE 820	810	-	821	786
VE 830	821	-	831	796
VE 840	831	-	841	805
VE 850	841	-	851	814
VE 860	851	-	861	824
VE 870	861	-	871	833
VE 880	871	-	882	843
VE 890	882	-	892	853
VE 900	892	-	912	871
VE 920	912	-	922	880
VE 930	922	-	933	890
VE 940	933	-	944	900
VE 950	944	-	955	911
VE 960	955	-	966	921
VE 970	966	-	977	932
VE 980	977	-	988	942
VE 990	988	-	999	953
VE 1000	999	-	1010	963
VE 1020	1010	-	1025	973
VE 1040	1025	-	1045	990
VE 1060	1045	-	1065	1008
VE 1080	1065	-	1085	1027
VE 1100	1085	-	1105	1045
VE 1120	1105	-	1125	1065
VE 1140	1125	-	1145	1084
VE 1160	1145	-	1165	1103
VE 1180	1165	-	1185	1121
VE 1200	1185	-	1205	1139
VE 1220	1205	-	1225	1157
VE 1240	1225	-	1245	1176
VE 1260	1245	-	1270	1195

Reference	Shaft diameter			d
VE 1280	1270	-	1295	1218
VE 1300	1295	-	1315	1240
VE 1325	1315	-	1340	1259
VE 1350	1340	-	1365	1281
VE 1375	1365	-	1390	1305
VE 1400	1390	-	1415	1328
VE 1425	1415	-	1440	1350
VE 1450	1440	-	1465	1374
VE 1475	1465	-	1490	1397
VE 1500	1490	-	1515	1419
VE 1525	1515	-	1540	1443
VE 1550	1540	-	1570	1467
VE 1575	1570	-	1600	1495
VE 1600	1600	-	1640	1524
VE 1650	1640	-	1680	1559
VE 1700	1680	-	1720	1596
VE 1750	1720	-	1765	1632
VE 1800	1765	-	1810	1671
VE 1850	1810	-	1855	1714
VE 1900	1855	-	1905	1753
VE 1950	1905	-	1955	1794
VE 2000	1955	-	2010	1844

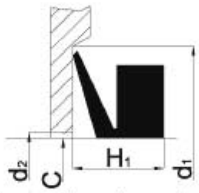
Over 2000 mm available on request

Standard size

Frontseal® VAX



Ring dimensions
H = 31
h = 17,3
W= 17,8

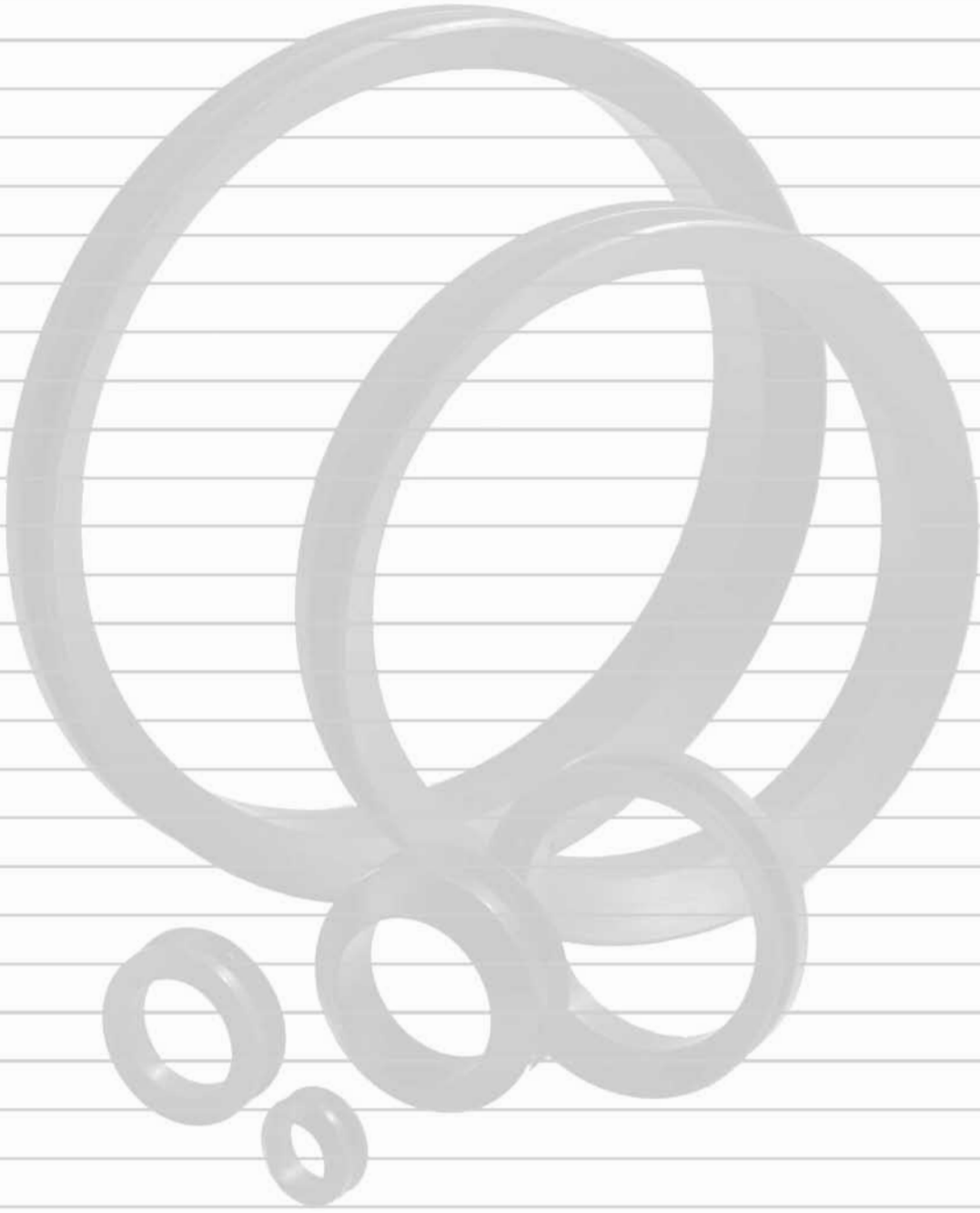


Assembling dimensions
$H_1 = 25 \pm 5$
d_2 max = C + 12
d_1 min = C + 50

Reference	Shaft diameter			d
VAX 200	200	-	205	192
VAX 205	205	-	210	196
VAX 210	210	-	215	200
VAX 215	215	-	219	204
VAX 220	219	-	224	207
VAX 225	224	-	228	211
VAX 230	228	-	232	215
VAX 235	232	-	236	219
VAX 240	236	-	240	223
VAX 250	240	-	250	227
VAX 260	250	-	260	236
VAX 270	260	-	270	245
VAX 280	270	-	281	255
VAX 290	281	-	292	265
VAX 300	292	-	303	275
VAX 310	303	-	313	285
VAX 320	313	-	325	295
VAX 330	325	-	335	305
VAX 340	335	-	345	315
VAX 350	345	-	355	322
VAX 360	355	-	372	328
VAX 380	372	-	390	344
VAX 400	390	-	415	360
VAX 425	415	-	443	385
VAX 450	443	-	480	410
VAX 500	480	-	530	450
VAX 550	530	-	580	495
VAX 600	580	-	630	540
VAX 650	630	-	665	600
VAX 700	665	-	705	630
VAX 725	705	-	745	670
VAX 750	745	-	785	705
VAX 800	785	-	830	745
VAX 850	830	-	875	785
VAX 900	875	-	920	825
VAX 950	920	-	965	865
VAX 1000	965	-	1015	910
VAX 1050	1015	-	1065	955
VAX 1100	1065	-	1115	1000
VAX 1150	1115	-	1165	1045
VAX 1200	1165	-	1215	1090
VAX 1250	1215	-	1270	1135
VAX 1300	1270	-	1320	1180
VAX 1350	1320	-	1370	1225
VAX 1400	1370	-	1420	1270
VAX 1450	1420	-	1470	1315
VAX 1500	1470	-	1520	1360
VAX 1550	1520	-	1570	1405
VAX 1600	1570	-	1620	1450
VAX 1650	1620	-	1670	1495
VAX 1700	1670	-	1720	1540
VAX 1750	1720	-	1770	1585
VAX 1800	1770	-	1820	1630
VAX 1850	1820	-	1870	1675
VAX 1900	1870	-	1920	1720
VAX 1950	1920	-	1970	1765
VAX 2000	1970	-	2020	1810

Over 2000 mm available on request

Notes



DICHTA®

Wiper seals

Description

Wiper rings are used to protect seals in sliding or reciprocating motions, preventing contamination from dirt particles (dust, mud, water, etc.). The lip of the wiper removes even the first dirt from the piston rod.
Such dirt particles can cause damage to hydraulic or pneumatic systems during stroke movement. Even if they appear in good condition, wipers should always be replaced when changing seals.

Some applications are:
- earth moving machinery
- lift trucks
- hydraulic presses

Standard Seal Types

Current types

DAS with ground outer metal case

DP6 without metal insert

DP7 with rubber covered metal insert

DP8 without metal insert, special profile

DRS with rubber covered metal insert

DWR without metal insert, inch sizes

Interchange Table

Dichta types	DAS	DP6	DP7	DP8	DRS	DWR
SIMRIT	AS			ASOB		
PRÄDIFA	AM	A5		A1		
MERKEL		P6		P5		
GACO			P7		RS	
POLYPAC						WRM

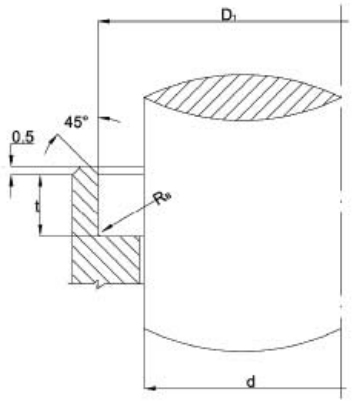
Production and Quality Assurance

Our wiper seals are manufactured according to internal Standard and Quality Assurance Standards ISO 9001:2000.

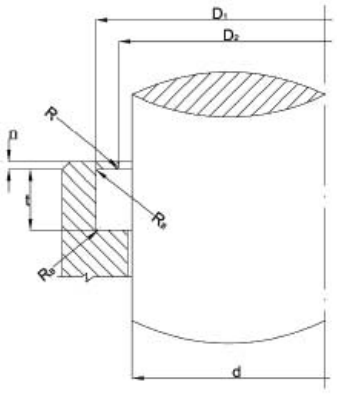
All production phases are checked and all measurements are recorded and stored for tracing.

Installation and Operation

Groove design and tolerances



Groove for wiper seal with metal insert



Groove for wiper seal without metal insert

Tolerances

d	D_1		D_2	t	n	R_B
	with metal insert DP7 DRS DAS	**without metal insert DP6 DP8 DWR**				
f7 - e9	H8	H11	+ 0 + 0,2	+ 0 + 0,1	± 0,2	0,4 max

Temperature range and maximum speed

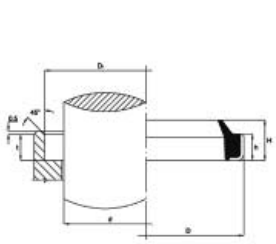
Temperature range of wiper seals is usually between –40° C and + 120° C and max. speed is at 4 m/s. In most cases the material used is NBR. FPM is used for temperatures up to 200° C.This elastomer is also resistant against aggressive chemicals.

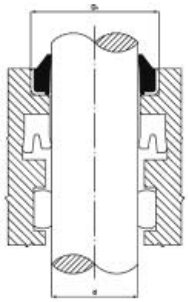
Storage and Handling

Some storage precautions must be taken in order to avoid deterioration of the material. Wiper seals should be stored in a dust free and dry atmosphere and they must be kept in their original wrapping which should only be opened just before installation. Samples should be repacked after inspection. Excessive humidity will deteriorate some elastomers as well as cause corrosive damage to metal casing.
Do not drop wiper seals on shelves or boxes nor hang seals on hooks, wires or nails, since in either case the sealing lip can be damaged.
Seals should be stored on a first in-first out basis to avoid ageing on the shelf. Avoid storage near sources of heat or near electrical equipment that may generate ozone. Also keep away from direct sunlight.

Standard Sizes

Wiper seals **DAS**



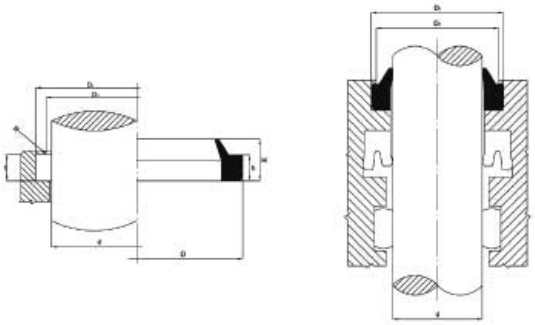


Reference	Rod diameter mm	Wiper dimensions mm				Bore dimensions mm	
		d	D	h	H	D_1	t
DAS 8/22/3/4,5	8	8	22	3	4,5	22	3
DAS 10/16/3/4,5	10	10	16	3	4,5	16	3
DAS 10/20/5/8	10	10	20	5	8	20	5
DAS 12/20/4/6	12	12	20	4	6	20	4
DAS 12/22/5/8	12	12	22	5	8	22	5
DAS 14/22/3/4	14	14	22	3	4	22	3
DAS 16/22/3/4	16	16	22	3	4	22	3
DAS 16/26/5/8	16	16	26	5	8	26	5
DAS 18/28/7/10	18	18	28	7	10	28	7
DAS 20/28/3,5/5	20	20	28	3,5	5	28	3,5
DAS 20/30/7/10	20	20	30	7	10	30	7
DAS 22/28/5/9	22	22	28	5	9	28	5
DAS 22/32/7/10	22	22	32	7	10	32	7
DAS 25/35/7/10	25	25	35	7	10	35	7
DAS 28/40/7/10	28	28	40	7	10	40	7
DAS 30/40/5/8	30	30	40	5	8	40	5
DAS 30/40/7/10	30	30	40	7	10	40	7
DAS 32/45/7/10	32	32	45	7	10	45	7
DAS 35/45/7/10	35	35	45	7	10	45	7
DAS 36/45/7/10	36	36	45	7	10	45	7
DAS 40/50/5/8	40	40	50	5	8	50	5
DAS 40/50/7/10	40	40	50	7	10	50	7
DAS 40/52/5/8	40	40	52	5	8	52	5
DAS 42/52/7/10	42	42	52	7	10	52	7
DAS 45/55/7/10	45	45	55	7	10	55	7
DAS 45/60/7/10	45	45	60	7	10	60	7
DAS 50/56/5/8	50	50	56	5	8	56	5
DAS 50/60/5/8	50	50	60	5	8	60	5
DAS 50/60/7/10	50	50	60	7	10	60	7
DAS 50/65/5/8	50	50	65	5	8	65	5
DAS 50/65/7/10	50	50	65	7	10	65	7
DAS 52/62/7/10	52	52	62	7	10	62	7
DAS 55/65/7/10	55	55	65	7	10	65	7
DAS 60/70/7/10	60	60	70	7	10	70	7
DAS 63/75/7/10	63	63	75	7	10	75	7
DAS 65/75/7/10	65	65	75	7	10	75	7
DAS 70/80/7/10	70	70	80	7	10	80	7
DAS 75/85/7/10	75	75	85	7	10	85	7
DAS 80/90/7/10	80	80	90	7	10	90	7
DAS 85/95/7/10	85	85	95	7	10	95	7
DAS 90/100/7/10	90	90	100	7	10	100	7
DAS 95/105/7/10	95	95	105	7	10	105	7
DAS 100/110/7/10	100	100	110	7	10	110	7
DAS 105/115/7/10	105	105	115	7	10	115	7
DAS 110/120/7/10	110	110	120	7	10	120	7
DAS 115/125/7/10	115	115	125	7	10	125	7
DAS 120/130/7/10	120	120	130	7	10	130	7
DAS 125/140/9/12	125	125	140	9	12	140	9
DAS 130/145/9/12	130	130	145	9	12	145	9
DAS 140/155/9/12	140	140	155	9	12	155	9
DAS 170/185/10/14	170	170	185	10	14	185	10
DAS 180/195/10/14	180	180	195	10	14	195	10
DAS 200/220/12/16	200	200	220	12	16	220	12
DAS 320/340/12/16	320	320	340	12	16	340	12

DAS wiper seals have a metal case and are installed in open grooves with interference.

Standard Sizes

Wiper seals **DP6**

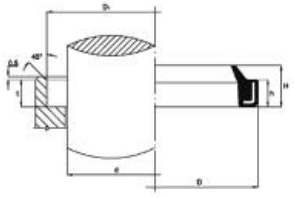


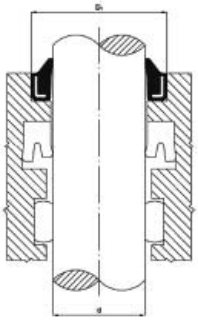
Reference	Rod diameter mm	Wiper dimensions mm				Bore dimensions mm			
		d	D	h	H	D_1	D_2	t	R
DP6 20/28/5/7	20	20	28	5	7	28,6	23	5,3	1
DP6 22/30/5/7	22	22	30	5	7	30,6	25	5,3	1
DP6 25/33/5/7	25	25	33	5	7	33,6	28	5,3	1
DP6 28/36/5/7	28	28	36	5	7	36,6	31	5,3	1
DP6 30/38/5/7	30	30	38	5	7	38,6	33	5,3	1
DP6 32/40/5/7	32	32	40	5	7	40,6	35	5,3	1
DP6 35/43/5/7	35	35	43	5	7	43,6	38	5,3	1
DP6 36/44/5/7	36	36	44	5	7	44,6	39	5,3	1
DP6 40/48/5/7	40	40	48	5	7	48,6	43	5,3	1
DP6 42/50/5/7	42	42	50	5	7	50,6	45	5,3	1
DP6 45/55/5/7	45	45	55	5	7	55,6	48	5,3	1
DP6 50/58/5/7	50	50	58	5	7	58,6	53	5,3	1
DP6 50/60/5/7	50	50	60	5	7	60,6	53	5,3	1
DP6 55/65/5/7	55	55	65	5	7	65,6	58	5,3	1
DP6 56/66/5/7	56	56	66	5	7	66,6	59	5,3	1
DP6 60/70/5/7	60	60	70	5	7	70,6	63	5,3	1
DP6 60/68/5/7	60	60	68	5	7	68,6	63	5,3	1
DP6 63/73/5/7	63	63	73	5	7	73,6	66	5,3	1
DP6 65/75/5/7	65	65	75	5	7	75,6	68	5,3	1
DP6 70/80/5/7	70	70	80	5	7	80,6	73	5,3	1
DP6 75/87/7/12	75	75	87	7	12	87,2	81	7,1	1
DP6 80/92/7/12	80	80	92	7	12	92,2	86	7,1	1
DP6 85/97/7/12	85	85	97	7	12	97,2	91	7,1	1
DP6 90/102/7/12	90	90	102	7	12	102,2	96	7,1	1
DP6 95/107/7/12	95	95	107	7	12	107,2	101	7,1	1
DP6 100/112/7/12	100	100	112	7	12	112,2	106	7,1	1
DP6 110/122/7/12	110	110	122	7	12	122,2	116	7,1	1
DP6 115/127/7/12	115	115	127	7	12	127,2	121	7,1	1
DP6 120/132/7/12	120	120	132	7	12	132,2	126	7,1	1
DP6 125/140/10/16	125	125	140	10	16	140	132,6	10,1	1,5
DP6 140/155/10/16	140	140	155	10	16	155	147,6	10,1	1,5
DP6 150/165/10/16	150	150	165	10	16	165	157,6	10,1	1,5
DP6 160/175/10/16	160	160	175	10	16	175	167,6	10,1	1,5
DP6 180/200/10/18	180	180	200	10	18	200	190	10,2	3
DP6 200/220/10/18	200	200	220	10	18	220	210	10,2	3
DP6 240/260/10/18	240	240	260	10	18	260	250	10,2	3

DP6 wiper seals do not have any metal insert and are elastically installed in recessed grooves.

Standard Sizes

Wiper seals **DP7**



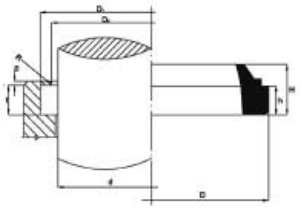


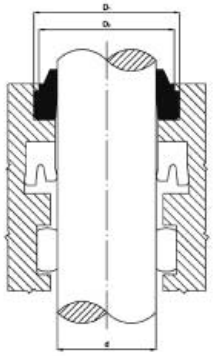
Reference	Rod diameter mm	Wiper dimensions mm				Bore dimensions mm	
		d	D	h	H	D_1	t
DP7 8/14/3,5/5	8	8	14	3,5	5	14	3,5
DP7 10/16/3,5/5	10	10	16	3,5	5	16	3,5
DP7 12/18/3,5/5	12	12	18	3,5	5	18	3,5
DP7 14/20/3,5/5	14	14	20	3,5	5	20	3,5
DP7 15/21/3,5/5	15	15	21	3,5	5	21	3,5
DP7 16/22/3,5/5	16	16	22	3,5	5	22	3,5
DP7 16/24/3,5/5	16	16	24	3,5	5	24	3,5
DP7 17/22/5/7	17	17	22	5	7	22	5
DP7 18/28/5/7	18	18	28	5	7	28	5
DP7 20/30/5/7	20	20	30	5	7	30	5
DP7 22/32/5/7	22	22	32	5	7	32	5
DP7 25/35/5/7	25	25	35	5	7	35	5
DP7 28/38/5/7	28	28	38	5	7	38	5
DP7 30/40/5/7	30	30	40	5	7	40	5
DP7 32/42/5/7	32	32	42	5	7	42	5
DP7 35/45/7/10	35	35	45	7	10	45	7
DP7 36/46/5/7	36	36	46	5	7	46	5
DP7 40/50/5/8	40	40	50	5	8	50	5
DP7 42/52/5/7	42	42	52	5	7	52	5
DP7 45/55/5/7	45	45	55	5	7	55	5
DP7 50/56/5/7	50	50	56	5	7	56	5
DP7 50/60/5/7	50	50	60	5	7	60	5
DP7 55/65/5/7	55	55	65	5	7	65	5
DP7 56/66/5/7	56	56	66	5	7	66	5
DP7 60/70/5/7	60	60	70	5	7	70	5
DP7 63/73/5/7	63	63	73	5	7	73	5
DP7 65/75/5/7	65	65	75	5	7	75	5
DP7 70/80/5/7	70	70	80	5	7	80	5
DP7 75/83/7/10	75	75	83	7	10	83	7
DP7 80/88/7/10	80	80	88	7	10	88	7
DP7 90/100/5/7	90	90	100	5	7	100	5

DP7 wiper seals have a metal insert and are installed in open grooves with interference.

Standard Sizes

Wiper seals **DP8**



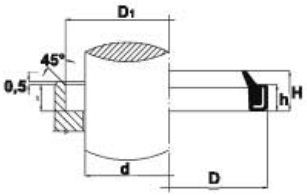


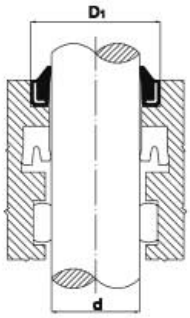
Reference	Rod diameter mm	Wiper dimensions mm				Bore dimensions mm			
		d	D	h	H	D_1	D_2	t	R
DP8 8/16/4/7	8	8	16	4	7	16	14	4,15	1
DP8 10/18/4/7	10	10	18	4	7	18	16	4,15	1
DP8 12/20/4/7	12	12	20	4	7	20	18	4,15	1
DP8 14/22/4/7	14	14	22	4	7	22	20	4,15	1
DP8 16/24/4/7	16	16	24	4	7	24	22	4,15	1
DP8 18/26/4/7	18	18	26	4	7	26	24	4,15	1
DP8 20/28/4/7	20	20	28	4	7	28	26	4,15	1
DP8 22/30/4/7	22	22	30	4	7	30	28	4,15	1
DP8 25/33/4/7	25	25	33	4	7	33	31	4,15	1
DP8 28/36/4/7	28	28	36	4	7	36	34	4,15	1
DP8 30/38/4/7	30	30	38	4	7	38	36	4,15	1
DP8 32/40/4/7	32	32	40	4	7	40	38	4,15	1
DP8 35/43/4/7	35	35	43	4	7	43	41	4,15	1
DP8 36/44/4/7	36	36	44	4	7	44	42	4,15	1
DP8 40/48/4/7	40	40	48	4	7	48	46	4,15	1
DP8 42/50/4/7	42	42	50	4	7	50	48	4,15	1
DP8 45/53/4/7	45	45	53	4	7	53	51	4,15	1
DP8 48/56/4/7	48	48	56	4	7	56	54	4,15	1
DP8 50/58/4/7	50	50	58	4	7	58	56	4,15	1
DP8 55/63/4/7	55	55	63	4	7	63	61	4,15	1
DP8 56/64/4/7	56	56	64	4	7	64	62	4,15	1
DP8 60/68/4/7	60	60	68	4	7	68	66	4,15	1
DP8 63/71/4/7	63	63	71	4	7	71	69	4,15	1
DP8 65/73/4/7	65	65	73	4	7	73	71	4,15	1
DP8 70/78/4/7	70	70	78	4	7	78	76	4,15	1
DP8 80/88/4/7	80	80	88	4	7	88	86	4,15	1
DP8 90/98/4/7	90	90	98	4	7	98	96	4,15	1
DP8 100/108/4/7	100	100	108	4	7	108	106	4,15	1
DP8 110/122/5,5/10	110	110	122	5,5	10	122	119	5,65	1,5
DP8 120/132/5,5/10	120	120	132	5,5	10	132	129	5,65	1,5
DP8 125/137/5,5/10	125	125	137	5,5	10	137	134	5,65	1,5
DP8 140/152/5,5/10	140	140	152	5,5	10	152	149	5,65	1,5
DP8 160/172/5,5/10	160	160	172	5,5	10	172	169	5,65	1,5
DP8 180/192/5,5/10	180	180	192	5,5	10	192	189	5,65	1,5
DP8 200/212/5,5/10	200	200	212	5,5	10	212	209	5,65	1,5
DP8 220/235/6,5/13	220	220	235	6,5	13	235	231	6,65	2
DP8 250/265/6,5/13	250	250	265	6,5	13	265	261	6,65	2

DP8 wiper seals do not have any metal insert and are installed with slight interference in recessed grooves, so that the wiper can be locked into position in both axial and radial directions.

Standard Sizes

Wiper seals **DRS**



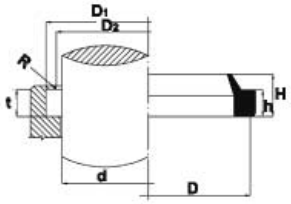


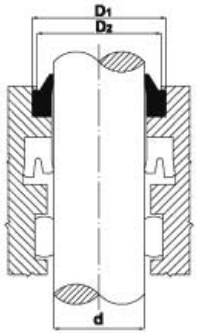
Reference	Rod diameter mm	Wiper dimensions mm				Bore dimensions mm	
		d	D	h	H	D_1	t
DRS 6/13/3/4,5	6	6	13	3	4,5	13	3
DRS 10/20/5/8	10	10	20	5	8	20	5
DRS 12/22/5/8	12	12	22	5	8	22	5
DRS 15/25/5/8	15	15	25	5	8	25	5
DRS 16/26/5/8	16	16	26	5	8	26	5
DRS 18/28/5/8	18	18	28	5	8	28	5
DRS 20/30/7/10	20	20	30	7	10	30	7
DRS 22/32/7/10	22	22	32	7	10	32	7
DRS 24/35/5/8	24	24	35	5	8	35	5
DRS 25/35/7/10	25	25	35	7	10	35	7
DRS 26/35/7/10	26	26	35	7	10	35	7
DRS 28/40/7/10	28	28	40	7	10	40	7
DRS 30/40/7/10	30	30	40	7	10	40	7
DRS 32/45/7/10	32	32	45	7	10	45	7
DRS 35/45/7/10	35	35	45	7	10	45	7
DRS 36/45/7/10	36	36	45	7	10	45	7
DRS 38/48/7/10	38	38	48	7	10	48	7
DRS 40/50/7/10	40	40	50	7	10	50	7
DRS 42/52/7/10	42	42	52	7	10	52	7
DRS 45/55/7/10	45	45	55	7	10	55	7
DRS 48/60/7/10	48	48	60	7	10	60	7
DRS 50/60/7/10	50	50	60	7	10	60	7
DRS 52/62/7/10	52	52	62	7	10	62	7
DRS 55/65/7/10	55	55	65	7	10	65	7
DRS 60/70/7/10	60	60	70	7	10	70	7
DRS 65/75/7/10	65	65	75	7	10	75	7
DRS 70/80/7/10	70	70	80	7	10	80	7
DRS 75/85/7/10	75	75	85	7	10	85	7
DRS 80/90/7/10	80	80	90	7	10	90	7
DRS 85/95/7/10	85	85	95	7	10	95	7
DRS 90/100/7/10	90	90	100	7	10	100	7
DRS 95/105/7/10	95	95	105	7	10	105	7
DRS 100/110/7/10	100	100	110	7	10	110	7
DRS 105/115/7/10	105	105	115	7	10	115	7
DRS 110/120/7/10	110	110	120	7	10	120	7
DRS 115/125/7/10	115	115	125	7	10	125	7
DRS 120/130/7/10	120	120	130	7	10	130	7
DRS 125/140/9/12	125	125	140	9	12	140	9
DRS 130/145/9/12	130	130	145	9	12	145	9
DRS 140/155/9/12	140	140	155	9	12	155	9
DRS 150/165/9/12	150	150	165	9	12	165	9
DRS 160/175/9/12	160	160	175	9	12	175	9
DRS 170/185/10/14	170	170	185	10	14	185	10
DRS 180/195/10/14	180	180	195	10	14	195	10
DRS 200/220/12/16	200	200	220	12	16	220	12
DRS 220/240/12/16	220	220	240	12	16	240	12

DRS wiper seals have a metal insert and are installed in open grooves with interference.

Standard Sizes

Wiper seals **DWR**





Reference	Rod diameter mm	Wiper dimensions mm				Bore dimensions mm			
		d	D	h	H	D_1	D_2	t	R
DWR 047070	12	12	18	3,5	5	18,6	15	3,8	1
DWR 051074	13	13	19	3,5	5	19,6	16	3,8	1
DWR 055082	14	14	21	3,5	5	21,6	18	3,8	1
DWR 059082	15	15	21	3,5	5	21,6	18	3,8	1
DWR 062087	16	16	22	3,5	5	22,6	19	3,8	1
DWR 066094	17	17	23	3,5	5	23,6	20	3,8	1
DWR 070094	18	18	24	3,5	5	24,6	21	3,8	1
DWR 074110	19	19	28	5	7	28,6	22	5,3	1
DWR 078110	20	20	28	5	7	28,6	23	5,3	1
DWR 086118	22	22	30	5	7	30,6	25	5,3	1
DWR 094125	24	24	32	5	7	32,6	27	5,3	1
DWR 098129	25	25	33	5	7	33,6	28	5,3	1
DWR 102133	26	26	34	5	7	34,6	29	5,3	1
DWR 106137	27	27	35	5	7	35,6	30	5,3	1
DWR 110141	28	28	36	5	7	36,6	31	5,3	1
DWR 118149	30	30	38	5	7	38,6	33	5,3	1
DWR 125157	32	32	40	5	7	40,6	35	5,3	1
DWR 129161	33	33	41	5	7	41,6	36	5,3	1
DWR 137169	35	35	43	5	7	43,6	38	5,3	1
DWR 141173	36	36	44	5	7	44,6	39	5,3	1
DWR 149181	38	38	46	5	7	46,6	41	5,3	1
DWR 157188	40	40	48	5	7	48,6	43	5,3	1
DWR 165196	42	42	50	5	7	50,6	45	5,3	1
DWR 177208	45	45	53	5	7	53,6	48	5,3	1
DWR 181212	46	46	54	5	7	54,6	49	5,3	1
DWR 188220	48	48	56	5	7	56,6	51	5,3	1
DWR 196228	50	50	58	5	7	58,6	53	5,3	1
DWR 208240	53	53	61	5	7	61,6	56	5,3	1
DWR 216248	55	55	63	5	7	63,6	58	5,3	1
DWR 220251	56	56	64	5	7	64,6	59	5,3	1
DWR 236267	60	60	68	5	7	68,6	63	5,3	1
DWR 248279	63	63	71	5	7	71,6	66	5,3	1
DWR 255287	65	65	73	5	7	73,6	68	5,3	1
DWR 275307	70	70	78	5	7	78,6	73	5,3	1
DWR 275322	70	70	82	7	12	82,2	76	7,1	1
DWR 287318	73	73	81	5	7	81,6	76	5,3	1
DWR 295326	75	75	83	5	7	83,6	78	5,3	1
DWR 295345	75	75	87	7	12	87,2	81	7,1	1
DWR 307362	78	78	92	7	12	92,2	85	7,1	1
DWR 314346	80	80	88	5	7	88,6	83	5,3	1
DWR 314362	80	80	92	7	12	92,2	86	7,1	1
DWR 326358	83	83	91	5	7	91,6	86	5,3	1
DWR 334366	85	85	93	5	7	93,6	88	5,3	1
DWR 334381	85	85	97	7	12	97,2	91	7,1	1
DWR 346393	88	88	100	7	12	100,2	94	7,1	1
DWR 354401	90	90	102	7	12	102,2	96	7,1	1
DWR 374421	95	95	107	7	12	107,2	101	7,1	1
DWR 393440	100	100	112	7	12	112,2	106	7,1	1

DWR wiper seals do not have any metal insert and are elastically installed in recessed grooves.

DICHTA®

Mupuseals

Mupusealing system consists of a range of static and dynamic high performance seals, designed for applications where the physical and chemical working conditions are beyond the limits of traditional seals.
Thus the Mupusealing system is highly applicable in most equipments serving chemical, food, petrochemical, offshore and cryogenic industries.

The Mupuseal concept

The MupuSeal consists of a jacket of Kefloy or Ultralen energized by a metal spring with carefully chosen characteristics.
The dynamic seals are furnished with springs that maintain their force over a wide deformation interval. This means that the spring force remains practically constant during the life time of the seal. The static seals are furnished with springs that ensure a high uniform force on the entire circumference of the seal.

Application survey

Seal Type		Application			Working range			Max.speed	
		Static	Reciprocating	Rotary	Max pressure dynamic bar	Max pressure static bar	Temp. °C	Reciprocating m/s	Rotary m/s
All-round		B	A	B	450	600	-70 to +260	15	1
Static		A	B	B	450	600	-70 to +260	10	0,5
Rotary		B	B	B	150	250	-100 to +260	-	2
Dynamic		B	A	B	450	600	-70 to +260	15	1
Flange		A	-	C	400	800	-100 to +260	-	0,1
"R"		A	B	C	400	800	-200 to +260	5	0,1
"R" Face		A	-	C	400	800	-200 to +260	-	0,1

CHARACTERISTICS: **A** very good - **B** good - **C** satisfactory

Material survey

FLUID	STATIC	RECIPROCATING	ROTARY
AIR / GAS	Keyfloy 30	Keyfloy 25	Keyfloy 25
WATER / STEAM		Keyfloy 28	Keyfloy 28
OIL / GREASE			
CHEMICALS			
FOOD / DRUGS	Keyfloy 11	Ultralen 90 (1)	Keyfloy 40
VACUUM		Keyfloy 11	Keyfloy 11

(1) Max. operating temperature 90°C. It can be sterilized at higher temperatures if it is done fast and at low pressure.

Incofep

Encapsulated o-rings are O-rings consisting of a seamless and uniform Teflon® FEP/PFA encapsulation/jacket which completely encloses a core material of either silicone or FPM elastomers. The encapsulated O-ring behaves like a highly viscous fluid, any pressure exerted on the seal is transmitted practically undiminished in all directions.

Features:

High Chemical Resistance: Chemical attack and swelling are the primary causes of O-Ring failure. Encapsulated O-rings are virtually chemically inert.

Outperforms solid PTFE O-Rings: encapsulated O-rings match the chemical and temperature resistance of solid PTFE O-Rings. They possess properties of elasticity and recovery which are crucial in many sealing applications.

Economical: encapsulated O-rings economically and effectively replace Kalrez and other exotic O-Ring compounds. They will decrease downtime and hence increase profitability wherever corrosive fluids and gases cause premature seal failure.

Wide Temperature Range: encapsulated O-rings withstand breakdown caused by industrial solvents and corrosive materials at elevated temperatures from -60° C to +205° C.

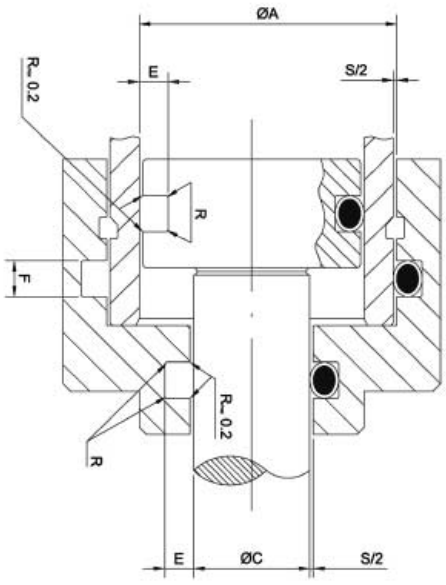
Non Stick Surface: provides easy cleanup of viscous materials.

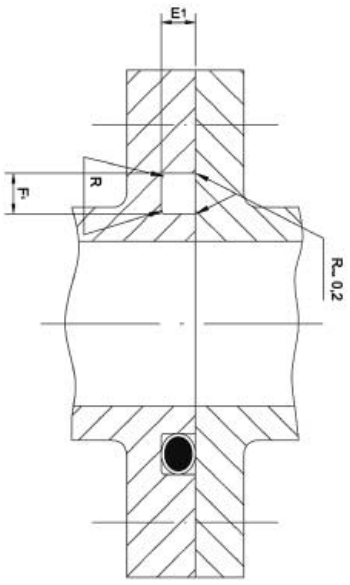
Low Coefficient of Friction: .2 on metal. Self lubricating surface.

Sanitary: Eliminates contamination of fluids by elastomers. Sterilizable and autoclavable. FDA compliant, USP Class VI compliant, NSF compliance available for specific applications.

Unlimited Sizes: Available in standard and metric sizes from .059" cross section x ½" I.D. to virtually unlimited larger sizes.

Low compression set: consist of either a solid silicon or Viton® core encapsulated in FEP/PFA resin (with .01 to .045 wall depending on cross section).





General specs		
Encapsulation	FEP (tetrafluoroethylene - hexafluoropropylene)	204 °C
Continuous service temperature	PFA (tetrafluoroethylene - perfluoro)	260 °C

Lip Seals

Symmetrical and non symmetrical rubber lip seals for reciprocating movements.

U/UM UM are the strongest kind of moulded lip seals with a hardness of 90 ShA. They can be assembled both on pistons and cylinders and withstand pressure up to 120bar/cm². U seals are the same as UM, but their sizes are in inches.

M Same structure as the UM type, but different in sizes and in the negative cut of the lips. They are produced in 85 ShA.

DE/DEM They are produced with a hardness of 75 ShA for easier assembling. These seals are made for dynamic external sealing on only one lip. They withstand a pressure of up to 80 bar/cm².
DE seals are used on pistons with inch dimensions and have lips with sharp cut edges; DEM seals are used on pistons with metric dimensions and have lips with tapered negative cut.

DI/DIM They are produced with a hardness of 90 ShA and made for dynamic internal sealing on only one lip. The external lip is higher and stronger than the internal one and they are suitable for operating pressure up to 120 bar/cm².
DI seals are used on rods with inch dimensions and have lips with sharp cut edges; DIM seals are used on rods with metric dimensions and have lips with tapered negative cut.

H They are made with a hardness of 90 ShA and withstand a working pressure of 40 bar/cm². They are used on cylinders as oil control rings or dust covers and must be axially pressed in the seat with a ring.

C They are made with a hardness of 90 ShA and withstand a working pressure not exceeding 40 bar/cm². They are known as caps and are installed on pistons as rod wipers.

Special rubber hardness or different elastomers available on request.

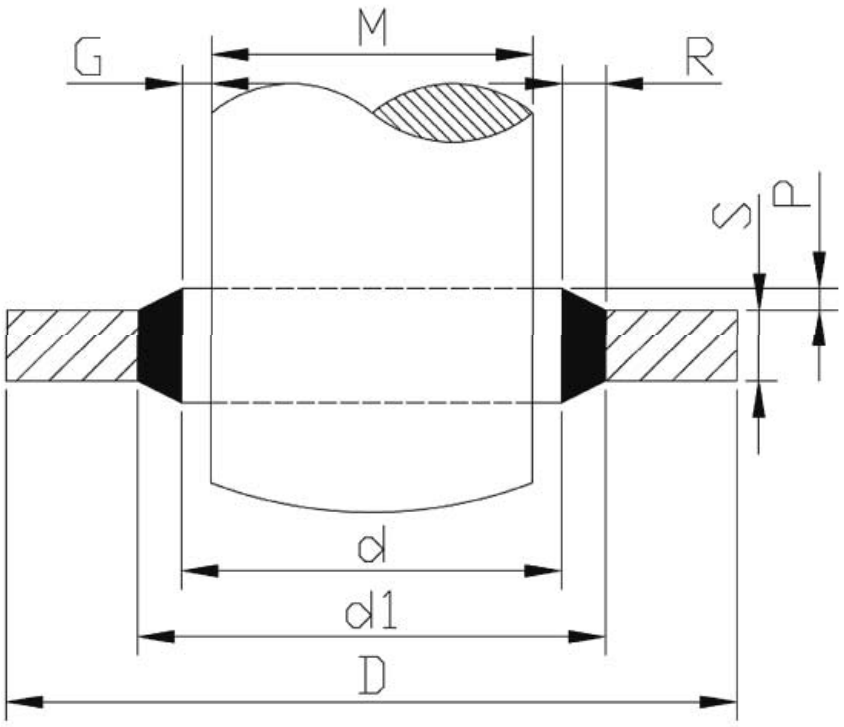
Springs

All our FPM oil shaft seals are supplied with stainless steel springs AISI 302, whereas the NBR seals are fitted with carbon steel springs. In our stock we have a wide range of stainless steel springs AISI 302 that, on customers' request, can either be fitted on the NBR seals or can be dispatched singularly for customers' service.

For special applications we can also supply stainless steel sprigs AISI 316; a more limited range of dimensions is available in our stock for immediate delivery.

Bonded Seals

Bonded seals are static seals used as sealing rings for threaded fittings and flange connections. To avoid any damage on the sealing lip, the inside diameter of bonded seal should be larger than the external thread diameter and the rubber should be bonded to the inside metal only.



Hydraulic Seals For High Pressure

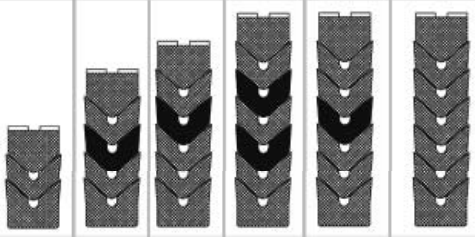
TO - TG Packing Seals

TO and TG packing seals are composed of lip rings made of cotton fabric reinforced elastomer. TO and TG packing seals are suitable for reciprocating movements and can be fitted on rods as well as on pistons. They are available in a variety that covers all applications from light duty to the heaviest working conditions.

	ENERGISING RING: cotton fabric reinforced rubber; its function is to ensure a uniform pre-load to the seal.
	ENERGISING RING: special compound with resins to obtain a great resistance.
	INTERMEDIATE RING: cotton fabric reinforced rubber; the sealing ring.
	INTERMEDIATE RING: rubber; for application with low pressure and continuous vibrations
	SUPPORT RING: cotton fabric reinforced rubber; its function is to support the entire series, it also has an optimal extrusion resistance.

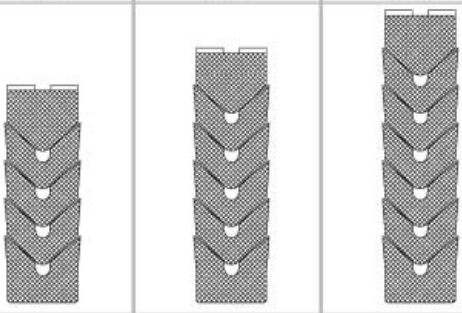
TO SERIES

Pressure: up to 40 MPa
Speed: up to 0,5 m/s
Temperature: up to 200°C depending on elastomer

TYPE	TO 3	TO 5	TO 6	TO 7	TO 7/1	TO 7/0
COMPOSITION						
ENERGISING RINGS	1	1	1	1	1	1
FABRIC RUBBER INTERMEDIATE RINGS	1	2	3	3	4	5
RUBBER INTERMEDIATE RINGS	-	1	1	2	1	-
SUPPORT RINGS	1	1	1	1	1	1

TG SERIES

Pressure: up to 40 MPa
Speed: up to 0,5 m/s
Temperature: up to 200°C depending on elastomer

TYPE	TG 5	TG 6	TG 7
COMPOSITION			
ENERGISING RINGS	1	1	1
FABRIC RUBBER INTERMEDIATE RINGS	3	4	5
SUPPORT RINGS	1	1	1

Hydraulic Seals For Medium High Pressure

TEOL Packing Seals

TEOL/1 (S8)

Rod seal manufactured as an integral element, vulcanising a NBR sealing element on a reinforced cotton fabric base. Compact seal, even for standard housings according to ISO 5597.

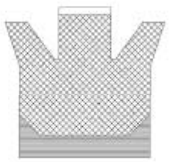
Pressure: up to 20 MPa
Speed: up to 0,3 m/s

TEOL/1A (S24) Similar to TEOL/1 with an anti extrusion synthetic resin ring.

Pressure: up to 25 MPa
Speed: up to 0,5 m/s

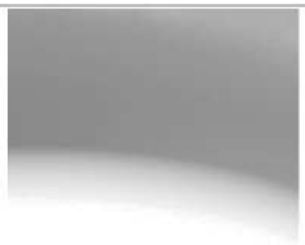
TEOL/1A (G10) Rod seal manufactured as an integral element by vulcanising togheter cotton fabric and NBR. Excellent resistance to wear and low friction.

Pressure: up to 25 MPa
Speed: up to 0,5 m/s



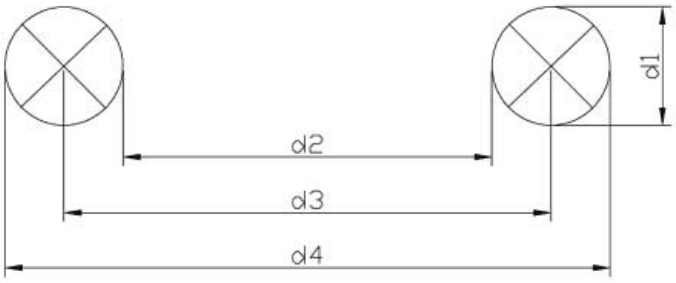
TEOL/8 (G18) Two parts rod seal: lip sealing part in fabric reinforced rubber and support part moulded in a special rigid fabric. Suitable in cases where hydraulic equipment is subjected to severe vibration, shock and high pressure.

Pressure: up to 40 MPa
Speed: up to 0,5 m/s



Hot Vulcanised O-RINGS

We can produce spliced O-rings on request with our hot vulcanisation technology. With this procedure the O-ring is endless and without any evidence of splice: endurance and elasticity are very similar to those of moulded O-rings.

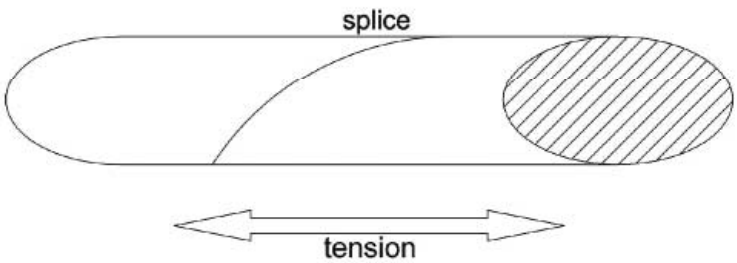


d1 = cord diameter
d2 = inner diameter
d3 = medium diameter
d4 = outer diameter

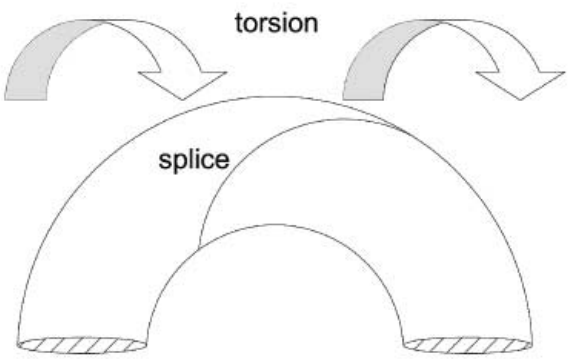
Upon request we can splice any extruded profile used by customers.

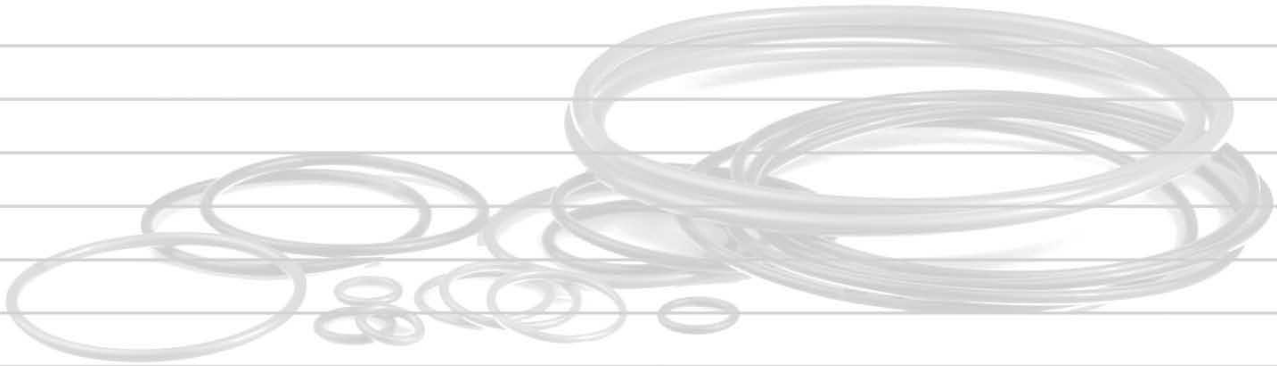
Although this technology avoids the majority of spliced O-rings problems, it is important to take some cautions when handling vulcanised O-rings, and specifically :

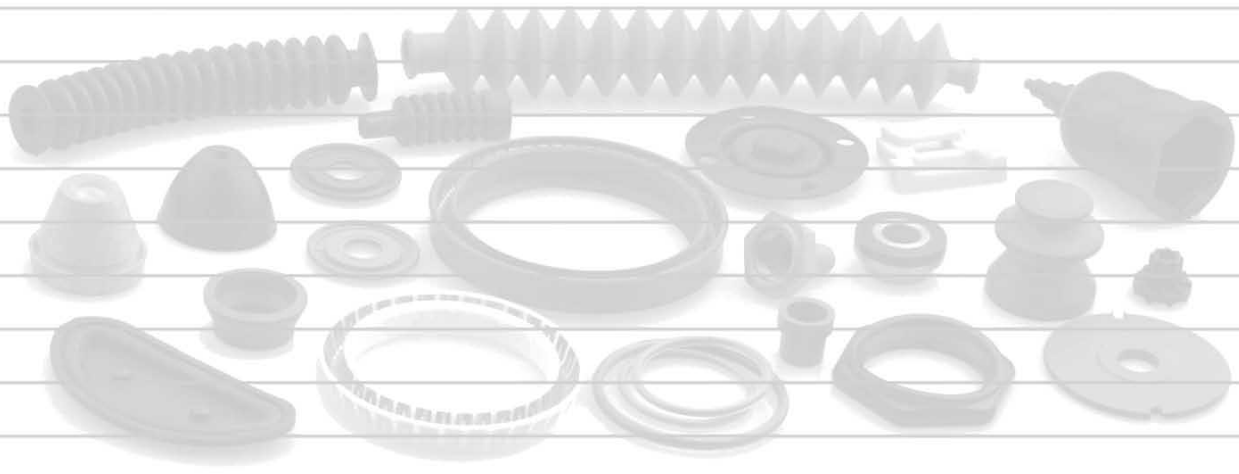
no excessive tension on splice



bending radius on splice not bigger than ¼ of cord diameter







Compounds

Elestromeric Sealing Materials

NITRILE RUBBER NBR

This elastomer is a copolymer of butadiene and acrylonitrile and is used for the majority of conventional fluid sealing applications.

- Working temperature range: -30°C to +100°C (+120°C maximum)
- Standard colour: black

Advantages:
- Good swelling resistance in mineral oils and greases
- Good swelling resistance in water and radiator fluid

Limitations:
- Poor resistance to high-alloyed hypoid oil
- Poor resistance to ozone, weathering and sunlight
- Not resistant to automotive brake fluid (glycol ether based)
- Poor resistance to polar fluids (ketones, ethers, esters)
- Poor resistance to chlorinated hydrocarbons (carbon tetrachloride, trichlorethylene)
- Poor resistance to aromatic hydro-carbons

FLUORO ELASTOMER FPM

Mostly known under the trade names VITON® from Du Pont, TECNOFLON® from Solvay and FLUOREL® from 3M. It has good chemical resistance and is recommended far high temperature applications.

- Working temperature range: -30° C to + 200° C
- Standard colour: brown

Advantages:
- Excellent resistance to mineral oils, greases (also with the majority of additives) and above all high-alloyed hypoid oils
- Excellent acid resistance
- Good resistance to aromatic and chlorinated hydrocarbons
- Excellent resistance to ageing, ozone and weathering

Limitations:
- Limited cold flexibility
- Poor resistance to polar fluids (ketones, ethers, esters)

SILICONE RUBBER SIL

Also referred to as MVQ or VMQ
Standard colour: red
- Working temperature range: -50° C to + 200° C
- Standard colour: red

Advantages:
- Retains flexibility down to very low temperatures
- Withstands continuous heating at high temperatures without hardening
- Resistant to mineral oils and greases
- Excellent resistance to ageing, weathering and ozone

Limitations:
- Not recommended for use with aliphate as well as aromatic hydrocarbons such as petrols and paraffin, and lighter mineral oils or steam over 3.5 bar
- Not resistant to hot water water (100°C), acids and non-mineral automotive brake fluids
- Poor tensile and tear strength
- Poor wear resistance

Compounds

CHLOROBUTADIENE RUBBER (CR)

- Working temperature range: -40° C to + 100° C
- Standard colour: black

Advantages:
- excellent resistance to ageing, weathering and ozone
- moderate resistance to mineral oils and greases

Limitations:
- tends to harden or stiffen at low temperatures
- not resistance to non-mineral automotive brake fluids

ACRYLATE RUBBER (ACM)

- Working temperature range: -10° C to + 150° C
- Standard colour: black

Advantages:
- good resistance to oils and fuels
- good resistance to ozone and weathering

Limitations:
- not resistant to water, water solutions and steam
- poor resistance to polar fluids (ketones, ethers, esters)
- poor resistance to chlorinated hydrocarbons (carbon tetrachloride, trichloroethylene)
- poor resistance to aromatic hydrocarbons
- limited cold flexibility
- poor wear resistance

ETHYLENE PROPILENE DIENE RUBBER (EPDM)

- Working temperature range: -45° C to + 150° C
- Standard colour: black

Advantages:
- excellent resistance to ageing, weathering and ozone
- good resistance to water and steam
- good resistance to automotive brake fluid (glycol ether based)
- good resistance to polar fluids

Limitations:
- poor resistance to mineral oils and greases

Temperature values are maximum values and therefore approximate, since they may vary depending on the different operating parameters.

For more detailed information please contact our technical department.

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