

DICHTOMATIK

Rotary shaft seal



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Rotary shaft seals

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DIN EN ISO 9001:2000

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Dichtomatik

Any seal. Any time.

Dichtomatik is known as a specialist in technical seals – and nothing but seals. The company's comprehensive range of products for industrial applications, its worldwide network of highly efficient production partners and its own developments make Dichtomatik a highly competent partner. Customers are guaranteed the best possible support in terms of speed, flexibility and application expertise.

To ensure fast and punctual delivery to all parts of the world, Dichtomatik has continuously expanded its network of subsidiaries, of which there are currently eight in Europe: in England, Sweden, the Netherlands, France, Austria, Hungary, Italy and the head office in Germany, as well as five locations in the USA and Canada. Carefully selected partners are responsible for Central and South America, Africa and Asia.

The Dichtomatik team is committed to living up to the corporate slogan "Any seal. Any time." It devotes all its attention to the customer – when dealing with everyday orders, obtaining a special seal or providing complex technical advice, we always want the work we do to set standards.

Advice on applications, designing installation housings, altering designs, adapting standard seals to changes in

ambient conditions – these are some of the daily demands we make of our application engineers. As highly experienced seal specialists they are familiar with all questions regarding applications and materials and they work closely with customers and suppliers. Application-specific developments and adaptations of constructions and materials are just as much part of the job as supervising product series until they are ready for production.

www.dichtomatik.de

The Dichtomatik website provides a virtual insight into the warehouse. Both the availability of all standard seals and technical information on the seal articles, including descriptions of materials and installation instructions, can be accessed at www.dichtomatik.de. Having been issued a personal password, customers can view prices, make enquiries and place orders around the clock.



Rotary shaft seals

Rotary shaft seals are used to seal rotating machine elements against media from the inside and/or contamination from the outside. The selection of the correct type of seal is dependent on the operating parameters, e.g. operating medium, operating temperature, peripheral speed, pressure and the ambient conditions on the air side.

The rotary shaft seal consists of an elastomer component, a metal insert and a spring.

The outer surface guarantees secure static sealing and fixes the rotary shaft seal in the housing. The outer sheath can be made of either an elastomer or a metal material. The metal insert provides the rotary shaft seal with the necessary stability. The sealing lip is prestressed by means of a tension spring. This supplies the radial contact pressure of the sealing lip on to the shaft. Optionally, a sealing lip can be used that excludes dirt or dust from the outside.

Types

We distinguish between three basic types. The WA type has an elastomer outer sheath that ensures excellent static sealing. The WB type is characterised by a metallic outer surface that effects a firm and precise fit in the housing. The WC type gives the WB type additional rigidity by means of a metal insert, making it more suitable for difficult assembly and hostile operation conditions.

Standards

Dichtomatik rotary shaft seals comply with the DIN 3760 standard. You will find design notes and installation guidelines for the sealing partners of the rotary shaft seal in our catalogue on page 23.

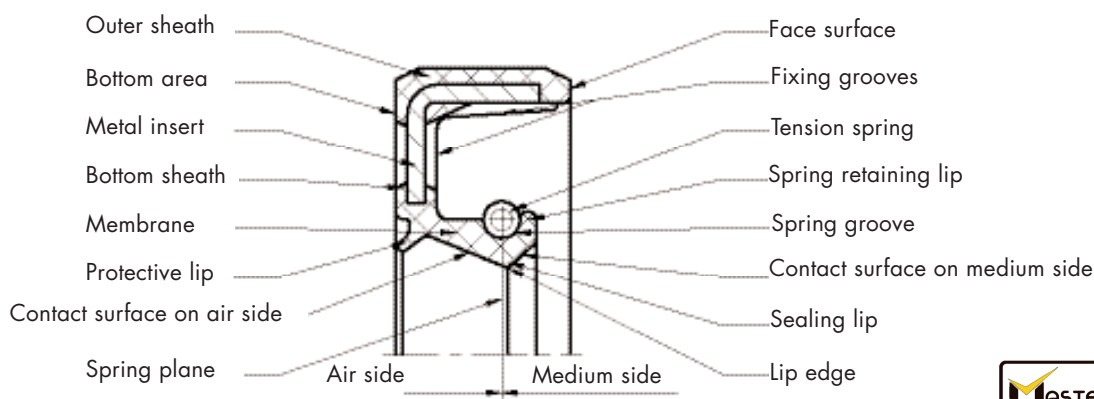
Areas of application

Rotary shaft seals are used for sealing rotating machine elements, e.g. shafts, hubs, axles in a variety of industries:

- in drive technology, e.g. transmission manufacturing, electric motors, internal combustion engines
- in pumps
- in agricultural and construction machinery, where they are exposed to extreme soiling and guarantee long maintenance intervals and long service life
- in household and industrial washing machines (white goods), where materials with high temperature resistance and water and suds tolerance are required
- in the wind energy industry, ship-building and rolling mills as particularly large rotary shaft seals

Requirements

The main purpose of a rotary shaft seal is to ensure reliable and functional leak tightness. At the same time, it should reduce secondary mechanical influences such as friction on the shaft in order to minimise heat development in the immediate vicinity of the seal and thereby loss of power. Furthermore, the simple design of the rotary shaft seal allows problem-free installation and removal.



Materials

For rotary shaft seals, different standard and special materials are available for the sealing lip (the elastomer component), the metal insert and the tension spring, depending on the type and application in question.

The material used for the sealing lip is usually given. The description of the elastomer materials follows the nomenclature used in DIN ISO 1629 and ASTM D 1418.

The basic material used in elastomer for rotary shaft seals is synthetic rubber manufactured in the chemical industry. Elastomers differ in the basic polymer from which they are made. The nomenclature according to DIN ISO 1629 and ASTM D 1418 is shown in the table below.

The finished material is made by mixing the basic elastomer with the required filler materials, softeners, processing aids, vulcanisation agents, accelerators and other additives.

This procedure makes it possible to set the required material properties and thereby offer standard materials with a wide range of uses, as well as special compounds for highly specific applications.

The rotary shaft seal is formed in a vulcanisation process in which the metal insert is bonded to the elastomer element. The plastic rubber compound assumes a rubbery-elastic state and the rotary shaft seal attains its final mechanical properties. The lip edge is created by subsequent cutting or previously in the moulding tool. Finally, the tension spring is attached.

Nomenclature for sealing lip materials:

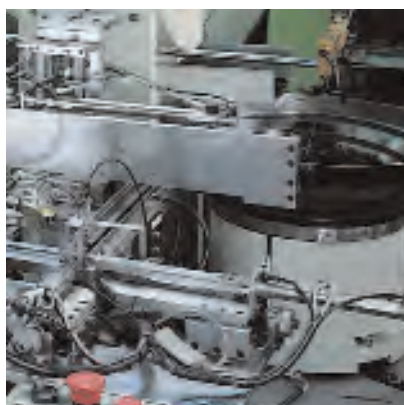
chemical description

Acrylonitrile butadiene rubber
Hydrogenated acrylonitrile butadiene rubber
Fluoro rubber
Ethylene propylene diene rubber
Silicone rubber
Acrylate rubber

Abbreviation

DIN ISO 1629	ASTM D 1418
NBR (HNBR)	NBR HNBR
FPM	FKM
EPDM	EPDM
VMQ	VMQ
ACM	ACM
DIN EN ISO 1043-1	ASTM D 1600
PTFE	PTFE

() = not listed in the standard



Standard elastomers

The wide range of rotary shaft seals is available in two standard elastomer materials and two PTFE materials from stock or at short notice:

Standard elastomer materials for rotary shaft seals

Basic elastomer	DIN ISO 1629	Hardness [Shore A]	Colour	Temperature [°C]
Acrylonitrile butadiene rubber	NBR	70	black	-40 to +100 short term +120
Fluoro rubber	FPM	80	brown	-30 to +200

Standard PTFE materials for rotary shaft seals Type WEPO and WCP21

Basic polymer	DIN EN ISO 1043-1	Filler materials	Hardness [Shore D]	Temperature [°C]	Type
Polytetrafluorethylene	PTFE	Carbon/graphite	62	-30* to +205	WEPO
Polytetrafluorethylene	PTFE	Glass fibre/MoS2	60-80	-90 to +250	WCP21

*The temperature range is determined by the FPM O-ring used in the WEPO.





NBR-acrylonitrile-butadiene rubber / trade name:

e.g. Perbunan® (Bayer)

NBR is the most common standard material for rotary shaft seals because of its good mechanical properties and resistance to mineral oil-based lubricants and greases. Good resistance to fuels is usually possible only with special compounds.

Its properties are mainly determined by the acrylonitrile content (ACN between 18% and 50%). A low ACN content ensures good flexibility at low temperatures, but offers limited resistance to oils and fuels; as the ACN content increases, flexibility at low temperatures decreases and resistance to oils and fuels improves.

The standard NBR material for rotary shaft seals offers an average ACN content to suit a wide range of applications with balanced properties. It has good mechanical-technological values such as high abrasion resistance, as well as good resistance to mineral oil-based lubricants and greases, hydraulic oils H, H-L, H-LP, non-inflammable hydraulic fluids HFA, HFB, HFC, aliphatic hydrocarbons, silicone oil and greases and water to approx. +80°C.

NBR is generally not resistant to aromatic and chlorinated hydrocarbons, fuels with a high aromatic content, polar solvents, glycol-based brake fluids, and non-inflammable hydraulic fluids HFD.

It has a low resistance to ozone, weather and ageing, but in most applications, e.g. when the material is wetted with oil, this has no negative effect.

FPM – fluoro rubber / trade name: e.g. Viton® (Du Pont-Dow Elastomers)

FPM is noted for its very high resistance to temperatures and chemicals. Other key benefits are its excellent resistance to ageing and ozone, very low gas permeability (excellent for vacuum application) and the fact it is self-extinguishing.

The standard FPM material for rotary shaft seals has excellent resistance to mineral oils and greases, synthetic oils and greases, aliphatic, aromatic and chlorinated hydrocarbons, fuels, non-inflammable hydraulic pressure fluids HFD and many organic solvents and chemicals.

FPM is generally not resistant to hot water, steam, polar solvents, glycol-

based brake fluids and low-molecular organic acids.

PTFE – polytetrafluorethylene

PTFE is a fluorinated plastic material. It is noted for its almost universal resistance to chemicals, wide temperature range (-90°C to +250°C), extremely low coefficient of friction, physiological suitability and very high resistance to ozone, weather and ageing. PTFE compounds containing filler materials such as carbon, graphite or glass fibre are generally used for rotary shaft seals.

In rotary shaft seals, PTFE is used for sealing lips, coating on sealing lips and entire rotary shaft seals if high demands are made in terms of resistance to media, thermal resistance, peripheral speed, low friction or high pressure. Dichtomatik offers the WEPO type made from PTFE carbon/graphite ex warehouse. The WCP21 type with a sealing lip made from PTFE glass fibre/molybdenite (MoS2) is also available at short notice. Other PTFE compounds such as elastomer rotary shaft seals with PTFE-coated sealing lips are available on request.



Special elastomers

In addition to the standard elastomers described, various special elastomers are available for special application conditions.

These include material variants with low friction properties due to antifriction filler materials such as graphite or molybdenite (MoS₂) and optimised materials for better resistance to media or high/low temperatures.

Basic elastomer	DIN ISO 1629	Hardness [Shore A]	Colour	Temperature [°C]
Hydrogenated acrylonitrile-butadiene rubber	HNBR	70	black	-40 to 150
NBR high nitrile	NBR	70	black	-30 to 100
NBR high temperature	NBR	70	black	-30 to 120
NBR low temperature	NBR	70	black	-50 to 90
NBR graphite	NBR	70	black	-40 to 100
NBR MoS ₂	NBR	70	black	-40 to 100
Silicone rubber	VMQ	70	red	-50 to 200
Acrylate rubber	ACM	70	black	-25 to 150
Ethylene-propylene-diene rubber	EPDM	70	black	-40 to 130

Further material variants can be produced in other hardnesses and colours.

HNBR – hydrogenated acrylonitrile-butadiene rubber / trade name:

e.g. Therban® (Bayer)

HNBR is obtained by fully or partially hydrogenating NBR. It leads to considerable improvement in resistance to heat, ozone and ageing, and gives it very good mechanical properties, e.g. good resistance to wear. The media resistance compares to that of NBR.

NBR high nitrile – with higher ACN content

This material has better resistance to oil and fuels compared to standard NBR.

NBR high temperature

Compared to standard NBR, this material can be used in a higher temperature range and at continuous temperatures of up to +120°C.

NBR low temperature

Due to its reduced ACN content this material can be used in a lower temperature range and at continuous temperatures of between -50°C and +90°C.

NBR graphite / NBR MoS₂

Due to the addition of antifriction filler materials such as graphite or molybdenite these materials achieve

friction-optimised running properties.

VMQ – silicon rubber / trade name:

e.g. Silopren® (Bayer)

Silicone rubbers are distinguished in particular by their wide thermal application range and excellent resistance to ozone, weather and ageing. Compared to other elastomers, the mechanical properties of silicone are minimal. Generally speaking, silicone materials are physiologically safe, i.e. they are used in food-related and medical areas.

The silicone standard material can be used in a temperature range from -50°C to +200°C and is resistant in aliphatic engine and transmission oils, animal and vegetable oils and fats. Silicone is not resistant to fuels, aromatic mineral oils, steam, silicone oils and greases, acids and alkalis.

ACM – acrylate rubber

ACM is used mainly by the automotive industry as it is resistant to motor, transmission and ATF oils. In terms of application areas, ACM lies between NBR and FPM. The temperature application range is from -25°C to +150°C.

EPDM – ethylene-propylene-diene rubber / trade name: e.g. Nordel® (Du Pont-Dow Elastomers)

EPDM has good resistance in hot water and steam, detergent, natron and potassium hydroxide solutions, silicone oils and greases, many polar solvents, many diluted acids and chemicals, and has a wide thermal application range. EPDM materials offer no resistance with all mineral oil products (lubricants, fuels).

Materials for tension springs**Standard tension spring**

Non-alloyed spring steel acc. to DIN EN 10270-1

Exceptions

VIA, VIAS
(FPM standard rotary shaft seals):
rust and acid-resistant steel 1.4301
(AISI 304)

WEPO
(Rotary shaft seal made of PTFE):
rust and acid-resistant steel 1.4571

Optionally, other types can also be fitted with the rust and acid-resistant springs 1.4301 (AISI 304) or 1.4571.

Materials for metal inserts (housing)**Standard material**

Non-alloyed steel acc. to DIN EN 10139

Special material

Rust and acid-resistant steel 1.4301
(AISI 304)

Sealing mechanism

Static tightness on the outer surface

The primary task of the outer surface of the rotary shaft seal is to ensure static tightness in the housing bore, i.e. the passage of the medium where the rotary shaft seal sits in the housing bore must be prevented in all possible operating conditions.

The outer surface of the rotary shaft seal must also perform other tasks:

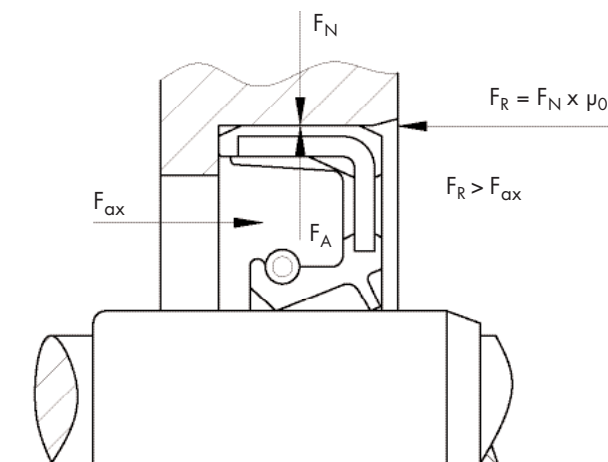
– Guidance and firm fit of the rotary shaft seal in the bore. A secure seating is guaranteed when the frictional force F_R is greater than all the axial forces F_{ax} that are exerted on the rotary shaft seal, e.g. the force resulting from the difference in pressure. The frictional force is the product of the static friction coefficient μ_0 and the radial normal force F_N . The normal force F_N is equal to the radial force on the outer surface F_A .

Different press fit allowances have to be made to the nominal diameter, depending on the composition of the outer surface (see table "Press fit allowances" page 14).

– Simple and easy installation, requiring chamfers and roundings.

– Compensation of the resulting gap by means of different coefficients of thermal expansion.

The selection of the correct outer surface for a rotary shaft seal depends on the specific application and prevailing operating conditions.



Types of outer surface

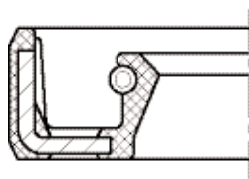
Rotary shaft seals are generally supplied with an elastomer outer sheath and metal outer surface. Combinations of both or special versions are no problem for Dichtomatik. The various types of outer surface are described in the following:

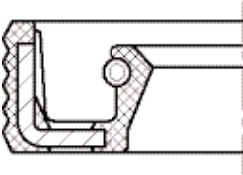
Rubber-encased outer surface: type WA, WAS

Type WA rotary shaft seals have a smooth outer surface made of elastomer material, ensuring good static sealing in the housing bore, even in difficult cases. This type is also supplied with a protective lip (WAS).

– Excellent static sealing
– For use in split housings, possibly with edge breakage and/or joint offset
– For use in light-metal housing with high thermal expansion (in all housings with a higher coefficient of thermal expansion than steel)

– For use in thin fluid or gaseous media
– For use in pressure applications (within the application limits)
– Capable of sealing larger surface roughnesses
– No fretting corrosion
– The housing bore is not damaged during installation and removal



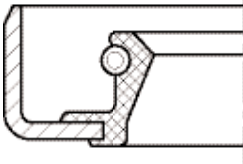


Grooved, rubber-encased outer surface: Type WAK

To reduce the press-in force and improve static sealing, the elastomer outer surface is grooved along its circumference.

- Easier installation because less press-in force is required

- Secure static sealing, especially in housings with high thermal expansion, as the grooved, rubber-encased outer surface is made with a higher press-fit allowance
- Avoidance of a permanent skew of the rotary shaft seal



Metal outer surface, type WB, WBS

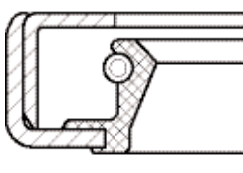
In the type WB rotary shaft seals the smooth metal outer surface of the metal insert is not encased, but ground, drawn or turned.

- A particularly exact (central) and firm fit in the bore is ensured
- More cost-effective due to the lower elastomer content
- The outer surface is made with a tighter press-fit allowance
- Good surface quality of the housing bore is required
- Not for use in split housings (also only limited use in split housings with paint coating)

In the case of large thermal expansion of the housing, rough bore surfaces, pressure applications or thin fluid, creeping media an additional sealant should be applied to the outer surface (see "Additional sealants" page 14).

To prevent corrosion, the metal outer surface is coated with corrosion protection oil or a thin layer of wax following final processing.

This type is also supplied with the protective lip (WBS).



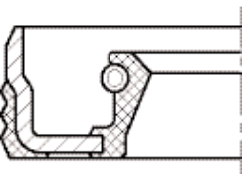
Metal outer surface with metal insert: Type WC, WCS

Type WC rotary shaft seals have a smooth metal outer surface like type WB and an additional metal insert. These seals are used successfully in particularly difficult installation conditions, hostile operating conditions and for large dimensions.

Type WC rotary shaft seals have greater rigidity than type WB rotary shaft seals.

Due to the additional metal insert the type WC is highly insensitive to installation errors.

This type is also supplied with the protective lip (WCS).



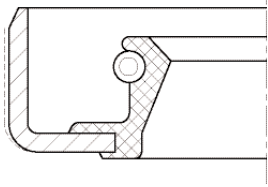
Partially rubber-encased outer surface: Type WA/B

The so-called "half-shoulder" type is a special design of the outer surface of the rotary shaft seal which is not stocked as standard at Dichtomatik.

This type combines the advantages of the type WA rubber-encased outer surface and WB metal outer surface, the secure static sealing and firm seating and exact fit in the bore. Due

to the influence of the metal outer surface, good centring is ensured during installation.

The rubber-encased part of the outer surface is grooved, enabling this type to be used successfully in housings with high thermal expansion and in split housings.



Additional sealants

In order to attain high static sealing in the housing bore, rotary shaft seals with a metal outer surface are often coated with paint or sealing compounds. Wax or paint is also applied to protect against corrosion.

The paint should compensate processing marks on the outer surface of the rotary shaft seal, any roughness in the housing bore and more pronounced thermal expansion. It also protects against damage to the housing bore during installation or removal.

The thickness of the paint coating is usually approx. 30 µm. When it comes into contact with a medium, volume swell frequently occurs in the paint which provides additional static sealing.

When applying paint to the outer surface, somewhat higher press-in force is required as the paints have a certain adhesive effect.

Paints are supplied in different colours, namely blue, dark red, orange, dark green and light green.



Simulation of static sealing in the housing bore using the finite-element method

Press-fit allowance

The rotary shaft seals are manufactured with press-fit allowances at the outer diameter depending on the type. The press-fit allowances are attuned to the ISO tolerance H8 of the housing bore. This ensures a firm fit, moderate press-in and press-out forces and higher static sealing in the housing bore without the need for further measures.

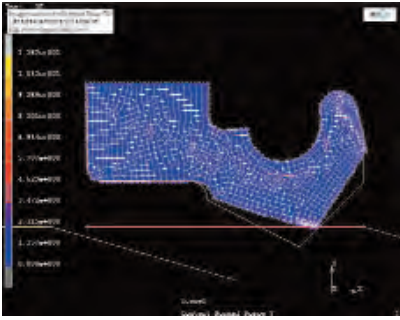
Outer diameter d2 [mm]	Type WA	Type WAK	Type WB, WC
≤ 50	+ 0.3 + 0.15	+ 0.4 + 0.2	+ 0.2 + 0.1
> 50 - 80	+ 0.35 + 0.2	+ 0.45 + 0.25	+ 0.23 + 0.13
> 80 - 120	+ 0.35 + 0.2	+ 0.5 + 0.3	+ 0.25 + 0.15
> 120 - 180	+ 0.45 + 0.25	+ 0.65 + 0.4	+ 0.28 + 0.18
> 180 - 300	+ 0.45 + 0.25	+ 0.65 + 0.4	+ 0.3 + 0.2
> 300 - 500	+ 0.55 + 0.33	+ 0.75 + 0.45	+ 0.35 + 0.23

Out-of-roundness

The out-of-roundness tolerance ($d_{2max} - d_{2min}$) results from three or more measurements distributed evenly on the periphery. The values given must not be exceeded. Within the tolerances, roundness is of secondary importance because the rotary shaft seal adapts to the location bore when it is installed.

Outer diameter d2 [mm]	Out-of-roundness tolerance [mm]
≤ 50	0.25
> 50 - 80	0.35
> 80 - 120	0.5
> 120 - 180	0.65
> 180 - 300	0.8
> 300 - 500	1

Dynamic sealing mechanism



The functional principle of the rotary shaft seal is that the elastomer sealing edge slides on the rotating shaft surface. The sealing edge is pressed in the radial direction against the shaft surface as the inner diameter of the sealing lip is smaller in its non-tensioned condition than the shaft diameter. The difference in diameter is called prestressing.

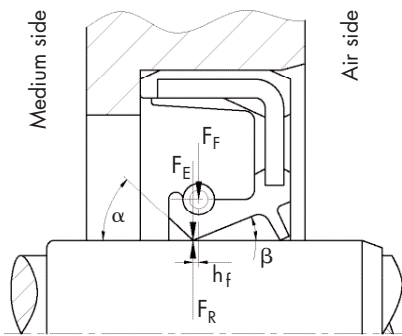
The resulting radial force on the linear contact zone is additionally supported by a metal screw tension spring to counteract the gradual decrease in radial force as a result of the ageing of the elastomer material (stress relaxation).

The sealing action at the elastomer sealing edge is achieved for two functional states:

- for the stationary shaft
- for the rotating shaft

It is dependent on the following parameters:

- geometry of the sealing lip
- properties of the elastomer material
- alignment of the screw tension spring
- finish of the shaft surface
- lubrication condition



Sealing action with stationary shaft

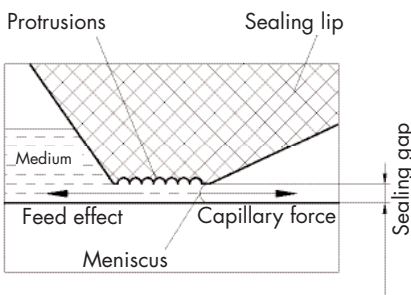
When the shaft is stationary the sealing action is based on the radial contact pressure of the sealing lip on the spiral-free ground shaft surface, so that the deformation of the elastomer sealing edge compensates for the surface roughnesses of the shaft and closes the gap. A radial force is exerted on the shaft. The contact pressure of the sealing lip is attained by prestressing and supported by the screw tension spring. The lessening of the elastomer prestress during operation is dependent on the application parameters.

The radial force F_R is thus composed of the elastomer component F_E and the spring component F_F .

the contact zone and the rotation direction of the shaft.

They create a feed effect (drag flow) from the air side to the medium side of the contact zone that is similar to a micro-threaded shaft pump. The required "feed effect" of the rotary shaft seal is obtained only if the distribution of the contact pressure of the axial track width is asymmetrical. Only then does the "micro-threaded shaft pump" feed in the right direction.

The asymmetrical distribution of the contact pressure is attained partly by the different contact surface angles ($\alpha > \beta$) of the sealing lip to the shaft surface and partly by the shifting of the screw tension spring to the air side (spring distance).

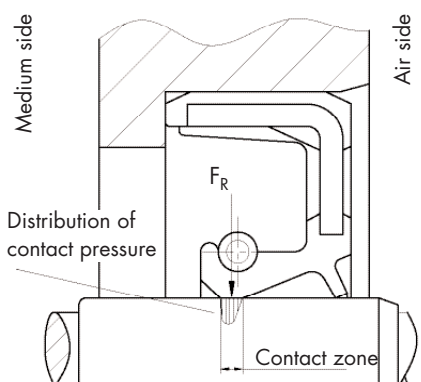


Sealing action with rotating shaft

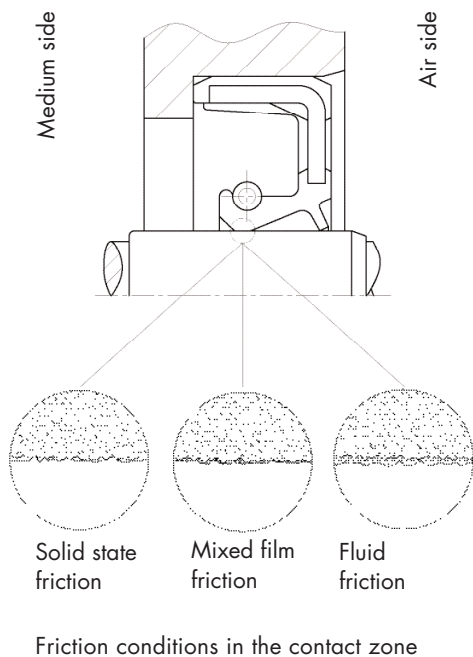
When the shaft is rotating a hydrodynamic effect occurs which causes the sealing lip to float on the lubricating film formed by the medium to be sealed. This prevents the premature wear and thermal destruction of the sealing lip.

On the one hand, the wear-inhibiting lubricating film within the contact zone is to be retained and on the other hand, the medium to be sealed is to be prevented from escaping on the air side and resulting in leakage.

Due to the skew of the protrusions the medium in the contact area is fed not only peripherally, but also axially. In addition, with wetting media such as lubricants, the influence of the surface tensions has an effect in the leakage direction. As a result of capillary forces, these media are drawn into the sealing gap and form a cambered interface on the air side known as a "meniscus". In the case of a "tight" rotary shaft seal there is a balance between the forces causing the leakage (pressure difference and capillary force) on the one side and the pumping effect of the elastomer protrusions on the other side.



Shortly after the start-up of a new rotary shaft seal, micro-protrusions form in the elastomer contact zone in an axial direction. These are deformed as a result of the relative motion between the sealing edge and the shaft. The alignment of these deformed protrusions is dependent on the distribution of contact pressure in



Friction conditions and lubrication

The interplay of the machine elements shaft, rotary shaft seal and lubricant is to be seen as a tribological system, i.e. three components / materials meet. At a friction point the lubricant is equal to the solid components and has a decisive influence on the operational reliability and service life of the system.

Even at low rotational speeds the medium intrudes into the contact zone due to the capillary forces. The feed of fluid by the capillary forces in the direction of the leakage is essential for the lubrication of the contact zone which is subjected to extreme thermal stress.

Probably the most common condition is mixed film friction between the shaft and sealing lip. Here too, the materials of the two contact surfaces are extremely important.

At higher shaft rotational speeds the friction condition changes from solid state friction through mixed film friction to hydrodynamic fluid friction. The higher rotational speed and the hydrodynamic effect cause the sealing lip to float on the lubricating film formed by the medium to be sealed.

This hydrodynamic lubricating film protects the elastomer sealing edge from premature wear and thermal destruction caused by the existing friction condition. To ensure a long service life it is important to supply the sealing edge with sufficient and continuous lubricating medium. Friction and friction loss are influenced decisively by the radial force, the rotary shaft seal material, the lubricating condition, the peripheral speed, the temperature, the pressurisation and the surface condition of the shaft.

Frictional energy:

$$P_{REIB} = F_R \cdot \mu \cdot d/2 \cdot 2 \cdot \pi \cdot n$$

P_{REIB} = frictional energy [Watt]

F_R = radial force [N]

μ = coefficient of friction

d = shaft diameter [mm]

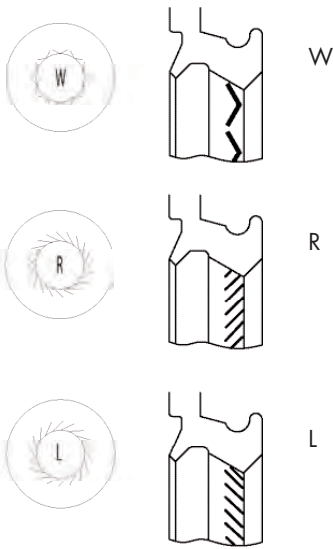
n = rotational speed [1/min]

This calculation can only serve as an estimate as the coefficient of friction for the individual operating conditions cannot be sufficiently determined.

To keep friction loss to a minimum the lowest possible radial force is applied. However, the radial force must be sufficient to perform the sealing function.

If the required lubricating film under the sealing edge is disturbed, e.g. due to contamination of the medium, damage to the contact surface or too much surface roughness on the shaft, leakage occurs.

Some machine elements, e.g. taper roller bearings, angular contact ball bearings and some types of gearwheel, exert a feed effect that can impair the supply of lubricant to the sealing point. Appropriate measures to feed the lubricant, e.g. lubricating ducts and flingers, should therefore be taken in the design stage.



Various designs of hydrodynamic sealing aids "spiral"

Dry run

Under no circumstances must the shaft rotate without lubrication on the rotary shaft seal as premature wear to the sealing edge will otherwise occur and the temperature at the sealing edge rises too high as a result of non-functioning heat dissipation.

The sealing edge of the rotary shaft seal should therefore be lightly lubricated prior to installation. Besides acting as a lubricant, the medium to be sealed also has the function of ensuring the continuous dissipation of the frictional heat that occurs.

For dry run application, special types and materials are to be selected, e.g. rotary shaft seal seals with a PTFE sealing lip.

Grease lubrication

With pure grease lubrication, frictional heat is dissipated to a considerably lesser degree than with oil lubrication. It should only be applied to slowly rotating shafts with a peripheral speed not exceeding the permissible values for oil lubrication (see rotational speed table on page 20).

For the sealing of slowly rotating shafts we recommend filling the space between the rotary shaft seal and the bearing almost completely with grease. If no suitable lubricating grease can be applied, a rotary shaft seal with a PTFE sealing lip can be used.

Sealing against poorly lubricating media

When sealing against poorly lubricating media, e.g. water or suds, a maximum of 2/3 of the space between the sealing lip and the protective lip must be filled with grease to ensure sufficient lubrication of the sealing edge. Two rotary shaft seals aligned in tandem with a max. 2/3 grease filling between them and the possibility of relubrication are even more effective.

Hydrodynamic sealing aids "spiral"

If the normal feed effect of the rotary shaft seal is not sufficient, so-called spiral grooves can be used as additional, hydrodynamic sealing aids to increase the functionality of the rotary shaft seal. Spiral grooves are raised return feed grooves that run at a slanting angle from the air side to the sealing edge.

Depending on the rotation direction of the shaft, rotary shaft seals with right or left spiral or with alternating spiral are used. The purpose of the spiral grooves is, in the event of impairment of the normal feed effect, to prevent the medium running to the air side from flowing off as leakage and to bring it back to the sealing edge. Rotary shaft seals with hydrodynamic sealing aids therefore provide double protection against leakage.

The mode of action of the spiral grooves is the same as that of a simple threaded shaft seal. The feed value of single-spiral rotary shaft seal is considerably greater than that of a standard type.

Rotary shaft seals with hydrodynamic sealing aids have improved functionality, particularly in difficult operating conditions, e.g. true running deviations, centricity deviation between shaft and bore and minor damage to the shaft surface.

Operating parameters

Pressure

Unpressurised operation

Rotary shaft seals are generally designed for unpressurised operation, i.e. there is no difference in pressure between the spaces to be sealed.

The rotational speed table on page 20 shows the maximum permissible rotational speeds in unpressurised operation with regard to the elastomer material.

Pressurised operation

The load combination of pressure p and peripheral speed V is decisive for the selection of the correct rotary shaft seal.

With pressurised rotary shaft seals the sealing lip is pressed hard against the shaft, thereby increasing the radial force in accordance with the pressure and the effective surface (self-strengthening effect) and thus the sealing action. The sealing capacity of the rotary shaft seal adapts, within certain limits, to the prevalent pressure difference.

However, this process also causes the thermal load and the frictional energy at the sealing edge to increase, which can result in premature wear and hardening. If pressures are too high, the sealing lip can turn over to the air side.

When selecting the elastomer material it is essential to take the higher thermal load of the sealing edge into consideration (overtemperature). The recommended values in the rotational speed table on page 20 for peripheral speed and rotational speed therefore do not apply to pressurised rotary shaft seals.

In pressurised rotary shaft seals (WASY) the capability of the sealing lip to absorb both the true running tolerance of the shaft and the centricity deviation between the shaft and the location bore is also reduced.

Pressurised rotary shaft seals must be secured axially on the non-pressure side by means of a housing shoulder, a distance ring or a retaining ring against being pressed out of the location bore.

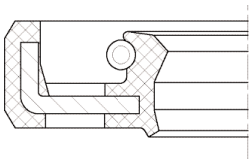
Pressurising with standard types

Standard rotary shaft seals are still suitable for use in very low pressures. They have to seal spaces with small pressure difference against fluids, greases and even air. Pressure differences of max. 0.5 bar can be sealed, depending on the rotational speed.

The following table shows the limit values for pressure dependent on rotational speed and peripheral speed.

Maximum permissible shaft rotational speeds under pressurisation

max. pressure difference [bar]	permissible rotational speeds [1/min]	max.peripheral speed [m/s]
0.5	up to 1000	2.8
0.35	up to 2000	3.15
0.2	up to 3000	5.6



Pressure-loadable type WAY/WASY

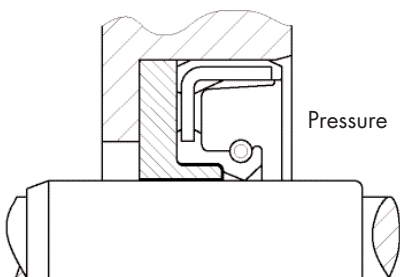
For pressure differences greater than 0.5 bar, pulsating pressures and vacuum applications the type WASY is recommended.

This type is fitted with a short, reinforced sealing lip and a drawn-down metal cage (stabilised membrane). This reduces the increase in contact pressure resulting from the pressure and thus also the increased frictional energy and, where applicable, premature wear.

Due to its reinforcement the sealing lip is also prevented, within certain limits, from turning over to the air side if the pressure is too high.

Depending on the rotational speed, the type WASY is pressure-loadable up to max. 10 bar (see table).

Pressure difference [bar]	Rotational speed [1/min]	max. peripheral speed [m/s]
up to 10	< 500	0.6
4.5	1.000	2.7
2.4	2.000	5.9
1.3	3.000	8.4
0.6	4.000	11.3

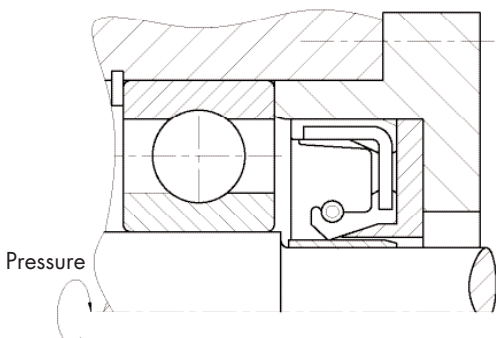


Backup rings

Pressure differences greater than 0.5 bar can also be sealed with standard rotary shaft seals and an additional backup ring. Such combinations permit pressures of up to approx. 10 bar, depending on the rotational speed.

Only types without protective lips can be used because the backup ring supports the sealing lip under the membrane. The backup ring must therefore be adapted exactly to the sealing lip profile in question. Dichtomatik can supply a drawing of the corresponding backup ring for every standard type (without protective lip) on request.

This kind of sealing system is ideal for applications where pressure-loadable types (WASY) are not available.



Permissible rotational and peripheral speeds

According to the following formula, the peripheral speed V of the shaft is the product of the rotational speed n and the shaft diameter d :

Peripheral speed
 $v = (2 \pi \cdot n) \cdot d/2$

v = peripheral speed [m/s]
 n = rotational speed [1/min]
 d = shaft diameter [mm]

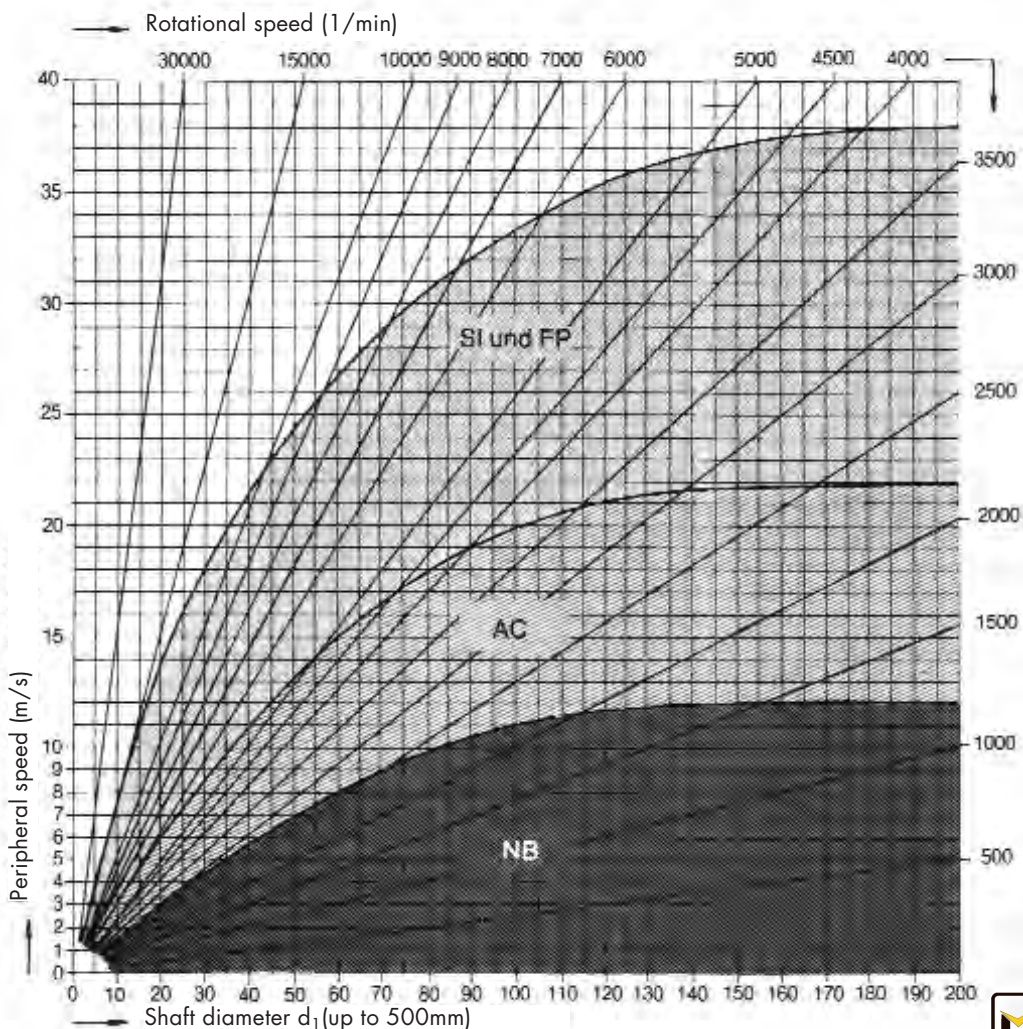
To prevent function-threatening over-temperatures at the sealing edge that can lead to the hardening of the elastomer or the formation of oil carbon, the peripheral speed must be limited.

The table shows recommended values for material selection, depending on the maximum permissible peripheral speed. The recommended values given are based on experience in accordance with DIN 3760.

Manufacturer-specific properties of the rotary shaft seals such as the geometry of the sealing lip or radial force are not taken into consideration.

These recommended values are valid only for unpressurised operation, adequate lubrication conditions with mineral oil and good heat dissipation at the point of sealing. In the case of insufficient lubrication or pure grease lubrication the limit values are to be halved. The recommended values are also to be reduced for pressurisation, poor surface quality in the contact area and large true running deviations.

For shafts with larger diameters, higher peripheral speeds are permissible than for shafts with smaller diameters as the cross-section of the shaft increases with the square of the diameter. This results in considerably better heat dissipation possibilities.



Temperature

Due to the rotation of the shaft and the resulting friction at the sealing edge, the actual temperature at the sealing edge is higher than in the oil bath.

$$t_D = t_{Öl} + t_{Ü}$$

t_D = temperature at the sealing edge [°C]

$t_{Öl}$ = temperature in the oil bath [°C]

$t_{Ü}$ = overtemperature [°C]

The difference in temperature between oil bath and sealing edge is called overtemperature.

The level of overtemperature is dependent on the following parameters:

- peripheral speed
- lubrication condition / oil level
- heat dissipation
- pressure load
- surface condition of the shaft
- rotary shaft seal material

The higher the peripheral speed, the higher the overtemperature at the sealing edge. Depending on the peripheral speed, the overtemperature can be up to +40°C.

If the maximum permissible operating temperatures for the different elastomer materials are exceeded, this leads to premature hardening of the elastomer material and extreme wear.

The permissible operating temperatures for our elastomer materials are given in the tables in the chapter (see "Materials" page 7). The high temperatures given in the tables refer to the temperature at the sealing edge.

Media to be sealed

The selection of the correct rotary shaft seal and particularly of the correct material depends on the peripheral speed of the shaft, the pressure load and the friction-related rise in temperature, but most importantly on the medium to be sealed and its temperature. In particular, the chemical resistance of the rotary shaft seal to the medium used influences the lifespan of the seal to a decisive degree.

Chemical aggression by the medium can lead to

- softening of the material due to swelling
- or hardening and premature ageing, fostered by high temperatures.

The behaviour of the individual material groups to a variety of media is listed in the Dichtomatik resistance list. If new media are used, if there is any uncertainty or if maximum application parameters (e.g. temperature, pressure, peripheral speed) occur simultaneously, we recommend carrying out a test in advance. A practical test under standard conditions provides the best information on the suitability of a seal. A laboratory test and consultation with the medium manufacturer can also be helpful.

When sealing aggressive media, the types VIA/VIAS in FPM materials are more suitable for many applications than the types in NBR. Rotary shaft seals made of FPM have higher chemical and thermal resistance.

In addition, the types VIA/VIAS are already fitted as standard with tension springs made of 1.4301 (AISI 304) rust and acid-resistant steel and the metal insert is fully sheathed in elastomer.

For even higher requirements with regards to media resistance, two types with a PTFE sealing lip or made completely of PTFE are available, namely types WCP21 and WEPO.

Frequently used media: mineral oil-based oils and greases

Generally speaking, seals with NBR and FPM standard materials show good resistance to these media. With highly additivated media for which there are no values taken from experience, a test may be advisable.

Synthetic oils and greases

The composition of synthetic lubricants is characterised mainly by the base oil and a large number of additives. Depending on the type of base oil and additives, the NBR standard material can be used with less additivated lubricants. With more highly additivated oils, particularly at temperatures above +80°C, FPM is more suitable as a sealing material.

Due to the large number and the combination of additives in synthetic lubricants, however, resistance problems may arise. We therefore recommend verifying the suitability of the material in advance by means of testing.

Areas of application for rotary shaft seal materials

Material	NBR	FPM	HNBR	NBR High nitrile	NBR High temp.	NBR Low temp.	VMQ	ACM	PTFE
Low temperature [°C]	-40	-30	-40	-30	-30	-50	-50	-25	-80
High temperature [°C] (no media influence)	100	200	150	100	120	90	200	150	200
Wear resistance	2	1-2	1-2	2	2	2	3	3	3

Media to be sealed / permissible continuous temperatures [°C]

Mineral oils

Engine oils	100	150	100	100	120	90	130	130	150
Transmission oils	80	150	80	80	100	70	130	120	150
Hypoid transmission oils	80	140	80	80	100	70	-	120	150
ATF oils	100	150	100	100	110	80	■	130	150
Hydraulic fluids acc. to DIN 51524	90	130	90	90	100	80	■	120	150
Heating oils EL and L	90	150	80	90	90	■	■	■	150
Greases	90	150	90	90	100	80	■	120	150

Non-flammable hydraulic fluids

VDMA 24317 / 24320

HFA oil in water emulsions	60	■	60	60	60	■	■	-	■
HFB water in oil emulsions	60	■	60	60	60	■	■	-	■
HFC aqueous polymer solutions	60	-	60	60	60	■	■	-	■
HFD non-aqueous synthetic fluids	-	150	-	-	-	-	■	-	150

Other media

Water	80	80	90	80	80	■	■	-	■
Suds	80	80	90	80	80		■	■	■

The values given for the high temperatures refer to the maximum temperatures occurring under the sealing lip. Depending on the application, these can be up to +40°C above the medium temperature.

1 = excellent / 2 = good /

3 = moderate

■ = resistant, but not normally used

■ = resistant to a limited degree

- = not resistant

Installation housing

Shaft

Besides the rotary shaft seal, the shaft is a key machine element in the rotation sealing system and must therefore fulfill a number of technical requirements in order to ensure good sealing action.

The correct shaft composition design in the contact surface area of the sealing edge of the rotary shaft seal is very important to the lifespan and the sealing function of the rotation sealing system.

Tolerances

The ISO tolerance field h_{11} according to DIN ISO 286 is to be applied to the shaft diameter d_1 in the contact surface area of the sealing edge of the rotary shaft seal in order to attain the necessary prestressing. Tolerance class IT 8 is valid for the roundness of the shaft.

Surface finish of the shaft

The shaft must be treated circularly in the contact surface area.

The surface roughness, measured longitudinally, should lie within the following ranges:

$$R_a = 0.2 \text{ to } 0.8 \text{ } \mu\text{m}$$

$$R_z = 1.0 \text{ to } 4.0 \text{ } \mu\text{m}$$

$$R_{\text{max}} \leq 6.3 \text{ } \mu\text{m}$$

Shaft surfaces that are too smooth ($R_a < 0.2 \text{ } \mu\text{m}$) combined with excessive peripheral speeds lead to malfunctions. The supply of lubricant to the sealing edge is impeded, the hydrodynamic lubricating film under the sealing edge is broken and thermal damage to the sealing edge results. Shaft surfaces that are too rough quickly lead to premature wear of the sealing edge. In both cases, serious leakage is the result.

Should axial movements also occur at the rotating shaft, the following roughness depths should be observed to ensure a good sealing action:

$$R_a \leq 0.2 \text{ } \mu\text{m}$$

$$R_z \leq 0.8 \text{ } \mu\text{m}$$

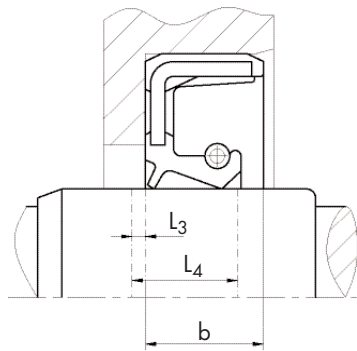
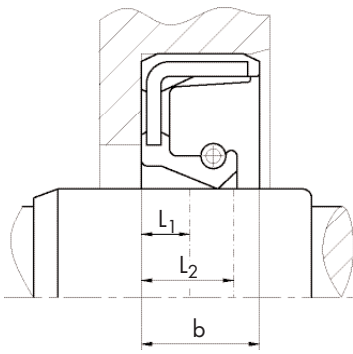
Surface hardness of the shaft

The lifespan of the sealing point is also dependent on the surface hardness of the contact surface on the shaft. The surface hardness should be at least 45 HRC.

Should there be influx of contaminated media or dirt from the outside, and with peripheral speeds of $\geq 4 \text{ m/s}$, the surface hardness must be at least 55 HRC – 60 HRC.

In the event of surface hardening, a hardness penetration depth of at least 0.3 mm is required.

Chrome-plated, cadmium-plated, nitrided and phosphated shaft surfaces require special treatment processes. Case by case decisions must be made regarding their suitability. Following nitration the grey layer is to be smoothed. With chrome-plated shaft surfaces the formation of lubricating film is to be determined by subsequent plunge grinding.



Contact surface area

The previously named values for surface finish and surface hardness are to be observed within the contact surface area specified in the table below. The contact surface area is specified in terms of the sealing width b.

b	L ₁ min.	L ₂ min.	L ₃ min.	L ₄ min.
7	3.5	6.1	1.5	7.6
8	3.5	6.8	1.5	8.3
10	4.5	8.5	2	10.5
12	5	10	2	12
15	6	12	3	15
20	9	16.5	3	19.5

Treatment of the shaft surface

The shaft is treated spiral-free and circularly in the contact surface area of the sealing edge to ensure that no feeding or pumping effect occurs at the sealing point and thereby causes leakage. The correct treatment of the contact surface is very important for the sealing function.

The following treatment methods are used:

Plunge grinding

The most frequently used method is plunge grinding (grinding without axial feed of the grinding wheel) as this produces a completely spiral-free sliding surface. To obtain a high degree of efficiency the sparking out time must be 30 seconds. The grinding wheel is whetted with a multi-grain dresser to ensure that no spiral occurs. During grinding, an integral transmission ratio between the rotational speed of the shaft (e.g. 50 1/min) and the rotational speed of the grinding wheel (e.g. 1500 1/min) is to be avoided.

Hard turning

When hard turning, special process parameters such as feed, cutting speed, depth of cut and cutting material must be observed in order to produce a usable sliding surface. The reason for choosing this treatment method is its high cost-efficiency. Other advantages are:

- complete treatment in one mounting
- short set-up times
- fewer production steps
- no wheel swarf to dispose of
- precisely defined surface structure of the shaft

Turned shafts have a considerable feed effect in one direction, i.e. due to the orientation of the treatment scores (spiral) the oil is fed in one direction, as

with a micro-thread. The feed direction is dependent on the rotational direction of the shaft. When selecting the rotary shaft seal it is essential that the shaft can also feed against the sealing direction if the rotational direction changes. For this reason, either hard turning should be used for shafts with only one rotational direction (shaft feed direction towards the oil chamber) or a rotary shaft seal should be selected that is capable of feeding the feed stream created by the hard-turned shaft back into the oil chamber.

The friction torque of rotary shaft seals is comparable to that of ground shafts.

Dichtomatik conducts various test runs with different rotary shaft seal types at a renowned scientific institute. In order to guarantee the maximum possible functional reliability we strongly advise that the selection of seals should be verified by test runs. For further information, e.g. process parameters or test runs, please contact Dichtomatik's development department.

Flow turning

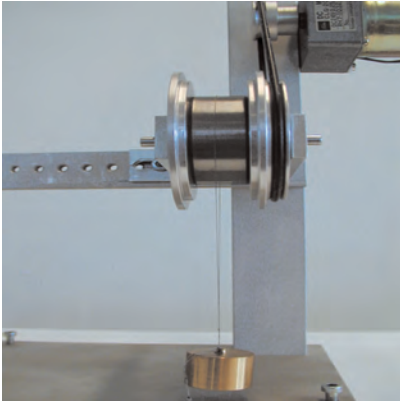
Deep-drawn sheet metal

Other methods include lapping, honing, grinding with emery, reaming and abrasive blasting. These methods can produce sliding surfaces of only limited correctness for a rotary shaft seal. Sliding surfaces prepared like this should definitely be checked with sufficient test runs.

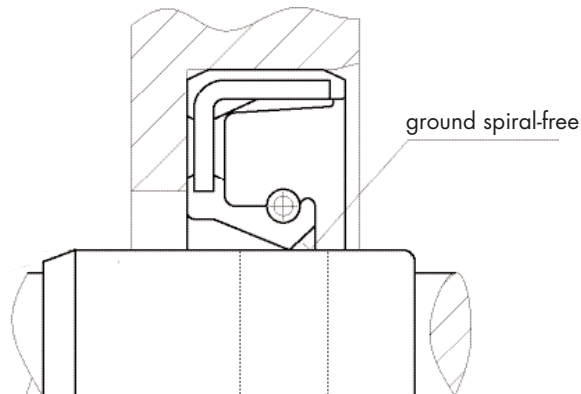
Spiral-freeness of the shaft surface

It is essential that the contact surface area of the shaft has been made spiral-free to ensure that no feed or pump effect occurs at the point of sealing, thereby disturbing the functional mechanism of the rotary shaft seal and causing leakage. Spiral-free means that the treatment marks show no orientation such as a rising micro-thread.

Shafts and shaft sleeves can be tested for spiral-freeness using the thread method. To obtain a reliable result, various parameters, e.g. angle of thread contact, rotational speed and weight must be observed. The test thread slides on the wetted, spiral-free contact surface without any change in the axial track. If there is a spiral the test thread moves axially to the left or right, depending on the rotational direction.



Shaft surface spiral measuring device
"Thread method"



Shaft material

Common tempering steels are suitable as shaft material if the values for the surface hardness are observed.

The formation of corrosion in the contact surface area of the rotary shaft seal is to be avoided. Shafts made of heat-treatable, high-alloy, rust-resistant steel are therefore to be used to seal water or aqueous media. For low peripheral speeds and secondary applications, nonferrous metals can also be used.

Cast iron materials are sometimes suitable as shaft material if they are cavity-free and have a pore size of < 0.05 mm.

In special cases, ceramic layers can be used as shaft material if the surface is sealed and a pore size of < 0.05 mm is ensured. In addition, the required surface finish must be observed and a good bond to the basic shaft material ensured.

Hard chrome-plated shafts are suitable only to a limited degree due to poor formation of the lubricating film and eccentric wear. The formation of the

lubricating film can be improved only by subsequent plunge grinding.

Plastic shafts are also suitable only to a limited degree. As plastics have a very low thermal conduction coefficient, the heat dissipation via the shaft is impaired and there is a high rise in temperature at the sealing edge. At and above certain rotational speeds the plastic can soften or melt.

For all shaft surface materials the same applies: the required values for surface finish and hardness must be observed.

If the shaft cannot be made with the required contact surface properties for economic, design or technical manufacturing reasons, corresponding shaft sleeves can be used. Dichtomatik supplies shaft sleeves in all dimensions and various materials and the development department realises them in terms of design.

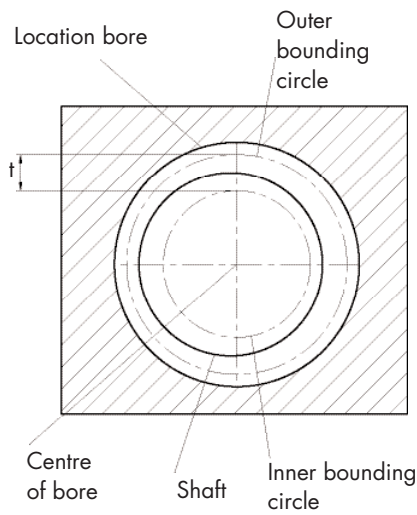
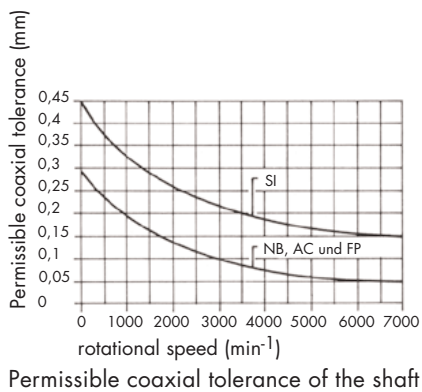


Illustration of out-of-roundness tolerance

Out-of-roundness

The out-of-roundness or dynamic eccentricity of the shaft should be kept within small tolerances. Otherwise, at high rotational speeds, there is a danger of the sealing lip, due to its inertia, no longer being able to follow the shaft. If this creates too large a gap between sealing edge and shaft on one side, the medium to be sealed escapes and leakage occurs. It is therefore advisable to position the rotary shaft seal in the immediate vicinity of the bearing and to keep bearing play as small as possible. The permissible values for out-of-roundness in terms of rotational speed are shown in the diagram on the left.

Limited values apply to our pressurisable type WAY/WASY because the sealing lip here is considerably more rigid.

Installation d_1	chamfer d_3
< 10	$d_1 - 1.5$
10 < 20	$d_1 - 2$
20 < 30	$d_1 - 2.5$
30 < 40	$d_1 - 3$
40 < 50	$d_1 - 3.5$
50 < 70	$d_1 - 4$
70 < 95	$d_1 - 4.5$
95 < 130	$d_1 - 5.5$
130 < 240	$d_1 - 7$
240 < 500	$d_1 - 11$

Chamfer on the shaft

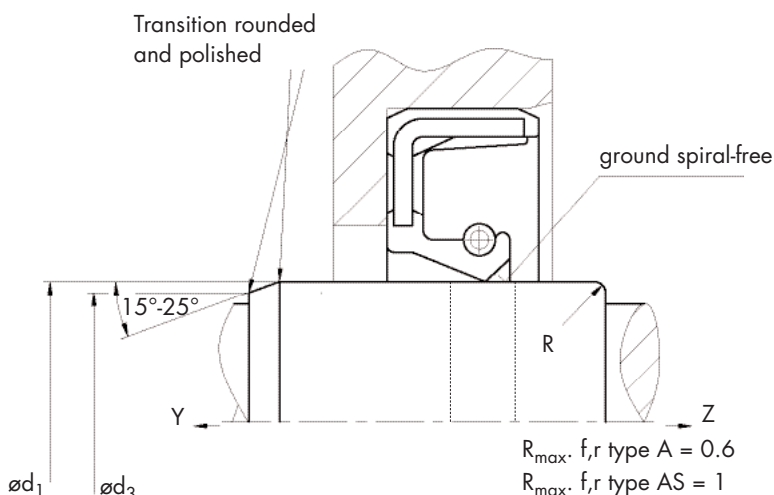
Two following designs of the shaft shoulder are suggested:

Installation direction Z of the shaft
Rounding of the shaft shoulder with $r = 0.6$ to 1 mm.

Installation direction Y of the shaft
Chamfering of the shaft shoulder, recommended angle 15° to 25°. The chamfer diameter d_3 is listed in the adjacent table.

Damage to the shaft

It is essential that all kinds of damage such as scoring, scratching, dents, cavities, pores or corrosion on the contact surface of the shaft are avoided. This leads to premature failure and leakage. 30% of such failures are caused by incorrect shaft treatment or damage. Shafts should therefore be protected carefully from production to final installation. Transport fixtures or specially moulded or slip-on sleeves made of plastic can be used.



Housing bore

The design of the housing bore is important because the static sealing (second leakage path) by the outer sheath of the rotary shaft seal takes place inside it. To obtain a firm and tight seating in the housing bore it is essential that the following technical requirements are observed:

Tolerances

For the bore diameter d_2 the ISO tolerance field H8 in accordance with DIN ISO 286 is to be allowed for in order to obtain good static sealing performance in combination with the press-fit allowance at the outer sleeve of the rotary shaft seals.

Housing dimensions

The axial housing dimensions and the pertaining corner radii are given in the table in relation to the rotary shaft seal height b :

b	t₁ min.	t₂ min.	R₁
7	5.95	7.3	
8	6.8	8.3	0.5
10	8.5	10.3	
12	10.3	12.3	
15	12.75	15.3	0.7
20	17	20.3	

Permissible coaxial tolerance of the shaft

Chamfer on the housing bore

The housing bore should have a chamfer of 10° to 20° and the transitions should be free of burrs in order to facilitate problem-free installation of the rotary shaft seal.

Surface finish of the housing bore

In order to obtain good static tightness and a secure, firm seating in the housing bore, the following roughness values should be observed:

permissible values for types with rubber outer sleeve WA

$$R_a = 1.6 \text{ to } 6.3 \mu\text{m}$$

$$R_z = 10 \text{ to } 20 \mu\text{m}$$

$$R_{\text{max}} \leq 25 \mu\text{m}$$

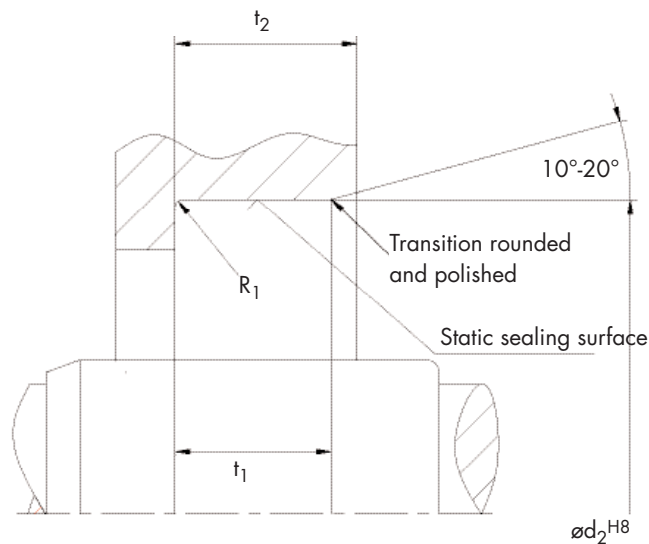
permissible values for types with metal outer sleeve WB, WC

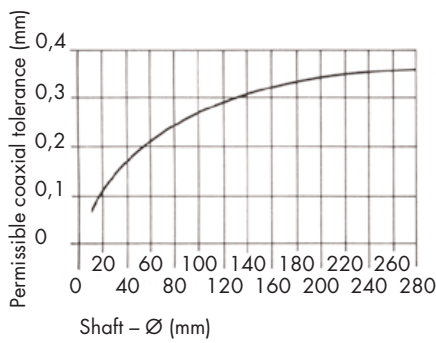
$$R_a = 0.8 \text{ to } 3.2 \mu\text{m}$$

$$R_z = 6.3 \text{ to } 16 \mu\text{m}$$

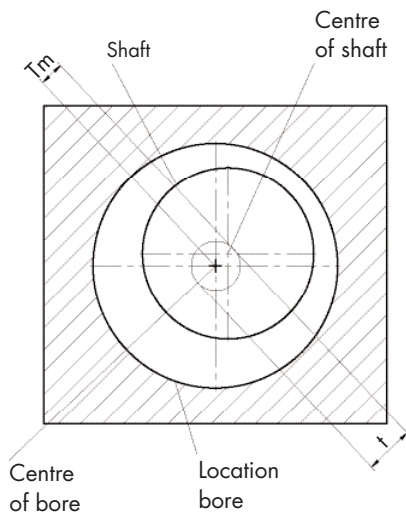
$$R_{\text{max}} \leq 16 \mu\text{m}$$

Rotary shaft seals with metal sheaths and/or application in combination with thin fluid media or gas, a very good surface quality is required, i.e. the surface in the housing bore should be free of damage and treatment marks of any kind, e.g. scratching, scoring, cavities and dents.





The permissible coaxiality tolerance between the housing bore and the shaft



Coaxiality tolerances

Coaxiality tolerances in the housing bore

The permissible coaxiality tolerance (concentricity deviation) between the housing bore and the shaft/bearing position is shown in the adjacent table. Coaxiality leads to the uneven distribution of contact pressure at the circumference. This results on the one hand in greater strain on the sealing edge which leads to premature wear. On the other hand there is too little contact pressure of the sealing edge

on the shaft which can lead to an impairment of the sealing function and thereby cause leakage. It should be noted that shorter sealing lips (pressurisable type WAY/WASY) require smaller permissible values. With special elastomers, more flexible sealing lip mountings and longer sealing lips the coaxiality tolerance can be increased. The coaxiality deviation should be kept as small as possible in order to obtain even specific radial force/line pressure.

Materials for housings

The following materials are used for housings and housing covers/flanges that hold the rotary shaft seal:

- steel and heat-treatable steel common in mechanical engineering
- cast iron materials, e.g. GGG, GG, GS, GTS
- nonferrous metals and nonferrous metal alloys, e.g. G-ALMg
- plastics, e.g. thermoplasts and duro-plasts

When selecting the rotary shaft seal type and the housing material it is essential to take the heat dissipation coefficient into consideration as this varies greatly in the materials given above.

Thermal expansion

The thermal expansion behaviour (thermal expansion coefficient) of the rotary shaft seal and housing materials are of key importance to the static sealing process in the housing bore (second leakage path). During operation, considerable temperature differences can occur that then result in different linear dimensional changes in the different materials. The linear dimensional changes can be calculated using the generally valid law of linear extension:

$$\Delta L = \alpha \cdot \Delta T \cdot L_0 \text{ [mm]}$$

The differences in the thermal expansion coefficients of steel, cast iron materials, nonferrous metals, plastics (thermoplasts) and elastomers are sometimes very large and thus cause various problems. If there is a rise in temperature between a non-ferrous metal or plastic housing and a rotary shaft seal with a metal casing, the prestressing decreases due to the very different thermal expansion coefficients and the seal may be pushed out. The use of rotary shaft seals with rubber casing (e.g. type WA) is therefore recommended for nonferrous metal or plastic housings. These are designed with a larger press-fit allowance and can follow the expansion of the housing better because of their much higher thermal expansion coefficient. Rotary shaft seals with a grooved, rubber-encased outer surface (type WAK) are designed with an even higher press-fit allowance and can therefore cover even larger gaps. Housings made of steel or cast-iron material in combination with a rotary shaft seal with a rubber outer sleeve offer the greatest advantages from a thermal point of view.

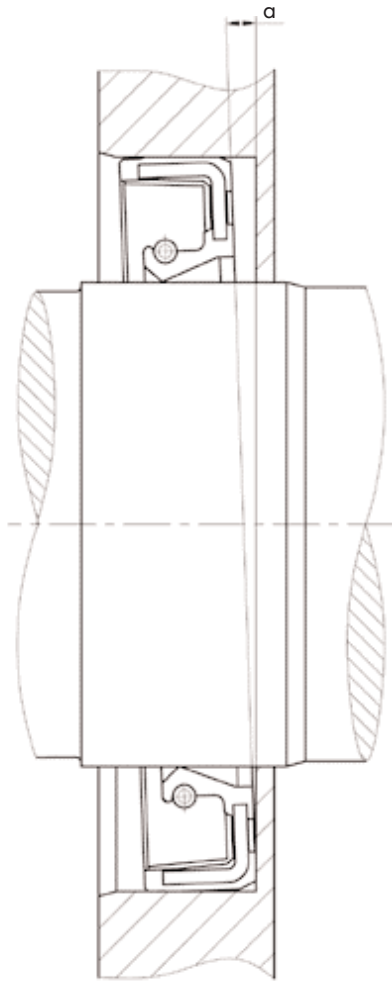


Illustration of skew

Permissible skew

The installed rotary shaft seal must be as central and vertical to the shaft as possible. The right-angle tolerance should not exceed the values in the adjacent table. Larger deviations (skew) lead to a pumping action and have a negative influence on the sealing function. Furthermore, excessive one-sided wear on the sealing lip is to be expected with rough surfaces.

Shaft diameter/mm	Right-angle tolerance/mm
up to 25	0.1
over 25 up to 80	0.2
over 80	0.3

Rigidity

For economic reasons, mount housings are frequently designed with very thin walls. When installing rotary shaft seals in thin-walled housing bores or mount housings with low stability there is a danger of the mount housing being considerably enlarged, which can lead to leakage. The enlargement of the housing bore must therefore be kept within the limits possible by the selection of the correct rotary shaft seal type in order to guarantee the wringing fit necessary for static tightness.

We recommend using rotary shaft seals with a rubber sleeve (e.g. WA) or applying a larger housing bore tolerance.

Split housings

In split housings, static tightness can also be obtained at the partition lines with the type WA (rubber outer sleeve).

Due to the good elastic deformability of the elastomer and its mould filling capacity, the required static tightness is obtained with the type WA. This means that split mount housings with different partition levels and possible offset at the partition lines can also be securely sealed.

Installation

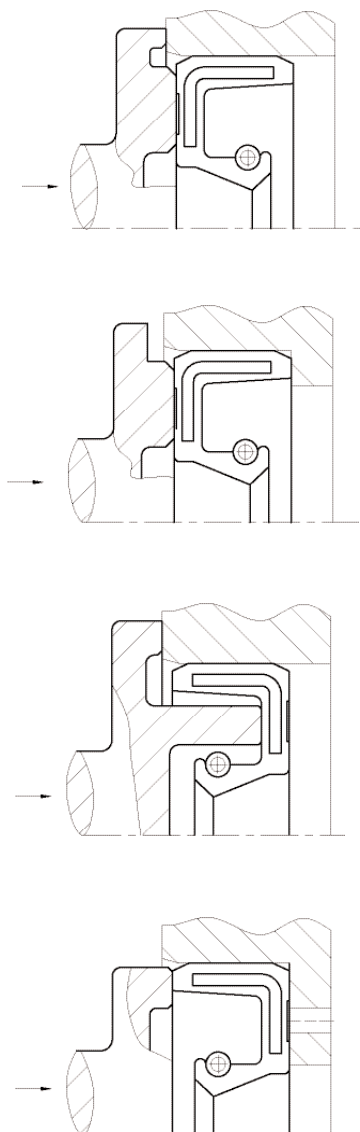
Correct installation is important. Approximately 30% of all failures and damage to the rotary shaft seals are caused by incorrect installation or unsuitable installation tools. The installation of rotary shaft seals is performed in accordance with DIN 3760.

Prior to installation, the installation space and the rotary shaft seal should be cleaned carefully. Otherwise adherent dirt particles may lead to leakage shortly after operation starts. Please also follow our installation guidelines on catalogue page 23.

Preferably, a hydraulic or mechanical press-fitting device should be used to press the rotary shaft seal into the housing bore. This grips a large area on the outside of the rotary shaft seal, with the result that the force of pressure is exerted as closely as possible to the outer diameter. Please make sure that the press-fitting tool is held in the final position for a while. This reduces spring-back or skew of the rotary shaft seal to a minimum.

If a rotary shaft seal has to be passed over sharp edges, e.g. grooves, threads or shaft ends, appropriate installation sleeves are to be provided. The sleeve must not have any damage such as scratches or rough surfaces.

To guarantee a firm fit it must be ensured that the outer sheath rests completely against the inside of the housing bore. If the front chamfer of the rotary shaft seal protrudes slightly over the housing chamfer, the seating proportion is reduced, which can cause the rotary shaft seal to "wander" in the bore. If the space between the protective lip and the sealing lip is filled with grease, a defined application is to be provided. Application aids such as brushes can leave function-impairing residue behind on the seal. The space should be filled to a maximum of 2/3 with grease.



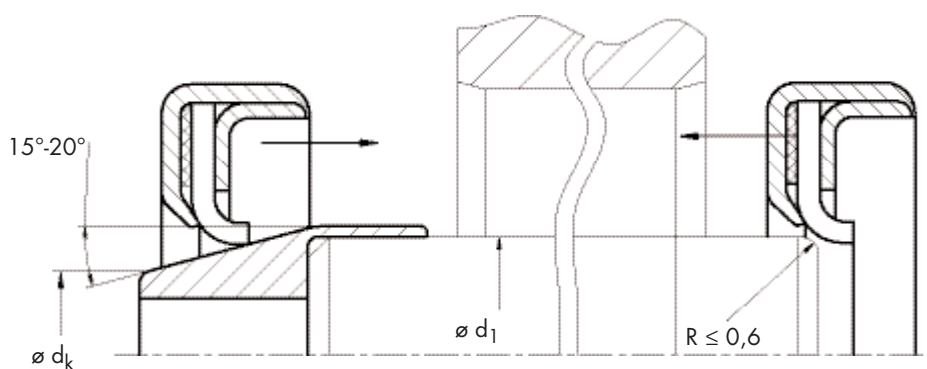
Various installation tools for rotary shaft seals

WCP21

The diagram shows the secure installation of the WCP21. To install the WCP21 over a chamfered shaft an installation cone is to be used so that the sealing lip is guided and not folded over.

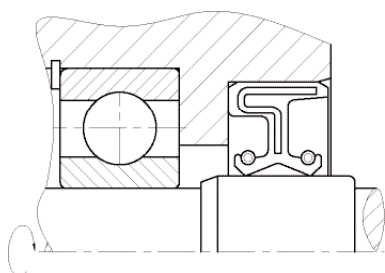
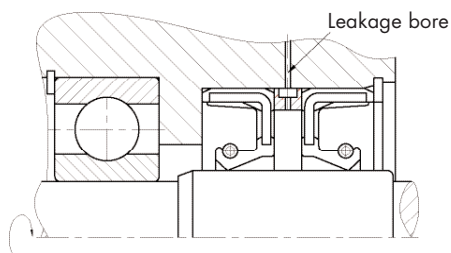
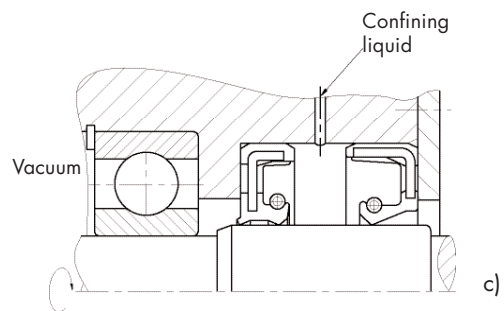
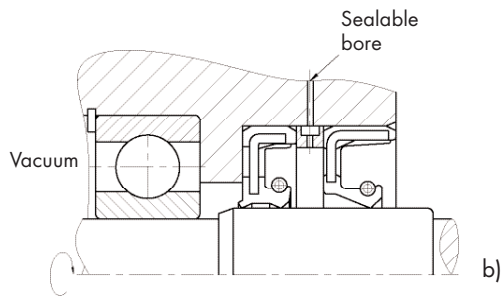
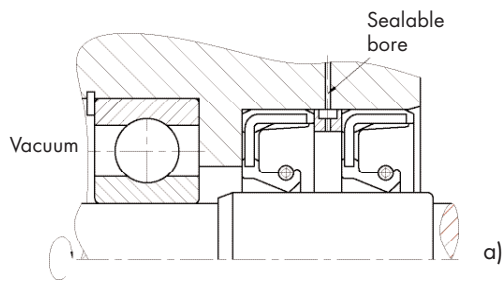
When installing the WCP21 with the outside at the front, bevelling or rounding must be performed. Otherwise, the general installation guidelines for rotary shaft seals apply.

$\varnothing d_1$	$\varnothing d_k$
6 - 60	$\varnothing d_1 - 3.5$
65 - 135	$\varnothing d_1 - 4.5$
140 - 170	$\varnothing d_1 - 6$



Installation cone WCP21

Special applications



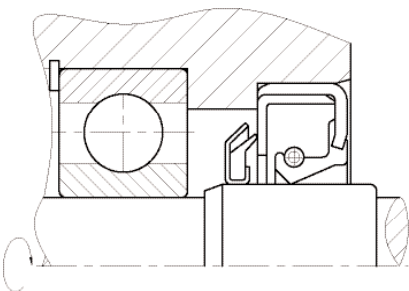
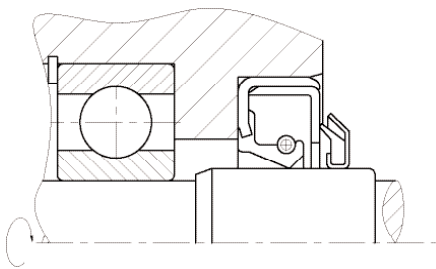
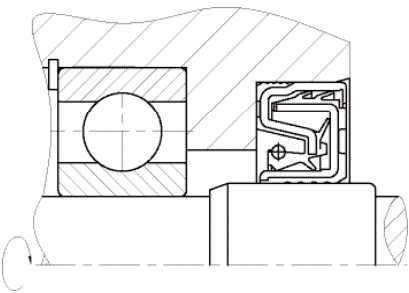
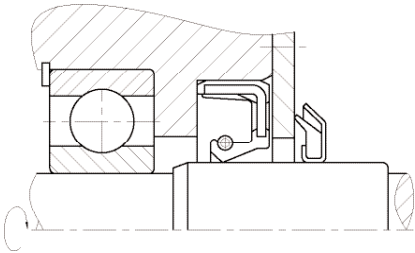
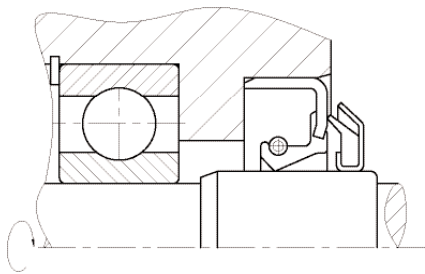
Sealing against negative pressure or vacuum

To seal a shaft against negative pressure, rotary shaft seals are used which correspond to the pressure gradient with the sealing lip on the air side. When grease is used, the outer rotary shaft seal must also be used with the sealing lip on the air side. Image a) and b)

To ensure lubrication of the sealing lip and to support the sealing action a confining medium should be used between two rotary shaft seals. If a liquid confining medium is used, the rotary shaft seals are installed with the sealing lips facing each other. Due to the negative pressure gradient the inner seal is pressurised by the confining medium. Here we recommend the use of our type WASY. Image c)

Separating two media

To separate two spaces containing different media, two rotary shaft seals are used back to back, i.e. with the sealing lips facing in opposite directions. We recommend making a leakage bore-hole in the space between the rotary shaft seals. Another possible way of separating two media at low to medium peripheral speeds is to use our type WAD which combines two back-to-back sealing lips in one seal. The space between the two sealing lips should be filled with grease during installation.



Sealing with excessive external dirt formation

External dirt leads to premature wear of the sealing and the shaft surface. Depending on the type and quantity of the dirt occurring, the sealing lip should be protected.

The simplest solution is to use type WAS with its outward-facing protective lip. The space between the sealing lip and the protective lip should be filled to a maximum of 2/3 with grease during installation.

If external dirt formation is excessive, a VRM axial seal can be connected in series to the rotary shaft seal. This VRM ring rotates with the shaft and propels the dirt away directly. In addition, the VRM ring seals against an axial housing surface with its elastomer lip (possibly directly against the rotary shaft seal type WB).

In extreme conditions, e.g. in agricultural and construction machinery, cassette seals are used. These seals are fully encapsulated and on the inside they form a grease-filled labyrinth with several protective lips. In this way the penetration of dirt is effectively prevented. The cassette seals also contain the completely pre-treated seal contact surface.

Sealing with contaminated media

Contaminated media or media with abrasive contents cause intensive wear in the sealing area. Particularly with vertical shafts, the lower seal is severely subjected to sinking particles. Connecting a second seal in series and/or using our axial seal VRM solves this problem.

Storage of elastomer products

Generally speaking, elastomers are suitable for storage. They remain almost unchanged in their properties for years, provided that certain minimum requirements regarding storage conditions are observed. These are described in DIN 7716 and ISO 2230.

The seals must be stored stress-free, i.e. without tension, pressure or other forms of deformation.

The seals should be protected from excessive ventilation, especially draughts. Storage in packaging, e.g. polythene bags or airtight containers, is recommended.

The storage location should be cool, dry, dust-free and moderately ventilated.

A constant storage temperature is optimal. It should be no lower than -10°C and no higher than $+20^{\circ}\text{C}$.

Heaters in storage rooms should be screened and placed at a distance of at least 1 m from the stored goods.

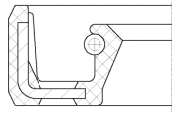
Relative humidity should not exceed 65%. Strong light, especially UV rays and direct sunlight should be avoided.

Electrical devices that produce ozone should not be placed in storage rooms for elastomers.

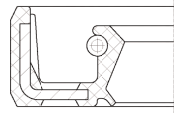


Overview
Rotary
shaft seals

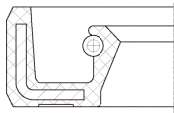
Profile



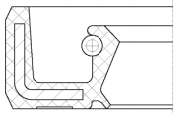
WA Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 70/ steel DIN EN 10270-1 Dimensions metr. inch Page 38



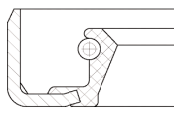
WAS Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 70/ steel DIN EN 10270-1 Dimensions metr. inch Page 38



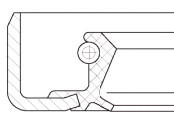
VIA Rotary shaft seal Temp. -30 +200 Speed 35 Materials FPM 80/ steel 1.4301 Dimensions metr. inch Page 100



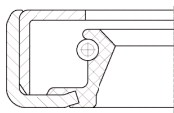
VIAS Rotary shaft seal Temp. -30 +200 Speed 35 Materials FPM 80/ steel 1.4301 Dimensions metr. inch Page 100



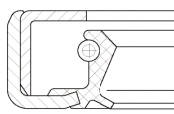
WB Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 70/ steel DIN EN 10270-1 Dimensions metr. inch Page 120



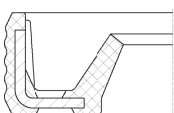
WBS Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 70/ steel DIN EN 10139 Dimensions metr. inch Page 120



WC Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 70/ steel DIN EN 10139 Dimensions metr. inch Page 142



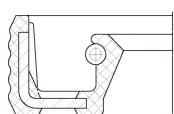
WCS Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 70/ steel DIN EN 10139 Dimensions metr. inch Page 142



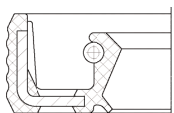
WAO Rotary shaft seal Temp. -40 +100 Speed 6 Materials NBR 70/ steel DIN EN 10139 Dimensions metr. inch Page 164



WBO Rotary shaft seal Temp. -40 +100 Speed 6 Materials NBR 70/ steel DIN EN 10139 Dimensions metr. inch Page 164



WAK Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 70/ steel DIN EN 10270-1 Dimensions metr. inch Page 174

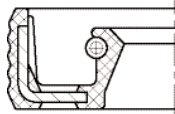


WAG Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 70/ steel DIN EN 10270-1 Dimensions metr. inch Page 174

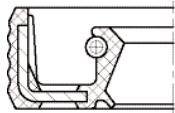


**Overview
Rotary
shaft seals**

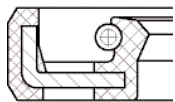
Profile



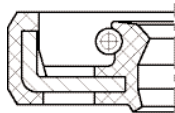
VIAK Rotary shaft seal Temp. -30 +200 Speed 35 Materials FPM 80/
steel DIN EN 10270-1 Dimensions Page 175



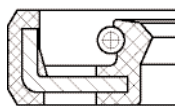
VIAG Rotary shaft seal Temp. -30 +200 Speed 35 Materials FPM 80/
steel DIN EN 10270-1 Dimensions Page 175



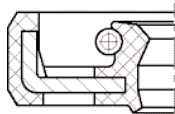
WAY Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 80/
steel DIN EN 10270-1 Dimensions Page 176



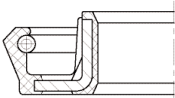
WASY Rotary shaft seal Temp. -40 +100 Speed 12 Materials NBR 80/
steel DIN 10270-1 ■ ■ Page 176



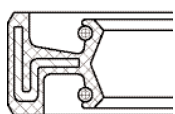
VIAY Rotary shaft seal Temp. -30 +170 Speed 35 Materials FPM 80/
steel DIN EN 10139 Dimensions Page 182



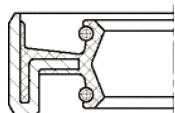
VIASY Rotary shaft seal Temp. -30 +170 Speed 35 Materials FPM 80/
steel DIN 10139 ■ ■ Page 182



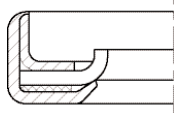
WAX Rotary shaft seal Temp. -40 +100 Speed 10 Materials NBR 70/
steel DIN EN 10270-1 Dimensions Page 185



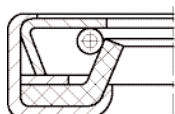
WAD Rotary shaft seal Temp. -40 +100 Speed 6 Materials NBR 70/
steel DIN EN 10270-1 ■ ■ Page 186



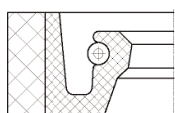
WBD Rotary shaft seal Temp. -40 +100 Speed 6 Materials NBR 70/
steel DIN EN 10270-1 Dimensions Page 186



WCP21 Rotary shaft seal Temp. -90 +250 Speed 40 Materials PTFE/glass fibre/MOS2
steel DIN 1.4404 ■ ■ Page 190



WCL Rotary shaft seal Temp. -40 +100 -30 +200 Speed 12/15 Materials NBR 75/FPM 75/
steel DIN 1.4404 ■ ■ Page 194

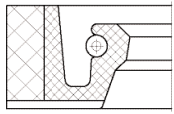


WE5 Rotary shaft seal Temp. -30 +100 -20 +200 Speed 20/25 Materials NBR 80/FPM 80/
fabric/steel 1.4301 ■ ■ Page 202

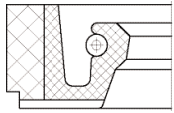


**Overview
Rotary
shaft seals**

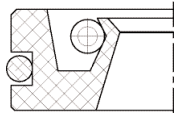
Profile



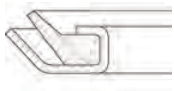
WE6 Rotary shaft seal Temp. -30 +100 / -20 +180 Speed 20/25 Materials NBR 80/FPM 80/fabric/steel 1.4301 Dimensions metr. inch Page 202



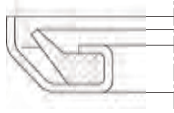
WE7 Rotary shaft seal Temp. -30 +100 / -20 +180 Speed 20/25 Materials NBR 80/FPM 80/fabric/steel 1.4301 Dimensions metr. inch Page 202



WEPO Rotary shaft seal Temp. -20 / +205 Speed 15 Materials PTFE/carbon/graphite/steel 1.4571 Dimensions metr. inch Page 212



VRM 01 Axial seal Temp. -40 +100 / -30 +180 Speed 12 Materials NBR 70/FPM 80 steel 1.0204 Dimensions metr. inch Page 218



VRM 02 Axial seal Temp. -40 +100 / -30 +180 Speed 12 Materials NBR 70/FPM 80 steel 1.0204 Dimensions metr. inch Page 218

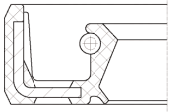
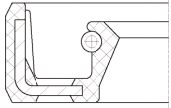


Special models Page 222



Cassette seals Page 223





WA/WAS

Rotary shaft seal in standard design according to DIN 3760 with an elastomer outer sheath covering a metal insert as well as a spring-energised sealing lip. In addition, the standard design is available with a protective lip (WAS) on the air side.

Standard materials

NBR 70

Colour: black

Energised spring: non-alloy spring steel according to DIN EN 10270-1

Metal insert: non-alloy steel according to DIN EN 10139

Areas of application

Sealing of rotating machine elements such as shafts, hubs and axles.

Function

The WA/WAS is a single action rotary shaft seal for rotating or pivoting shafts with optional protective lip sealing action (WAS) on the side facing away from the medium, against dirt accumulation from the outside. The elastomer outer sheath provides good static sealing, good thermal expansion balance e.g. in light-metal housings, better sealing with greater roughness and secure sealing for split housings as well as good static sealing with thin fluid or gaseous media.

Media

Good chemical resistance to many mineral oils and greases. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): $\leq 0.05/0.5$

Temperature (°C): -40 to $+100$

Peripheral speed (m/s): ≤ 12

Please also refer to our rotational speed diagram on page 20 of this catalogue.

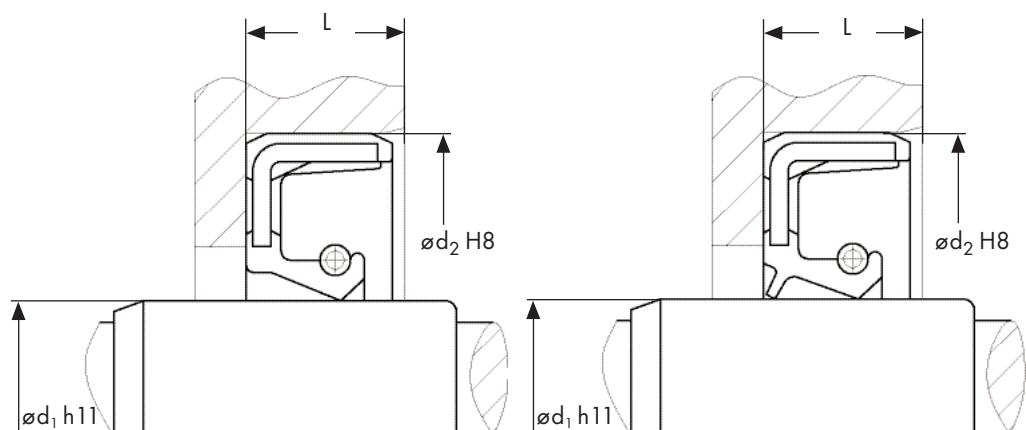
Installation

Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. double dust protection lip, spiral on the sealing lip, springs or metal cases made of other steel grades can be produced as well as all kinds of special designs. Minimum quantities may be obligatory for dimensions outside of the standard.



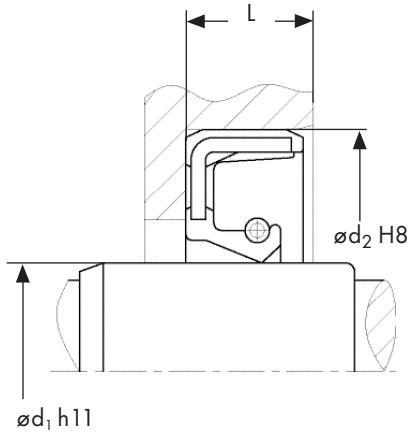
WA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
57025	4	11	6	34928	9	16	5
42406	4	12	6	16770	9	18	6
125600	4	16	6	16771	9	18	7
38808	4.8	22	7	36597	9	19	4
118986	5	13	7	38815	9	19	5
16758	5	15	6	62967	9	19	7
18651	5	15	7	18683	9	22	7
38432	5	16	6	16772	9	24	7
38809	5	16	7	18597	9	26	7
34771	5	18	7	60312	9	30	7
81892	6	13	4.5	62934	9.5	19	6.3
38433	6	14	6	90027	9.5	25.4	8
19683	6	14.1	4	26384	9.8	20	5
18652	6	15	4	57029	10	15	6
18653	6	15	6	16773	10	16	4
18654	6	16	5	18598	10	16	5
18658	6	16	6	43576	10	16.5	4
18655	6	16	7	150905	10	17	5
19391	6	17	6	84522	10	17	6
35748	6	18	5	18600	10	18	4
35749	6	18	6	18601	10	18	5
35750	6	18	7	16774	10	18	6
59318	6	19	6	26385	10	18	9
16759	6	19	7	39280	10	19	4
16760	6	22	7	18605	10	19	6.5
18656	6	22	8	16776	10	19	7
144398	6	26	7	39272	10	19	8
18657	7	14	5	28395	10	20	4
78430	7	15	5	39273	10	20	5
16761	7	16	7	16777	10	20	6
38810	7	18	7	27032	10	20	7
56582	7	19	6	18608	10	21	5
16762	7	22	7	16778	10	22	6
16763	7	22	8	16779	10	22	7
38811	8	14	4	16780	10	22	8
38812	8	15	5	16781	10	24	7
39266	8	15	7	39275	10	24	10
38813	8	15	8	39276	10	25	6
118719	8	16	4	37432	10	25	8
18659	8	16	6	16782	10	26	7
16764	8	16	7	16783	10	28	7
16765	8	18	5	16784	10	30	7
18660	8	18	6	38816	10	30	8
39265	8	18	7	39279	10	30	10
57027	8	20	5	18612	11	17	4
130629	8	20	7	130833	11	18	4
36216	8	20	8	80661	11	19	5
16766	8	22	6	127624	11	19	7
16767	8	22	7	39281	11	21.5	5
18595	8	22	8	16785	11	22	7
38814	8	22	10	18569	11	22	8
16768	8	24	7	39282	11	23	8
16769	8	30	7	16786	11	26	6
39267	8.5	18	8	18684	11	26	7
73093	9	16	4	26251	11	30	7

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
39283	11	30	8	83438	12.5	20	6
81900	11	30	10	39293	12.5	20.5	5
18571	12	18	4.5	38826	12.5	22	5
38817	12	18	5	56979	12.7	26	6
36471	12	19	4	69633	13	19	3
16787	12	19	5	74863	13	22	4
36470	12	20	4	16807	13	22	5
16788	12	20	5	18556	13	22	6
57035	12	20	7	60309	13	24	7
18573	12	21	4	38827	13	25	4
18574	12	21	5	38828	13	25	5
18575	12	22	4	16808	13	25	7
35427	12	22	4.5	18558	13	26	5
18577	12	22	5	16809	13	26	7
16789	12	22	6	44219	13	26	9
18578	12	22	6.5	35009	13	28	7
16791	12	22	7	39297	13	30	5
16794	12	22	8	18560	13	30	7
57037	12	24	4.5	16811	13	30	8
16795	12	24	6	16812	13	30	10
18583	12	24	6.5	38829	13	32	6
16796	12	24	7	18562	13	32	7
38818	12	24	7.5	22354	13	35	10
16798	12	24	8	39322	13.5	32	5
44237	12	24	10	38830	13.7	22	5
16757	12	24.5	5.5	19599	13.7	24	5
18585	12	25	4.5	39298	13.8	26	7
18587	12	25	5	89767	14	20	5
39288	12	25	6	38831	14	21	4
37095	12	25	7	16813	14	22	4
16799	12	25	8	18564	14	22	5
79069	12	26	6	18566	14	22	7
19484	12	26	6.5	18567	14	23	6
16800	12	26	7	18527	14	24	5
16801	12	26	8	18524	14	24	6
38819	12	28	5	16814	14	24	7
16802	12	28	7	39324	14	24	8
38824	12	28	8	35044	14	25	5
75964	12	30	5	38832	14	25	6
18546	12	30	6	16815	14	25	7
18547	12	30	7	75840	14	25	8
16805	12	30	10	18529	14	26	7
38301	12	32	5	60308	14	28	6
16806	12	32	7	16816	14	28	7
18552	12	32	10	39329	14	28.5	10
64559	12	35	4.3	16817	14	30	7
43605	12	35	7	16818	14	30	8
18553	12	35	10	18535	14	30	10
38825	12	37	10	18536	14	32	5
127438	12	38	10	38833	14	32	7
82987	12	45	7	38834	14	32	10
44234	12	52	7	38835	14	34	7
39289	12.3	32	5	16819	14	35	4.5
83437	12.5	19	5	16820	14	35	7
76323	12.5	20	5	16821	14	35	8

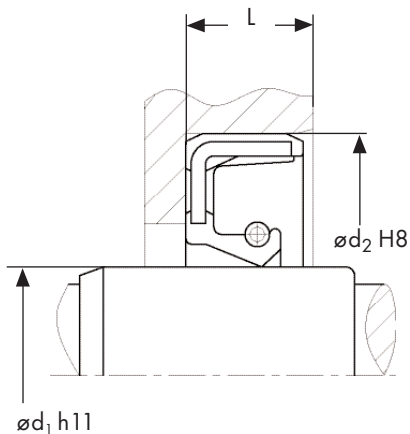
WA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
38866	14.8	30	5	64434	16	25	7
38867	14.8	30	7	18615	16	25.5	6
16823	15	21	4	39342	16	26	5
38868	15	21	4.4	39189	16	26	6
43690	15	21	5	18616	16	26	7
16824	15	22	7	39343	16	26	8
16825	15	24	5	39347	16	28	6
16826	15	24	7	16853	16	28	7
39336	15	24	9	126007	16	29	6.5
18688	15	25	5	39349	16	29	9.5
18540	15	25	6	18621	16	30	4.5
69749	15	25	7	16856	16	30	7
39337	15	25.5	5	44220	16	30	8
18543	15	25.5	7	16858	16	30	10
16829	15	26	4.5	39350	16	32	6
18544	15	26	6	16860	16	32	7
16830	15	26	7	39351	16	32	8
38304	15	26.5	4.6	38626	16	32	10
18501	15	27	7	37244	16	33	8
37433	15	28	4	19647	16	33	11
130821	15	28	6	18539	16	35	6
16832	15	28	7	18511	16	35	7
44235	15	28	8	38982	16	35	8
39338	15	28	10	16863	16	35	10
38434	15	30	4.5	39830	16	36	7
18504	15	30	5	44236	16	38	7
18506	15	30	5.5	39831	16	40	5
62966	15	30	6	39832	16	40	7
16833	15	30	7	16864	16	40	10
16837	15	30	8	39833	16	42	6
16838	15	30	10	19561	16.5	32	9
38875	15	32	5	38984	16.9	28	5
18503	15	32	5.5	16865	17	24	7
16840	15	32	7	18624	17	25	4
16842	15	32	8	38986	17	25	7
38877	15	32	9	18625	17	26	6
60306	15	32	10	18626	17	26	7
18510	15	33	7	18627	17	27	5
16843	15	35	5	16866	17	27	6
18689	15	35	7	16867	17	27	7
16845	15	35	8	18628	17	27	10
16846	15	35	10	16868	17	28	5
38882	15	37	7	16869	17	28	6
18514	15	37	10	16871	17	28	7
16847	15	40	10	38436	17	28	8
16848	15	42	7	19529	17	28.5	6
16849	15	42	10	18632	17	29	5
19601	15.3	22	7	18634	17	30	5
18492	15.6	25	7	18635	17	30	6
38435	16	22	4	16874	17	30	7
64656	16	22	7	16877	17	30	8
43694	16	22.2	4	16878	17	31	7
16850	16	24	5	18706	17	32	5
18520	16	24	6	16879	17	32	7
16852	16	24	7	16881	17	32	8

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
16882	17	32	10	39001	18	37	6
18710	17	33	8	18742	18	37	8
38992	17	34	4	18744	18	38	5
18711	17	34	7	16916	18	40	7
19594	17	34.5	4	16917	18	40	10
18712	17	35	5	16918	18	42	8
18713	17	35	6	26387	18	42	10
16886	17	35	7	39850	18	44	8
16888	17	35	8	18747	18	47	10
18568	17	35	9.5	39851	18.5	40	5
16890	17	35	10	130785	18.9	30	5
83440	17	37	4	19604	18.9	30	7
16892	17	37	7	18748	19	26	5.5
26386	17	37	8	16919	19	27	6
16893	17	37	10	39857	19	29	5
18719	17	38	7	39858	19	29	6.5
38995	17	38	8	83377	19	30	5
16894	17	38	11	40897	19	30	6
16895	17	40	6	39069	19	30	7
16896	17	40	7	18750	19	30	8
18721	17	40	8	39862	19	30	10
16900	17	40	8.5	39071	19	32	5
16901	17	40	10	16920	19	32	6
39841	17	42	5	16921	19	32	7
69748	17	42	7	16922	19	32	10
16903	17	47	7	16923	19	34	6
38996	17	47	8	56653	19	35	7
18725	17	47	10	18752	19	35	8
39842	17	47	11	16924	19	35	10
19603	17.5	20	6	39865	19	36	7
19672	17.5	28	6	18754	19	36	8
43705	17.8	26.2	3.5	44221	19	37	10
83015	18	24	5	39866	19	38	9.5
39845	18	25	5	26388	19	38	10
38998	18	26	6	127962	19	40	8
18674	18	27	5	16926	19	40	10
38999	18	28	4	39868	19	44.5	8
18728	18	28	5	56484	19	47	10
18729	18	28	6	19843	19	53	7.5
16904	18	28	7	19547	19.3	30	4.7
83441	18	30	5	39870	19.5	28	6
39847	18	30	6	19605	19.6	33	9
16905	18	30	7	26389	20	26	10
60302	18	30	10	69238	20	28	4.5
130846	18	32	4.7	39874	20	28	5
19652	18	32	6	18757	20	28	6
18737	18	32	7	18758	20	28	7
16908	18	32	8	18759	20	30	4.5
18739	18	32	10	72730	20	30	4.6
39849	18	35	5	16928	20	30	5
27036	18	35	6	18761	20	30	6
16910	18	35	7	16929	20	30	7
16912	18	35	8	44242	20	30	8
16914	18	35	10	39877	20	30	9
39000	18	36	7	18763	20	31	7

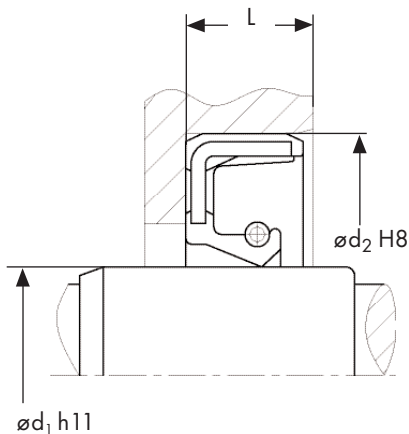
WA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
18765	20	32	5	16974	20	52	10
39881	20	32	6	27677	20	52	12
16932	20	32	7	40517	20	57	8
39089	20	33	8	40660	20	60	10
16935	20	33	9	18811	20	62	6.5
18768	20	33	10	44544	20	72	5
18769	20	34	6	43740	20	72	10
18770	20	34	7	16977	21	30	6.5
18773	20	35	5	18813	21	32	5
130832	20	35	5.3	16978	21	32	7
18774	20	35	5.5	18815	21	35	6
16936	20	35	6	16979	21	35	7
16937	20	35	7	39120	21	35	8
18776	20	35	8	26390	21	35	10
16940	20	35	10	18818	21	37	7
16942	20	35	12	40523	21	40	5
40510	20	35.5	10	18820	21	40	10
36567	20	36	5	19797	21	48	8
36500	20	36	6	39121	21	52	8
18781	20	36	7	40521	21.3	32	5
39106	20	37	7	38561	22	30	7
16943	20	37	8	26391	22	30	10
18784	20	37	10	18822	22	31	5
18786	20	38	5	40526	22	31.8	5
39107	20	38	6	26488	22	32	4
16944	20	38	7	18823	22	32	5
18788	20	38	8	16980	22	32	5.5
40511	20	38	9	16981	22	32	7
18792	20	40	5	44243	22	32	10
16948	20	40	6	20236	22	33	7
16949	20	40	7	39122	22	34	7
16953	20	40	8.5	18528	22	35	5.5
18793	20	40	9	39123	22	35	5.6
16954	20	40	10	18828	22	35	6
40513	20	40	11	16844	22	35	6.5
18830	20	40.2	6	16983	22	35	7
40514	20	41	8	16985	22	35	8
39110	20	41.2	6	16986	22	35	10
16958	20	42	7	39124	22	36	6
16960	20	42	10	18836	22	36	7
16963	20	43	7.5	16989	22	37	7
16964	20	45	10	39127	22	38	6
18799	20	45	12	16991	22	38	7
39113	20	46	6	18839	22	38	8
16965	20	47	7	120661	22	40	6
16968	20	47	8	16992	22	40	7
18802	20	47	8.5	18842	22	40	8
18803	20	47	9	16994	22	40	8.5
60298	20	47	9.5	16995	22	40	10
16969	20	47	10	40531	22	42	5
135052	20	47.5	7	16998	22	42	7
19796	20	48	9	16999	22	42	10
83442	20	48.4	7	18847	22	42	11
18807	20	52	7	17001	22	45	7
18808	20	52	8	56821	22	45	8

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
39135	22	45	10	17037	25	36	10
18849	22	47	7	17038	25	37	5
17005	22	47	10	18887	25	37	6
39137	22	48	5	17039	25	37	7
19798	22	48	10	18890	25	37	8
135221	22	50	10	40609	25	38	5
18850	23	35	6	17041	25	38	7
17008	23	35	7	40610	25	38	8
39141	23	37	6	39168	25	38	10
39143	23	37	7	18893	25	39	9
17009	23	38	7	18894	25	40	5
17010	23	38	8	39372	25	40	6
18854	23	40	8	17044	25	40	7
17011	23	40	10	17047	25	40	8
38627	23	42	10	17049	25	40	10
19803	23	52	12	18902	25	40	11
40538	24	32	5	17054	25	42	6
18857	24	34	5.5	18905	25	42	6.5
18858	24	35	6	18906	25	42	7
17015	24	35	7	17057	25	42	8
18861	24	36	6	18908	25	42	8.5
43758	24	36	7	75827	25	42	9
17016	24	37	7	17059	25	42	10
156826	24	38	7	57054	25	42.9	9.5
18866	24	38.5	10	19787	25	43	9
40539	24	39	8	18911	25	44	7
17017	24	40	7	40687	25	44.5	10
38628	24	40	8	18898	25	45	7
17019	24	40	10	17063	25	45	10
17021	24	40	11	18913	25	45	11
40540	24	40	12	17066	25	46	7
39155	24	42	7	18915	25	47	6
17022	24	42	8	17068	25	47	7
18867	24	42	10	17071	25	47	8
40542	24	44	6	17074	25	47	10
18868	24	44	7	17079	25	48	8
17024	24	47	7	62885	25	50	7
17026	24	47	10	17080	25	50	10
39162	24	48	10	18921	25	50	12
39163	24	50	10	17082	25	51	11
61142	24	52	10	43762	25	52	5
19851	24	62	7	18922	25	52	6.4
43755	24.5	33	5	17083	25	52	7
56980	24.5	40	8.5	17086	25	52	8
19608	24.9	45	6.5	17089	25	52	10
18872	25	32	6	17093	25	52	12
18873	25	32	7	39385	25	52	15
18874	25	33	4	70355	25	54	7
18875	25	33	6	35579	25	55	10
17029	25	35	5	66361	25	58	10
17030	25	35	7	40694	25	60	7
17033	25	35	8	130795	25	62	5
18882	25	35	9	18929	25	62	7
17035	25	35	10	17096	25	62	8
17036	25	36	7	17097	25	62	10

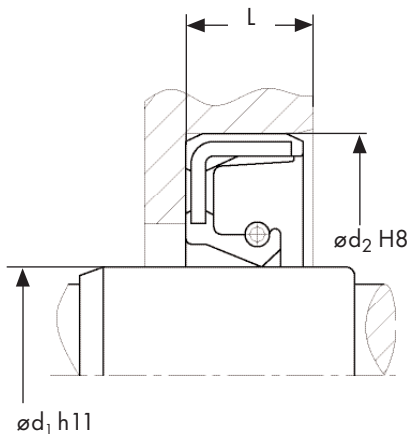
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
39389	25	72	7	17128	28	38	7
130788	26	35	5	18970	28	38	8
17101	26	35	7	17131	28	40	5
38437	26	36	7	17132	28	40	7
17104	26	37	7	17133	28	40	8
18934	26	37	10	68264	28	40	9
18935	26	38	5	17134	28	40	10
18937	26	38	7	17136	28	42	7
18941	26	40	6	17137	28	42	8
18942	26	40	7	18692	28	42	10
39392	26	40	9	18972	28	42.5	8
17105	26	42	6	38897	28	42.9	9.5
18944	26	42	7	38898	28	43	7
18945	26	42	8	19788	28	43	9
39395	26	42	10	17138	28	43	10
19718	26	42.7	10	19790	28	44	10
18950	26	45	7	38902	28	45	5
18953	26	47	5	18979	28	45	6
17107	26	47	7	64399	28	45	7
18691	26	47	10	17140	28	45	8
40695	26	48.5	11	17142	28	45	9
62965	26	50	10	38905	28	47	5
17108	26	52	8	17145	28	47	7
17110	26	52	10	18980	28	47	8
83443	26.5	47	7	17148	28	47	10
17111	27	35	4	26392	28	48	5
17112	27	35	7	60202	28	48	10
27479	27	35	7.5	18983	28	48	11
17113	27	37	7	18986	28	50	8
17114	27	38	6	38909	28	50	10
69710	27	38	7	68334	28	50	12
18960	27	40	6	38910	28	52	5
39200	27	40	7	18988	28	52	7
56918	27	40	10	17151	28	52	10
17116	27	41	10	17152	28	52	12
40702	27	41.2	8	19807	28	52.4	12.5
40703	27	41.2	9.5	40715	28	55	10
17117	27	42	7	83444	28	57	12
17118	27	42	10	18990	28	62	10
18962	27	43	9	19852	28	62	12
39404	27	45	7	40717	29	38	6
17121	27	45	8	18991	29	39	5
17122	27	47	6	83445	29	40	7
17123	27	47	8	18992	29	41	5
19795	27	47	9.8	18993	29	41	6
17124	27	47	10	17154	29	42	7
18967	27	50	10	38913	29	43	7
17125	27	52	8	18994	29	45	7
130638	27	53	7	17155	29	45	8
74986	27.8	38	7	38915	29	45	9
117567	28	35	5	19791	29	45	9.5
40698	28	37	8	38916	29	46	10
40712	28	38	5	17157	29	47	10
18969	28	38	5.5	17158	29	48	10
17127	28	38	6	17159	29	50	10

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
26393	29	50	12	17214	30	52	12
17160	29	52	9	17218	30	54	10
17161	29	55	9	19027	30	55	6
17162	29	62	10	17219	30	55	7
36387	30	36	5	17221	30	55	10
36154	30	37	4	17226	30	55	12
18995	30	40	5	38941	30	56	7
17163	30	40	7	19030	30	56	8
38917	30	40	8	17231	30	56	10
24206	30	40	9	44229	30	56	12
17166	30	40	10	19849	30	57	8
40721	30	41	6.3	17234	30	60	10
18997	30	42	4.5	38944	30	62	5
38366	30	42	5.7	40733	30	62	6.5
18998	30	42	6	17243	30	62	7
17167	30	42	7	17246	30	62	8
19000	30	42	8	17248	30	62	10
26154	30	42	10	17252	30	62	12
26394	30	42	12	38958	30	65	8
19003	30	43	8	19033	30	65	10
26395	30	44	7	38961	30	70	10
38924	30	44	8	17256	30	72	10
17170	30	44	10	19038	31	41	5
19007	30	45	5	40738	31	44.5	5
44857	30	45	5.5	40739	31	44.5	8
26396	30	45	6	17263	31	47	7
17171	30	45	7	17264	31	47	10
17173	30	45	8	17265	31	52	6
19008	30	45	10	17266	31	52	7
19793	30	45.2	10	60219	31	52	8
19010	30	46	5	17267	31	52	9
19013	30	46	8	17269	31	55	9
19014	30	46	10	19687	31.5	40	7
17179	30	47	5	38969	31.5	47	7
19015	30	47	6	64824	31.5	52	7
17180	30	47	7	40743	32	40	5
17183	30	47	8	78227	32	40	7
17185	30	47	10	59428	32	42	5
17190	30	48	8	38970	32	42	6
17191	30	48	10	17270	32	42	7
17192	30	49	9	40744	32	42	9
19799	30	49.5	10	40746	32	44	7
130784	30	50	5	40750	32	44.5	10
38438	30	50	7	17271	32	45	6
17194	30	50	8	17272	32	45	7
17195	30	50	10	19045	32	45	8
19019	30	50	11	17274	32	45	10
38934	30	50	12	40754	32	46	7
6225	30	52	4	68266	32	46	10
19021	30	52	5	17275	32	47	7
17204	30	52	6	17277	32	47	8
17205	30	52	7	17279	32	47	10
17207	30	52	8	39410	32	47.5	6
69917	30	52	8.5	19048	32	48	5
17209	30	52	10	17282	32	48	7

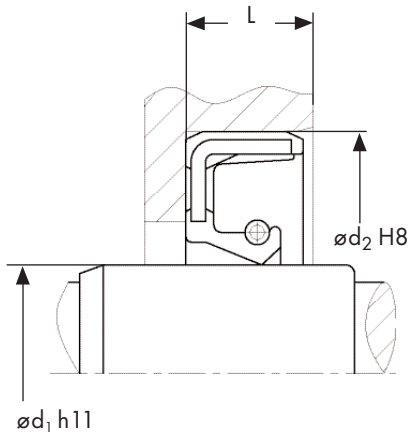
WA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
39412	32	48	8	17328	34	50	10
17284	32	48	9	19081	34	51	8
39413	32	48	10	17331	34	52	7.5
19711	32	50	7	17332	34	52	8
17285	32	50	8	17333	34	52	10
17286	32	50	10	17335	34	52	11
17288	32	50	12	115872	34	55	6
24235	32	51	8	17336	34	55	9
39416	32	51	9	17337	34	58	13
40758	32	51	9.5	17339	34	62	10
40757	32	51	19.5	19085	34	72	10
17290	32	52	5	143868	34.5	47	7
17291	32	52	7	68562	35	42	8
17293	32	52	7.5	76213	35	43	6
40617	32	52	8	40776	35	44.5	5
27029	32	52	9	40777	35	44.7	8
17295	32	52	10	65118	35	45	5
17298	32	52	12	40778	35	45	6
39417	32	54	8	17345	35	45	7
17301	32	55	10	21002	35	45	10
17305	32	56	10	40780	35	45	12
44238	32	56	12	19794	35	46	6.5
26397	32	57	12	38365	35	47	4.5
39421	32	57.15	7	19089	35	47	5
19056	32	62	6	17348	35	47	6
19057	32	62	8	17350	35	47	7
17312	32	62	10	39437	35	47	8
44239	32	62	12	17353	35	47	10
17319	32	66	10	40782	35	47.3	7
20673	32	70	8	40783	35	47.5	8
19789	33	43	7	24365	35	48	8
19065	33	45	7	17356	35	48	9
83415	33	47	11	40792	35	50	5
40766	33	47.5	7.5	17357	35	50	7
17320	33	48	12	17359	35	50	8
19067	33	50	6	17360	35	50	10
81231	33	50	7	39444	35	51	8
38629	33	50	8	17369	35	52	7
17322	33	50	10	17373	35	52	8
19070	33	52	6	19097	35	52	8.5
19804	33	52	8	17372	35	52	8.8
17324	33	52	10	27294	35	52	9
39428	33	55	10	17378	35	52	10
19848	33	56	12	19100	35	52	12
26398	34	44	6	156996	35	53	7
19071	34	44	7	83416	35	53	8
19072	34	45	7	19844	35	54	8
39430	34	46	8	19101	35	54	10
17326	34	46	10	39448	35	55	5
38630	34	47	9	127439	35	55	7
38631	34	47	12	17385	35	55	8
19076	34	48	7	17387	35	55	10
17327	34	48	8	40799	35	55	11
39431	34	49.3	9.5	19105	35	55	12
19080	34	50	8	38439	35	55.5	9

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
17393	35	56	8	17469	36	62	10
17394	35	56	10	17470	36	68	10
17398	35	56	12	19864	36	75	12
26399	35	57	10	69356	36	83	12
40802	35	58	7	19800	37	50	10
17403	35	58	7.5	83239	37	52	7
17404	35	58	10	39496	37	52	8
17406	35	58	12	60227	37	52	10
40803	35	59.5	12	74780	37	58	13
40804	35	60	5	17473	37	62	8
40805	35	60	8	39490	37	62	10
17410	35	60	10	17474	37	62	11
17413	35	60	12	35001	37	62	12
125750	35	62	5	19856	37	72	12
17416	35	62	7	19808	37.5	52.4	8
39456	35	62	8	124706	38	47	7
17421	35	62	10	39500	38	48	6
17425	35	62	12	40816	38	48	7
39458	35	64	8	17476	38	50	7
17430	35	65	9	19116	38	50	8
19110	35	65	10	24362	38	50	10
17433	35	65	12	27462	38	52	7
83417	35	67	7	17479	38	52	8
17436	35	68	6	39508	38	52	9
17437	35	68	10	17480	38	52	10
17438	35	68	12	39510	38	53	8
39464	35	72	7	38089	38	54	6.5
17444	35	72	10	17483	38	54	10
17448	35	72	12	17486	38	55	6
117038	35	80	8	19121	38	55	7
24343	35	80	10	27594	38	55	10
36617	35	80	12	19124	38	55	10.5
35187	35	80	13	40820	38	55	11
39470	35.7	63.3	9.3	19847	38	55.5	9
44222	35.8	68	10	56917	38	56	7
17455	36	47	7	17490	38	56	10
17456	36	48	10	81233	38	56	11
40808	36	48	12	39514	38	56	12
17457	36	50	7	26400	38	57	10
17458	36	50	10	40823	38	57.5	8
40813	36	52	5	39515	38	58	5
74061	36	52	6.5	37107	38	58	8
17459	36	52	7	44224	38	58	10
19113	36	54	6.5	19126	38	58	11
39058	36	54	7	40825	38	58.5	7
17461	36	54	7.5	17494	38	60	10
44223	36	54	10	19128	38	60	12
151456	36	55	8	19129	38	62	7
39486	36	56	6	19130	38	62	8
17463	36	56	10	19131	38	62	9
40814	36	58	9	17496	38	62	10
18693	36	58	10	19728	38	62	11.5
17465	36	58	12	17499	38	62	12
17467	36	59	9.5	26401	38	64	12
17468	36	62	7	39528	38	65	8

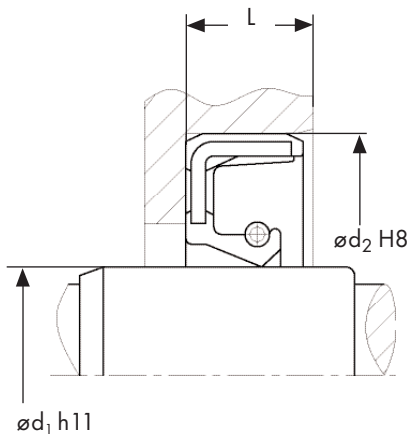
WA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
81236	38	65	9	17559	40	62	12
17501	38	65	10	118562	40	62	14
44240	38	70	12	40842	40	63	6
17506	38	72	10	38440	40	63	10
39533	38	72	12	37310	40	63.6	12.7
19858	38	74	10	24366	40	65	9
40828	38	75	5	17563	40	65	10
72816	38	80	10	17567	40	65	12
39535	38	80	12	26938	40	68	6
19132	39	51	7.5	39567	40	68	7
39540	39	52	8	83420	40	68	8
56708	39	55.9	9	17573	40	68	10
17511	39	65	9	17575	40	68	11
39543	39.7	61.9	8	19166	40	68	12
36838	39.7	80.4	15	27033	40	70	8
40831	40	50	5	17577	40	70	10
19134	40	50	7	26403	40	70	12
17512	40	50	8	17581	40	72	7
40832	40	50	9	17585	40	72	10
40834	40	51	5.5	19169	40	72	12
24361	40	52	5	38632	40	75	7
17513	40	52	6	24192	40	78	10
17514	40	52	7	27979	40	80	7
19139	40	52	8	19170	40	80	8
39547	40	52	8.5	17590	40	80	10
17518	40	52	10	27389	40	80	12
17519	40	53	8.5	17597	40	80	13
35615	40	54	7	19171	40	85	10
39552	40	55	6.5	69820	40	90	8
17520	40	55	7	36995	40	90	10
17523	40	55	8	39593	40	90	12
17527	40	55	10	72975	40	110	12
39554	40	55	12	81139	41	52	8
27031	40	56	7	19172	41	55	8.5
17531	40	56	8	19174	41	56	7
19146	40	56	9	19175	41	56	7.4
17533	40	56	10	19176	41	56	8
17536	40	56	12	17602	41	56	10
44225	40	57.15	10	40847	41	63	6
26402	40	58	7	40848	41	63.5	10
19148	40	58	8	19801	42	50	7
19150	40	58	9	60217	42	50	10
19151	40	58	10	88988	42	52	5
17541	40	58	12	39198	42	52	8
17545	40	60	7	39601	42	52.5	7
19153	40	60	8	17604	42	55	7
17546	40	60	10	17606	42	55	8
44246	40	60	12	40850	42	55	9
40838	40	61	10	19185	42	55	10
40769	40	62	5	39606	42	56	5
40840	40	62	6.5	19188	42	56	6
17550	40	62	7	17607	42	56	7
44268	40	62	8	39203	42	57	7
17553	40	62	10	75064	42	58	7
17558	40	62	11.5	72520	42	58	8

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
17611	42	58	10	39631	44	100	12
17613	42	58	12	19609	44.5	62	10
40853	42	58.5	10	19231	44.5	62	11.5
40854	42	60	7	65119	45	50	5
19198	42	60	8	19232	45	52	8
19199	42	60	9	38441	45	55	7
17614	42	60	10	19233	45	55	8
40855	42	60	12	39634	45	55	10
134080	42	62	6.5	39635	45	56	6
21584	42	62	7	7353	45	56	7
19203	42	62	8	19235	45	57	7
17621	42	62	10	39638	45	57	7.5
17624	42	62	12	17657	45	58	7
19205	42	64	7	19237	45	58	8
19206	42	65	8	26406	45	59	8
17627	42	65	10	39641	45	60	6.5
17630	42	65	12	17658	45	60	7
44230	42	68	11	17660	45	60	8
17634	42	68	11.5	17662	45	60	10
39613	42	70	8	26407	45	60	12
19208	42	70	10	40878	45	61	9
17637	42	70	12	126993	45	61	12
19210	42	72	8	17668	45	62	7
17638	42	72	10	17670	45	62	8
39616	42	72	12	19244	45	62	9
17643	42	80	10	17671	45	62	10
19822	42	81	13	17676	45	62	12
19213	43	53	5	40880	45	64	9.5
40857	43	54	7.5	39647	45	65	6
19214	43	55	7	35297	45	65	7
40858	43	59	5	17680	45	65	8
72615	43	60	10	44460	45	65	9
17646	43	62	10	17681	45	65	10
60210	43	65	8	17685	45	65	12
17647	43	65	13	56350	45	66	6
17648	43	66	10	39649	45	66	9
17649	43	66	12	17689	45	66	10
38633	43	75	10	25919	45	68	8
17650	43	80	10	17690	45	68	10
26404	44	52	10	40883	45	68	10.8
19845	44	54	4.5	19249	45	68	12
39629	44	54	7.5	39652	45	68	12.5
26405	44	55	7	19855	45	68.2	12
40865	44	58.5	10	72739	45	69.1	12
19218	44	60	9	20250	45	70	10
17651	44	60	10	17697	45	70	12
40868	44	62	8	26408	45	70	14
19225	44	62	10	47274	45	72	7
40869	44	63.5	11	18694	45	72	8
17654	44	65	10	17702	45	72	9
40872	44	66	13	17703	45	72	10
62968	44	70	10	17706	45	72	12
17655	44	72	10	26563	45	75	6
17656	44	73	12	38442	45	75	8
81250	44	78	12	17711	45	75	10

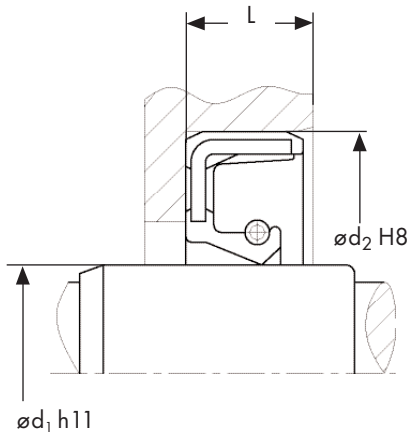
WA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
19257	45	78	13	17758	48	90	10
17716	45	80	10	17759	48	90	12
17719	45	80	13	21578	49	65	10
17721	45	85	10	40932	49	68	7
27678	45	85	13	36203	49	68	12
19259	45	90	10	19735	49	70	9.5
47276	45	100	10	83421	49.5	60	8
26409	46	62	9	40934	50	58	4.5
17726	46	64	8	19292	50	59	4
16460	46	72	10	40936	50	60	7
26410	46	78	10	38751	50	60	8
39667	46.2	80	10	60361	50	60	10
56982	47	58	6	17761	50	62	7
19263	47	58	7	39696	50	62	8
39668	47	62	6	19293	50	62	10
19264	47	62	8	19294	50	64	10
19265	47	65	8	64230	50	65	7
40891	47	65	9	17764	50	65	8
17727	47	65	10	17767	50	65	10
17728	47	67	12	27679	50	65	12
40892	47	68	6	44094	50	66	7.93
17729	47	72	9	38752	50	66	8
44247	47	72	10	17772	50	66	10
57132	48	55	4	19298	50	67	9
44226	48	58	4	17773	50	68	8
124704	48	60	6	83393	50	68	9
81253	48	62	7	17774	50	68	10
17730	48	62	8	19300	50	68	11
17731	48	62	10	17776	50	68	12
69323	48	62	12	19301	50	68	14
81254	48	63	11	24363	50	70	8
27034	48	65	8	39702	50	70	9
17733	48	65	10	17779	50	70	10
19274	48	65	12	17782	50	70	12
40895	48	66.8	9.8	40940	50	72	6
19278	48	68	10	17785	50	72	8
17740	48	68	12	17786	50	72	10
19280	48	70	8	17789	50	72	12
83397	48	70	9	40941	50	72	14
17742	48	70	10	40944	50	74	9
19282	48	70	12	39708	50	75	10
17744	48	72	7	17793	50	75	12
19285	48	72	8	60359	50	75	13
19286	48	72	9	39709	50	76	10
17746	48	72	10	39713	50	78	10
17748	48	72	12	19311	50	78	12
19734	48	72.5	10	17795	50	80	8
19860	48	74	10	17796	50	80	10
44107	48	75	8	19314	50	80	12
19290	48	80	8	17801	50	80	13
17751	48	80	10	19317	50	80	14
17753	48	80	13	19319	50	85	8
17755	48	85	6	27536	50	85	10
17756	48	85	10	17806	50	85	12
17757	48	85	13	17808	50	85	13

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
17810	50	90	10	64231	55	70	7
17815	50	90	13	17864	55	70	8
36797	50	95	7	19348	55	70	9
127704	50	100	10	17867	55	70	10
69397	50	110	10.5	37269	55	72	7
47348	50	110	12	17871	55	72	8
18789	51	72	10	17872	55	72	10
39059	52	60	8	38563	55	72	12
126852	52	62	7	26411	55	72	13
19321	52	65	8	40969	55	72.5	9
39724	52	65	9	19352	55	75	8
17817	52	68	7	17878	55	75	10
19324	52	68	8	17880	55	75	12
40951	52	68	9	19355	55	78	8
39726	52	68	10	39756	55	78	9
44227	52	68	13	17885	55	78	10
17822	52	69	10	19356	55	78	12
39731	52	70	10	83422	55	80	5
17825	52	72	8	83423	55	80	6
17826	52	72	10	17887	55	80	8
17828	52	72	12	17888	55	80	10
39735	52	75	10	17893	55	80	12
17831	52	75	12	17896	55	80	13
31244	52	76	13	17900	55	85	8
19865	52	76.2	10	17902	55	85	10
44248	52	78	13	144060	55	85	12
19331	52	80	8	17905	55	85	13
17833	52	80	10	17907	55	85	16
17837	52	80	13	44270	55	88	10
19333	52	85	8	83424	55	90	8
17839	52	85	10	17908	55	90	10
40955	53	65	10	35576	55	90	12
17844	53	68	10	17910	55	90	13
60354	53	68	13	39199	55	100	10
47548	53	79	10	26356	55	100	12
19821	53	80	10	83425	55	100	13
19854	54	68	10.5	17914	55	100	16
18695	54	70	10	37203	56	69	10
19337	54	72	5	19360	56	70	8
39741	54	72	8	17915	56	72	8
17846	54	72	10	26412	56	72	9
39743	54	72.5	9	17917	56	72	10
17851	54	74	8	17918	56	76	11
40962	54	75	12	19362	56	80	8
19343	54	76	12	19364	56	85	8
17852	54	76	12.5	19365	56	85	13
25920	54	78	12	17919	56	88	10
39745	54	80	8	17920	56	88	13
17859	54	82	11	56290	56	90	10
17861	54	85	15	38753	56	100	10
20674	54	90	13	40983	57	67.5	6
44797	55	65	8	40984	57	72	10
40965	55	65.7	7.1	39774	57	75	10
18696	55	68	8	19368	57	75	12
40967	55	68.5	7.5	40985	57	76	12.5

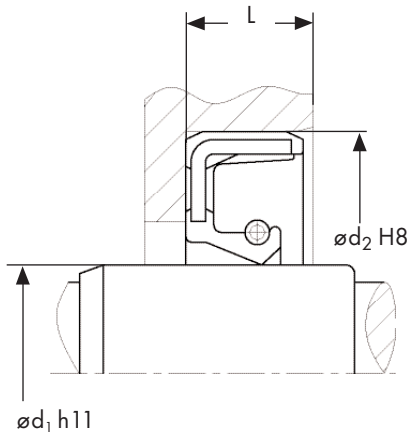
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
40986	57	78	12	39791	60	82	9
115754	57	80	12	19400	60	82	12
40987	57	80	13	17959	60	85	8
49503	57	82.7	10	17961	60	85	10
39776	57	85	10	19401	60	85	12
17923	57	85	13	19402	60	85	13
69272	57	87	15	17965	60	89	11
19370	57	90	13	17966	60	90	8
26413	57	95	10	17968	60	90	10
73091	58	70	6	17972	60	90	13
40993	58	72	7	19406	60	92	11
17926	58	72	8	44250	60	93	13
19372	58	72	9	89800	60	95	8
40991	58	75	5	17976	60	95	10
19375	58	75	9	17979	60	100	10
40992	58	75	10	17981	60	100	13
127856	58	75	11	17983	60	110	12
26414	58	75	12	19586	60	110	13
134628	58	76	7	133549	60	120	12
26415	58	76	9	44545	60	130	15
17259	58	78	13	41007	60.5	78	9
120839	58	80	5	17984	61	80	13
17930	58	80	8	41008	61	82.5	13
17931	58	80	10	19410	62	80	10
19381	58	80	12	17988	62	80	12
44231	58	80	13	81258	62	82	10
17934	58	85	10	130159	62	85	8
19385	58	85	12	41011	62	85	9.5
17937	58	85	13	17990	62	85	10
19823	58	86	14	24440	62	85	12
17939	58	90	10	17994	62	85	13
19386	58	90	11	17996	62	90	10
44249	58	90	13	17999	62	90	11
24442	59	80	10	19412	62	90	13
19389	59	85	8	39816	62	95	10
38443	60	70	7	18001	62	100	10
19390	60	72	8	18002	62	100	12
39782	60	72	8.5	72953	62	111	7.5
19862	60	74	10	150445	63	80	8
64232	60	75	7	19415	63	85	10
17942	60	75	8	39819	63	85	12
19392	60	75	9	44251	63	85	13
44232	60	75	10	18005	63	88	10
17944	60	75	12	19417	63	90	10
39785	60	76	10	18006	63	100	13
40999	60	78	7	41016	63	110	12
19394	60	78	9	18007	63	110	13
39788	60	78	10	43962	64	80	7
40898	60	78	13	18009	64	80	8
69612	60	80	7	18012	64	85	10
17947	60	80	8	44323	64	85	12
19397	60	80	9	18013	64	85	13
17949	60	80	10	18016	65	80	8
17953	60	80	12	18018	65	80	10
17956	60	80	13	18021	65	80	12

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
18008	63.5	90	13	41039	70	90	7
44252	65	80	13	18072	70	90	10
144061	65	82	10	18077	70	90	12
41023	65	82	12	19443	70	90	13
19419	65	85	8	19444	70	92	12
41026	65	85	9	18083	70	92	13
18025	65	85	10	41059	70	92	14
18029	65	85	12	19446	70	95	10
26434	65	85	13	19447	70	95	12
39901	65	86	9.52	18085	70	95	13
35107	65	88	12	41062	70	96	13
18034	65	90	10	41201	70	100	6
18037	65	90	12	60655	70	100	8
18040	65	90	13	18088	70	100	10
44228	65	92	12	18091	70	100	12
18043	65	92	13	18094	70	100	13
18044	65	95	10	41064	70	100	16
18047	65	95	13	18096	70	105	13
18049	65	95	16	19451	70	110	8
80809	65	100	8	65687	70	110	10
18050	65	100	10	18099	70	110	12
18053	65	100	12	19452	70	110	13
18055	65	100	13	39937	70	110	15
18057	65	110	10	18102	70	111	13
41030	65	110	13	18103	70	112	12
26416	65	115	15	19453	70	115	15
117913	65	120	10	83426	70	120	12
19429	65	120	12	18104	70	120	13
18058	65	125	12	35079	70	125	12
39898	66	86	9.52	18105	70	135	12
156163	66	90	10	48694	70	150	12
19430	66	100	11	41067	71	83	12
41031	67	80	6.7	38754	71	88	8
41032	68	79.3	7	18106	72	85	8
36572	68	82	10	20677	72	85	10
24367	68	85	8	19456	72	90	8
38303	68	85	10	38755	72	90	10
44512	68	85	13	19458	72	95	10
18060	68	90	10	24364	72	95	12
44253	68	90	12	18108	72	95	13
24368	68	90	13	18109	72	100	10
19437	68	95	10	18110	72	100	13
19438	68	95	12	38444	72	110	12
18063	68	95	13	39944	73	95	10
18064	68	100	10	35104	73.5	110	10
18065	68	100	13	73092	74	88	10
39915	69	90	10	19825	74	101.4	12
41034	70	80	6	18112	74	105	12
36962	70	81.5	6.5	57182	74	135	15
44370	70	83	5	18114	75	90	8
83613	70	85	6	18115	75	90	10
19441	70	85	7	48802	75	90	12
18066	70	85	8	41074	75	91.5	6
18069	70	85	10	41075	75	92	7
41037	70	86	8.5	69275	75	95	8

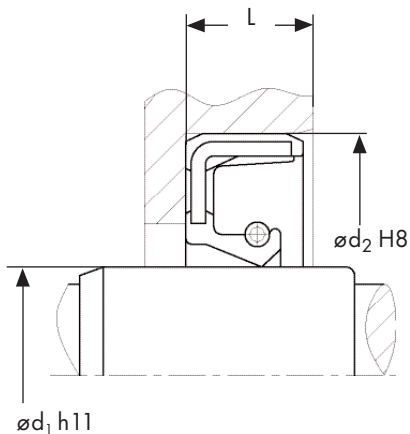
WA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
18118	75	95	10	19678	80	115	10
18121	75	95	12	18171	80	115	12
19462	75	95	13	144063	80	120	12
41076	75	95.5	11	18173	80	120	13
41078	75	100	7	18176	80	125	12
18124	75	100	10	39975	80	125	13
18129	75	100	12	18179	80	130	13
18132	75	100	13	18180	80	140	13
19824	75	101	12	19835	80	145	13
39953	75	102	12	19837	80	150.5	13
41082	75	105	12	19479	82	100	8
39955	75	105	13	18181	82	105	12
41083	75	105	15	19480	82	105	14
35509	75	110	10	18182	82	110	12
18137	75	110	12	89802	83	110	13
19468	75	110	13	41101	85	100	7
19827	75	112	12	44466	85	100	9
35523	75	115	9.52	39980	85	100	10
26272	75	115	10	19481	85	100	12
19469	75	115	12	56417	85	105	8
19828	75	115	16	19483	85	105	10
129757	75	120	8	27002	85	105	12
18140	75	120	12	18190	85	105	13
44381	75	125	12	36054	85	110	10
19470	75	130	12	18193	85	110	12
35526	75	130	13	18698	85	110	13
19832	75	135	13	41104	85	110	15
39961	76	102	12	18200	85	115	13
18141	76	105	13	19489	85	115	15
19472	76	120	12	116534	85	120	10
72773	77	95	10	19490	85	120	12
18142	77	100	10	18202	85	120	13
49549	78	90	8	19492	85	125	7
18143	78	95	11	18204	85	125	12
18144	78	100	10	18206	85	126	13
44233	78	100	13	117914	85	130	10
26417	78	105	13	19494	85	130	12
26418	78	105	15	35529	85	130	12.7
38756	78	110	12	83427	85	140	12
44254	78	110	13	74633	85	150	12
19836	78	150.5	13	35527	85	150	13
36770	80	95	8	19719	85	155	12
39965	80	95	10	69843	86	110	13
18145	80	100	10	18210	87	110	13
19473	80	100	12	61425	88	100	13
18152	80	100	13	83428	88	105	12
26419	80	100	14	18211	88	110	12
18155	80	105	10	18212	88	110	13
27605	80	105	12	150987	88	113	8
18156	80	105	13	41110	88	115	9
18159	80	110	10	18213	88	120	12
18163	80	110	12	150978	88	120	13
18166	80	110	13	26420	88	121.5	12
35575	80	110	14	18214	88	126	12
18170	80	113	12	18216	88	128	12

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
9493	88	140	12	18321	95	170.5	12
18217	88	140	13	19819	95	170.5	13
19838	88	150.5	13	19811	95	180.5	13
19839	88	150.5	15	52105	96	112	10
120840	89.7	105	6	19834	96	135.7	12
19496	90	110	8	18282	96	136	12
39989	90	110	10	41134	97	127	13
18222	90	110	12	18283	97	130	14
22355	90	110	13	19737	97	167	13
39990	90	110	15	18284	98	120	13
39991	90	115	8	34700	98	125	10
27457	90	115	9	18454	98	125	13
18231	90	115	10	18285	98	128	10
18232	90	115	13	19812	98	180.5	13
72646	90	120	10	18286	100	115	9
18234	90	120	12	18288	100	120	10
19501	90	120	13	19515	100	120	11
69273	90	120	14	18291	100	120	12
75829	90	120	15	19517	100	120	13
19503	90	125	13	40009	100	125	10
19831	90	125	14	18293	100	125	12
38445	90	130	12	19519	100	125	13
18243	90	130	13	27030	100	125	15
19833	90	135.7	13	18297	100	127	13
19504	90	140	13	93307	100	130	10
18246	90	155.2	12	18298	100	130	12
35316	90	160	12	18299	100	130	13
19592	90	167	14	83429	100	130	14
18247	91	136	12	36505	100	135	12
81260	92	110	12	36799	100	135	13
40000	92	120	12	19525	100	140	12
18699	92	120	13	18302	100	140	13
18249	92	120	14	117915	100	150	12
36372	95	110	9	18304	100	150	13
38446	95	110	10	37098	100	150	15
18254	95	110	12	52481	100	160	12
44255	95	110	13	40014	100	180	12
75826	95	115	8	35528	100	180	13
19509	95	115	11	19817	100	185	13
18259	95	115	13	26436	102	135	13
18264	95	120	12	40018	104	125	10
18267	95	120	13	52490	104	130	10
18270	95	125	12	19813	104	180.5	
18272	95	125	13	38802	105	120	10
41130	95	125	16	19526	105	125	10
18275	95	127	12	18308	105	125	13
37596	95	130	12	18311	105	130	12
18276	95	130	13	19530	105	130	13
26421	95	130	15	38447	105	130	15
40004	95	132	12	18315	105	135	13
18278	95	135	13	26422	105	135	14
18279	95	136	13	18316	105	140	12
59485	95	145	13	18318	105	140	13
18280	95	150	15	56611	105	140	16
18281	95	160	15	18323	105	145	16

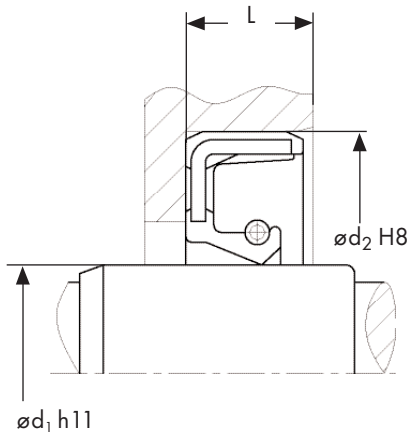
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
44798	105	150	15	26457	120	140	10
19809	105	170.5	12	44244	120	140	12
18324	107	150	15	18364	120	140	13
40023	108	130	12	44256	120	140	14
40024	108	130	13	19542	120	145	12
41151	108	133.5	13	18367	120	150	12
18325	108	145	15	18369	120	150	13
41153	110	125	12	19544	120	150	15
26423	110	125	13	19841	120	150.5	13
38448	110	130	8	18686	120	160	12
68272	110	130	10	18373	120	160	13
18327	110	130	12	44241	120	160	14
19535	110	130	13	18375	120	160	15
36246	110	130	14	26425	120	195	13
38449	110	130	14.5	18377	122	150	15
26424	110	135	12	38451	125	140	10
18331	110	135	13	38251	125	143	12
56984	110	140	10	69856	125	145	7.5
18333	110	140	12	18378	125	150	12
18335	110	140	13	26253	125	150	13
44991	110	140	14	61439	125	150	14
18340	110	145	13	18381	125	150	15
41165	110	145	14	38452	125	155	12
27035	110	145	15	18687	125	160	12
151982	110	150	12	44257	125	160	13
18341	110	150	13	18383	125	160	15
18343	110	150	15	19815	125	180.5	13
19840	110	150.5	14	40050	127	150	13
18344	110	155	15	19316	127	170	14
41166	110	159	14	18386	128	146	13.5
122137	110	160	8	27680	128	150	13
68273	110	160	10	18387	128	150	14
115893	110	160	12	52926	128	158	13
18345	110	160	15	20496	130	140	10
19818	110	200.5	13	38453	130	150	10
41168	112	125	9	133233	130	155	10
18346	112	140	13	18388	130	160	12
41169	114	127	9	22356	130	160	13
35888	114	140	13	65688	130	160	14
18348	115	130	12	18391	130	160	15
44854	115	130	13	40055	130	165	13
38450	115	140	10	44258	130	165	15
18350	115	140	12	18393	130	170	12
18353	115	140	13	22357	130	170	13
18357	115	145	13	44259	130	170	14
19539	115	145	14	18395	130	170	15
60195	115	145	15	19816	130	182	16
18358	115	150	12	40057	130	230	14
18359	115	150	13	83430	132.5	155.6	13
18362	115	160	15	22627	135	155	12
19810	115	170.5	13	22358	135	160	12
19814	115	180.5	13	18398	135	160	13
38025	115	190	15	69274	135	160	14
18685	118	140	13	18400	135	160	15
121537	118	150	15	18403	135	165	12

WA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
60183	135	165	15	57697	155	180	14
19550	135	170	12	44264	155	180	15
41397	135	170	15	26426	155	190	15
44748	135	170	18	44265	155	200	15
26383	135	180	15	41402	156	196	20
40062	135	190	14	18433	158	180	15
18404	135	190	15	41403	158	190	15
18405	135	192	16	68274	160	180	10
34837	138	160	15	44245	160	180	12
68275	140	160	10	38757	160	180	15
18406	140	160	13	18434	160	185	10
44260	140	160	15	18436	160	185	15
53093	140	165	12	18437	160	190	13
44261	140	165	15	65717	160	190	14
18410	140	170	12	18438	160	190	15
40065	140	170	13	40083	160	195	18
44262	140	170	14	18439	160	200	12
18413	140	170	15	19560	160	200	14
37263	140	170	18	18440	160	200	15
19553	140	180	12	69747	161	215	15
38454	140	180	13	36373	162	190	12
65689	140	180	14	18442	165	190	13
19554	140	180	15	41400	165	191	15
148662	140	190	15	41404	165	195	13
122138	140	215	8	127301	165	200	9
115783	140	215	12	26382	165	200	15
74410	143	175	16	121789	169	184	7
19152	144	160	12	25675	170	190	13
44092	145	160	10	81160	170	190	15
19239	145	165	13	18445	170	200	12
44263	145	165	15	72647	170	200	14
18418	145	170	15	18446	170	200	15
41398	145	175	12	10831	170	200	16
18420	145	175	15	60653	170	210	14
19556	145	180	12	40087	170	220	15
21585	145	180	13	68277	175	195	13
22359	145	180	14	54700	175	200	10
74657	145	185	15	18449	175	200	15
53969	146	163	7	21917	175	205	15
38455	148	170	14.5	21579	175	210	14
41512	150	162	9	43936	175	220	17
41399	150	164	16	43938	175	250	16
18422	150	168	12	43937	177	250	16
39234	150	168	13	18451	178	208	15
21586	150	170	12	68276	180	200	10
19764	150	170	13	22360	180	200	13
18424	150	170	15	34838	180	200	15
18425	150	180	12	57187	180	210	10
19665	150	180	13	18453	180	210	15
41401	150	180	14	22254	180	215	16
18428	150	180	15	19870	180	220	15
132876	150	190	15	44269	180	220	16
39999	150	200	15	18455	185	210	13
40078	155	174	12	64800	185	215	15
54384	155	175	12	83432	185	215	16

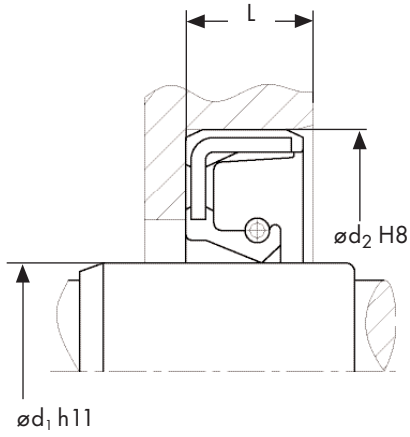
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
40094	190	220	12	18469	240	280	15
18457	190	220	15	76105	240	280	16
44266	190	220	16	44751	240	280	19
22255	190	225	12	126466	240	335	15
18459	190	225	15	116185	250	270	12
27682	190	225	16	18471	250	280	15
72641	190	230	15	19568	250	280	16
54887	192	210	10	34689	250	290	15
83373	195	215	15	10846	250	290	16
20227	195	230	16	55199	260	290	15
22256	195	230	17	18472	260	290	16
122009	195	235	15	125445	260	290	20
41405	198	230	12	72643	260	300	15
18461	200	225	15	20010	260	300	18
38456	200	230	13	25806	260	300	20
18462	200	230	15	38458	265	290	16
44267	200	230	16	118312	265	310	16
56694	200	235	16	90276	270	300	15
37650	200	235	18	72644	270	310	15
63209	200	240	15	156355	270	310	16
25906	200	250	15	64572	270	310	20
153719	200	310	18	135146	270	320	18
34839	205	230	15	44753	270	330	25
22259	205	230	16	65051	275	294	12
60265	205	250	16	21348	280	310	15
19566	210	240	15	41408	280	316	18
18465	210	250	15	72645	280	320	15
41406	210	250	16	44754	280	320	18
41407	210	265	25	21580	280	320	20
83433	210	290	20	44755	280	340	28
57290	212	245	16	76586	285	325	16
18690	215	240	12	75096	287	330	18
36247	215	240	15	26427	290	334	20
27683	215	250	16	27639	300	320	20
40098	220	245	8	152234	300	335	18
83434	220	250	12	56792	300	340	15
55973	220	250	14	17150	300	340	16
18466	220	250	15	18473	300	340	18
38758	220	250	16	35553	300	340	20
37649	220	255	16	44756	300	350	25
10861	220	255	18	83013	305	330	13
60268	220	260	15	82111	310	350	18
38457	220	260	16	44758	310	370	25
44749	220	260	22	42989	315	350	18
40099	225	250	15	40666	315	355	18
43956	230	250	15	61790	315	359	20
27684	230	255	15	42990	320	360	18
19567	230	260	15	25673	320	360	20
44750	230	269	22	44759	320	380	25
72642	230	270	15	69153	320	380	28
18468	230	280	15	41409	320	410	28
40646	230	280	16	24895	330	370	18
20230	240	270	15	69585	330	390	25
83435	240	275	16	152869	335	375	18
10876	240	275	18	148836	340	380	15

WA

Sizes
metric



Part No.	Dimensions in mm		
	ød ₁	ød ₂	L
20887	340	380	18
36509	340	380	20
57272	340	390	25
38459	350	390	18
76106	350	390	20
41417	350	410	28
56254	360	390	18
76178	360	400	16
56793	360	400	18
35406	360	400	20
20222	370	410	15
143786	380	400	10
37305	380	420	15
24746	380	420	18
38461	380	420	20
40101	380	424	20
83436	390	430	20
38462	394	420	16
76107	400	440	18
69573	400	440	20
83682	400	450	25
39233	420	460	20
43648	420	470	15
131224	420	470	25
37996	430	460	14
36709	440	480	20
149672	450	470	10
143685	450	490	20
38463	450	500	22
76108	450	500	25
69556	450	510	25
83721	460	500	20
82378	467	510	20
117306	470	520	22
38464	480	520	20
76110	480	530	25
56356	480	540	25
37583	485	535	22
20709	490	540	25
38465	500	540	20
37582	500	550	22
76109	500	550	25
20223	530	580	22
76014	550	600	25
126499	560	610	20
156277	565	600	20
20671	600	640	20
131223	600	650	25
37581	620	684	25
80861	660	700	20

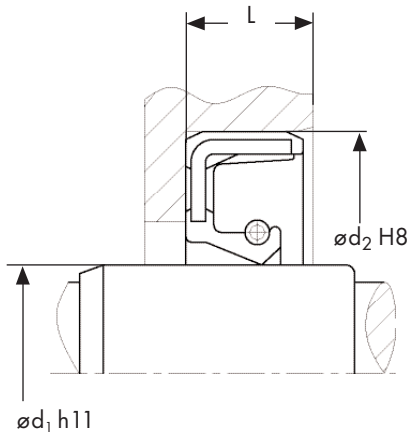
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**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
19997	6.35	19.05	6.35	0.25	0.75	0.25
59667	7.93	15.87	3.96	0.312	0.625	0.156
37883	7.93	17.46	7.93	0.312	0.687	0.312
19875	7.93	19.05	6.35	0.312	0.75	0.25
37268	7.93	19.05	7.93	0.312	0.75	0.312
20795	7.93	22.22	6.35	0.312	0.875	0.25
59668	8.05	22.22	6.35	0.317	0.875	0.25
19876	9.52	19.05	6.35	0.375	0.75	0.25
19998	9.52	22.22	6.35	0.375	0.875	0.25
19999	11.11	22.22	6.35	0.437	0.875	0.25
19991	11.11	25.4	6.35	0.437	1	0.25
59669	11.11	25.4	7.93	0.437	1	0.312
20000	11.11	28.57	9.52	0.437	1.125	0.375
83439	12.45	26.97	6.35	0.49	1.062	0.25
19877	12.7	22.22	6.35	0.5	0.875	0.25
20652	12.7	25.4	4.76	0.5	1	0.187
20001	12.7	25.4	6.35	0.5	1	0.25
19879	12.7	25.4	9.52	0.5	1	0.375
19881	12.7	28.57	6.35	0.5	1.125	0.25
19882	12.7	28.57	7.93	0.5	1.125	0.312
20002	12.7	28.57	9.52	0.5	1.125	0.375
20003	12.7	31.75	6.35	0.5	1.25	0.25
37930	12.7	31.75	9.52	0.5	1.25	0.375
20004	14.28	25.4	6.35	0.562	1	0.25
20005	14.28	28.57	6.35	0.562	1.125	0.25
19883	14.28	28.57	9.52	0.562	1.125	0.375
20242	14.28	34.92	7.93	0.562	1.375	0.312
19878	15.87	23.81	4.76	0.625	0.937	0.187
20006	15.87	25.4	4.76	0.625	1	0.187
19880	15.87	25.4	6.35	0.625	1	0.25
57047	15.87	28.55	4	0.625	1.124	0.157
19884	15.87	28.57	6.35	0.625	1.125	0.25
20007	15.87	28.57	7.93	0.625	1.125	0.312
20008	15.87	28.57	9.52	0.625	1.125	0.375
20009	15.87	31.75	6.35	0.625	1.25	0.25
19887	15.87	31.75	7.93	0.625	1.25	0.312
19888	15.87	31.75	9.52	0.625	1.25	0.375
19891	15.87	33.33	6.35	0.625	1.312	0.25
20011	15.87	34.92	6.35	0.625	1.375	0.25
19892	15.87	34.92	7.93	0.625	1.375	0.312
20012	15.87	34.92	9.52	0.625	1.375	0.375
20239	15.87	38.1	6.35	0.625	1.5	0.25
19900	15.87	38.1	9.52	0.625	1.5	0.375
59670	15.87	40.08	6.35	0.625	1.578	0.25
59671	16.51	38.1	6.35	0.65	1.5	0.25
20799	16.67	38.1	6.35	0.656	1.5	0.25
59672	16.67	40.08	6.35	0.656	1.578	0.25
19885	17.46	28.57	6.35	0.687	1.125	0.25
20013	17.46	31.75	6.35	0.687	1.25	0.25
20014	17.46	34.92	9.52	0.687	1.375	0.375
59673	17.53	27.94	6.85	0.69	1.1	0.27
59674	17.78	38.1	7.52	0.7	1.5	0.296
83277	19.05	25.4	4.76	0.75	1	0.187
21856	19.05	28.57	4.76	0.75	1.125	0.187
19886	19.05	28.57	6.35	0.75	1.125	0.25

WA

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
20015	19.05	30.16	6.35	0.75	1.187	0.25
21117	19.05	31.75	4.76	0.75	1.25	0.187
19889	19.05	31.75	6.35	0.75	1.25	0.25
19890	19.05	31.75	7.93	0.75	1.25	0.312
20016	19.05	31.75	9.52	0.75	1.25	0.375
20017	19.05	33.33	6.35	0.75	1.312	0.25
20018	19.05	33.33	7.93	0.75	1.312	0.312
19893	19.05	34.92	6.35	0.75	1.375	0.25
19894	19.05	34.92	7.93	0.75	1.375	0.312
20019	19.05	34.92	9.52	0.75	1.375	0.375
19903	19.05	38.1	6.35	0.75	1.5	0.25
20020	19.05	38.1	7.93	0.75	1.5	0.312
19901	19.05	38.1	9.52	0.75	1.5	0.375
20021	19.05	41.27	7.93	0.75	1.625	0.312
20022	19.05	41.27	9.52	0.75	1.625	0.375
20804	19.05	44.45	7.93	0.75	1.75	0.312
35307	19.05	57.15	12.7	0.75	2.25	0.5
59675	19.2	28.57	6.35	0.756	1.125	0.25
19867	19.84	31.75	6.35	0.781	1.25	0.25
20023	19.84	34.92	4.7	0.781	1.375	0.185
20024	19.84	38.1	7.9	0.781	1.5	0.311
21153	20.63	30.16	6.35	0.812	1.187	0.25
19895	20.63	34.92	6.35	0.812	1.375	0.25
19896	20.63	34.92	9.52	0.812	1.375	0.375
20244	20.63	38.1	6.35	0.812	1.5	0.25
20797	22.22	31.75	4.76	0.875	1.25	0.187
20240	22.22	31.75	6.35	0.875	1.25	0.25
20241	22.22	31.75	7.93	0.875	1.25	0.312
20243	22.22	34.92	4.76	0.875	1.375	0.187
20025	22.22	34.92	6.35	0.875	1.375	0.25
19897	22.22	34.92	7.93	0.875	1.375	0.312
19898	22.22	34.92	9.52	0.875	1.375	0.375
19902	22.22	38.1	6.35	0.875	1.5	0.25
20026	22.22	38.1	7.93	0.875	1.5	0.312
19904	22.22	38.1	9.52	0.875	1.5	0.375
19908	22.22	41.27	9.52	0.875	1.625	0.375
20805	22.22	44.45	9.52	0.875	1.75	0.375
20808	22.22	47.62	9.52	0.875	1.875	0.375
20812	22.22	50.8	9.52	0.875	2	0.375
43747	23.81	36.51	6.35	0.937	1.437	0.25
19905	23.81	38.1	9.52	0.937	1.5	0.375
20027	23.81	44.45	9.52	0.937	1.75	0.375
156934	24.5	47.62	6.35	0.965	1.875	0.25
60753	24.87	34.92	6.83	0.979	1.375	0.269
20798	25.4	34.92	4.76	1	1.375	0.187
19899	25.4	36.51	6.35	1	1.437	0.25
19906	25.4	38.1	6.35	1	1.5	0.25
20028	25.4	38.1	7.93	1	1.5	0.312
20029	25.4	38.1	9.52	1	1.5	0.375
20801	25.4	39.69	7.93	1	1.563	0.312
81358	25.4	41	5	1	1.614	0.197
20030	25.4	41.27	6.35	1	1.625	0.25
20031	25.4	41.27	7.93	1	1.625	0.312
20032	25.4	41.27	9.52	1	1.625	0.375
37597	25.4	44.45	5.95	1	1.75	0.234

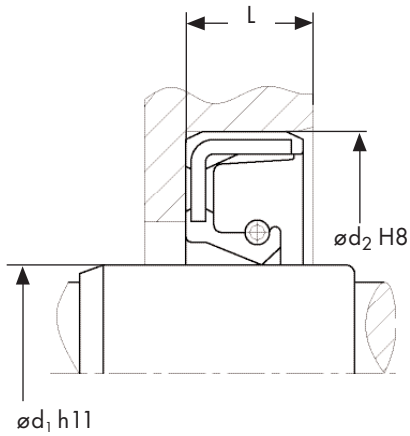
WA

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
19911	25.4	44.45	6.35	1	1.75	0.25
19912	25.4	44.45	9.52	1	1.75	0.375
19916	25.4	46.04	9.52	1	1.813	0.375
61828	25.4	46.43	11	1	1.828	0.433
20809	25.4	47.62	6.35	1	1.875	0.25
20033	25.4	47.62	9.52	1	1.875	0.375
20034	25.4	50.8	6.35	1	2	0.25
19921	25.4	50.8	9.52	1	2	0.375
19922	25.4	50.8	12.7	1	2	0.5
20035	25.4	52.38	9.52	1	2.062	0.375
20036	25.4	53.97	9.52	1	2.125	0.375
20037	25.4	57.15	9.52	1	2.25	0.375
20800	26.98	38.1	6.35	1.062	1.5	0.25
19909	26.98	41.27	7.93	1.062	1.625	0.312
20038	26.98	44.45	9.52	1.062	1.75	0.375
59676	26.98	47.62	9.52	1.062	1.875	0.375
59677	26.98	55.56	7.93	1.062	2.187	0.312
19907	28.57	38.1	6.35	1.125	1.5	0.25
57060	28.57	39.69	6.35	1.125	1.563	0.25
21668	28.57	39.69	9.52	1.125	1.563	0.375
19910	28.57	41.27	6.35	1.125	1.625	0.25
20039	28.57	41.27	7.93	1.125	1.625	0.312
20040	28.57	41.27	9.52	1.125	1.625	0.375
95606	28.57	44.45	5.33	1.125	1.75	0.21
20041	28.57	44.45	7.93	1.125	1.75	0.312
20042	28.57	44.45	9.52	1.125	1.75	0.375
19913	28.57	44.45	11.11	1.125	1.75	0.437
80695	28.57	45.24	7.14	1.125	1.781	0.281
80696	28.57	45.24	9.52	1.125	1.781	0.375
19917	28.57	47.62	6.35	1.125	1.875	0.25
19918	28.57	47.62	9.52	1.125	1.875	0.375
20043	28.57	50.8	9.52	1.125	2	0.375
20044	28.57	50.8	11.11	1.125	2	0.437
19923	28.57	50.8	12.7	1.125	2	0.5
20045	28.57	52.38	9.52	1.125	2.062	0.375
20046	28.57	53.97	9.52	1.125	2.125	0.375
20047	28.57	57.15	9.52	1.125	2.25	0.375
60207	28.57	57.4	9.52	1.125	2.26	0.375
59678	30.16	42.86	4.76	1.187	1.687	0.187
20048	30.16	42.86	9.52	1.187	1.687	0.375
19914	30.16	44.45	4.76	1.187	1.75	0.187
20806	30.16	44.45	6.35	1.187	1.75	0.25
59679	30.16	44.45	11.11	1.187	1.75	0.437
20810	30.16	47.62	7.93	1.187	1.875	0.312
59680	30.16	49.21	4.76	1.187	1.937	0.187
44853	30.16	49.21	6.35	1.187	1.937	0.25
20049	30.16	50.8	6.35	1.187	2	0.25
76152	30.16	50.8	7.93	1.187	2	0.312
19924	30.16	50.8	9.52	1.187	2	0.375
20050	30.16	52.38	6.35	1.187	2.062	0.25
37096	31.75	38.1	3.96	1.25	1.5	0.156
41492	31.75	39.69	6.35	1.25	1.563	0.25
20802	31.75	41.27	6.35	1.25	1.625	0.25
20803	31.75	42.86	9.52	1.25	1.687	0.375
20807	31.75	44.45	6.35	1.25	1.75	0.25

WA

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
19915	31.75	44.45	9.52	1.25	1.75	0.375
20228	31.75	44.45	9.92	1.25	1.75	0.391
37097	31.75	44.68	6.35	1.25	1.759	0.25
20051	31.75	47.62	6.35	1.25	1.875	0.25
20052	31.75	47.62	7.93	1.25	1.875	0.312
20053	31.75	47.62	9.52	1.25	1.875	0.375
20811	31.75	49.21	11.11	1.25	1.937	0.437
20054	31.75	50.8	6.35	1.25	2	0.25
20055	31.75	50.8	7.93	1.25	2	0.312
20056	31.75	50.8	9.52	1.25	2	0.375
59681	31.75	50.8	10.31	1.25	2	0.406
19925	31.75	50.8	12.7	1.25	2	0.5
20057	31.75	52.38	9.52	1.25	2.062	0.375
19931	31.75	53.97	7.93	1.25	2.125	0.312
20058	31.75	53.97	9.52	1.25	2.125	0.375
20813	31.75	55.56	11.11	1.25	2.187	0.437
19935	31.75	57.15	7.93	1.25	2.25	0.312
19936	31.75	57.15	9.52	1.25	2.25	0.375
20059	31.75	57.15	12.7	1.25	2.25	0.5
20060	31.75	60.32	9.52	1.25	2.375	0.375
20061	31.75	63.5	9.52	1.25	2.5	0.375
20840	31.75	69.85	9.52	1.25	2.75	0.375
40736	31.9	44.6	6.4	1.256	1.756	0.252
59682	33.33	46.99	6.35	1.312	1.85	0.25
59683	33.33	47.22	6.35	1.312	1.859	0.25
19919	33.33	47.62	7.93	1.312	1.875	0.312
69433	33.33	49.21	4.76	1.312	1.937	0.187
59684	33.33	53.97	9.52	1.312	2.125	0.375
66879	33.4	49.3	9.5	1.315	1.941	0.374
68260	33.85	63.5	12.7	1.333	2.5	0.5
130831	34.13	53.95	7.93	1.344	2.124	0.312
59685	34.92	47.62	3.17	1.375	1.875	0.125
20062	34.92	47.62	6.35	1.375	1.875	0.25
19920	34.92	47.62	7.93	1.375	1.875	0.312
19926	34.92	50.8	7.93	1.375	2	0.312
20063	34.92	50.8	9.52	1.375	2	0.375
20064	34.92	50.8	12.7	1.375	2	0.5
20245	34.92	52.38	6.35	1.375	2.062	0.25
20065	34.92	52.38	9.52	1.375	2.062	0.375
19928	34.92	52.38	12.7	1.375	2.062	0.5
19932	34.92	53.97	7.93	1.375	2.125	0.312
19992	34.92	53.97	9.52	1.375	2.125	0.375
60225	34.92	54.23	7.93	1.375	2.135	0.312
19937	34.92	57.15	9.52	1.375	2.25	0.375
19938	34.92	57.15	12.7	1.375	2.25	0.5
59695	34.92	58.73	11.11	1.375	2.312	0.437
20835	34.92	60.32	9.52	1.375	2.375	0.375
19988	34.92	60.32	12.7	1.375	2.375	0.5
20066	34.92	63.5	9.52	1.375	2.5	0.375
19946	34.92	63.5	12.7	1.375	2.5	0.5
20067	34.92	66.67	9.52	1.375	2.625	0.375
37598	34.92	69.85	9.52	1.375	2.75	0.375
21027	34.92	69.85	12.7	1.375	2.75	0.5
21025	36.51	53.97	6.35	1.437	2.125	0.25
20068	36.51	57.15	9.52	1.437	2.25	0.375

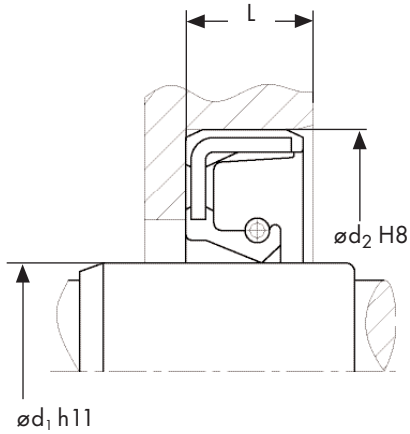
WA

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
37488	36.51	60.32	9.52	1.437	2.375	0.375
20069	36.51	63.5	12.7	1.437	2.5	0.5
20070	38.1	47.62	9.52	1.5	1.875	0.375
83418	38.1	50.29	12.7	1.5	1.98	0.5
59696	38.1	50.8	5.56	1.5	2	0.219
19927	38.1	50.8	6.35	1.5	2	0.25
20071	38.1	50.8	12.7	1.5	2	0.5
19929	38.1	52.38	6.35	1.5	2.062	0.25
19930	38.1	52.38	7.93	1.5	2.062	0.312
20072	38.1	52.38	9.52	1.5	2.062	0.375
20073	38.1	53.97	9.52	1.5	2.125	0.375
20074	38.1	55.56	7.93	1.5	2.187	0.312
19934	38.1	55.56	9.52	1.5	2.187	0.375
59697	38.1	57.15	6.35	1.5	2.25	0.25
20075	38.1	57.15	7.93	1.5	2.25	0.312
19939	38.1	57.15	9.52	1.5	2.25	0.375
19940	38.1	57.15	12.7	1.5	2.25	0.5
19993	38.1	60.32	9.52	1.5	2.375	0.375
59698	38.1	60.32	11.11	1.5	2.375	0.437
20076	38.1	60.32	12.7	1.5	2.375	0.5
20837	38.1	61.91	9.52	1.5	2.437	0.375
20077	38.1	63.5	6.35	1.5	2.5	0.25
19947	38.1	63.5	7.93	1.5	2.5	0.312
20078	38.1	63.5	9.52	1.5	2.5	0.375
37674	38.1	63.5	11.11	1.5	2.5	0.437
19948	38.1	63.5	12.7	1.5	2.5	0.5
39537	38.1	65.08	12	1.5	2.562	0.472
20079	38.1	66.67	12.7	1.5	2.625	0.5
60243	38.1	69.85	9.52	1.5	2.75	0.375
20841	38.1	69.85	12.7	1.5	2.75	0.5
35367	38.1	73.02	11.11	1.5	2.875	0.437
59702	39.68	52.38	4.76	1.562	2.062	0.187
44803	39.68	57.15	7.93	1.562	2.25	0.312
20814	39.68	57.15	9.52	1.562	2.25	0.375
59699	39.68	58.75	9.52	1.562	2.313	0.375
19943	39.68	60.32	9.52	1.562	2.375	0.375
24674	39.68	62.5	12.7	1.562	2.461	0.5
20080	39.68	63.5	7.93	1.562	2.5	0.312
59700	39.68	63.5	9.52	1.562	2.5	0.375
20081	39.68	66.67	9.52	1.562	2.625	0.375
36462	39.68	68.26	9.52	1.562	2.687	0.375
83419	40.08	50.85	4.1	1.578	2.002	0.161
59703	41.27	50.8	12.7	1.625	2	0.5
20082	41.27	53.97	6.35	1.625	2.125	0.25
20083	41.27	55.56	9.52	1.625	2.187	0.375
20084	41.27	57.15	9.52	1.625	2.25	0.375
19944	41.27	60.32	7.93	1.625	2.375	0.312
20085	41.27	60.32	9.52	1.625	2.375	0.375
20086	41.27	60.32	12.7	1.625	2.375	0.5
20246	41.27	61.91	12.7	1.625	2.437	0.5
20087	41.27	63.5	7.93	1.625	2.5	0.312
20088	41.27	63.5	9.52	1.625	2.5	0.375
19949	41.27	63.5	12.7	1.625	2.5	0.5
20838	41.27	65.08	9.52	1.625	2.562	0.375
20089	41.27	66.67	9.52	1.625	2.625	0.375

WA

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
20090	41.27	66.67	12.7	1.625	2.625	0.5
72954	41.27	68.26	12.7	1.625	2.687	0.5
20091	41.27	69.85	9.52	1.625	2.75	0.375
20092	41.27	69.85	12.7	1.625	2.75	0.5
35552	41.27	73.02	7.93	1.625	2.875	0.312
20842	41.27	73.02	12.7	1.625	2.875	0.5
21522	42.86	57.15	7.93	1.687	2.25	0.312
20093	42.86	63.5	9.52	1.687	2.5	0.375
19950	42.86	63.5	12.7	1.687	2.5	0.5
20247	42.86	68.26	12.7	1.687	2.687	0.5
35309	42.86	76.2	12.7	1.687	3	0.5
59704	43.26	61.11	9.52	1.703	2.406	0.375
19933	44.45	53.97	4.76	1.75	2.125	0.187
20094	44.45	57.15	7.93	1.75	2.25	0.312
19941	44.45	57.15	9.52	1.75	2.25	0.375
20095	44.45	57.15	12.7	1.75	2.25	0.5
19942	44.45	58.73	6.35	1.75	2.312	0.25
19945	44.45	60.32	7.93	1.75	2.375	0.312
20096	44.45	60.32	9.52	1.75	2.375	0.375
20097	44.45	60.32	12.7	1.75	2.375	0.5
20836	44.45	61.91	7.93	1.75	2.437	0.312
19951	44.45	63.5	7.93	1.75	2.5	0.312
19986	44.45	63.5	9.52	1.75	2.5	0.375
19952	44.45	63.5	12.7	1.75	2.5	0.5
74038	44.45	65.08	7.93	1.75	2.562	0.312
20098	44.45	66.67	9.52	1.75	2.625	0.375
20099	44.45	66.67	12.7	1.75	2.625	0.5
59705	44.45	68.26	11.11	1.75	2.687	0.437
35072	44.45	68.26	12.7	1.75	2.687	0.5
72738	44.45	69.1	12.7	1.75	2.72	0.5
19957	44.45	69.85	9.52	1.75	2.75	0.375
20100	44.45	69.85	12.7	1.75	2.75	0.5
20101	44.45	73.02	9.52	1.75	2.875	0.375
20102	44.45	73.02	12.7	1.75	2.875	0.5
20103	44.45	76.2	9.52	1.75	3	0.375
144614	44.45	80.77	12.7	1.75	3.18	0.5
20816	44.45	80.96	12.7	1.75	3.187	0.5
59706	45.64	65.23	10.59	1.797	2.568	0.417
19953	46.03	63.5	6.35	1.812	2.5	0.25
20104	46.03	63.5	9.52	1.812	2.5	0.375
20839	46.03	66.67	9.52	1.812	2.625	0.375
20105	46.03	69.85	12.7	1.812	2.75	0.5
56408	46.03	76.2	9.52	1.812	3	0.375
31011	46.8	61.3	4	1.843	2.413	0.157
39673	47.02	66.67	9.52	1.851	2.625	0.375
20106	47.62	60.32	6.35	1.875	2.375	0.25
20107	47.62	63.5	6.35	1.875	2.5	0.25
20108	47.62	63.5	7.93	1.875	2.5	0.312
20109	47.62	63.5	9.52	1.875	2.5	0.375
19954	47.62	63.5	12.7	1.875	2.5	0.5
19955	47.62	65.08	6.35	1.875	2.562	0.25
20110	47.62	66.67	9.52	1.875	2.625	0.375
20111	47.62	66.67	12.7	1.875	2.625	0.5
20112	47.62	69.85	9.52	1.875	2.75	0.375
19958	47.62	69.85	12.7	1.875	2.75	0.5

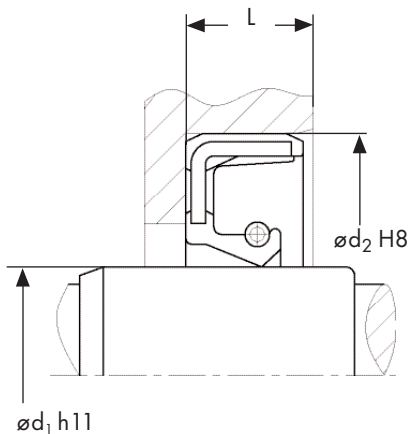
WA

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
20113	47.62	73.02	9.52	1.875	2.875	0.375
20114	47.62	73.02	12.7	1.875	2.875	0.5
20115	47.62	76.2	9.52	1.875	3	0.375
20116	47.62	76.2	12.7	1.875	3	0.5
19966	47.62	80.96	12.7	1.875	3.187	0.5
152498	47.62	82.6	11.5	1.875	3.252	0.453
20117	49.21	63.5	9.52	1.937	2.5	0.375
20118	49.21	69.85	9.52	1.937	2.75	0.375
59707	49.21	76.2	12.7	1.937	3	0.5
59708	50.8	60.32	4.76	2	2.375	0.187
20119	50.8	63.5	6.35	2	2.5	0.25
20120	50.8	66.67	9.52	2	2.625	0.375
19956	50.8	68.26	9.52	2	2.687	0.375
20121	50.8	68.26	12.7	2	2.687	0.5
20122	50.8	69.85	6.35	2	2.75	0.25
19959	50.8	69.85	9.52	2	2.75	0.375
59709	50.8	69.85	11.11	2	2.75	0.437
19960	50.8	69.85	12.7	2	2.75	0.5
20123	50.8	73.02	9.52	2	2.875	0.375
39753	50.8	73.02	12.7	2	2.875	0.5
81229	50.8	73.81	7.93	2	2.906	0.312
28009	50.8	74.18	7.93	2	2.92	0.312
20124	50.8	76.2	9.52	2	3	0.375
20125	50.8	76.2	12.7	2	3	0.5
20844	50.8	79.37	9.52	2	3.125	0.375
20126	50.8	82.55	9.52	2	3.25	0.375
20127	50.8	85.72	12.7	2	3.375	0.5
20128	50.8	88.9	12.7	2	3.5	0.5
20129	52.38	66.67	7.93	2.062	2.625	0.312
19961	52.38	73.02	9.52	2.062	2.875	0.375
19963	52.38	76.2	9.52	2.062	3	0.375
22234	52.38	80.96	9.52	2.062	3.187	0.375
31610	52.38	80.96	11.43	2.062	3.187	0.45
59710	53.28	80.26	9.52	2.098	3.16	0.375
20130	53.97	66.67	4.76	2.125	2.625	0.187
20131	53.97	68.26	7.93	2.125	2.687	0.312
20132	53.97	69.85	7.93	2.125	2.75	0.312
20133	53.97	69.85	9.52	2.125	2.75	0.375
20134	53.97	73.02	9.52	2.125	2.875	0.375
20135	53.97	73.02	12.7	2.125	2.875	0.5
20136	53.97	76.2	9.52	2.125	3	0.375
19964	53.97	76.2	12.7	2.125	3	0.5
20137	53.97	79.37	9.52	2.125	3.125	0.375
40957	53.97	79.37	11.11	2.125	3.125	0.437
37655	53.97	79.37	12.7	2.125	3.125	0.5
20138	53.97	85.72	12.7	2.125	3.375	0.5
20139	53.97	88.9	12.7	2.125	3.5	0.5
37311	54.77	82.55	9.52	2.156	3.25	0.375
59711	54.99	81.99	11.99	2.165	3.228	0.472
21563	55.56	73.02	9.52	2.187	2.875	0.375
20933	55.56	76.2	9.52	2.187	3	0.375
20843	55.56	76.2	12.7	2.187	3	0.5
130334	56	82.55	12.7	2.205	3.25	0.5
49470	56.48	84.93	13	2.224	3.344	0.512
20140	57.15	73.02	9.52	2.25	2.875	0.375

WA

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
20141	57.15	76.2	9.52	2.25	3	0.375
19965	57.15	76.2	12.7	2.25	3	0.5
59712	57.15	77.78	11.11	2.25	3.062	0.437
42640	57.15	77.88	11.91	2.25	3.066	0.469
20845	57.15	79.37	9.52	2.25	3.125	0.375
20817	57.15	80.96	12.7	2.25	3.187	0.5
20818	57.15	82.55	12.7	2.25	3.25	0.5
35716	57.15	85.72	9.52	2.25	3.375	0.375
59713	57.15	85.72	9.92	2.25	3.375	0.391
19869	57.15	85.72	12.7	2.25	3.375	0.5
20142	57.15	88.9	12.7	2.25	3.5	0.5
20820	57.15	92.07	12.7	2.25	3.625	0.5
35052	57.15	130	9.52	2.25	5.118	0.375
56983	57.94	84.93	7.93	2.281	3.344	0.312
9431	58.73	77.78	9.52	2.312	3.062	0.375
20815	58.73	79.37	9.52	2.312	3.125	0.375
59714	58.73	85.09	7.93	2.312	3.35	0.312
20248	58.73	85.32	7.93	2.312	3.359	0.312
59715	58.73	85.72	9.52	2.312	3.375	0.375
59716	59.97	129.99	9.52	2.361	5.118	0.375
20143	60.32	69.85	7.93	2.375	2.75	0.312
19962	60.32	73.02	7.93	2.375	2.875	0.312
20144	60.32	76.2	9.52	2.375	3	0.375
20145	60.32	79.37	9.52	2.375	3.125	0.375
39802	60.32	79.48	9.52	2.375	3.129	0.375
20146	60.32	82.55	12.7	2.375	3.25	0.5
20147	60.32	85.72	12.7	2.375	3.375	0.5
20148	60.32	88.9	9.52	2.375	3.5	0.375
56409	60.32	88.9	11.11	2.375	3.5	0.437
20149	60.32	88.9	12.7	2.375	3.5	0.5
20821	60.32	92.07	12.7	2.375	3.625	0.5
59717	61.91	77.78	12.7	2.437	3.062	0.5
20150	61.91	82.55	9.52	2.437	3.25	0.375
20151	61.91	85.72	12.7	2.437	3.375	0.5
36627	61.91	100.4	12.7	2.437	3.953	0.5
56729	63.5	76.2	9.52	2.5	3	0.375
20152	63.5	76.2	12.7	2.5	3	0.5
59718	63.5	77.78	10.9	2.5	3.062	0.429
80172	63.5	77.78	11.11	2.5	3.062	0.437
20153	63.5	79.37	6.35	2.5	3.125	0.25
59719	63.5	80.96	9.52	2.5	3.187	0.375
20154	63.5	82.55	9.52	2.5	3.25	0.375
20155	63.5	82.55	12.7	2.5	3.25	0.5
20156	63.5	85.72	12.7	2.5	3.375	0.5
19995	63.5	88.9	9.52	2.5	3.5	0.375
20249	63.5	88.9	12.7	2.5	3.5	0.5
41179	63.5	88.9	15.87	2.5	3.5	0.625
20157	63.5	92.07	12.7	2.5	3.625	0.5
20158	63.5	95.25	12.7	2.5	3.75	0.5
20159	63.5	98.42	6.35	2.5	3.875	0.25
20160	63.5	98.42	12.7	2.5	3.875	0.5
35522	63.5	100	9.52	2.5	3.937	0.375
20819	65.08	85.72	9.52	2.562	3.375	0.375
59720	65.08	92.07	12.7	2.562	3.625	0.5
49471	66.6	85	12.7	2.622	3.346	0.5

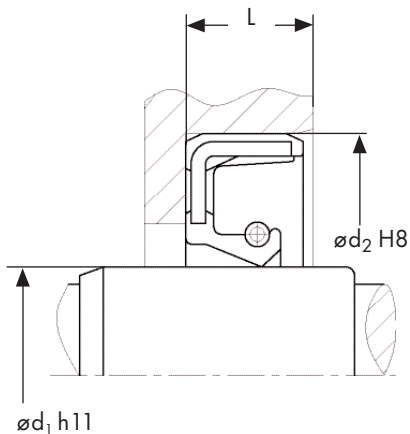
WA

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
49472	66.6	91.95	13	2.622	3.62	0.512
20161	66.67	85.72	7.93	2.625	3.375	0.312
19967	66.67	85.72	9.52	2.625	3.375	0.375
19968	66.67	88.9	12.7	2.625	3.5	0.5
20162	66.67	92.07	12.7	2.625	3.625	0.5
19970	66.67	95.25	12.7	2.625	3.75	0.5
20823	66.67	101.6	12.7	2.625	4	0.5
59721	68.26	95.25	12.7	2.687	3.75	0.5
35368	68.26	98.42	12.7	2.687	3.875	0.5
20163	68.26	101.6	12.7	2.687	4	0.5
20164	69.85	85.72	12.7	2.75	3.375	0.5
26195	69.85	86.09	7.93	2.75	3.389	0.312
133641	69.85	88.9	6.35	2.75	3.5	0.25
19969	69.85	88.9	9.52	2.75	3.5	0.375
20165	69.85	92.07	12.7	2.75	3.625	0.5
19971	69.85	95.25	12.7	2.75	3.75	0.5
20166	69.85	98.42	12.7	2.75	3.875	0.5
20167	69.85	101.6	12.7	2.75	4	0.5
20826	69.85	114.3	12.7	2.75	4.5	0.5
27563	71.43	92.07	9.52	2.812	3.625	0.375
20169	73.02	92.07	7.93	2.875	3.625	0.312
20170	73.02	92.07	9.52	2.875	3.625	0.375
20171	73.02	95.25	12.7	2.875	3.75	0.5
20822	73.02	98.42	12.7	2.875	3.875	0.5
20172	73.02	101.6	12.7	2.875	4	0.5
20173	73.02	107.95	12.7	2.875	4.25	0.5
36272	74.61	95.25	9.52	2.937	3.75	0.375
59722	76.2	95.25	7.93	3	3.75	0.312
22181	76.2	95.25	9.52	3	3.75	0.375
19972	76.2	95.25	12.7	3	3.75	0.5
22182	76.2	98.42	9.52	3	3.875	0.375
20174	76.2	101.6	9.52	3	4	0.375
19973	76.2	101.6	12.7	3	4	0.5
20175	76.2	107.95	12.7	3	4.25	0.5
20176	76.2	114.3	9.52	3	4.5	0.375
19974	76.2	114.3	12.7	3	4.5	0.5
20827	76.2	114.3	15.87	3	4.5	0.625
59723	77.78	96.04	8.98	3.062	3.781	0.354
37910	77.78	104.77	12.7	3.062	4.125	0.5
19975	79.37	101.6	12.7	3.125	4	0.5
20177	79.37	104.77	9.52	3.125	4.125	0.375
20178	79.37	104.77	12.7	3.125	4.125	0.5
20179	79.37	107.95	12.7	3.125	4.25	0.5
20180	79.37	114.3	12.7	3.125	4.5	0.5
72689	79.37	114.3	15.87	3.125	4.5	0.625
43949	79.37	120.65	12.7	3.125	4.75	0.5
37196	80.96	107.95	12.7	3.187	4.25	0.5
35239	80.96	111.12	12.7	3.187	4.375	0.5
37454	80.96	123.82	12.7	3.187	4.875	0.5
19976	82.55	101.6	12.7	3.25	4	0.5
24437	82.55	107.95	7.93	3.25	4.25	0.312
20181	82.55	107.95	12.7	3.25	4.25	0.5
20182	82.55	114.3	12.7	3.25	4.5	0.5
59724	82.55	114.3	15.87	3.25	4.5	0.625
37911	82.55	120.15	9.52	3.25	4.73	0.375

WA

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
24425	82.55	120.65	12.7	3.25	4.75	0.5
21010	84.13	111.12	12.7	3.312	4.375	0.5
35550	85.72	101.6	12.7	3.375	4	0.5
20183	85.72	107.95	12.7	3.375	4.25	0.5
22219	85.72	111.12	12.7	3.375	4.375	0.5
19977	85.72	114.3	12.7	3.375	4.5	0.5
44387	85.72	127	11.91	3.375	5	0.469
20831	85.72	127	12.7	3.375	5	0.5
20828	87.31	114.3	12.7	3.437	4.5	0.5
20824	88.9	104.77	7.93	3.5	4.125	0.312
59725	88.9	104.77	9.52	3.5	4.125	0.375
59726	88.9	107.95	12.7	3.5	4.25	0.5
21876	88.9	111.12	9.52	3.5	4.375	0.375
20825	88.9	111.12	12.7	3.5	4.375	0.5
20184	88.9	114.3	9.52	3.5	4.5	0.375
44386	88.9	114.3	11.91	3.5	4.5	0.469
19978	88.9	114.3	12.7	3.5	4.5	0.5
20829	88.9	114.3	15.87	3.5	4.5	0.625
20185	88.9	120.65	12.7	3.5	4.75	0.5
59727	88.9	123.82	12.7	3.5	4.875	0.5
20186	88.9	127	12.7	3.5	5	0.5
74387	88.9	130.17	12.7	3.5	5.125	0.5
20252	88.9	136.52	12.7	3.5	5.375	0.5
20187	92.07	114.3	12.7	3.625	4.5	0.5
35502	92.07	117.47	12.7	3.625	4.625	0.5
20188	92.07	120.65	12.7	3.625	4.75	0.5
43971	92.25	114.3	12.7	3.632	4.5	0.5
37692	95.25	111.12	8.33	3.75	4.375	0.328
20189	95.25	114.3	12.7	3.75	4.5	0.5
19979	95.25	120.65	12.7	3.75	4.75	0.5
34877	95.25	127	12.7	3.75	5	0.5
19868	95.25	133.35	12.7	3.75	5.25	0.5
56011	95.25	136.52	11.11	3.75	5.375	0.437
36956	96.83	123.82	12.7	3.812	4.875	0.5
21952	98.42	123.82	12.7	3.875	4.875	0.5
20190	98.42	127	12.7	3.875	5	0.5
20191	98.42	133.35	12.7	3.875	5.25	0.5
35524	99.85	150	12.7	3.931	5.906	0.5
35421	100.01	127	12.7	3.937	5	0.5
43950	101.35	127	12.7	3.99	5	0.5
20830	101.6	120.65	12.7	4	4.75	0.5
57183	101.6	127	7.93	4	5	0.312
20192	101.6	127	9.52	4	5	0.375
19980	101.6	127	12.7	4	5	0.5
20193	101.6	133.35	12.7	4	5.25	0.5
20883	101.6	133.35	15.87	4	5.25	0.625
20194	101.6	139.7	12.7	4	5.5	0.5
84096	101.6	146.05	12.7	4	5.75	0.5
21009	104.77	127	12.7	4.125	5	0.5
20832	104.77	130.17	12.7	4.125	5.125	0.5
21951	106.36	133.35	12.7	4.187	5.25	0.5
20195	107.95	127	12.7	4.25	5	0.5
19981	107.95	133.35	12.7	4.25	5.25	0.5
20196	107.95	136.52	12.7	4.25	5.375	0.5
20197	107.95	139.7	12.7	4.25	5.5	0.5

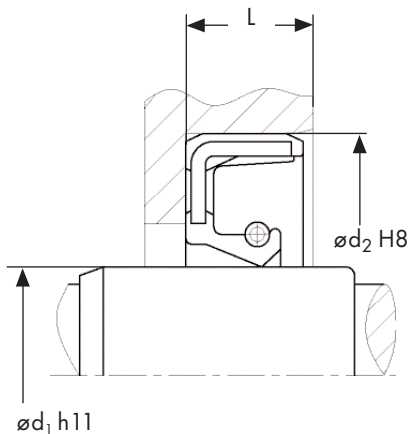
WA

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
21026	107.95	142.87	12.7	4.25	5.625	0.5
27066	107.95	146.05	11.11	4.25	5.75	0.437
20198	107.95	152.4	14.28	4.25	6	0.562
35525	110.15	170	12.7	4.337	6.693	0.5
20199	111.12	136.52	12.7	4.375	5.375	0.5
20200	111.12	139.7	12.7	4.375	5.5	0.5
20201	111.12	152.4	12.7	4.375	6	0.5
20833	114.3	133.35	11.11	4.5	5.25	0.437
20834	114.3	136.52	11.11	4.5	5.375	0.437
20202	114.3	139.7	9.52	4.5	5.5	0.375
19982	114.3	139.7	12.7	4.5	5.5	0.5
20857	114.3	142.87	12.7	4.5	5.625	0.5
20203	114.3	146.05	12.7	4.5	5.75	0.5
37197	114.3	155.57	14.28	4.5	6.125	0.562
25985	117.47	142.87	12.7	4.625	5.625	0.5
35399	117.47	146.05	14.28	4.625	5.75	0.562
20856	120.65	139.7	9.52	4.75	5.5	0.375
19983	120.65	139.7	12.7	4.75	5.5	0.5
20204	120.65	146.05	12.7	4.75	5.75	0.5
37775	120.65	152.4	12.7	4.75	6	0.5
20205	120.65	152.4	14.2	4.75	6	0.559
24217	120.65	152.4	14.28	4.75	6	0.562
38092	120.65	168.27	12.7	4.75	6.625	0.5
35400	125.41	152.4	12.7	4.937	6	0.5
59729	127	146.05	11.11	5	5.75	0.437
20206	127	146.05	12.7	5	5.75	0.5
19984	127	152.4	12.7	5	6	0.5
59730	127	152.4	14.28	5	6	0.562
20207	127	165.1	12.7	5	6.5	0.5
35053	128.58	200.02	12.7	5.062	7.875	0.5
26454	130.17	155.57	12.7	5.125	6.125	0.5
36628	133.35	158.75	12.7	5.25	6.25	0.5
144070	133.35	158.75	14.28	5.25	6.25	0.562
20208	133.35	165.1	14.28	5.25	6.5	0.562
38215	133.35	171.45	15.87	5.25	6.75	0.625
118496	134.54	155.58	9.52	5.297	6.125	0.375
27003	136.52	161.92	12.7	5.375	6.375	0.5
20209	136.52	165.1	12.7	5.375	6.5	0.5
26564	138.12	165.1	12.7	5.438	6.5	0.5
20210	139.7	158.75	12.7	5.5	6.25	0.5
20214	139.7	165.1	12.7	5.5	6.5	0.5
59731	139.7	171.45	12.7	5.5	6.75	0.5
38784	139.7	215.9	15.87	5.5	8.5	0.625
20211	142.87	165.1	12.7	5.625	6.5	0.5
20858	142.87	168.27	12.7	5.625	6.625	0.5
34761	142.87	171.45	14.28	5.625	6.75	0.562
59732	142.87	177.8	12.7	5.625	7	0.5
19987	146.05	171.45	12.7	5.75	6.75	0.5
24426	146.05	177.8	12.7	5.75	7	0.5
26483	147.64	174.63	12.7	5.813	6.875	0.5
56023	149.22	171.45	15.87	5.875	6.75	0.625
37626	149.22	177.8	12.7	5.875	7	0.5
27291	150.81	177.8	12.7	5.937	7	0.5
20212	152.4	177.8	12.7	6	7	0.5
43970	152.4	184.15	15.87	6	7.25	0.625

WA

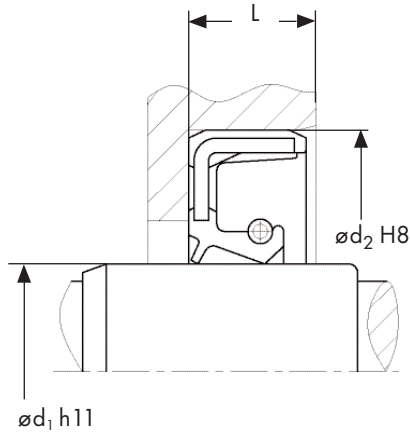
**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
24218	152.4	190.5	19.05	6	7.5	0.75
59733	152.4	190.5	24.13	6	7.5	0.95
21024	155.58	180.98	12.7	6.125	7.125	0.5
35848	155.58	193.68	15.87	6.125	7.625	0.625
35606	157.16	184.15	12.7	6.187	7.25	0.5
38209	158.75	182.44	15.87	6.25	7.183	0.625
38214	158.75	182.56	15.87	6.25	7.187	0.625
21525	158.75	184.15	12.7	6.25	7.25	0.5
27575	161.92	187.32	12.7	6.375	7.375	0.5
35849	161.92	187.32	19.05	6.375	7.375	0.75
35054	161.92	190.5	12.7	6.375	7.5	0.5
20213	165.1	190.5	12.7	6.5	7.5	0.5
20859	165.1	196.85	12.7	6.5	7.75	0.5
38210	168.28	190.5	14.28	6.625	7.5	0.562
25984	168.28	193.67	12.7	6.625	7.625	0.5
36629	169.86	196.85	12.7	6.687	7.75	0.5
20216	171.45	196.85	12.7	6.75	7.75	0.5
25982	176.21	203.2	12.7	6.937	8	0.5
20215	177.8	203.2	12.7	7	8	0.5
39241	177.8	215.9	12.7	7	8.5	0.5
25981	184.15	222.25	14.28	7.25	8.75	0.562
83431	184.15	222.25	14.5	7.25	8.75	0.571
27041	190.5	228.6	14.28	7.5	9	0.562
26100	193.68	231.77	14.28	7.625	9.125	0.562
25983	203.2	241.3	14.28	8	9.5	0.562
25980	209.55	247.65	14.28	8.25	9.75	0.562
27440	215.9	254	14.28	8.5	10	0.562
78494	215.9	254	19.05	8.5	10	0.75
59734	228.6	254	11.11	9	10	0.437
37594	228.6	266.7	14.28	9	10.5	0.562
37593	254	292.1	14.28	10	11.5	0.562
59735	266.7	317.5	25.4	10.5	12.5	1
44120	285.75	336.55	23.81	11.25	13.25	0.937
59466	355.6	396.87	19.05	14	15.625	0.75
57291	365.12	412.75	17.46	14.375	16.25	0.687
35789	406.4	457.2	20.63	16	18	0.812
36521	546	596.9	19.05	21.5	23.5	0.75

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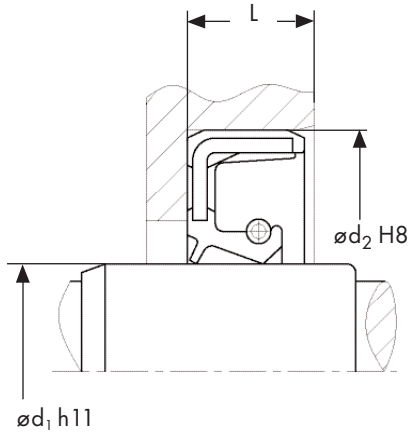
Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
38166	5	15	5	26216	11	30	7
38836	5	15	6	19772	11.6	24	10
38837	5	16	7	57032	12	18	4.5
38838	5	18	7	57033	12	18	5
27672	5	19	5	57034	12	19	5
38839	5	22	7	38852	12	20	4
57030	6	16	5	122334	12	20	5
38840	6	16	7	57036	12	22	5
38841	6	19	7	16790	12	22	6
41281	6	20	6	37434	12	22	6.5
27673	6	22	7	18579	12	22	7
27674	6	22	8	16793	12	22	7.5
19596	6.5	14.5	7	39287	12	22	8
19597	6.8	22	7	18580	12	22	9
35612	7	16	7	18581	12	23	8
83458	7	18	8	18582	12	24	6
39260	7	22	10	16797	12	24	7
38842	8	16	6	74715	12	24	8
66795	8	16	7	18586	12	25	4.5
27675	8	18	5	56177	12	25	5
57026	8	18	7	18589	12	25	7
38843	8	19	7	38853	12	25	8
18592	8	20	5	38854	12	26	7
38844	8	20	7	38855	12	26	8
18593	8	21	6	38856	12	28	7
19684	8	22	6	18591	12	28	8
18594	8	22	7	18548	12	30	7
18596	8	25	8	18550	12	30	9
83459	9	18	8	18551	12	32	7
27676	9	19	5	39290	12	34	7
57028	9	20	7	18554	12	42	8
39269	9	21	9.5	57038	12.5	23.5	10
38845	9	22	7	131026	12.5	25	8
38846	9	24	7	124592	13	22	5
73081	9.5	16	4	39295	13	25	5
131002	10	18	4	18557	13	25	7
39253	10	18	6	18559	13	26	7
38847	10	19	7	38857	13	26	9
18606	10	20	5	16810	13	28	7
39178	10	20	6	18561	13	30	10
18607	10	20	7	19598	13.5	26	8
38848	10	22	4	124817	13.5	35.5	10
18609	10	22	5	38858	14	22	4
38849	10	22	6	75421	14	22	4.5
37145	10	22	7	83461	14	22	5
39188	10	24	7	61095	14	22	7
39274	10	25	4.5	39323	14	24	4
18610	10	25	7	43679	14	24	5
38850	10	26	7	38466	14	24	7
70293	10	28	7	18526	14	24	8
57031	11	17	4	36581	14	25	7
18613	11	21	8	39326	14	26	6
18614	11	22	7	36820	14	26	7
115789	11	25	7	39328	14	27	7
38851	11	30	5	18531	14	28	7

WAS

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
18533	14	28	8	18617	16	26	7
38859	14	30	7	18619	16	26	8
18534	14	30	8	39345	16	26.7	7
38860	14	30	10	16854	16	28	7
38861	14	30	13	39348	16	28	8
38862	14	32	7	57049	16	28.65	7
38634	14	35	7	39346	16	28.7	8
38863	14	36	7	143998	16	30	4.5
19600	14.5	30	8	38978	16	30	6
38865	14.7	30	7	18622	16	30	7
38869	15	22	5	38979	16	30	8
117756	15	24	5	38980	16	32	7
18538	15	24	7	39829	16	34	10
44981	15	25	5	38981	16	35	7
18541	15	25	6	36813	16	35	9
18542	15	25	7	149270	16	35	10
150141	15	25.4	5	155134	16	40	7
39340	15	25.4	8	38983	16	40	10
130122	15	25.5	7	39344	16	42	7
18545	15	26	6	39834	16	48	7
16831	15	26	7	38985	16.5	28	8
18502	15	27	7	39836	17	23	3
38870	15	28	6	130949	17	27	5
38871	15	28	7	38987	17	27	8
18505	15	30	5	18629	17	27	10
16834	15	30	7	18631	17	28	6
38872	15	30	8	16872	17	28	7
38873	15	30	10	19486	17	28	8
18508	15	30	12	38988	17	28.5	7
38874	15	32	5	38989	17	28.65	7
16841	15	32	7	57051	17	29	5
38876	15	32	8	18633	17	29	7
18509	15	32	9	83462	17	30	5
45323	15	33	10	18636	17	30	6
56930	15	35	6	16875	17	30	7
18512	15	35	7	18637	17	30	8
18513	15	35	8	39837	17	30	10
38878	15	35	10	39839	17	30.5	7
38879	15	35.2	5.5	38990	17	31	7
39339	15	36	7	144000	17	32	5
38880	15	37	6	39840	17	32	6
38881	15	37	7	16880	17	32	7
38883	15	40	8	38991	17	32	7.5
38884	15	40	10	18708	17	32	8
38885	15	42	7	39838	17	33	8
18515	15	42	8	38993	17	34	7
18516	15	42	10	16887	17	35	7
18517	15	48	8	16889	17	35	8
19602	15.6	30	7	18716	17	35	9
56790	16	22	4	143999	17	35	10
88176	16	22	7	18717	17	37	5
152309	16	24	4	38994	17	37	7
18521	16	24	6.5	18720	17	38	7
126759	16	24	7	35354	17	39	9.5
130948	16	26	6	16897	17	40	7

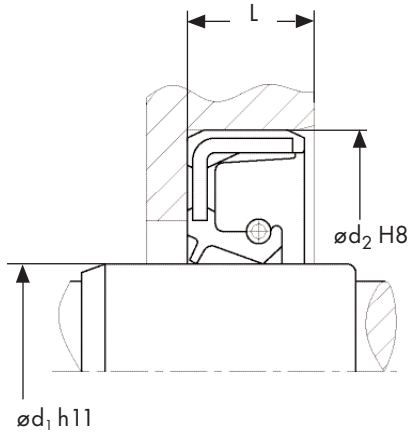
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
18722	17	40	8	18762	20	30	6
18724	17	47	8	16930	20	30	7
18726	17	47	10	39878	20	30	8
38997	17.4	30	7	38635	20	31	7
18495	18	28	6	39879	20	32	5
18730	18	28	7	39099	20	32	6
18732	18	28	8	39897	20	32	6.5
18733	18	29	7	16933	20	32	7
20235	18	30	6	39100	20	32	7.5
18734	18	30	7	18766	20	32	8
18735	18	30	8	40506	20	32	12
18736	18	31	7	40507	20	32.5	12
16907	18	32	6	18771	20	34	7
18738	18	32	7	39101	20	34	8
35856	18	32	8	40508	20	35	5
39848	18	32	10	39102	20	35	5.5
126973	18	34	7	18775	20	35	6
20224	18	35	6	16938	20	35	7
16911	18	35	7	18777	20	35	8
16913	18	35	8	18779	20	35	10
89307	18	35	10	39103	20	35	12
18743	18	37	8	39104	20	35	13
18745	18	38	7	18782	20	36	7
18746	18	38	10	39105	20	37	7
39002	18	40	7	18783	20	37	8
39003	18	40	10	18785	20	37	10
39068	18	42	7	41282	20	38	3
38041	19	27	5	18787	20	38	5
39860	19	30	6.5	16945	20	38	7
39070	19	30	7	18790	20	38	8
39861	19	30	8	18791	20	38	10
39859	19	30	9	40512	20	38.5	8
55977	19	31	8	34920	20	40	6
64549	19	32	5	16950	20	40	7
39072	19	32	7	17149	20	40	8
18751	19	32	8	18794	20	40	9
39864	19	32.5	8	18795	20	40	10
39090	19	33.3	8	39108	20	40	11
39091	19	35	7	39109	20	41.2	5
18753	19	35	8	83464	20	42	6
18755	19	38	7	18796	20	42	7
39867	19	38	10	18797	20	42	8
39190	19	40	10	39111	20	42	10
39092	19	47	7	40516	20	42	12
39093	19	47	8	39112	20	45	7
39094	19	47	10	18798	20	45	8
39869	19	47	10.5	18800	20	46	8
39856	19.5	27	6	39114	20	47	5
19606	19.8	52	8	16966	20	47	7
39095	20	26	5	18801	20	47	8
39096	20	28	4	18804	20	47	9
130999	20	28	6	18805	20	47	10
39097	20	28	7	18806	20	47	12
74062	20	30	4.5	39115	20	52	7
39098	20	30	5	18809	20	52	8

WAS

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
18810	20	52	9	18852	23	35	7
95601	20	52	10	39142	23	38	7
39116	20	54	7	18853	23	40	6
39117	20	62	10	39144	23	40	7
40522	21	31	5	39145	23	40	8
40519	21	32	8	39180	23	40	10
18816	21	35	7	125106	23	42	6
18817	21	35	13	133547	23	42	8
18819	21	40	7	39191	23	42	10
19607	21.6	35	8	39146	23	42	11
39118	22	30	7	40536	23	45	11
39119	22	30	8	18855	23	47	7
126054	22	32	4.5	61834	23	47	10
18825	22	32	7	18856	23	48	10
34931	22	32	8	40537	23	52	11
18826	22	33	6.5	39147	23	55	7
124264	22	34	5	150338	24	35	5
130996	22	34	7	39148	24	35	6
18827	22	35	5	38637	24	35	7
18829	22	35	6	18859	24	35	8
16984	22	35	7	18862	24	36	7
18831	22	35	8	131092	24	37	5
16988	22	35	10	39149	24	37	7
39125	22	36	8	39150	24	38	7
39126	22	36	10	18865	24	38	8
40529	22	36.5	7	39151	24	38	8.5
18837	22	37	7	39152	24	38	10
35897	22	37	8.5	17018	24	40	7
18838	22	38	6	39153	24	40	8
39128	22	38	7	39154	24	40	10
18840	22	38	8	40541	24	41	10
131078	22	39	6	39156	24	42	7
40530	22	40	5	39157	24	42	8
16993	22	40	7	39158	24	42	10
18843	22	40	8	148857	24	43	6
35082	22	40	10	39159	24	45	7
18844	22	40	11	40543	24	45	8
39129	22	40	16	39160	24	46	10
39130	22	41.25	6	17025	24	47	7
18845	22	42	7	39161	24	47	8
39131	22	42	8	24203	24	47	10
39132	22	42	10	40544	24	49	12
18848	22	42	11	40545	24	50	10
40532	22	42	12	18870	24	51	7
39133	22	45	7	18871	24	52	7
39134	22	45	8	40546	24	52	10
40533	22	45	11	40547	24	52	11
38636	22	47	7	40548	24	54	14
39136	22	47	10	17028	25	32	6
39138	22	48	7	46411	25	32	7
39139	22	48	11	18877	25	35	5
19802	22	52	10	18879	25	35	6
40534	22	62	12	17031	25	35	7
39140	23	32	5	18881	25	35	8
18851	23	35	6	40606	25	36	6

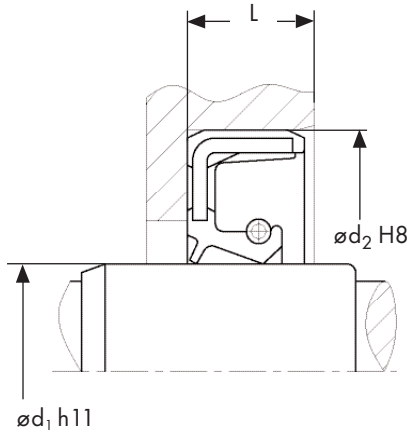
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
39165	25	36	7	18920	25	50	10
18885	25	36	8	17084	25	52	7
18886	25	36	9	18923	25	52	8
40608	25	37	5.5	18924	25	52	10
18888	25	37	6	18925	25	52	12
35080	25	37	7	18926	25	52	15
18891	25	37	8	18927	25	55	9
39166	25	38	5	18928	25	55	10
39167	25	38	6	39384	25	55	11
26155	25	38	7	132965	25	58	10
18892	25	38	8	39386	25	62	7
39169	25	38	10	18930	25	62	8
39179	25	39	7	38121	25	62	10
39371	25	39.5	10	39387	25	65	12
18895	25	40	5	39388	25	65	14
18897	25	40	6	74587	25	70	12
17045	25	40	7	80748	26	35	6
18899	25	40	8	18932	26	36	7
39373	25	40	9	62894	26	36	10
18901	25	40	10	35470	26	37	7
18903	25	41	6	62893	26	37	10
18904	25	41	7	18936	26	38	5
40682	25	41	8	18938	26	38	7
39374	25	41.2	8	18939	26	38	8
130998	25	41.2	10	18940	26	40	5
39375	25	41.25	6	39390	26	40	6
40683	25	41.5	6.5	39391	26	40	7
39377	25	41.55	10	39393	26	40	9
40684	25	42	6	39394	26	42	7
39378	25	42	7	18946	26	42	8
17058	25	42	8	18947	26	42	10
18909	25	42	10	18948	26	43	8
40685	25	43	8	18949	26	45	6
144048	25	43	9	18951	26	45	9
39379	25	43	10	39396	26	46	8
18912	25	44	7	18954	26	47	7
40686	25	44.5	6	18955	26	47	9
40688	25	44.5	9	39397	26	47	10
39380	25	45	7	39398	26	48	7
17062	25	45	8	18957	26	52	7
18900	25	45	9	39192	26	52	7.8
17064	25	45	10	18958	26	52	8
18914	25	45	11	18959	26	52	9
40690	25	45	18	38467	26	52	10
17067	25	46	7	39399	26	62	9
40607	25	46	15	75132	26	72	10
18916	25	47	6	39400	27	36	6
17069	25	47	7	69420	27	37	7
17072	25	47	8	40701	27	38	7
17075	25	47	10	39401	27	40	6
39381	25	48	7	39402	27	40	7
18918	25	48	8	18961	27	40	8
18919	25	48	10	40704	27	41.5	9
39382	25	48.5	7	17119	27	42	10
39383	25	50	8	39403	27	43	8

WAS

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
18963	27	43	9	18956	29	45	9
18965	27	45	8	81359	29	45	12
39405	27	45	9	156450	29	52	7
126131	27	47	7	127703	30	38	7
39406	27	47	8	18996	30	40	5
18966	27	47	11	17164	30	40	7
60218	27	50	10	69329	30	40	8
83465	27	51	10	38918	30	41	7
35718	27	55	8	38919	30	42	5
18968	27	75	12	26542	30	42	6
38886	28	35	5	38920	30	42	6.5
38887	28	35	7	34849	30	42	7
38888	28	37	5	38921	30	42	7.9
38891	28	37	6	19001	30	42	8
17129	28	38	7	19002	30	42	10
18971	28	38	8	40723	30	42	12
38892	28	38	10	38922	30	43	8
38893	28	40	5	19004	30	43	8.5
37886	28	40	7	38923	30	43	10
18973	28	40	8	19005	30	44	7
38894	28	40	10	19006	30	44	9
40708	28	41.2	8	37435	30	45	5
40709	28	41.5	9	38925	30	45	7
40710	28	42	6	17174	30	45	8
18975	28	42	7	40724	30	45	9
18976	28	42	8	38926	30	45	10
38895	28	42	11	19009	30	45	11
38896	28	42.5	8	19011	30	46	5
38899	28	43	8	19012	30	46	7
38900	28	43	10	38927	30	46	8
18977	28	44	7	40725	30	47	5
38901	28	45	5	38928	30	47	6
38903	28	45	6	17181	30	47	7
38904	28	45	7	18701	30	47	8
38203	28	45	8	19016	30	47	10
17143	28	45	10	38929	30	48	7
40711	28	45.2	8	19017	30	48	8
17146	28	47	7	38930	30	48	10
18981	28	47	8	38931	30	49	7
38906	28	47	10	19018	30	50	7
18982	28	48	8	38932	30	50	8
18984	28	48	11	38933	30	50	10
38907	28	50	6	19020	30	50	11
38908	28	50	10	40727	30	50	15
40714	28	50	11	40728	30	51	8
57058	28	50.8	10	152673	30	52	5
18987	28	52	6	19022	30	52	7
18989	28	52	7	19023	30	52	8
38911	28	52	10	19024	30	52	10
149309	28	55	8	19025	30	52	11
134458	28	62	10	19026	30	52	12
38912	28.6	40	8	38935	30	53.5	10.13
19705	29	40	7	135222	30	54	8
65444	29	40	8	144052	30	54	9
38914	29	45	8	40730	30	54	12

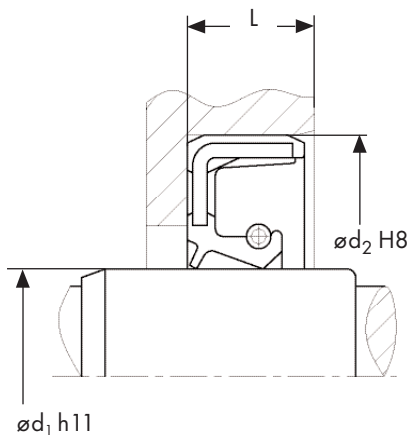
WAS

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
38936	30	55	6	40749	32	44.5	9
38938	30	55	7	40751	32	44.5	12
38939	30	55	8	40753	32	45	5
19028	30	55	10	19044	32	45	7
38940	30	55	11	79447	32	45	7.7
19029	30	55	12	39407	32	45	8
40731	30	56	6	19046	32	45	10
38942	30	56	8	40752	32	45	12
38943	30	56	10	39408	32	46	7
40729	30	58.3	9	19047	32	46	8
149789	30	60	8	37249	32	47	7
74030	30	60	10	130997	32	47	8
40732	30	60	12	40755	32	47	9
17244	30	62	7	39409	32	47	10
19031	30	62	8	35195	32	47	12
40734	30	62	9	39411	32	48	7
38945	30	62	10	19049	32	48	8
19032	30	62	11.5	39414	32	48	10
34801	30	62	12	19050	32	48	11
38959	30	65	10	39415	32	50	8
38960	30	66	12	35194	32	50	10
38962	30	70	10	40756	32	51	8
19034	30	72	8	40763	32	51	9.5
37163	30	72	10	40759	32	51	12
57064	30	75	9	18702	32	52	7
19035	30	75	10	19051	32	52	8
19036	30	77	9	39187	32	52	10
19037	30	77	10	19053	32	52	11
42561	30	80	10	19054	32	54	10
38963	30.5	47	8	39418	32	55	8
19039	31	43	8	39194	32	55	10
40735	31	44	7	39419	32	55	11
40740	31	44.5	9.5	17306	32	56	10
107173	31	45	9	39420	32	56	11
19040	31	46	6	19055	32	57	7.5
38964	31	47	8	40760	32	58	10
38965	31	48	7	40761	32	60	10
38966	31	48	10	40762	32	62	7
38967	31	49	7	19058	32	62	10
38968	31	51	7	19059	32	65	6.5
39186	31	52	6	39422	32	65	9
40741	31.5	55	11	39423	32	65	12
118829	32	40	7	17318	32	65	13
57065	32	41.25	7	19060	32	72	8
38971	32	42	6	19061	32	72	10
38972	32	42	7	39424	32	72	12
38973	32	42	8	19062	32	78	9.5
40745	32	42.7	9	19063	32	78	10
38974	32	43	5.5	19064	33	44	8
38975	32	43	7	39426	33	44	8.9
38976	32	44	7	6310	33	45	10
20218	32	44	8	19066	33	48	8.9
38977	32	44	9	17321	33	50	6
40747	32	44	10	19068	33	50	7
40748	32	44	12	39427	33	50	10

WAS

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
19069	33	50	11	19096	35	52	8
39183	33	50	12	19098	35	52	9
40767	33	52	8	17379	35	52	10
133187	33	54	10.7	19099	35	52	11
40768	33	59	12	39445	35	52	12
35960	34	45	7	40797	35	52.5	12
19073	34	45	9	40793	35	52.5	12.8
19074	34	45	11	39446	35	54	8
39429	34	46	8	40798	35	54	9.5
19075	34	47	7	39447	35	54	10
19077	34	48	7	19102	35	55	8
19078	34	48	8	19103	35	55	9
40771	34	48	11	17388	35	55	10
19079	34	50	7	19104	35	55	11
39432	34	50	11	39449	35	55	12
39433	34	50	12	39450	35	56	9
39193	34	52	7	35814	35	56	10
78830	34	52	10	17399	35	56	12
19083	34	52	11	40800	35	57	8
39434	34	54	7.5	39451	35	58	7
40772	34	54	10	39452	35	58	8
19084	34	54	11	39453	35	58	10
26164	34	54	12.5	19107	35	58	12
39435	34	55	9	39454	35	60	10
40773	34	62.5	8	19108	35	60	12
19086	34	72	10	127883	35	60	15
17344	34	72	14.5	39455	35	62	6
80137	34.5	47	7	34807	35	62	7
19087	35	42	8	17418	35	62	8
17346	35	45	7	17422	35	62	10
19088	35	45	8	17426	35	62	12
40779	35	45	12	39457	35	63.5	9
39436	35	46	7	39459	35	64	9
132578	35	46	8	39460	35	64	12
126514	35	47	6	39461	35	64	13
17351	35	47	7	18703	35	65	10
39711	35	47	8	17003	35	65	12
19090	35	47	9	39462	35	68	10
19091	35	47	10	40807	35	68	12
39438	35	48	7	39463	35	70	10
19092	35	48	8	73078	35	72	7
39439	35	48	9	39465	35	72	8
39440	35	48	10	39466	35	72	9.8
40784	35	48	12	19111	35	72	10
39441	35	48	15	17449	35	72	12
37302	35	50	7	39467	35	76	9
19093	35	50	8	39468	35	78	8
19094	35	50	10	44561	35	80	8
39442	35	50	11	27597	35	80	10
39443	35	50	12	34804	35	80	12
40795	35	51	9	34802	35	80	13
19095	35	51	12	40796	35.4	51	12
40785	35	51	14	39469	35.5	44	9
56981	35	52	6	39471	36	47	7
17370	35	52	7	39477	36	48	10

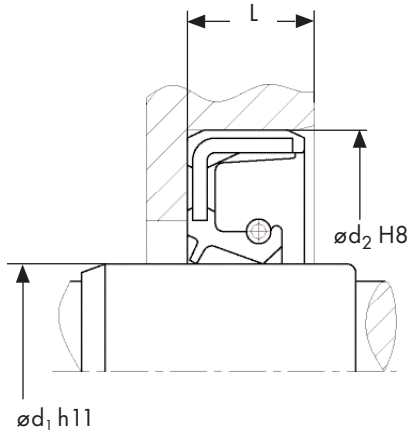
WAS

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
39478	36	50	6	17489	38	55	10
19112	36	50	7	40821	38	56	9
40810	36	50	8	39513	38	56	10
40809	36	50	9	40822	38	57	7
40811	36	51	8	19125	38	58	7
40812	36	52	7	39516	38	58	8
17460	36	52	9	39517	38	58	10
39480	36	52	10	19127	38	58	11
39481	36	53	9	40824	38	58.3	9
39482	36	54	7	39518	38	59	8
39483	36	54	7.5	39520	38	60	8
39484	36	54	10	39521	38	60	10
39485	36	54	11	39522	38	60.5	12
150262	36	56	7	38469	38	62	7
39487	36	56	9	39523	38	62	8
18704	36	58	10	24700	38	62	8.5
38638	36	58	12	39524	38	62	9
149995	36	58	15	39525	38	62	10
39488	36	59.3	9	39526	38	62	11
39491	36	60	10	40826	38	62	12
19114	36	62	7	39527	38	63	9
39492	36	63.4	12.5	39529	38	65	10
39493	36	63.5	12	39530	38	68	10
39494	36	68	10	39531	38	72	8
77851	37	48	6	39532	38	72	10
39495	37	50	7	127609	38	74	10
39497	37	52	10	39534	38	74	11
117910	37	52	12	40827	38	75	10
40815	37	53	7	39538	38.5	58	9
19115	37	55	8	39539	38.5	58	11
116824	37	60	10	19806	39	52	10
39498	37	62	7	40830	39	58.8	4.8
143789	37	72	7	40829	39	60	8
39499	38	47	10	39541	39	64	9
77850	38	48	6	39542	39.5	62	12
39501	38	48	10	39544	39.7	62	11.5
39184	38	50	7	39545	40	50	5
19117	38	50	8	19133	40	50	6.5
19118	38	50	10	19135	40	50	7
39502	38	50	11	19136	40	50	8
40817	38	50	12	40833	40	51	6
39503	38	51	7.54	40835	40	51	10
39504	38	52	6	19137	40	52	5
39505	38	52	7	39546	40	52	6
39506	38	52	8	17515	40	52	7
39507	38	52	8.5	19140	40	52	8
19119	38	52	9	17517	40	52	9
19120	38	52	9.5	39548	40	52	10
39509	38	52	10	150264	40	53	7
150263	38	53	7	39549	40	54	5.5
40819	38	53	10	39550	40	54	7
39511	38	54	10	39551	40	54	7.5
39512	38	55	7	17521	40	55	7
19122	38	55	8	17524	40	55	8
19123	38	55	9	75069	40	55	9

WAS

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
19144	40	55	10	122333	40	85	10
39553	40	55	12	127628	40	90	8
19145	40	56	7	39591	40	90	9
39555	40	56	8	39592	40	90	10
39556	40	56	10	39594	40	90	12
039557	40	57	10	122036	40	110	10
39558	40	57.2	10	39595	41	52	7
19149	40	58	8	19173	41	53	7
90328	40	58	8.5	39596	41	53	8
24416	40	58	8.9	39597	41	55	7
39559	40	58	9	39598	41	55	9
18705	40	58	10	39599	41	56	7
17544	40	59	9.5	19177	41	56	8
39560	40	60	7	19179	41	56	10
37770	40	60	8	39600	41.7	55	8
39561	40	60	9	19180	42	52	4
19154	40	60	10	19181	42	52	8
19155	40	60	12	39602	42	53	7
39562	40	62	7	39603	42	54	5
19157	40	62	8	39604	42	55	5
19158	40	62	9	39605	42	55	6
17554	40	62	10	19182	42	55	7
19159	40	62	11	19183	42	55	8
19160	40	62	11.5	19184	42	55	9
19161	40	62	12	19186	42	55	10
40841	40	62	14	40851	42	55	12
19156	40	63	7	34869	42	56	7
39563	40	64	10	19190	42	56	10
81239	40	64	12	40852	42	57	14
39564	40	65	8	19194	42	58	7
39565	40	65	9	19196	42	58	8
17564	40	65	10	39607	42	58	10
19162	40	65	12	19197	42	60	7
19163	40	65	13	39608	42	60	8
19164	40	65	14	19200	42	60	9
19165	40	67	8	19202	42	60	10
39566	40	68	7	17618	42	62	7
39255	40	68	10	38639	42	62	8
39568	40	68	11	39609	42	62	9
39569	40	68	12	19204	42	62	10
40839	40	69	9	39610	42	62	11
19167	40	70	8	39611	42	65	8
35081	40	70	10	39612	42	65	9
39570	40	72	7	39182	42	65	10
40843	40	72	8	19207	42	65	12
19168	40	72	10	77726	42	65	13
39571	40	72	12	60213	42	67	10
40844	40	72.5	11.5	17633	42	68	10
39588	40	75	10	40856	42	68	12
39589	40	75	12	150265	42	70	8
40845	40	80	7	19209	42	70	10
39590	40	80	8	39614	42	70	12
26199	40	80	10	48536	42	72	6
17594	40	80	12	39615	42	72	8
34803	40	80	13	81936	42	72	9

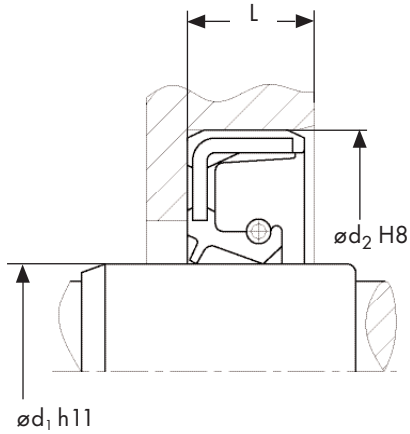
WAS

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
19211	42	72	10	19240	45	60	9
39617	42	72.5	12	17663	45	60	10
39618	42	75	10	40876	45	60	12
69295	42	75	12	19241	45	61	9
19212	42	76	12	17669	45	62	7
39619	43	54	7	19243	45	62	8
39620	43	54	7.5	39642	45	62	8.5
7179	43	54	9	19245	45	62	9
39621	43	55	8	17672	45	62	10
5941	43	55	9	39644	45	62	11
19215	43	58	7	19246	45	62	12
40859	43	59	8	39645	45	63.5	10
39622	43	62	8	40879	45	64	8
19216	43	62	12	39646	45	65	5
39623	43	66	10	25652	45	65	8
40860	43	68	12	17682	45	65	10
40861	43	70	10	39648	45	65	12
39624	43	73	10	39650	45	68	8
40862	43.5	68	12	19248	45	68	9
39625	44	54	4.5	39651	45	68	10
39626	44	54	7	19250	45	68	12
40863	44	58	9	40882	45	68	14
40864	44	58.3	9	39653	45	70	5
39627	44	60	7	39654	45	70	10
19219	44	60	9	19251	45	70	12
39628	44	60	10	40884	45	71	6.5
19221	44	60	12	17700	45	72	8
19222	44	61	8	37224	45	72	10
40866	44	61	10	19252	45	72	12
19223	44	62	8	39655	45	72	13
19224	44	62	9	81252	45	74	12
17652	44	62	10	19863	45	74.5	12
19227	44	62	11.5	39656	45	75	6
81249	44	64	9	39657	45	75	7
39630	44	65	8	19253	45	75	8
38640	44	65	11	19254	45	75	10
40871	44	69	11	19255	45	75	12
40873	44	70	12	40885	45	75	15
19690	44.5	62	10	39658	45	78	8
39632	44.5	70	10	39659	45	78	12
39633	45	54	4.5	34805	45	80	10
75031	45	55	7	39660	45	80	12
39637	45	56	7	19258	45	80	13
133548	45	56	10	39661	45	85	8
19234	45	57	5.5	34806	45	85	10
40875	45	57	7	17725	45	90	10
19236	45	57	7.5	75070	45	100	8
46806	45	57	10	39662	45	100	10
38641	45	58	7	82202	45	120	12
39639	45	58	12	39663	46	59	12
39643	45	59	10	68010	46	60	7
39640	45	59.13	10	65443	46	60	8
40877	45	60	5	19260	46	62	8
17659	45	60	7	39664	46	64	8
18661	45	60	8	25650	46	64	9

WAS

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
83446	46	64	14	39691	48	80	8
19261	46	65	7	39690	48	80	10
19262	46	65	9	39692	48	80	12
134151	46	68	8	81255	48	82	12
46196	46	68	12	26200	48	90	13
118934	46	70	8	19291	49	68	9
40887	46	70	10	40933	49	72	10
39665	46	70	14	150266	49	92	10
40888	46	73	10	39693	49.5	70	10
39666	47	58	7	39694	49.5	77	18
40890	47	64	8	40937	50	60	7.5
83447	47	67	10	127324	50	60	8
40893	47	70	8	39197	50	62	7
19266	47	70	10	39695	50	62	8
39669	47	70	11	39697	50	64	8
39670	47	70	12	19295	50	64	10
39671	47	76.5	9	19296	50	65	6
39672	47	80	12	17765	50	65	8
39674	48	60	7	19297	50	65	9
39675	48	60	9	39698	50	65	10
39676	48	60	10	40938	50	67	7
39677	48	62	6	39699	50	67	9
19268	48	62	7	39700	50	67	11
18664	48	62	8	156158	50	68	7
39678	48	62	9	37207	50	68	8
19270	48	62	10	19299	50	68	9
39064	48	62	11	37908	50	68	10
19271	48	62	12	19302	50	70	6
39679	48	65	7	39701	50	70	8
40870	48	65	8	39703	50	70	9
19272	48	65	9	39704	50	70	9.5
19273	48	65	10	19304	50	70	10
39680	48	65	12	39705	50	70	11
40894	48	65	15	19305	50	70	12
19276	48	66	12	39706	50	70	13.5
83448	48	67	10	40939	50	70	14
81237	48	68	8	39707	50	72	7
19279	48	68	10	27538	50	72	8
39681	48	68	11	19307	50	72	9
39682	48	68	12	19308	50	72	10
17741	48	68	14	19309	50	72	12
39683	48	69	10	40942	50	73	8
39684	48	70	9	40943	50	73	10
39685	48	70	10	40946	50	75	6
19281	48	70	11	38759	50	75	10
19283	48	70	12	19310	50	75	12
17745	48	72	7	39710	50	76	12
18662	48	72	8	40947	50	78	12
19287	48	72	10	19312	50	80	8
19288	48	72	12	19313	50	80	10
19289	48	72.5	10	19315	50	80	12
39686	48	74	10	26201	50	80	13
39687	48	75	12	19318	50	82	12
152976	48	76	11	39712	50	85	8
39689	48	79	9	39714	50	85	10

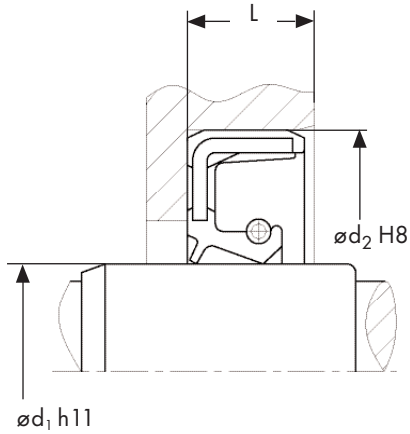
WAS

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
39715	50	85	12	135191	55	65	8
39716	50	90	8	40966	55	67	12
17811	50	90	10	17863	55	68	8
39717	50	90	12	90378	55	70	6
39722	50	110	10	17865	55	70	8
150146	50	125	10	39749	55	70	9
40948	51	64	7	19349	55	70	10
19320	51	65	13	39750	55	72	7
40949	51	70	10	19350	55	72	8
135223	52	63	6	19351	55	72	9
39723	52	63	8	17873	55	72	10
19322	52	65	9	39751	55	72	12
39725	52	65	10	126513	55	73	6
19325	52	68	8	39752	55	73.1	10
74174	52	68	10	39754	55	74	10
39727	52	68	13	79891	55	75	8
39728	52	69	10	19353	55	75	9
40953	52	70	7	37093	55	75	10
39730	52	70	8	19354	55	75	12
19326	52	70	9	17883	55	76	8
107203	52	70	10	17884	55	76	12
39732	52	72	8	40971	55	77	10
19327	52	72	9	39755	55	78	8
19328	52	72	10	40972	55	78	9
19329	52	72	12	26112	55	78	10
39733	52	75	9	19357	55	78	12
39734	52	75	10	36550	55	80	8
19330	52	75	12	17889	55	80	10
26165	52	75	15	39757	55	80	12
40954	52	78	12	40973	55	80	13
19332	52	80	8	40976	55	82	9.35
39739	52	85	10	39758	55	82	10
117720	52	100	10	40974	55	82	12
39737	53	65	10	40975	55	84	14
40952	53	66	6.4	39759	55	85	8
19334	53	72	10	26942	55	85	10
39736	54	65	13	19358	55	85	12
19336	54	66	7	40977	55	88	10
39740	54	68	10	40978	55	88	12
40958	54	68	12	40979	55	90	8
40959	54	70	9	17909	55	90	10
40960	54	70	10	39760	55	90	12
40961	54	72	8	36667	55	100	10
39742	54	72	9	40980	55	100	12
19338	54	72	10	39763	56	65	12
19341	54	74	10	39764	56	70	8
19342	54	76	8	19361	56	70	9
19344	54	76	13	82393	56	70	9.6
39744	54	76.2	10	39765	56	72	7
19345	54	80	13	39766	56	72	9
40964	54	80.5	12	39767	56	72	12.5
19346	54	81	10	39768	56	73.15	10
39746	54	82	10	39770	56	74	10
39747	54	82	11.45	60365	56	80	8
39748	54	85	10	19363	56	80	12

WAS

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
64977	56	85	8	19399	60	82	9
39771	56	85	13	41002	60	82	10
19366	56	86	13	39792	60	82	12
40981	56	90	13	39793	60	85	8
40982	56	100	10	17962	60	85	10
19367	56	100	12	39794	60	85	12
39772	57	67	7	39795	60	85	13
39773	57	73	7	39796	60	88	12
72779	57	75	7.5	41003	60	88	14
39775	57	79.5	10	35043	60	90	8
78268	57	80	12	17969	60	90	10
39777	57	85	12	19405	60	90	11
38801	57	85	13	39797	60	90	13
19369	57	86	13	41004	60	90	16
40989	57	88	13.5	41005	60	91	16
40988	57	89	13.5	75032	60	95	8
39778	58	68	9	19407	60	95	10
39779	58	72	8	39798	60	95	12
19373	58	72	9	39799	60	95	13
130960	58	72	10	130022	60	100	10
19374	58	72	12	144525	60	100	13
39780	58	74	10	39800	60	104	12
19376	58	75	9	149799	60	110	7
39781	58	75	12	155710	60	110	8
19377	58	75	13	39801	60	110	10
19378	58	76	13	152742	60	110	12
19379	58	80	8	153268	60	110	13
19380	58	80	9	39803	60.5	78	9
38061	58	80	10	39804	61	85	10
19382	58	80	12	19408	62	72	9
19383	58	80	13	75828	62	72	10
19384	58	82	12	19409	62	80	9
40994	58	85	10	41009	62	80	10
40995	58	90	8	39807	62	80	12
61783	58	90	10	115562	62	81	6
19387	58	90	11	39808	62	82	10
156526	60	70	7	39809	62	82	12
39251	60	72	8	41010	62	82.5	9.7
39783	60	72	12	39810	62	83	9
18476	60	75	8	39811	62	85	8
19393	60	75	9	39812	62	85	10
39784	60	75	10	19411	62	85	12
40997	60	75	12	39813	62	85	13
40998	60	75.4	10	39814	62	90	10
39786	60	77	12	39815	62	90	12
19395	60	78	9	41012	62	92	12
39787	60	78	10	41013	62	95	13
41000	60	78	12	19413	62	101	15
17946	60	80	7	134605	62	110	10
36551	60	80	8	117721	62	120	12
17948	60	80	9	39817	63	75	9
17950	60	80	10	19414	63	80	9
19398	60	80	12	41015	63	85	8
39789	60	80	13	19416	63	85	10
39790	60	82	7	39818	63	85	12

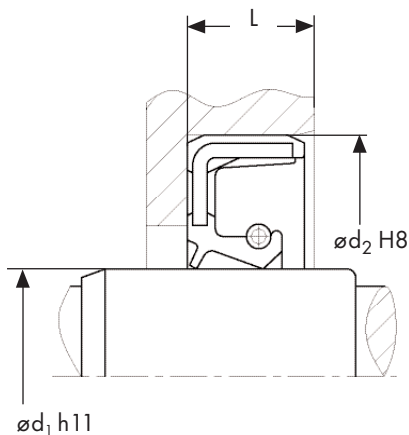
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
39820	63	88	10	19433	68	86	10
39821	63	90	10	18059	68	87	8
39822	63.5	82	12	39911	68	88	9
39823	63.5	85	12	130942	68	90	7
39824	63.5	85	13	19434	68	90	10
41019	63.5	95	14	19435	68	90	12
37628	63.5	100	9.52	39256	68	90	13
61402	64	80	13	143295	68	92	10
39826	64	85	12	143322	68	92	12
18014	64	85	16	18062	68	94	8
41017	64	86	10	39912	68	95	13
18015	64	90	13	19439	68	100	10
48032	65	75	8	39913	68	100	12
39827	65	80	8	39914	68	110	13
20676	65	80	10	39916	70	80	10
19418	65	80	12	19440	70	84	8
39896	65	82	9	18067	70	85	8
41024	65	83	10	39921	70	85	9
39899	65	84	9	39922	70	85	10
39900	65	85	8	39923	70	87	10
18026	65	85	10	19442	70	88	12
19420	65	85	12	41038	70	89	12
18032	65	85	13	39924	70	90	7
19421	65	88	12	18073	70	90	10
39902	65	89	13	25646	70	90	12
41027	65	90	8	39925	70	90	13
19422	65	90	10	41058	70	92	7
19423	65	90	12	39926	70	92	9
19424	65	90	13	19445	70	92	12
41028	65	90	15	39927	70	92	13
39903	65	95	10	41061	70	93	12
39905	65	95	12	39928	70	95	10
19425	65	95	13	39929	70	95	12
19426	65	95	14	19448	70	95	13
41029	65	98	15	39930	70	95	14
19427	65	100	10	39931	70	98.5	13
19428	65	100	12	18087	70	100	8
22179	65	100	13	19449	70	100	10
39906	65	110	10	39932	70	100	12
80858	65	110	12	39933	70	100	13
117911	65	120	10	41065	70	100	14
34921	65	120	13	41063	70	100	15
41025	65	140	10	144062	70	105	12
41020	66	80	17	39934	70	105	13
41021	66.5	85	10	41066	70	105	15
41022	67	82.5	11	39935	70	110	8
39907	68	72	7	39936	70	110	10
39908	68	80	8	83449	70	110	12
57695	68	80	10	39938	70	110	13
39909	68	82	7	39939	70	115	13
81931	68	82	10	19454	70	115	15
41033	68	82	12	39940	70	125	12
19431	68	83	10	39941	71	88	8
39910	68	85	10	61800	72	86	7
19432	68	85	13	19455	72	88	8

WAS

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
73959	72	90	10	39964	78	110	13
41068	72	92	12	41087	78	115	10
19457	72	94	12	75029	80	95	8
135200	72	95	10	118627	80	100	7
39942	72	96	9	18146	80	100	10
35704	72	100	10	19474	80	100	12
25648	72	100	12	19475	80	100	13
41069	72	100	13	41089	80	100	15
19459	72	105	10	41090	80	100	18
39943	72	105	13	41091	80	105	8.5
127466	72	110	13	39966	80	105	10
117722	72	140	12	39967	80	105	12
39945	73	96	9	19476	80	105	13
39946	74	93	12	19477	80	105	14
41070	74	95	10	41093	80	105	15
39947	74	96	9	41094	80	108	15
39948	74	98	12	18160	80	110	10
41072	75	90	6	26935	80	110	12
41073	75	90	7	39968	80	110	13
27537	75	90	8	39969	80	110	15
26174	75	90	10	27984	80	115	10
39949	75	92	12	39970	80	115	13
39950	75	95	7	19478	80	115	15
25653	75	95	8	116843	80	120	10
38470	75	95	9	39973	80	120	12
39951	75	95	10	39974	80	120	13
19461	75	95	12	50973	80	125	10
39181	75	95	13	41095	80	125	13
41077	75	98	12	39976	80	125	14
18125	75	100	10	34922	80	140	13
41084	75	100	12	41097	81.5	105	16
19465	75	100	13	39977	82	105	12
41079	75	100	14	39978	82	105	13
41080	75	100	15	117723	82	120	13
41081	75	101	13	117724	82	160	13
39952	75	102	12	41098	82.5	105	10
39954	75	105	12	127963	83	100	10
19466	75	105	13	150148	84	100	13
19467	75	105	15	41099	84	105	12
39956	75	110	10	19826	84	110	16
39957	75	110	12	41100	85	100	6
39958	75	110	13	39979	85	100	10
131001	75	120	10	39981	85	100	12
117912	75	120	12	19482	85	100	13
150147	75	130	10	41102	85	102	9
39959	76	98	12	38494	85	105	10
39960	76	100	12	39982	85	105	12
44560	76	100	16	19485	85	105	13
19471	76	105	12	35787	85	110	10
39962	76	105	13	19985	85	110	12
41085	78	98	12	18196	85	110	13
36900	78	100	10	19488	85	110	15
41086	78	100	12	39983	85	111	10
40678	78	100	13	36807	85	115	13
39963	78	110	12	39984	85	115	15

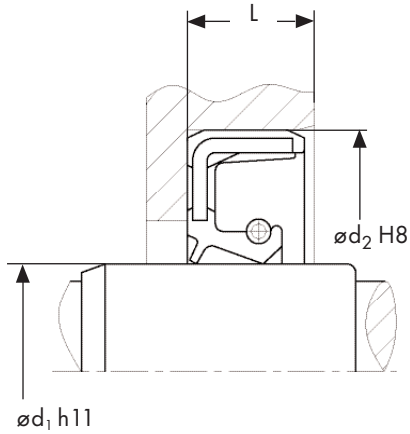
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
41105	85	115	16	18260	95	115	13
156279	85	120	8	18263	95	120	10
74149	85	120	10	18265	95	120	12
26936	85	120	12	19511	95	120	13
19491	85	120	13	51572	95	125	10
41107	85	120	15	25879	95	125	12
41106	85	120	17	40002	95	125	15
39985	85	124	12	41128	95	125	20
39986	85	125	13	131000	95	130	8
19493	85	125	14	38760	95	130	12
36886	85	130	10	40003	95	130	13
18207	85	130	12	19512	95	130	15
60342	85	130	13	19513	95	135	13
81106	85	140	12	41131	95	135	14
41108	85	140	14	41132	95	135	20
39987	85	150	12	41133	95	140	13
121525	85	150	13	40005	95	145	13
41109	85	195	15	143728	95	145	15
56012	88	108	11	41135	97	123	14
41111	88	115	12	41137	97.5	120	12
78269	88	120	13	41136	97.5	124	12
41113	89	114	14	144066	98	120	13
19495	89	115	13	41138	98	125	12
144064	90	105	13	19514	100	116	12
126562	90	110	7.5	40006	100	118	12
39988	90	110	10	40007	100	120	10
18223	90	110	12	19516	100	120	12
19497	90	110	13	40008	100	120	13
37625	90	110	14	25647	100	120	17
27039	90	110	15	41140	100	125	8
144065	90	112	12	41139	100	125	10
75030	90	115	9	19518	100	125	12
39992	90	115	10	19520	100	125	13
41120	90	115	12	41141	100	127	10
19498	90	115	13	19521	100	130	12
19499	90	115	15	40010	100	130	13
39993	90	118	12	19523	100	130	14
41121	90	118	15	81251	100	135	10
19500	90	120	12	36506	100	135	12
19502	90	120	13	59322	100	135	13
41124	90	120	15	40011	100	135	14
39994	90	125	13	41142	100	135	15
39995	90	130	12	19524	100	137	11
39996	90	130	13	41143	100	139	19
39997	90	135	13	40012	100	140	12
131077	90	140	13	40013	100	140	13
41125	92	105	10	107334	100	150	12
41126	92	120	12	75071	100	150	13
19505	92	145	18	130981	100	150	14
19506	94	110	10.8	41145	100	162	12
19507	95	110	10	115714	100	165	13
40001	95	110	12	40015	100	180	12
41127	95	110	13	41144	101	114	10
19508	95	112	12	40016	101.57	125	13
19510	95	115	12	52513	102	115	10

WAS

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
152182	105	120	9.5	40038	120	145	12
19527	105	125	11.7	41173	120	145	12.5
19528	105	125	13	40039	120	145	13
41147	105	127	10	56650	120	145	15
18663	105	130	12	41174	120	145	15.5
19531	105	130	13	38472	120	150	12
27040	105	130	15	40040	120	150	13
40019	105	135	13	19543	120	150	14
19532	105	135	14	38473	120	150	15
41148	105	135	15	41175	120	150	16
37452	105	136	13	41304	120	150	18
40020	105	140	12	41305	120	155	12
40021	105	140	13	40041	120	155	15
41149	105	140	15	41306	120	155	16
41150	105	145	15	37181	120	160	12
40022	106	126	13	40042	120	160	13
41152	110	125	9.5	38247	120	160	15
19533	110	126	18	115715	120	180	13
41154	110	130	10	128141	120	180	15
19534	110	130	12	152024	120	215	12
18329	110	130	13	38131	125	142	13
40025	110	130	15	38132	125	143	13
41155	110	130	18	38474	125	150	12
41156	110	133.5	11	40044	125	150	13
70451	110	135	12	40045	125	150	14
40026	110	135	13	40046	125	152.4	15
41161	110	135	14	38475	125	155	12
41162	110	135	15	40047	125	155	14
27500	110	140	12	41308	125	155	15
35013	110	140	13	40048	125	160	12
19537	110	140	14	41309	125	160	15
41163	110	140	15	41310	125	165	15
40028	110	145	14	73353	128	146	13.5
19538	110	145	15	40051	128	148	14
41164	110	148	15	44888	130	150	10
40029	110	150	13	38476	130	150	12
40030	110	160	13	83451	130	150	15
41167	110	170	12	41307	130	158.75	13
40031	110	200	13	38864	130	160	12
40032	112	142	12	40054	130	160	13
41170	115	135	14	19545	130	160	14
38471	115	140	12	19546	130	160	15
34841	115	140	13	41311	130	162	9
19540	115	145	14	41312	130	163	18
36549	115	150	12	127680	130	170	12
39254	115	150	13	40056	130	230	14
19541	115	150	15	19548	133	160	15
41171	115	151	10	40058	135	160	12
41172	115	165	15	40059	135	160	13
40034	116	132	12	19549	135	160	15
40035	118	140	13	69432	135	165	12
80570	118	150	12	72457	135	165	13
40638	120	140	12	40060	135	165	14
36844	120	140	13	41313	135	165	15
40036	120	140	14	19551	135	170	12

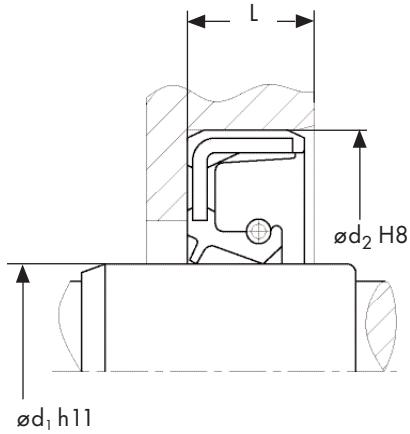
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
40061	135	170	14	19559	160	190	15
36552	135	170	15	133016	160	190	16
36845	140	160	12	41329	160	192	12
40063	140	160	13	41328	160	195	15
41314	140	162	12	40084	160	200	12
131079	140	165	15	44527	160	200	15
38477	140	170	12	41320	160	210	20
40064	140	170	13	54467	165	190	8
19994	140	170	14	36847	165	190	13
37182	140	170	15	19562	165	190	15
41315	140	170	16	41331	165	195	15
37356	140	175	15	41330	165	195	16
40066	140	175	16	18700	165	200	15
40067	140	180	12	40085	170	190	13
40068	140	180	15	130994	170	200	12
124771	142	157	10	19563	170	200	15
59492	143	167	13	40086	170	200	16
40069	144	160	12	40088	170	205	15
41316	144	160	25	41332	170	205	16
19347	145	167	13	41333	170	210	15
40070	145	170	12	41321	170	225	20
152743	145	170	13	41322	170	225	23
53106	145	170	15	41324	174	230	22.5
89906	145	175	14	41323	175	191	12
40072	145	175	15	40089	180	200	15
40073	145	180	12	56500	180	200	16
41317	146	225	20	41335	180	210	10
36846	148	170	14	41334	180	210	14
151864	148	170	14.5	19564	180	210	15
74040	148	170	15	41336	180	210	16
41318	148	170	18	41337	180	215	15
37600	150	168	13	19565	180	215	16
40074	150	170	15	40090	180	220	13
54377	150	178	12	40091	180	220	15
108665	150	180	12	148704	180	220	18
40075	150	180	13	149417	182	215	15
40076	150	180	14	40092	185	210	13
19557	150	180	15	40093	185	210	15
73247	150	180	18	41339	185	250	24
40077	150	190	15	41338	188	238	16
151562	152	176	15	54725	190	215	15
55875	154	180	18	83453	190	215	16
41325	155	175	13	156265	190	220	12
19558	155	180	15	18458	190	220	15
41326	155	185	15	41340	190	225	15
40079	155	190	15	38478	190	225	16
34923	155	200	15	43126	190	230	15
41319	155	210	25	81230	190	230	16
41327	160	180	10	149877	190	230	18
40080	160	180	13	40095	190	240	15
40081	160	185	10	40096	190	240	25
39252	160	185	13	62312	195	215	15
148703	160	190	12	41342	195	231	20
40082	160	190	13	43124	195	235	15
132687	160	190	14	41341	195	235	16

WAS

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
41343	195	250	22	44757	310	350	20
41344	195	255	20	43117	320	350	15
43125	198	230	15	41298	320	360	18
144484	200	230	13	20713	320	360	20
37605	200	230	15	44760	320	380	28
41345	200	230	16	41299	322	354.5	17
41346	200	235	18	124663	340	372	16
76111	200	240	18	41300	340	380	20
41347	200	240	20	72369	350	390	18
41283	200	255	22	39226	350	400	12
133670	200	310	18	83457	360	390	15
83454	207	240	16	152487	360	400	20
43123	210	240	15	132885	365	395	15
19569	210	250	15	144469	370	410	15
41284	210	265	18	26239	380	420	20
41285	210	275	26	41302	385	415	17
83455	210	290	20	37860	390	430	20
43122	215	245	15	41301	390	440	25
41286	215	275	26	56948	394	420	16
130993	220	250	14	43118	395	432	20
40097	220	250	15	57217	410	460	22
41287	220	260	14	41303	420	460	20
148705	220	260	18	38460	420	470	20
126850	220	260	22	25049	440	480	20
43121	220	275	23	25412	480	520	20
41288	225	260	15	20670	480	530	25
38479	230	260	15	56949	500	540	20
43114	230	260	20	144007	520	545	18.5
44742	230	270	15	122110	540	565	20
43113	230	270	22	116528	560	600	18
38390	230	285	23				
41289	240	265	15				
43120	240	270	14				
40100	240	270	15				
41290	240	273	16				
46812	250	280	15				
41291	250	280	16				
130995	260	290	15				
20846	260	300	18				
57081	270	310	16				
44752	270	310	20				
135147	270	320	18				
41293	270	330	20				
41292	279.3	310	17				
39356	280	310	15				
43116	280	310	16				
43115	280	320	20				
41294	280	340	28				
130474	285	310	16				
41295	290	330	18				
44123	300	340	18				
22028	300	340	20				
41296	305	335	17				
83456	310	340	15				
41297	310	340	16				

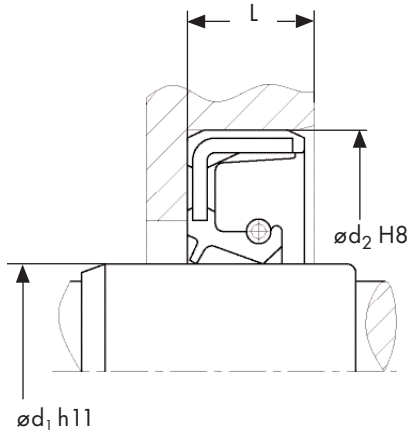
WAS

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
59736	6.35	19.05	6.35	0.25	0.75	0.25
118788	7.93	22.22	6.35	0.312	0.875	0.25
59468	9.52	22.22	6.35	0.375	0.875	0.25
59737	11.02	25.4	6.35	0.434	1	0.25
35313	11.11	22.22	6.35	0.437	0.875	0.25
83460	12.7	22.22	6.35	0.5	0.875	0.25
59738	12.7	25.4	6.35	0.5	1	0.25
20796	12.7	25.4	7.93	0.5	1	0.312
59739	12.7	28.57	6.35	0.5	1.125	0.25
59740	14.28	25.4	6.35	0.562	1	0.25
59741	14.28	28.57	6.35	0.562	1.125	0.25
59742	15.08	31.75	6.35	0.594	1.25	0.25
59743	15.87	23.81	4.76	0.625	0.937	0.187
59744	15.87	25.4	4.76	0.625	1	0.187
59745	15.87	28.57	6.35	0.625	1.125	0.25
59746	15.87	31.75	6.35	0.625	1.25	0.25
59747	15.87	34.92	6.35	0.625	1.375	0.25
57048	16	28.65	6.3	0.63	1.128	0.248
117746	17.46	28.57	6.35	0.687	1.125	0.25
59748	17.46	31.75	6.35	0.687	1.25	0.25
59749	19.05	28.57	6.35	0.75	1.125	0.25
78748	19.05	28.57	7.93	0.75	1.125	0.312
21524	19.05	31.75	6.35	0.75	1.25	0.25
59758	19.05	31.75	7.93	0.75	1.25	0.312
107174	19.05	33.33	7	0.75	1.312	0.276
118285	19.05	33.33	7.93	0.75	1.312	0.312
49491	19.05	34.92	6.35	0.75	1.375	0.25
59759	19.05	34.92	12.7	0.75	1.375	0.5
59760	19.05	38.1	7.93	0.75	1.5	0.312
59761	19.05	38.1	9.52	0.75	1.5	0.375
59762	19.05	41.27	6.35	0.75	1.625	0.25
59763	19.05	44.45	7.93	0.75	1.75	0.312
83463	20.63	30.8	4.6	0.812	1.213	0.181
59765	20.63	31.75	6.35	0.812	1.25	0.25
116510	20.63	33.73	8.74	0.812	1.328	0.344
44130	22.22	34.92	6.35	0.875	1.375	0.25
49492	22.22	38.1	6.35	0.875	1.5	0.25
59766	22.22	38.1	9.52	0.875	1.5	0.375
59767	22.22	41.27	9.52	0.875	1.625	0.375
45066	22.22	47.62	6.35	0.875	1.875	0.25
59768	22.22	47.62	9.52	0.875	1.875	0.375
35743	22.22	47.62	11.11	0.875	1.875	0.437
59769	23.81	38.1	9.52	0.937	1.5	0.375
35746	23.81	44.45	7.93	0.937	1.75	0.312
57053	24.68	35	8.5	0.972	1.378	0.335
59770	24.99	38.07	6.35	0.984	1.499	0.25
39376	25	41.25	7.3	0.984	1.624	0.287
59771	25.4	36.51	6.35	1	1.437	0.25
40691	25.4	36.51	6.5	1	1.437	0.256
44766	25.4	38.1	6.35	1	1.5	0.25
56901	25.4	38.1	7.93	1	1.5	0.312
59772	25.4	38.1	9.52	1	1.5	0.375
59773	25.4	41.27	6.35	1	1.625	0.25
39883	25.4	41.27	7.93	1	1.625	0.312
117872	25.4	44.45	4.76	1	1.75	0.187

WAS

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
45063	25.4	44.45	6.35	1	1.75	0.25
59774	25.4	44.45	9.52	1	1.75	0.375
59775	25.4	47.62	9.52	1	1.875	0.375
59776	25.4	50.8	6.35	1	2	0.25
59777	25.4	50.8	9.52	1	2	0.375
59778	25.4	50.8	12.7	1	2	0.5
37875	25.4	62	9.52	1	2.441	0.375
121347	28.5	38.1	6.2	1.122	1.5	0.244
57059	28.5	44.53	10	1.122	1.753	0.394
157019	28.57	39.67	6.35	1.125	1.562	0.25
59779	28.57	41.27	7.93	1.125	1.625	0.312
38468	28.57	41.27	9.52	1.125	1.625	0.375
34924	28.57	42.86	6.35	1.125	1.687	0.25
35744	28.57	42.86	7.93	1.125	1.687	0.312
59780	28.57	44.45	9.52	1.125	1.75	0.375
38095	28.57	45.24	6.35	1.125	1.781	0.25
144298	28.57	45.24	12.7	1.125	1.781	0.5
130185	28.57	46.53	7.93	1.125	1.832	0.312
59781	28.57	47.62	9.52	1.125	1.875	0.375
44814	28.57	50.8	6.35	1.125	2	0.25
59782	28.57	50.8	9.52	1.125	2	0.375
59783	28.57	61.91	11.11	1.125	2.437	0.437
57062	28.8	46.5	11.2	1.134	1.831	0.441
59817	30.16	44.45	4.76	1.187	1.75	0.187
59818	30.16	44.45	11.11	1.187	1.75	0.437
59819	30.16	50.8	9.52	1.187	2	0.375
21523	31.75	41.27	6.35	1.25	1.625	0.25
59820	31.75	42.86	6.35	1.25	1.687	0.25
59821	31.75	44.45	9.52	1.25	1.75	0.375
59822	31.75	47.62	9.52	1.25	1.875	0.375
19866	31.75	47.62	11.11	1.25	1.875	0.437
45064	31.75	50.8	6.35	1.25	2	0.25
20237	31.75	50.8	7.93	1.25	2	0.312
59823	31.75	50.8	9.52	1.25	2	0.375
59824	31.75	50.8	12.7	1.25	2	0.5
59825	31.75	53.97	9.52	1.25	2.125	0.375
135242	31.75	57.15	7.93	1.25	2.25	0.312
59826	31.75	57.15	9.52	1.25	2.25	0.375
127954	31.75	61.98	9.52	1.25	2.44	0.375
45065	31.75	63.5	9.52	1.25	2.5	0.375
59827	31.75	72	9.52	1.25	2.835	0.375
35742	31.75	82.55	11.11	1.25	3.25	0.437
39425	32.54	49.21	12.7	1.281	1.937	0.5
90946	34.74	47	9	1.368	1.85	0.354
59828	34.92	47.62	6.35	1.375	1.875	0.25
59829	34.92	47.62	7.93	1.375	1.875	0.312
118422	34.92	49.78	12.7	1.375	1.96	0.5
35747	34.92	50.8	7.93	1.375	2	0.312
59830	34.92	50.8	9.52	1.375	2	0.375
20848	34.92	50.8	11.11	1.375	2	0.437
60761	34.92	52.38	9.52	1.375	2.062	0.375
59831	34.92	53.97	9.52	1.375	2.125	0.375
40605	34.92	57.15	7.93	1.375	2.25	0.312
59832	34.92	57.15	9.52	1.375	2.25	0.375
59833	34.92	58.73	11.11	1.375	2.312	0.437

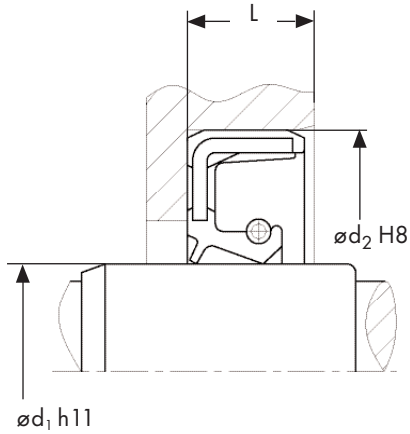
WAS

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
56227	34.92	59.13	10.31	1.375	2.328	0.406
59834	34.92	60.32	9.52	1.375	2.375	0.375
59835	34.92	63.5	9.52	1.375	2.5	0.375
59836	34.92	63.5	19.05	1.375	2.5	0.75
24849	34.92	63.8	19.05	1.375	2.512	0.75
34925	36.51	50.8	7.93	1.437	2	0.312
59837	36.51	52.38	7.93	1.437	2.062	0.312
44208	36.51	52.58	7.93	1.437	2.07	0.312
59839	36.51	57.15	9.52	1.437	2.25	0.375
59838	36.51	59.13	6.35	1.437	2.328	0.25
35745	36.51	73.02	15.87	1.437	2.875	0.625
56553	38.1	50.8	6.35	1.5	2	0.25
59840	38.1	52.38	6.35	1.5	2.062	0.25
59841	38.1	53.97	9.52	1.5	2.125	0.375
59842	38.1	57.15	9.52	1.5	2.25	0.375
39536	38.1	57.15	12.7	1.5	2.25	0.5
59843	38.1	60.32	9.52	1.5	2.375	0.375
59844	38.1	63.5	9.52	1.5	2.5	0.375
59845	38.1	66.67	9.52	1.5	2.625	0.375
128123	38.1	68.99	7.93	1.5	2.716	0.312
59846	38.1	69.85	9.52	1.5	2.75	0.375
59847	38.1	69.85	12.7	1.5	2.75	0.5
59848	39.68	58.75	9.52	1.562	2.313	0.375
59849	39.68	58.93	9.52	1.562	2.32	0.375
59850	39.68	60.32	9.52	1.562	2.375	0.375
59852	39.68	63.5	9.52	1.562	2.5	0.375
59851	39.68	63.5	12.7	1.562	2.5	0.5
117747	39.68	68.26	9.52	1.562	2.687	0.375
59853	40.49	58.75	9.52	1.594	2.313	0.375
39195	41.27	57.15	7.93	1.625	2.25	0.312
59854	41.27	57.15	9.52	1.625	2.25	0.375
21956	41.27	60.32	9.52	1.625	2.375	0.375
59855	41.27	63.5	9.52	1.625	2.5	0.375
59508	41.27	63.5	12.7	1.625	2.5	0.5
59856	41.27	66.67	9.52	1.625	2.625	0.375
107207	41.27	73.42	9.92	1.625	2.891	0.391
39196	42.86	57.15	7.93	1.687	2.25	0.312
59857	42.86	69.85	9.52	1.687	2.75	0.375
59858	43	54.99	7.01	1.693	2.165	0.276
81271	43.66	60.32	9.52	1.719	2.375	0.375
59859	44.45	57.15	9.52	1.75	2.25	0.375
59860	44.45	58.73	6.35	1.75	2.312	0.25
22626	44.45	60.32	9.52	1.75	2.375	0.375
35512	44.45	60.53	9.52	1.75	2.383	0.375
59861	44.45	63.5	7.93	1.75	2.5	0.312
59862	44.45	63.5	9.52	1.75	2.5	0.375
117748	44.45	63.5	12.7	1.75	2.5	0.5
59863	44.45	66.67	9.52	1.75	2.625	0.375
128124	44.45	68.99	7.93	1.75	2.716	0.312
22180	44.45	69.85	9.52	1.75	2.75	0.375
59864	44.45	69.85	12.7	1.75	2.75	0.5
59865	44.45	73.02	9.52	1.75	2.875	0.375
59866	44.45	76.2	9.52	1.75	3	0.375
59867	46.03	63.5	9.52	1.812	2.5	0.375
59868	47.62	63.5	9.52	1.875	2.5	0.375

WAS

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
59869	47.62	66.67	9.52	1.875	2.625	0.375
59870	47.62	69.85	9.52	1.875	2.75	0.375
59871	47.62	69.85	12.7	1.875	2.75	0.5
59872	47.62	73.02	9.52	1.875	2.875	0.375
59873	47.62	76.2	9.52	1.875	3	0.375
59874	47.62	79.37	12.7	1.875	3.125	0.5
59875	49.21	63.5	9.52	1.937	2.5	0.375
27023	49.21	69.85	9.52	1.937	2.75	0.375
59876	49.21	76.2	12.7	1.937	3	0.5
59877	50.8	63.5	6.35	2	2.5	0.25
59878	50.8	66.67	9.52	2	2.625	0.375
59879	50.8	69.85	9.52	2	2.75	0.375
59880	50.8	69.85	11.11	2	2.75	0.437
59881	50.8	69.85	12.7	2	2.75	0.5
59882	50.8	73.02	9.52	2	2.875	0.375
59883	50.8	76.2	9.52	2	3	0.375
59884	50.8	76.2	12.7	2	3	0.5
59885	50.8	77.78	12.7	2	3.062	0.5
39738	52.38	66.67	7.93	2.062	2.625	0.312
59886	52.38	73.02	9.52	2.062	2.875	0.375
59887	53.97	73.02	9.52	2.125	2.875	0.375
59888	53.97	76.2	9.52	2.125	3	0.375
59889	53.97	76.2	12.7	2.125	3	0.5
59890	53.97	77.75	12.7	2.125	3.061	0.5
59891	53.97	79.37	9.52	2.125	3.125	0.375
59892	53.97	82.55	9.52	2.125	3.25	0.375
59893	53.97	85.62	11.91	2.125	3.371	0.469
59894	55.56	73.02	9.52	2.187	2.875	0.375
21860	55.56	73.02	12.7	2.187	2.875	0.5
59895	55.56	76.2	9.52	2.187	3	0.375
59896	55.56	82.55	9.52	2.187	3.25	0.375
59897	57.15	69.85	9.52	2.25	2.75	0.375
56285	57.15	76.2	9.52	2.25	3	0.375
40990	57.15	76.2	11.11	2.25	3	0.437
59898	57.15	79.37	9.52	2.25	3.125	0.375
59899	57.15	82.55	11.11	2.25	3.25	0.437
59900	57.15	85.72	12.7	2.25	3.375	0.5
59901	57.15	88.9	12.7	2.25	3.5	0.5
37627	57.15	129.78	9.52	2.25	5.109	0.375
59902	57.35	79.37	9.52	2.258	3.125	0.375
59903	58.73	85.09	7.93	2.312	3.35	0.312
59904	58.73	85.72	9.52	2.312	3.375	0.375
59905	59.97	129.99	9.52	2.361	5.118	0.375
59906	60.32	73.02	7.93	2.375	2.875	0.312
59907	60.32	73.02	9.52	2.375	2.875	0.375
59908	60.32	76.2	9.52	2.375	3	0.375
59909	60.32	79.37	9.52	2.375	3.125	0.375
59910	60.32	82.55	9.52	2.375	3.25	0.375
59911	60.32	85.72	9.52	2.375	3.375	0.375
59912	60.32	85.72	12.7	2.375	3.375	0.5
59913	60.32	88.9	12.7	2.375	3.5	0.5
47912	60.33	88.9	12.7	2.375	3.5	0.5
59914	61.91	85.72	12.7	2.437	3.375	0.5
59915	63.5	80.96	9.52	2.5	3.187	0.375
59916	63.5	82.55	9.52	2.5	3.25	0.375

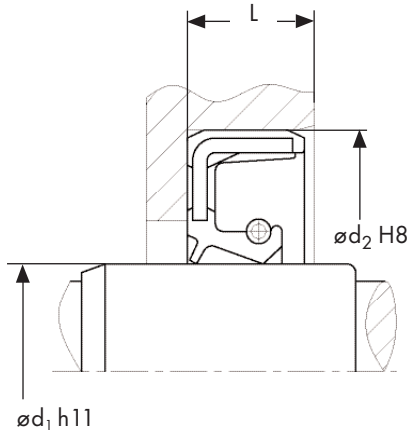
WAS

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
41018	63.5	82.55	10.5	2.5	3.25	0.413
47925	63.5	85.72	6.35	2.5	3.375	0.25
59917	63.5	85.72	12.7	2.5	3.375	0.5
39185	63.5	88.9	9.52	2.5	3.5	0.375
59918	63.5	88.9	12.7	2.5	3.5	0.5
59919	63.5	88.9	19.05	2.5	3.5	0.75
39825	63.5	90.09	12.7	2.5	3.547	0.5
59920	63.5	90.88	12.7	2.5	3.578	0.5
59922	63.5	95.25	12.7	2.5	3.75	0.5
61760	63.5	114.3	12.7	2.5	4.5	0.5
48376	65.08	88.9	12.7	2.562	3.5	0.5
59923	66.67	85.72	9.52	2.625	3.375	0.375
59924	66.67	85.83	9.52	2.625	3.379	0.375
59925	66.67	88.9	12.7	2.625	3.5	0.5
59926	66.67	92.07	12.7	2.625	3.625	0.5
59927	66.67	95.25	12.7	2.625	3.75	0.5
59928	66.67	95.25	15.87	2.625	3.75	0.625
59929	66.67	101.6	12.7	2.625	4	0.5
59930	68.26	95.25	12.7	2.687	3.75	0.5
59931	69.85	86.09	7.93	2.75	3.389	0.312
27022	69.85	88.9	9.52	2.75	3.5	0.375
20847	69.85	88.9	12.7	2.75	3.5	0.5
59932	69.85	95.25	9.52	2.75	3.75	0.375
59933	69.85	95.25	12.7	2.75	3.75	0.5
59934	69.85	98.42	12.7	2.75	3.875	0.5
59935	69.85	101.6	12.7	2.75	4	0.5
59936	69.85	107.95	12.7	2.75	4.25	0.5
59937	71.43	88.9	9.52	2.812	3.5	0.375
37195	71.43	92.07	9.52	2.812	3.625	0.375
73972	71.81	86.05	7	2.827	3.388	0.276
59938	73.02	92.07	9.52	2.875	3.625	0.375
59939	73.02	95.25	12.7	2.875	3.75	0.5
59940	73.02	98.42	12.7	2.875	3.875	0.5
59941	73.02	101.6	12.7	2.875	4	0.5
59942	76.2	95.25	9.52	3	3.75	0.375
59943	76.2	101.6	9.52	3	4	0.375
59609	76.2	101.6	12.7	3	4	0.5
59944	76.2	107.95	12.7	3	4.25	0.5
59945	76.2	114.3	12.7	3	4.5	0.5
59946	79.37	104.77	12.7	3.125	4.125	0.5
59947	80.96	117.47	12.7	3.187	4.625	0.5
83450	80.96	120.65	12.7	3.187	4.75	0.5
59948	82.55	101.6	12.7	3.25	4	0.5
59949	82.55	107.95	12.7	3.25	4.25	0.5
59950	82.55	111.12	12.7	3.25	4.375	0.5
59951	82.55	114.3	12.7	3.25	4.5	0.5
59952	82.55	117.47	12.7	3.25	4.625	0.5
59953	84.13	114.3	12.7	3.312	4.5	0.5
59954	85.72	114.3	12.7	3.375	4.5	0.5
59955	85.72	117.47	9.52	3.375	4.625	0.375
59956	85.72	117.47	12.7	3.375	4.625	0.5
59957	85.72	120.65	12.7	3.375	4.75	0.5
59958	87.31	114.3	12.7	3.437	4.5	0.5
59959	88.9	107.95	12.7	3.5	4.25	0.5
41112	88.9	111.12	9.52	3.5	4.375	0.375

WAS

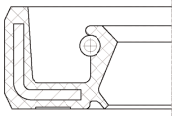
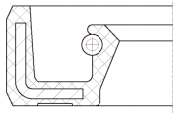
**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
59960	88.9	111.12	12.7	3.5	4.375	0.5
59961	88.9	114.3	9.52	3.5	4.5	0.375
21957	88.9	114.3	12.7	3.5	4.5	0.5
59962	88.9	120.65	12.7	3.5	4.75	0.5
81256	88.9	120.65	14.28	3.5	4.75	0.562
37928	92.07	111.12	11.11	3.625	4.375	0.437
59963	92.07	114.3	12.7	3.625	4.5	0.5
59964	92.07	117.47	12.7	3.625	4.625	0.5
59965	92.07	123.82	12.7	3.625	4.875	0.5
59966	92.07	142.87	12.7	3.625	5.625	0.5
59967	93.66	123.82	12.7	3.687	4.875	0.5
59968	93.66	142.87	12.7	3.687	5.625	0.5
59969	95.25	114.3	12.7	3.75	4.5	0.5
59970	95.25	117.47	9.52	3.75	4.625	0.375
59971	95.25	120.65	12.7	3.75	4.75	0.5
59972	95.25	142.87	12.7	3.75	5.625	0.5
59973	96.83	123.82	12.7	3.812	4.875	0.5
59974	98.42	127	12.7	3.875	5	0.5
59975	98.42	130.17	12.7	3.875	5.125	0.5
59976	98.42	133.35	12.7	3.875	5.25	0.5
59977	98.42	136.52	12.7	3.875	5.375	0.5
59978	98.42	144.52	12.7	3.875	5.69	0.5
24260	101.6	127	12.7	4	5	0.5
59979	101.6	130.17	12.7	4	5.125	0.5
59980	101.6	133.35	12.7	4	5.25	0.5
39583	101.6	139.7	12.7	4	5.5	0.5
59981	107.95	133.35	12.7	4.25	5.25	0.5
59982	107.95	139.7	12.7	4.25	5.5	0.5
59983	107.95	142.87	12.7	4.25	5.625	0.5
59984	107.95	146.05	12.7	4.25	5.75	0.5
59985	111.12	136.52	12.7	4.375	5.375	0.5
59986	111.12	152.4	12.7	4.375	6	0.5
59987	114.3	133.35	12.7	4.5	5.25	0.5
59988	114.3	139.7	12.7	4.5	5.5	0.5
59989	114.3	146.05	12.7	4.5	5.75	0.5
37748	114.3	146.43	21.84	4.5	5.765	0.86
59990	114.3	152.4	12.7	4.5	6	0.5
44486	114.3	155.57	14.28	4.5	6.125	0.562
59991	114.3	158.75	12.7	4.5	6.25	0.5
59992	114.3	158.75	14.28	4.5	6.25	0.562
38024	114.3	174.62	14.28	4.5	6.875	0.562
59993	117.47	142.87	12.7	4.625	5.625	0.5
70395	120.25	146.1	14.2	4.734	5.752	0.559
59995	120.65	146.05	9.52	4.75	5.75	0.375
59994	120.65	146.05	12.7	4.75	5.75	0.5
59996	120.65	152.4	14.28	4.75	6	0.562
59997	123.82	158.75	14.28	4.875	6.25	0.562
59998	127	152.4	12.7	5	6	0.5
59999	127	158.75	14.28	5	6.25	0.562
78423	127	161.92	15.87	5	6.375	0.625
60000	127	165.1	12.7	5	6.5	0.5
40052	128.57	160	14	5.062	6.299	0.551
60001	130.17	155.57	12.7	5.125	6.125	0.5
60002	133.35	158.75	12.7	5.25	6.25	0.5
60003	133.35	165.1	14.28	5.25	6.5	0.562

WAS**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
60004	136.52	161.92	12.7	5.375	6.375	0.5
60005	139.7	165.1	12.7	5.5	6.5	0.5
60006	140.2	158.75	12.7	5.52	6.25	0.5
60007	142.87	177.8	12.7	5.625	7	0.5
60008	146.05	177.8	12.7	5.75	7	0.5
60009	152.4	177.8	12.7	6	7	0.5
83452	152.4	187.32	19.05	6	7.375	0.75
60010	152.4	190.5	12.7	6	7.5	0.5
60011	155.58	180.98	12.7	6.125	7.125	0.5
20232	158.75	177.8	9.52	6.25	7	0.375
60012	158.75	184.15	12.7	6.25	7.25	0.5
44455	161.92	187.32	12.7	6.375	7.375	0.5
60013	165.1	190.5	12.7	6.5	7.5	0.5
60014	171.45	196.85	12.7	6.75	7.75	0.5
130195	171.45	209.55	14.28	6.75	8.25	0.562
60015	177.8	203.2	12.7	7	8	0.5
60016	177.8	203.2	19.05	7	8	0.75
27292	177.8	215.9	12.7	7	8.5	0.5
20932	177.8	215.9	19.05	7	8.5	0.75
60017	184.15	222.25	15.87	7.25	8.75	0.625
60018	196.85	234.95	12.7	7.75	9.25	0.5
20931	203.2	241.3	19.05	8	9.5	0.75
35734	215.9	254	19.05	8.5	10	0.75
60019	234.95	273.05	15.87	9.25	10.75	0.625
79107	247.65	279.4	19.05	9.75	11	0.75
60020	254	292.1	14.28	10	11.5	0.562
55892	323.85	346.07	14.28	12.75	13.625	0.562
43119	381	425.45	19	15	16.75	0.748



VIA/VIAS

Rotary shaft seal in standard design according to DIN 3760 with a completely elastomer-encased metal insert and a spring-energised sealing lip. In addition, the standard model is available with a protective lip (VIAS) on the air side.

Standard materials

FPM 80
Colour: brown
Energised spring: rust and acid-resistant steel 1.4571 (AISI 304)
Metal insert: non-alloy steel according to DIN EN 10139

Areas of application

Sealing of rotating machine elements such as shafts, hubs and axles.

Function

The VIA/VIAS is a single acting rotary shaft seal for rotating or pivoting shafts with optional protective lip sealing action (VIAS) on the side facing away from the medium against dirt accumulation from the outside. The elastomer outer sheath provides good static sealing, good thermal expansion balance, e.g. in light-metal housings, better sealing with greater roughness and secure sealing for split housings as well as good static sealing with thin liquid or gaseous media. FPM is superior to the NBR materials for high temperature applications, high peripheral speeds and chemically aggressive media.

The combination of FPM material, the standard fully-encased metal insert and the spring made of non-rusting steel enables application in chemically aggressive media.

Media

Mineral oils and greases, synthetic oils and greases, engine, gear and ATF oils, fuels, aromatic and chlorinated hydrocarbons, broad chemicals and solvents resistance. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (MPa/bar): $\leq 0.05/0.5$
Temperature (°C): -30 to $+200$
Peripheral speed (m/s): ≤ 35
Please also refer to our rotational speed diagram on page 20 of this catalogue.

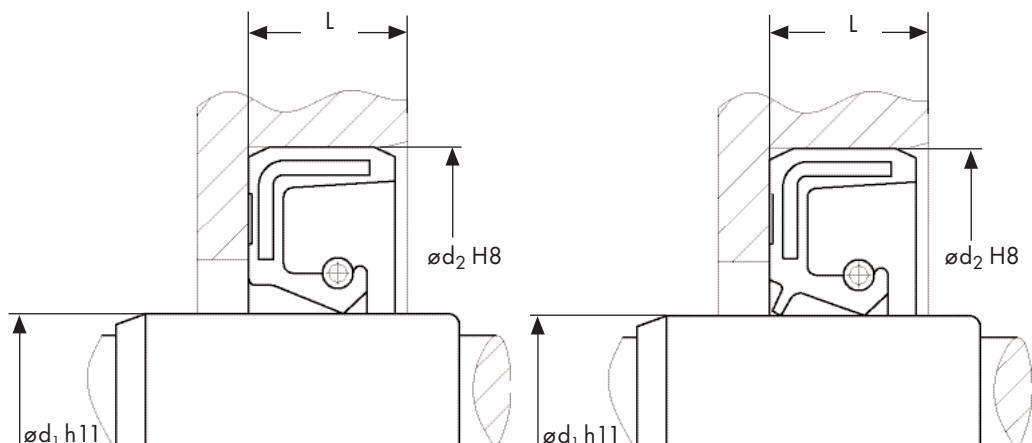
Installation

Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. double dust protection lip, spiral on the sealing lip, springs or metal inserts made of other steel grades can be produced as well as all kinds of special designs. Minimum quantities may be obligatory for dimensions outside of the standard.



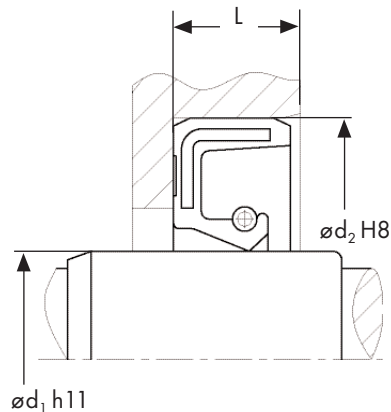
VIA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
128125	4	10	6	20466	10	30	7
73217	4	11	6	60311	10	30	8
150919	4	12	4	35204	11	17	4
77494	4	12	6	20263	11	22	7
20255	5	15	6	104187	11	22	8
22550	5	16	7	62560	11	26	6
20731	6	14	6	62493	11	26	7
73218	6	15	4	104188	11	30	7
104172	6	15	6	104189	12	18	4.5
104174	6	16	5	104190	12	18	5
20732	6	16	6	62617	12	19	5
20459	6	16	7	48599	12	20	5
104175	6	18	5	104192	12	21	4
20733	6	19	6	56742	12	22	4
62615	6	19	7	20734	12	22	4.5
56735	6	20	6	62620	12	22	6
20256	6	22	7	20264	12	22	7
104176	6	22	8	62621	12	22	8
20257	7	16	7	62624	12	24	6
20258	7	22	7	83161	12	24	6.5
104177	7	22	8	34929	12	24	7
43924	8	15	3	62625	12	24	8
20259	8	16	7	55894	12	25	5
56736	8	18	5	68241	12	25	7
104178	8	18	6	62633	12	25	8
37123	8	19	7	62561	12	26	7
83159	8	20	8	62562	12	26	8
104179	8	22	6	22551	12	28	7
20260	8	22	7	104193	12	28	8
104180	8	22	8	22552	12	30	7
62491	8	24	7	62576	12	30	10
127740	8	26	6.5	104194	12	32	5
62575	8	30	7	62489	12	32	7
62638	9	18	7	115494	12	35	7
104181	9	19	4	104317	12	50	5
56738	9	22	7	62622	13	22	4
56739	9	24	7	104195	13	22	5
62632	9	25	8	104196	13	25	7
62637	9	26	7	69946	13	26	7
83160	10	16	4	56746	13	30	7
104182	10	16	5	62577	13	30	8
62613	10	18	4	62623	14	22	4
104184	10	18	5	104197	14	22	7
104183	10	18	6	62626	14	24	6
104185	10	18	9	20265	14	24	7
62616	10	19	6	62634	14	25	7
20261	10	19	7	104198	14	26	7
56019	10	22	6	20735	14	27	7
20262	10	22	7	62566	14	28	7
62619	10	22	8	83162	14	28	10
56740	10	24	7	20266	14	30	7
104186	10	25	6	104199	14	30	8
62492	10	26	7	104200	14	32	7
56741	10	28	7	62596	14	35	7
20460	10	28	8	62597	14	35	8

VIA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
62618	15	21	4	62565	17	27	7
104201	15	22	7	62568	17	28	5
62627	15	24	5	62569	17	28	6
20267	15	24	7	20275	17	28	7
44932	15	25	5	20738	17	28	8
104202	15	25	6	62573	17	28.5	6
104203	15	26	4.5	104210	17	30	6
38305	15	26	7	20276	17	30	7
38306	15	26.5	4.6	62580	17	30	8
62563	15	27	7	20277	17	32	7
48601	15	28	5	62588	17	32	8
62567	15	28	6	20278	17	32	10
56747	15	28	7	62595	17	34.5	4
56748	15	30	4.5	104211	17	35	5
104204	15	30	5	104212	17	35	6
104205	15	30	5.5	22554	17	35	7
84881	15	30	6	62602	17	35	8
20268	15	30	7	62603	17	35	9.5
62578	15	30	8	20279	17	35	10
20269	15	30	10	153248	17	36	7
104206	15	32	5.5	104213	17	37	7
20270	15	32	7	62654	17	37	10
104207	15	33	7	62657	17	38	11
62599	15	35	5	62665	17	40	6
22553	15	35	7	60304	17	40	7
62600	15	35	8	104214	17	40	8
62601	15	35	10	62666	17	40	8.5
20736	15	37	7	62667	17	40	10
62664	15	40	10	20739	17	47	7
56749	15	42	7	104216	17	47	8
20271	15	42	10	104215	17	47	10
62635	15.6	25	7	62570	17.5	28	6
48603	16	22.2	4	62571	18	28	4
56750	16	24	4	56754	18	28	6
62628	16	24	5	20280	18	28	7
62629	16	24	7	56755	18	28	8
56730	16	26	7	20281	18	30	7
20272	16	28	7	56756	18	32	5
62574	16	29	10	62589	18	32	6
20273	16	30	7	20461	18	32	7
104208	16	30	8	62590	18	32	8
62579	16	30	10	104217	18	35	6
104319	16	32	7	62499	18	35	7
83163	16	32	8	62604	18	35	8
62586	16	32	10	36849	18	35	10
60305	16	35	7	44743	18	40	7
20274	16	35	10	62639	18	40	10
20476	16	40	10	62676	18	42	8
62587	16.5	32	9	62501	19	27	6
62630	17	24	5	20367	19	30	7
62631	17	24	7	62591	19	32	6
48604	17	25	4	62592	19	32	7
20737	17	26	6	62594	19	34	6
104209	17	26	7	104219	19	35	8
62564	17	27	6	104218	19	35	10

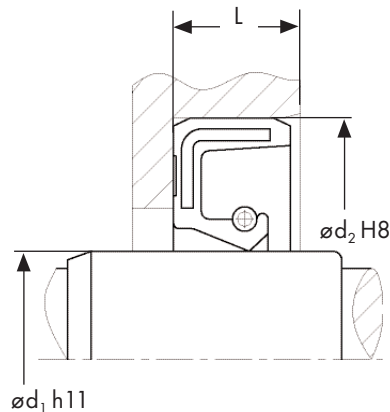
VIA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
104220	19	37	10	45802	22	40	5
104221	19	40	10	20294	22	40	7
62572	20	28	6	104234	22	40	8
104222	20	28	7	62670	22	40	8.5
37678	20	30	4.5	56764	22	40	10
72731	20	30	4.6	62678	22	42	7
20762	20	30	5	20295	22	42	10
20282	20	30	7	62857	22	45	7
104223	20	30	8	20740	22	47	7
104224	20	32	5	104235	22	47	10
104225	20	32	6	62659	23	38	7
20283	20	32	7	62660	23	38	8
22555	20	33	10	104236	23	40	10
104227	20	35	5	62915	23	52	12
104226	20	35	6	73220	24	35	6
20284	20	35	7	62503	24	35	7
62605	20	35	8	20462	24	36	7
22556	20	35	10	62504	24	37	7
104228	20	36	7	22561	24	38	10
115831	20	36	8	56766	24	38.5	10
62655	20	37	8	20296	24	40	7
104229	20	37	10	20297	24	40	10
62658	20	38	7	104238	24	42	7
22557	20	38	8	62679	24	42	8
62668	20	40	6	104237	24	42	10
20285	20	40	7	48611	24	45	7
62669	20	40	8.5	62868	24	47	7
20286	20	40	10	62869	24	47	10
62674	20	40.2	6	62916	24	52	10
62677	20	42	6	56767	24.5	40	8.5
20287	20	42	7	83166	25	32	6
22558	20	42	10	104239	25	32	7
62687	20	43	7.5	39210	25	33	6
62856	20	45	10	104240	25	35	5
20288	20	47	7	20298	25	35	7
62867	20	47	8	62649	25	35	8
20289	20	47	10	104241	25	35	10
62898	20	48	9	62653	25	36	7
22559	20	52	7	56768	25	37	5
62913	20	52	10	104242	25	37	6
62581	21	30	6.5	62656	25	37	7
83165	22	30	7	20299	25	38	7
20290	22	32	5.5	62662	25	38.1	8
56758	22	32	5.6	83167	25	40	5
20291	22	32	7	20300	25	40	7
104230	22	32	10	62671	25	40	8
62606	22	35	5.5	20301	25	40	10
104231	22	35	6	121228	25	41.2	6
62647	22	35	6.5	62680	25	42	6
20292	22	35	7	20463	25	42	7
22560	22	35	8	20302	25	42	8
62648	22	35	10	62681	25	42	8.5
104232	22	37	7	20303	25	42	10
20293	22	38	7	62692	25	43	9
104233	22	38	8	48615	25	43	10

VIA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
62505	25	45	7	56775	28	45	7
20304	25	45	10	20313	28	45	8
62864	25	46	7	20314	28	45	9
34930	25	47	7	36911	28	47	7
20305	25	47	8	104252	28	47	8
20306	25	47	10	20315	28	47	10
56769	25	50	7	104253	28	50	8
20307	25	50	10	20382	28	50	10
104243	25	50	12	21073	28	52	7
62912	25	51	11	62920	28	52	10
22562	25	52	7	62921	28	52	12
62917	25	52	8	104254	28	62	10
20308	25	52	10	63215	28	62	12
62918	25	52	12	62686	29	42	7
20370	25	55	10	62859	29	45	8
73222	25	62	7	62860	29	45	9.5
63214	25	62	8	62873	29	47	10
20309	25	62	10	62902	29	50	10
85351	25	72	7	62922	29	52	9
73957	26	34	4	63180	29	55	9
62650	26	35	7	63216	29	62	10
56771	26	36	7	73223	30	40	5
39719	26	37	7	20316	30	40	7
62640	26	37	10	104256	30	40	8
104244	26	40	7	104255	30	40	9
62682	26	42	6	62673	30	40	10
62507	26	42	7	104257	30	42	6
20310	26	47	7	20317	30	42	7
104245	26	47	10	104258	30	42	8
104246	26	52	8	20386	30	42	10
62651	27	35	4	124788	30	42.5	6
62652	27	35	7	104259	30	43	8
22563	27	37	7	62855	30	44	10
27548	27	41	10	104260	30	45	5
62683	27	42	7	104261	30	45	6
62684	27	42	10	62641	30	45	7
104247	27	47	6	22565	30	45	8
62870	27	47	8	20464	30	45	10
62871	27	47	9.8	62863	30	45.2	10
20311	27	47	10	104262	30	46	10
104248	27	50	10	144301	30	47	5
62919	27	52	8	104263	30	47	6
104249	28	38	5.5	20318	30	47	7
62661	28	38	6	62874	30	47	8
22564	28	38	7	20319	30	47	10
62672	28	40	5	37438	30	48	8
20312	28	40	7	104264	30	48	10
104250	28	40	8	62510	30	50	7
20742	28	40	10	62903	30	50	8
62685	28	42	7	20320	30	50	10
104251	28	42	8	73224	30	52	5
56774	28	42	10	62923	30	52	6
62693	28	43	9	20321	30	52	7
62852	28	43	10	62924	30	52	8
62854	28	44	10	20322	30	52	10

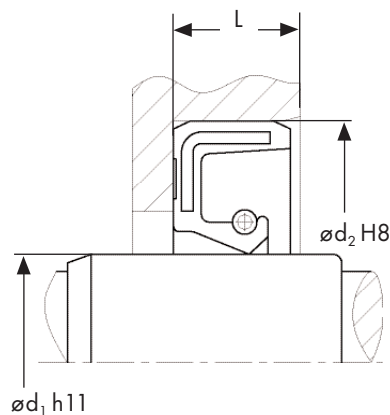
VIA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
62925	30	52	12	62931	33	52	6
63175	30	54	10	63163	33	52	8
56924	30	55	7	104272	33	52	10
20323	30	55	10	63190	33	56	12
63181	30	55	12	20743	34	44	7
104265	30	56	8	104273	34	45	7
20324	30	56	10	62865	34	46	10
104266	30	56	12	22570	34	49	8
63193	30	57	8	104274	34	50	8
63203	30	60	10	62644	34	50	10
20325	30	62	7	62911	34	50.8	7.8
63218	30	62	8	22571	34	52	7.5
20326	30	62	10	63164	34	52	8
63219	30	62	12	60221	34	52	10
104267	30	65	10	104321	34	55	7
62643	30	72	10	63184	34	55	9
22566	31	47	7	73226	34	55	10
62875	31	47	10	63194	34	58	13
62926	31	52	6	63221	34	62	10
62927	31	52	7	56785	35	44	7
62928	31	52	9	20744	35	45	7
63182	31	55	9	104275	35	45	10
38282	32	42	7	104276	35	47	5
62862	32	45	6	56786	35	47	6
20327	32	45	7	20331	35	47	7
104268	32	45	8	62896	35	47	10
22567	32	45	10	104320	35	48	7
73225	32	47	6	104277	35	48	8
24863	32	47	7	62901	35	48	9
104269	32	47	8	20332	35	50	7
62895	32	47	10	56787	35	50	8
62899	32	48	7	20333	35	50	10
56782	32	48	8	20334	35	52	7
62511	32	50	7	104278	35	52	8
62904	32	50	8	63166	35	52	8.8
20328	32	50	10	20335	35	52	10
62906	32	50	12	63167	35	52	12
62512	32	52	7	57150	35	53	9
62929	32	52	7.5	63177	35	54	8
104270	32	52	8	22572	35	54	10
20329	32	52	10	63185	35	55	8
62930	32	52	12	20336	35	55	10
63183	32	55	10	104279	35	55	12
59728	32	56	10	63191	35	56	8
22568	32	57	9.5	20337	35	56	10
104271	32	62	8	104280	35	56	12
63220	32	62	10	63195	35	58	7.5
63249	32	66	10	63196	35	58	10
22569	32	70	8	63197	35	58	12
62853	33	43	7	63204	35	60	10
56783	33	45	7	63205	35	60	12
62900	33	48	12	20338	35	62	7
62907	33	50	6	20339	35	62	10
83171	33	50	8	63223	35	62	12
20330	33	50	10	63239	35	65	9

VIA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
104281	35	65	10	62909	40	50	8
63240	35	65	12	104291	40	52	5
22573	35	68	6	56798	40	52	6
24429	35	68	10	20346	40	52	7
63255	35	68	12	63172	40	52	8
49578	35	72	7	63174	40	52	10
20340	35	72	10	56697	40	55	7
63272	35	72	12	20347	40	55	8
104282	35	80	10	63188	40	55	10
104283	35	80	12	104292	40	56	7
62515	36	47	7	22577	40	56	8
22574	36	48	10	20349	40	56	10
83172	36	50	7	38545	40	56	12
56796	36	50	10	104294	40	58	7
62517	36	52	7	104293	40	58	8
22575	36	54	7.5	57151	40	58	9
60592	36	56	10	20465	40	58	10
48626	36	58	10	62521	40	60	7
63198	36	58	12	104295	40	60	8
63225	36	62	7	20350	40	60	10
63227	36	62	10	104296	40	60	12
48627	36	65	10	20351	40	62	7
63256	36	68	10	104297	40	62	8
63297	36	75	12	20352	40	62	10
20483	37	52	8	63230	40	62	12
22576	37	52	10	20353	40	65	10
63228	37	62	8	63242	40	65	12
63274	37	72	12	20354	40	68	10
20341	38	50	7	63259	40	68	11
44635	38	50	8	104298	40	68	12
104284	38	50	10	104300	40	70	8
20342	38	52	7	63269	40	70	10
63169	38	52	8	104299	40	70	12
63170	38	52	10	22578	40	72	7
56797	38	54	6.5	20355	40	72	10
63178	38	54	10	104301	40	72	12
63186	38	55	6	104302	40	78	10
62518	38	55	7	104303	40	80	8
104285	38	55	10	22579	40	80	10
20343	38	56	10	63305	40	80	13
104286	38	58	10	20745	40	85	10
62519	38	60	7	62910	42	50	7
20344	38	60	10	121811	42	52	8
104287	38	60	12	62645	42	55	7
62520	38	62	7	35882	42	55	8
104288	38	62	8	104304	42	55	10
20345	38	62	10	20356	42	56	7
63229	38	62	12	63199	42	58	10
63236	38	63.5	9.5	104305	42	60	8
36037	38	65	8	44553	42	60	10
104289	38	65	10	22580	42	60	12
63275	38	72	10	22581	42	62	7
63294	38	74	10	37439	42	62	8
63241	39	65	9	20357	42	62	10
104290	40	50	7	63232	42	62	12

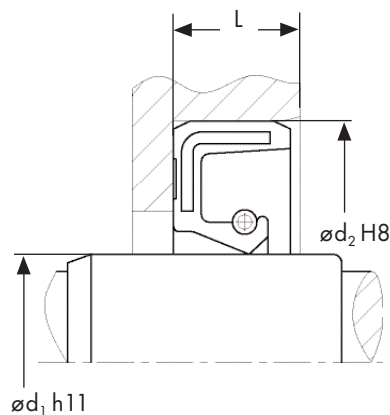
VIA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
104343	42	65	8	57152	46	64	9
20358	42	65	10	83173	46	72	10
63243	42	65	12	22586	47	58	6
62523	42	68	8	48646	47	62	6
63260	42	68	11.5	20368	47	65	10
62524	42	72	8	63254	47	67	12
25635	42	72	10	63289	47	72	9
104306	42	72	12	83174	47	80	8
63306	42	80	10	104327	47	80	10
63318	42	81	13	20369	48	62	8
63206	43	60	10	63235	48	62	10
63233	43	62	10	83175	48	65	7
63244	43	65	13	20467	48	65	10
63250	43	66	10	104322	48	68	8
63251	43	66	12	63261	48	68	12
22582	43	70	12	63270	48	70	10
63307	43	80	10	62532	48	72	8
63179	44	54	4.5	20371	48	72	10
75998	44	55	7	63290	48	72	12
63200	44	58	10	63295	48	74	10
63207	44	60	10	104311	48	80	8
104307	44	62	10	20372	48	80	10
62525	44	65	8	63320	48	85	6
20359	44	65	10	63321	48	85	10
63286	44	72	10	63322	48	85	13
63293	44	73	12	63341	48	90	10
20504	45	55	7	59611	50	58	8
104308	45	55	8	56806	50	60	7
20360	45	60	7	20373	50	62	7
44088	45	60	8	118798	50	62	8
22583	45	60	10	20374	50	65	8
104309	45	60	12	132907	50	65	9
20746	45	62	7	63248	50	65	10
20361	45	62	8	63253	50	66	10
20362	45	62	10	20748	50	68	8
22584	45	62	12	20375	50	68	10
63237	45	63.5	9.5	63263	50	68	12
20363	45	65	8	62533	50	70	8
20364	45	65	10	20376	50	70	10
63246	45	65	12	20377	50	70	12
20747	45	66	6	20378	50	72	8
63252	45	66	10	20379	50	72	10
44796	45	68	10	22587	50	72	12
63266	45	68.2	12	69906	50	75	10
104310	45	70	10	63298	50	75	12
20365	45	70	12	20380	50	80	8
36447	45	72	8	20381	50	80	10
63287	45	72	9	104312	50	85	10
20366	45	72	10	63323	50	85	13
63288	45	72	12	20383	50	90	10
56803	45	75	10	20484	52	62	8
22585	45	80	10	20468	52	68	8
63308	45	80	13	63267	52	69	10
62646	45	85	10	20384	52	72	8
63238	46	64	8	20385	52	72	10

VIA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
104313	52	72	12	20399	58	80	10
73232	52	75	10	63329	58	85	10
22588	52	75	12	63330	58	85	13
60355	52	80	10	63338	58	86	14
63310	52	80	13	63346	58	90	10
63264	53	68	10	73233	60	72	8
63311	53	80	10	20400	60	75	8
63265	54	68	10.5	22596	60	75	10
22589	54	70	12	63300	60	75	12
63291	54	72	10	35753	60	78	10
63296	54	74	8	20401	60	80	8
63301	54	76	12.5	20402	60	80	10
83176	54	85	10	39761	60	80	12
63324	54	85	15	63313	60	80	13
22590	54	90	10	116639	60	82	12
22591	54	90	13	56817	60	85	8
83177	55	68	8	20403	60	85	10
148479	55	70	7	63331	60	85	13
20387	55	70	8	35517	60	90	8
20388	55	70	10	20404	60	90	10
20389	55	72	8	20405	60	90	13
20390	55	72	10	20406	60	95	10
36701	55	75	8	63358	60	100	10
20391	55	75	10	63449	60	100	13
22592	55	75	12	63464	60	110	12
63303	55	78	10	56819	60	110	13
20392	55	80	8	48657	60	130	12
20393	55	80	10	61337	61	75	8
104314	55	80	12	63314	61	80	13
20394	55	80	13	83178	62	76	10
26934	55	85	8	73234	62	80	10
62535	55	85	10	63315	62	80	12
20395	55	85	13	20407	62	85	10
63327	55	85	16	20749	62	85	12
20396	55	90	10	63332	62	85	13
63345	55	90	13	62540	62	90	10
34294	55	100	13	63347	62	90	11
63357	55	100	16	63450	62	100	10
48656	55	120	12	20471	63	85	10
56812	56	70	8	62541	63	90	10
20397	56	72	8	63348	63.5	90	13
63292	56	72	10	63316	64	80	8
63302	56	76	11	63333	64	85	13
62538	56	80	8	20408	65	80	8
22593	56	80	12	20409	65	80	10
36884	56	85	8	63317	65	80	12
63339	56	88	10	56827	65	85	8
63340	56	88	13	20410	65	85	10
71719	56	90	10	62543	65	85	12
20398	58	72	8	79619	65	85	13
56814	58	72	10	20411	65	90	10
22594	58	75	8	62544	65	90	12
56815	58	78	13	63350	65	90	13
22595	58	80	8	63351	65	92	13
20470	58	80	9	20458	65	95	10

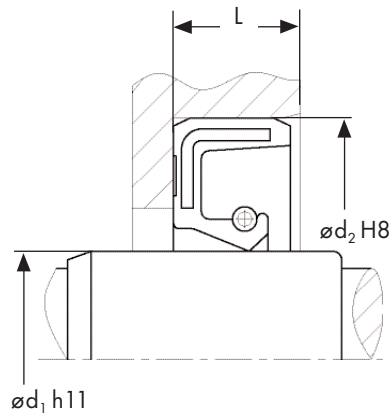
VIA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
63353	65	95	13	44828	75	120	10
20750	65	100	10	63482	75	120	12
63451	65	100	12	143474	75	130	13
63452	65	100	13	63461	76	105	13
63465	65	110	10	63455	77	100	10
63491	65	125	12	63356	78	95	11
38370	68	90	6	20482	78	95	13
20412	68	90	10	20427	78	100	10
63354	68	95	13	83182	78	105	13
20413	68	100	10	20433	78	110	12
63453	68	100	13	63530	78	150.5	13
83179	70	85	7	20481	80	95	8
20414	70	85	8	20428	80	100	10
63336	70	85	10	62549	80	100	12
56831	70	88	9	63456	80	100	13
20415	70	90	10	63462	80	105	10
56833	70	90	12	20505	80	105	12
20472	70	90	13	63463	80	105	13
63352	70	92	13	62550	80	110	10
20473	70	95	10	20429	80	110	12
20418	70	95	13	104315	80	110	13
20419	70	100	10	63477	80	113	12
20420	70	100	12	56837	80	115	12
22597	70	100	13	63483	80	120	13
63459	70	105	13	63492	80	125	12
56834	70	110	10	63501	80	130	13
63466	70	110	12	63515	80	140	13
63474	70	110	13	63521	80	145	13
63475	70	112	12	20430	82	105	12
63481	70	120	13	63467	82	110	12
134947	70	125	12	104316	83	110	13
63508	70	135	12	127705	85	100	9
63337	72	85	8	67964	85	105	10
22598	72	85	10	104323	85	105	12
83180	72	90	10	60338	85	105	13
20474	72	95	10	69609	85	110	10
69688	72	95	12	20431	85	110	12
63355	72	95	13	63469	85	110	13
62547	72	100	10	63478	85	115	13
63454	72	100	13	23736	85	120	12
20426	73	100	13	63484	85	120	13
63458	74	101.4	12	63493	85	125	12
63460	74	105	12	63496	85	126	13
116427	75	85	13	83183	86	100	7
20421	75	90	8	63471	87	110	13
20422	75	90	10	20432	88	110	12
20423	75	95	10	63472	88	110	13
20424	75	95	12	63486	88	120	12
20425	75	100	10	63497	88	126	12
56835	75	100	12	63499	88	128	12
60332	75	100	13	63516	88	140	13
63457	75	101	12	75066	90	110	10
22599	75	110	12	20434	90	110	12
22600	75	110	13	37669	90	115	9
63476	75	112	12	44008	90	115	12

VIA

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
63479	90	115	13	63518	105	140	13
35176	90	120	9	63522	105	145	16
20435	90	120	12	63548	105	170.5	12
56840	90	120	13	48666	110	128	9
63494	90	125	14	20753	110	130	8
63503	90	130	13	20443	110	130	12
63513	91	136	12	22605	110	130	13
37613	92	120	13	56850	110	130	14.5
63487	92	120	14	63511	110	135	12
22601	93	115	13	63512	110	135	13
83184	95	110	6	20445	110	140	12
83185	95	110	10	22606	110	140	13
63473	95	110	12	63523	110	145	13
62552	95	115	13	26445	110	150	13
20436	95	120	12	63528	110	150	15
63489	95	120	13	63531	110	155	15
20751	95	125	12	48667	110	200	13
63495	95	125	13	63519	112	140	13
63504	95	130	13	20444	114	140	13
63509	95	135	13	63507	115	130	12
63526	95	150	15	83187	115	135	9
63532	95	160	15	57142	115	135	10
156564	95	170	13	36719	115	137	9
63547	95	170.5	12	56851	115	140	10
34302	96	117	10	20446	115	140	12
63514	96	136	12	63524	115	145	13
63505	97	130	14	36451	115	150	12
20437	98	120	13	63533	115	160	15
34307	98	125	13	63549	115	170.5	13
63500	98	128	10	83188	120	135	12
63553	98	180.5	13	35046	120	140	10
63480	100	115	9	116428	120	140	12
57141	100	120	10	20447	120	140	13
20438	100	120	12	20448	120	150	12
22602	100	120	13	20754	120	150	13
20439	100	125	12	62556	120	150	15
22603	100	125	13	83733	120	150	16
63498	100	127	13	56855	120	160	12
20440	100	130	12	63534	120	160	13
63506	100	130	13	20450	120	160	15
56845	100	130	14	56856	125	140	10
63517	100	140	13	20451	125	150	12
63527	100	150	13	63529	125	150	13
22604	104	120	13	62558	125	150	15
24731	104	125	10	56857	125	155	12
20752	105	125	13	20479	125	160	12
134450	105	129	12	63535	125	160	15
20441	105	130	12	63542	127	170	14
60192	105	130	13	63525	128	146	13.5
56848	105	130	15	22607	128	150	13
104331	105	132	12	56860	128	158	20
48665	105	135	12	56861	130	150	10
63510	105	135	13	126322	130	150	13
132958	105	135	15	34870	130	160	12
20442	105	140	12	20478	130	160	13

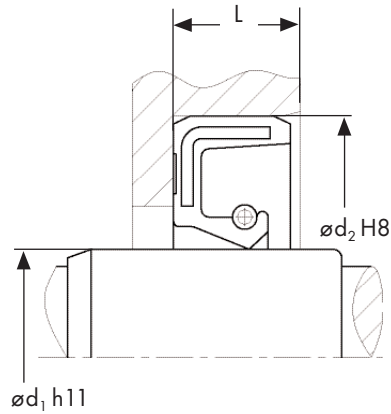
VIA

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
20452	130	160	15	63557	160	200	12
63539	130	165	13	63558	160	200	15
35701	130	170	12	20501	162	190	12
22608	130	170	13	92193	164.5	190	13
3543	130	170	15	144474	165	190	8
63554	130	182	16	22611	165	190	13
143318	130	230	14	64840	165	200	15
48677	130	230	15	118033	170	190	12
22609	135	160	12	20486	170	190	15
63536	135	160	13	57145	170	192	12
63540	135	165	12	20456	170	200	12
60467	135	165	15	49444	170	200	13
37462	135	170	12	20457	170	200	15
36455	135	170	15	83189	175	200	10
56863	138	160	15	134452	175	200	12
149918	140	160	13	27474	175	200	15
57143	140	162	12	127896	175	205	15
79560	140	165	12	22612	175	210	14
56476	140	165	15	151764	175	210	15
56501	140	165	16	20487	180	200	13
38656	140	170	12	36182	180	200	15
63544	140	170	13	57146	180	202	12
20453	140	170	15	22613	180	210	15
56865	140	180	12	20488	180	215	15
25848	140	180	13	22614	180	215	16
20480	140	180	15	24749	180	220	15
63537	144	160	12	73240	185	210	10
48678	144.5	165	13	20489	185	210	13
63541	145	165	13	48705	185	215	16
63545	145	170	15	57140	190	212	12
20477	145	175	15	20490	190	220	15
20755	145	180	12	71699	190	225	16
20485	145	180	13	75102	195	220	16
22610	145	180	14	57147	200	222	12
92182	146	163	7	56872	200	225	15
56866	148	170	14.5	20491	200	230	13
48682	149.5	180	13	20492	200	230	15
20475	150	170	12	151763	200	235	18
63546	150	170	15	20493	200	250	15
56867	150	180	12	56873	205	230	16
20469	150	180	13	57148	210	232	12
20454	150	180	15	22615	210	240	15
60232	155	174	12	56874	210	250	15
48693	155	175	12	56875	210	290	20
57144	155	177	12	65053	215	240	12
134451	155	180	12	60326	220	250	12
37105	155	180	13	20494	220	250	15
63551	155	180	15	48711	220	255	16
63552	158	180	15	72596	220	260	15
118032	160	180	12	36230	220	260	16
56868	160	185	10	20495	230	260	15
63555	160	185	15	22616	230	280	15
126323	160	190	12	130175	230	280	16
63556	160	190	13	20496	240	270	15
20455	160	190	15	71700	240	275	16

VIA

Sizes metric



Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L
56877	240	280	15
20497	250	280	15
134769	250	290	16
118680	255	290	16
48713	260	290	15
73047	260	290	16
117338	260	290	20
75104	260	300	16
22617	260	300	20
44090	265	290	16
152978	270	300	15
129934	270	310	16
20498	280	310	15
36946	280	320	20
56878	280	350	16
56906	290	330	20
24094	300	340	18
36073	300	340	20
35008	300	344	20
149518	310	350	18
124924	320	350	15
20499	320	360	18
27394	320	360	20
122109	325	365	16
48718	330	370	18
122603	335	375	18
150888	340	372	16
44619	340	380	18
134402	340	380	20
56879	350	390	18
78377	360	400	18
118859	365	405	18
56880	370	410	15
26244	380	420	20
56882	390	430	20
56883	394	420	16
56884	400	440	20
37895	420	460	20
26245	440	480	20
83190	450	500	22
134401	460	500	20
117891	460	510	22
56887	480	520	20
56655	500	540	20
44881	500	550	22
83384	560	610	20
59499	600	640	20
130179	670	730	25

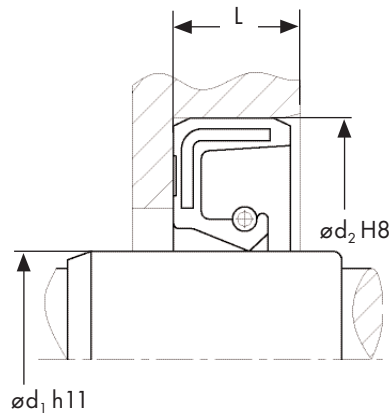
VIA

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
83158	6.35	15.87	4.76	0.25	0.625	0.187
37270	6.35	19.05	6.35	0.25	0.75	0.25
104318	12.7	22.22	6.35	0.5	0.875	0.25
56744	12.7	25.4	4.76	0.5	1	0.187
37714	12.7	25.4	6.35	0.5	1	0.25
56745	12.7	31.75	9.52	0.5	1.25	0.375
62636	15.7	25.5	4.6	0.618	1.004	0.181
27465	15.87	25.4	4.76	0.625	1	0.187
49505	15.87	28.57	6.35	0.625	1.125	0.25
56753	17.27	28.44	9.52	0.68	1.12	0.375
156524	17.46	28.57	6.35	0.687	1.125	0.25
83164	19.05	28.57	6.35	0.75	1.125	0.25
78356	19.05	31.75	6.35	0.75	1.25	0.25
38250	22.22	34.92	6.35	0.875	1.375	0.25
56761	22.22	35.15	9.52	0.875	1.384	0.375
56765	23.81	36.51	6.35	0.937	1.437	0.25
115832	25.4	41.27	6.35	1	1.625	0.25
83168	25.4	41.27	7.93	1	1.625	0.312
78520	25.4	44.45	5.16	1	1.75	0.203
45081	25.4	44.45	9.52	1	1.75	0.375
62675	26.92	41.15	7.87	1.06	1.62	0.31
44746	26.98	38.1	6.35	1.062	1.5	0.25
83169	26.98	47.62	9.52	1.062	1.875	0.375
21145	28.57	41.27	9.52	1.125	1.625	0.375
21144	28.57	50.8	11.11	1.125	2	0.437
38292	28.57	50.8	12.7	1.125	2	0.5
62663	28.6	39.65	4.75	1.126	1.561	0.187
56777	30.16	44.45	6.35	1.187	1.75	0.25
83170	31.75	44.45	9.52	1.25	1.75	0.375
116982	31.75	47.62	6.35	1.25	1.875	0.25
38254	31.75	50.8	9.52	1.25	2	0.375
76485	34.92	49.9	9.92	1.375	1.965	0.391
41539	36.51	57.15	7.93	1.437	2.25	0.312
120894	44.45	61.91	7.93	1.75	2.437	0.312
38148	44.45	63.5	9.52	1.75	2.5	0.375
26354	44.45	63.5	12.7	1.75	2.5	0.5
48640	44.65	60.32	6.35	1.758	2.375	0.25
104325	45.65	60.32	6.35	1.797	2.375	0.25
56805	47.62	69.85	12.7	1.875	2.75	0.5
63268	49.2	69.95	9.5	1.937	2.754	0.374
56807	50.8	63.5	6.35	2	2.5	0.25
38149	50.8	69.85	9.52	2	2.75	0.375
56810	53.97	79.37	12.7	2.125	3.125	0.5
56813	57.15	82.55	12.7	2.25	3.25	0.5
41540	61.91	88.9	9.52	2.437	3.5	0.375
56820	61.91	95.73	12.7	2.437	3.769	0.5
55947	63.5	73.02	6.35	2.5	2.875	0.25
73235	63.5	82.55	9.52	2.5	3.25	0.375
56825	63.5	88.9	11.11	2.5	3.5	0.437
63342	65.88	88.9	12.7	2.594	3.5	0.5
56828	66.67	85.72	9.52	2.625	3.375	0.375
56829	66.67	92.07	11.91	2.625	3.625	0.469
56830	69.85	88.9	9.52	2.75	3.5	0.375
83181	76.2	107.95	12.7	3	4.25	0.5
73236	77.78	114.3	12.7	3.062	4.5	0.5

VIA

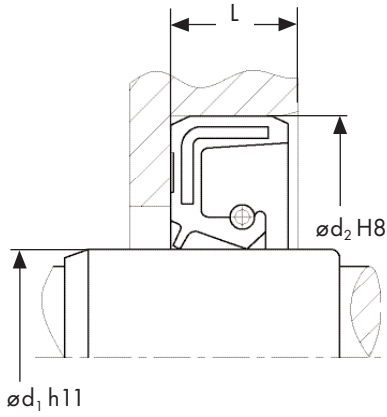
**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
107883	101.6	127	11.11	4	5	0.437
56907	101.6	139.7	12.7	4	5.5	0.5
83186	104.77	136.39	12.7	4.125	5.37	0.5
38097	107.95	133.35	12.7	4.25	5.25	0.5
56859	127	152.4	12.7	5	6	0.5
63538	134.94	161.92	12.7	5.313	6.375	0.5
38098	158.75	184.15	12.7	6.25	7.25	0.5
80401	165.1	190.5	14.28	6.5	7.5	0.562
69474	177.8	203.2	12.7	7	8	0.5
48704	177.8	206.38	10.15	7	8.125	0.4
148712	177.8	222.25	9.52	7	8.75	0.375
56870	184.15	222.25	14.28	7.25	8.75	0.562
37031	234.95	266.7	15.87	9.25	10.5	0.625
56208	266.7	317.5	25.4	10.5	12.5	1
92197	285.75	336.55	23.81	11.25	13.25	0.937
148710	330.2	376.23	15.87	13	14.812	0.625
148711	342.9	388.93	15.87	13.5	15.312	0.625

VIAS

Sizes metric

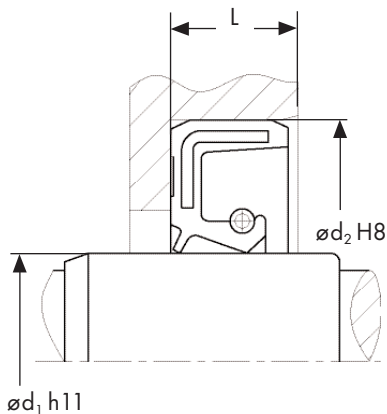


Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
56737	8	22	7	22500	25	40	7
152053	9	18	7	73221	25	40	8
62614	10	18	6	20774	25	42	7
135245	10	19	7	62689	25	42	8
62494	11	26	7	62858	25	45	10
56743	12	22	7	62872	25	47	7
62612	12	24	7	56770	25	52	7
76242	12	28	7	82368	25	62	7
88549	14	24	5	62506	26	37	7
62495	14	28	7	22501	26	42	7
22497	15	24	7	135018	26	47	7
62582	15	26	7	56772	26	52	10
134230	15	28	7	62690	27	42	10
62584	15	30	7	62508	28	38	7
82246	15	35	7	134897	28	40	7
56751	16	28	7	56776	28	47	7
62585	16	30	4.5	22161	28	47	10
62496	16	32	7	22502	28	52	7
62497	16	35	7	44792	30	40	7
56752	17	28	6	72723	30	42	6
62583	17	28	7	22503	30	42	7
34254	17	30	7	62691	30	42	8
62498	17	32	7	62509	30	45	7
62610	17	35	8	62861	30	45	8
35375	17	39	9.5	21967	30	47	7
45841	17	47	5	36444	30	52	7
88212	18	28	6	22504	30	52	10
152998	18	28	7	76243	30	55	7
73219	18	30	7	56778	30	55	10
62607	18	32	6	63217	30	62	7
40556	18	32	7	64390	30	62	8
83096	18	32	8	56779	30	72	8
62500	18	35	7	84916	32	40	7
152997	19	30	6.5	115489	32	47	6
80199	19	30	7	56781	32	47	7
62593	19	32	10	88552	32	48	8
38946	20	30	7	62905	32	50	10
126248	20	32	5	143691	32	52	7
25717	20	32	7	63189	32	56	10
62611	20	35	7	40293	32	65	13
127927	20	35	10	126808	32	72	7
22498	20	40	7	63271	34	72	14.5
62502	20	42	7	157345	35	46	7
62866	20	47	7	22505	35	47	7
62897	20	47.5	7	62513	35	48	7
48609	22	32	7	38947	35	50	7
83191	22	35	7	56794	35	50	8
56763	22	40	7	62908	35	50	10
62914	22	52	10	56795	35	52	5.5
22107	24	36	7	22506	35	52	6
22499	24	38.5	10	63165	35	52	7
62688	24	40	7	22507	35	52	10
62609	25	32	6	62514	35	55	7
72722	25	35	5	73227	35	55	10
21966	25	35	7	44802	35	55	11

VIAS

Sizes metric

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
63192	35	56	12	21208	45	62	7
36445	35	62	7	56698	45	62	8
63222	35	62	8	60647	45	62	10
104344	35	62	10	157346	45	63	10
63224	35	62	12	62527	45	65	8
124582	35	72	7	63245	45	65	10
81536	35	72	10	36448	45	72	8
63273	35	72	12	60352	45	72	10
127007	35	80	12	135227	45	75	7
62516	36	50	7	62528	45	75	8
22508	36	52	6	56804	45	75	10
22509	36	52	7	73231	45	80	10
63168	36	52	9	74479	45	85	10
22510	36	62	7	63343	45	90	10
22237	38	52	7	132867	45	100	10
122477	38	55	7	60319	46	65	8
63187	38	55	10	48649	48	62	8
22511	38	62	7	62529	48	65	8
73228	38	62	10	22514	48	65	10
63171	39	52	10	62530	48	68	8
56561	40	52	7	63262	48	68	14
63173	40	52	9	22515	48	72	8
130576	40	52	10	22516	50	65	8
22512	40	55	6	56808	50	68	8
22513	40	55	7	83193	50	68	10
20348	40	55	8	38949	50	70	10
75767	40	58	8	22517	50	72	7
63202	40	59	9.5	36449	50	72	8
84822	40	60	10	22518	50	72	10
20775	40	62	7	48650	50	72	12
38948	40	62	10	48653	50	75	10
48635	40	62	12	22519	50	80	8
60690	40	65	10	63309	50	80	10
75825	40	65	12	22520	50	80	13
56799	40	68	10	121798	50	90	10
48637	40	72	7	121799	50	110	10
73229	40	72	10	62531	52	68	8
73230	40	80	10	22521	52	72	8
63304	40	80	12	63319	54	81	10
127620	40	85	10	22522	55	70	8
56800	40	90	12	38950	55	70	10
77493	42	55	7	56811	55	72	8
62522	42	55	8	22523	55	72	10
75063	42	55	9	62534	55	75	8
48638	42	56	7	63299	55	75	10
104346	42	60	7	135224	55	75	12
63231	42	62	7	83194	55	78	12
56801	42	62	8	36453	55	80	8
63234	44	62	10	56232	55	80	10
143525	45	55	7	63326	55	85	10
104345	45	56	7	63344	55	90	10
63201	45	58	7	152972	55	100	10
63208	45	60	7	62536	56	70	8
62526	45	60	8	62537	56	72	8
63213	45	60	10	63328	57	85	13



VIAS

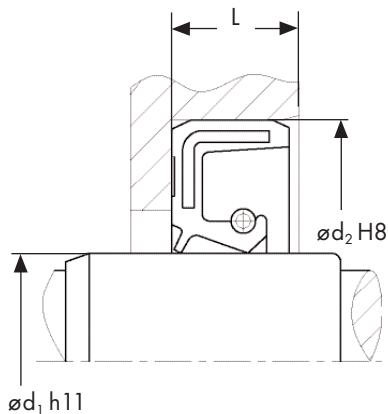
**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
152909	58	72	10	22540	85	120	12
22524	58	80	8	63485	85	120	13
22238	58	80	9	63502	85	130	12
22525	60	75	8	22541	85	130	13
151001	60	75	10	56838	90	110	12
121712	60	78	9	56839	90	110	13
22526	60	80	7	57135	90	115	12
36454	60	80	8	73237	90	117.5	12.5
63312	60	80	9	157489	90	120	12
21156	60	80	10	125902	95	110	10
21666	60	80	12	22542	95	115	13
83195	60	85	8	63488	95	120	10
21157	60	85	10	36450	95	120	12
62539	60	90	8	38119	95	120	13
56818	60	90	10	22543	95	125	12
157166	60	95	10	56841	95	125	13
22527	63	85	10	152197	95	145	13
62542	63	90	10	56842	100	115	9
63334	64	85	16	66385	100	120	8
63349	64	90	13	63490	100	120	10
56826	65	80	8	73238	100	120	12
22528	65	80	10	62553	100	120	13
36446	65	85	10	57136	100	125	12
22529	65	85	13	21344	100	130	12
22530	65	90	10	45436	100	135	13
62545	65	100	10	56846	100	135	15
156945	65	100	12	149669	100	180	12
130572	68	80	7	148593	104	125	10
38371	68	90	6	56847	105	125	13
22531	68	90	10	134453	105	129	12
63335	70	85	8	66391	105	130	8
22532	70	90	10	62554	105	130	12
84926	70	90	12	37962	105	130	13
83196	70	90	13	118724	108	130	13
62546	70	95	10	56849	110	130	12
22533	70	100	8	42642	110	140	12
22534	70	100	10	63520	112	140	13
134959	70	125	12	22544	115	140	12
62548	72	100	10	36452	115	150	12
119050	73	96	9	62555	120	140	12
83197	75	90	8	56853	120	140	13
22535	75	95	10	22545	120	150	12
22536	75	100	10	57149	120	150	13
59397	75	100	12	56854	120	150	15
48661	75	115	12	62557	120	160	12
130573	77	95	10	22546	125	150	12
35355	80	100	10	56858	125	155	12
22537	80	100	13	48670	128	146	13.5
22538	80	110	10	56862	130	150	12
146162	80	130	13	48672	130	150	15
63468	84	110	16	73239	130	160	12
135225	85	100	12	22547	130	160	15
62551	85	105	12	62559	130	170	12
22539	85	110	12	134454	135	160	12
63470	85	110	13	83198	135	160	15

VIAS

Sizes metric

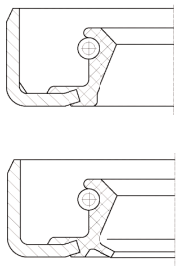
Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
36456	135	170	15	117548	560	590	20
127396	140	160	13	134118	670	730	25
22548	140	170	12	130529	720	760	20
37164	140	170	13				
60178	140	170	14				
56864	140	170	15				
156268	140	180	15				
48679	145	170	15				
83199	145	175	15				
151519	145	184	15				
90735	150	180	10				
57137	150	180	13				
63550	150	180	14				
69508	150	180	15				
134455	155	180	12				
57138	155	185	15				
69911	155	190	15				
48695	160	180	10				
151602	160	185	10				
25697	160	190	15				
148905	162	190	15				
149618	168	200	13				
149619	170	200	13				
27300	170	200	15				
72495	170	204	10				
134456	175	200	12				
56869	180	200	16				
24676	180	210	15				
60259	185	210	13				
48707	190	215	16				
124590	190	220	15				
56871	190	225	16				
48708	190	230	16				
27506	200	230	15				
57139	200	240	16				
48709	207	240	16				
143883	210	240	15				
56876	210	290	20				
48710	220	250	15				
22549	230	260	15				
48712	240	270	15				
42609	265	290	16				
73241	280	320	20				
48717	310	340	15				
48719	360	390	15				
48720	360	400	20				
56881	380	420	20				
104347	394	420	16				
56885	420	470	20				
48723	440	480	20				
56886	450	500	22				
135295	470	500	20				
48724	480	520	20				
56888	500	540	20				
116745	540	590	20				



VIAS

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
48600	12.7	22.22	6.35	0.5	0.875	0.25
56757	19.05	31.75	6.35	0.75	1.25	0.25
152317	20.63	31.75	6.35	0.812	1.25	0.25
56762	22.22	35.15	9.52	0.875	1.384	0.375
46854	25.4	38.1	9.52	1	1.5	0.375
157077	25.4	44.45	6.76	1	1.75	0.266
83192	25.4	44.45	9.52	1	1.75	0.375
44747	26.98	38.1	6.35	1.062	1.5	0.25
134033	29.36	38.1	4.76	1.156	1.5	0.187
134030	29.36	42.82	7.93	1.156	1.686	0.312
56780	31.75	41.27	6.35	1.25	1.625	0.25
134034	36.51	47.62	6.35	1.437	1.875	0.25
134031	36.51	50.8	7.93	1.437	2	0.312
63176	37.5	52.6	12.5	1.476	2.071	0.492
149273	38.1	57.15	9.52	1.5	2.25	0.375
134029	41.27	53.97	6.35	1.625	2.125	0.25
134032	41.27	60.32	9.52	1.625	2.375	0.375
39636	47.62	70.84	15.87	1.875	2.789	0.625
156704	50.8	69.85	11.11	2	2.75	0.437
79690	60.32	79.37	9.52	2.375	3.125	0.375
79689	63.5	92.07	9.52	2.5	3.625	0.375
69713	63.5	95.25	9.52	2.5	3.75	0.375
134355	69.85	88.9	12.7	2.75	3.5	0.5
59417	85.72	111.12	9.52	3.375	4.375	0.375
59418	107.95	133.35	7.93	4.25	5.25	0.312
48692	152.4	187.32	19	6	7.375	0.748
148709	273.05	323.85	25.4	10.75	12.75	1



WB/WBS

Rotary shaft seal in standard design with a metal outer surface and a spring-energised sealing lip made of elastomer. In addition, the standard model is available with a protective lip (WBS) on the air side.

Standard materials

NBR 70
Colour: black
Energised spring: non-alloy spring steel according to DIN EN 10270-1
Metal housing: non-alloy steel according to DIN EN 10139

Areas of application

Sealing of rotating machine elements such as shafts, hubs and axles.

Function

The WB/WBS is a single action rotary shaft seal for rotating or pivoting shafts with optional protective lip sealing action (WBS) on the side facing away from the medium, against dirt accumulation from the outside. Tight and accurate fitting is achieved by the metal outer surface. The WB/WBS model has limited sealing action with thin fluid or gaseous media and with split housings.

To guarantee a high degree of static sealing on the outer surface, better surface treatment of the housing bore is required or an additional coat of paint should be applied to the outer surface.

Media

Good chemical resistance to diverse mineral oils and greases. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): $\leq 0.05/0.5$
Temperature ($^{\circ}\text{C}$): -40 to $+100$
Peripheral speed (m/s): ≤ 12
Please also refer to our rotational speed diagram on page 20 of this catalogue.

Installation

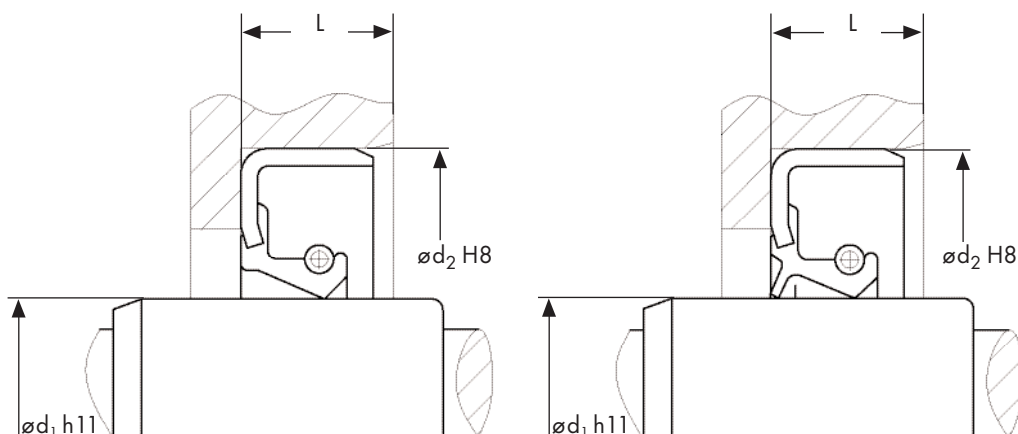
Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. double dust protection lip, spiral on the sealing lip, spring or metal insert made of other steel grades can be produced as well as all kinds of special designs. WB/WBS are available with an additional coat of paint.

Minimum quantities may be obligatory for dimensions outside of the standard.



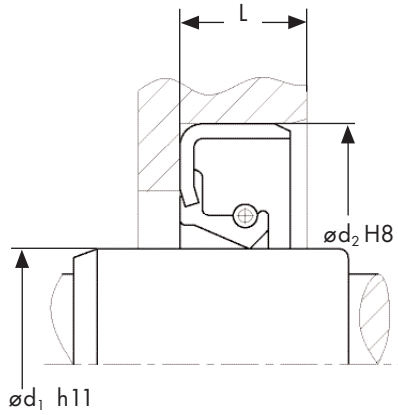
WB

Sizes
metric

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
18602	5	16	6	57044	14.8	30	5
18603	6	13	5	16827	15	24	7
18604	6	16	7	16828	15	25	5
40102	7	16	7	41352	15	25	7
19403	8	14.5	6.5	41353	15	25	10
75093	8	15	5	18500	15	26	7
18491	8	16	7	18668	15	28	7
44271	8	22	8	16835	15	30	7
38643	8	24	7	18507	15	30	8
57039	9	17	4.5	16839	15	30	10
34811	9	22	7	18669	15	32	7
21110	10	15	3	18671	15	35	7
77691	10	16	6	18670	15	35	10
18599	10	17	5	73049	15	40	10
19742	10	18	6	18518	16	22	4
16775	10	19	7	18519	16	24	4
130627	10	20	5	16851	16	24	6
44272	10	22	8	20251	16	24	7
40103	10	24	7	18522	16	24	7.5
18665	10	26	7	18618	16	26	7
74867	10	30	7	38644	16	28	7
46293	10	30	8	16855	16	30	4.5
18611	10	30	10	16857	16	30	7
73085	11	17	4	44275	16	30	8
18570	12	18	4	16859	16	30	10
41348	12	19	5	19688	16	32	7
115626	12	20	3	16861	16	32	10
18572	12	20	5	18672	16	35	7
18576	12	22	4	41354	16	35	7.5
16792	12	22	7	18623	16	35	10
134951	12	22	10	38645	16	52	7
18584	12	24	7	18630	17	28	5
18588	12	25	5	16870	17	28	6
18590	12	25	8	16873	17	28	7
16803	12	28	7	16876	17	30	7
16804	12	30	5	44276	17	30	8
18549	12	30	7	18707	17	32	7
18666	12	32	7	83379	17	32	7.5
61724	12	37	7	18709	17	32	10
60310	12	37	10	16884	17	33	7
18555	13	22	5	16885	17	34	4
41351	13	22.2	7	40104	17	35	5.5
41350	13	23	6.5	18714	17	35	7
57040	13	25	7	18715	17	35	8
44273	13	26	9	44277	17	35	10
18563	14	20	5	18718	17	37	10
18565	14	22	5	16898	17	40	7
18523	14	24	5	38646	17	40	10
44992	14	24	6	60303	17	43	7
18525	14	24	7	18723	17	47	7
18530	14	26	7	18727	18	25	4
18532	14	28	7	21865	18	25	6
44274	14	30	8	18731	18	28	7
18667	14	32	7	18675	18	30	7
16822	14	35	10	18676	18	32	7

WB

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
60301	18	35	7	148707	24	34	5
18741	18	35	8	41358	24	35	5
18749	19	27	6	21595	24	35	7
36626	19	30	8	18860	24	36	5
21664	19	32	7	18863	24	36	9
16925	19	37	10	18864	24	37	7
60300	19.5	31	6	41357	24	38	10
18756	20	26	4	76564	24	40	7
16927	20	30	4.5	17020	24	40	10
18760	20	30	5	18678	24	47	7
16931	20	30	7	72652	25	32	7
41355	20	30	9	18876	25	34	5
18764	20	31	7	41359	25	34	10
57209	20	31.2	7	37877	25	35	4
117544	20	32	6	18878	25	35	5
16934	20	32	7	18880	25	35	6
18767	20	32	8.5	17032	25	35	7
19692	20	33	10	44278	25	35	8
16939	20	35	7	18883	25	35	10
18778	20	35	8	18884	25	36	7
18780	20	35	10	18889	25	37	7
93130	20	37	6	17042	25	38	7
41373	20	37	6.5	18896	25	40	5
21086	20	37	7	18679	25	40	6
16947	20	40	4	17046	25	40	7
16951	20	40	7	18680	25	40	8
16955	20	40	10	17050	25	40	10
16959	20	42	7	18907	25	42	7
16961	20	42	10	18833	25	42	8
16967	20	47	7	18681	25	42	10
16970	20	47	10	135068	25	42.9	9.5
16973	20	52	7	18910	25	45	10
16975	20	52	10	17070	25	47	7
18812	21	30	6.5	18917	25	47	8
18814	21	32	5	17076	25	47	10
18821	22	30	7	38648	25	50	12
18824	22	32	6	17085	25	52	7
16982	22	32	7	17087	25	52	8
16987	22	35	7	17090	25	52	10
18832	22	35	8	17094	25	52	12
18834	22	35	10	35715	25	62	7
18677	22	37	7	17098	25	62	10
38647	22	40	7	18931	25	62	12
19695	22	40	8	41361	25.3	35	5
19696	22	40	8.5	41362	25.5	47.5	7.5
16996	22	40	10	17102	26	35	7
18846	22	42	10	41363	26	36	8
41356	22	43	15	18933	26	37	7
17002	22	45	8	18943	26	40	7
60296	22	47	7	75250	26	42	7
17006	22	47	10	18697	26	42	10
41374	23	31.8	7	18952	26	45	10
40111	23	32	5	17109	26	52	8
17012	23	40	10	124959	27	37	7
125290	24	32	5	17120	27	42	10

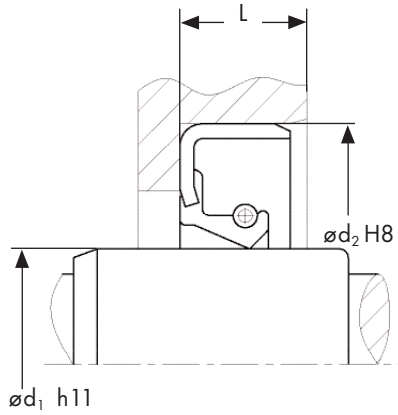
WB

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
40123	27	43	9	20238	30	72	10
17126	27	52	8	144356	31	42	7
150406	28	37	6	41366	31	42	12
17130	28	38	7	41367	31	44.6	6.7
40124	28	39	7	19041	32	42	7
38649	28	40	7	117514	32	42	10
40125	28	40	8	40259	32	43	8
44279	28	40	10	19042	32	43	10
117513	28	42	8	19043	32	44	9
17139	28	43	10	41372	32	44.5	6.5
17141	28	45	8	17273	32	45	7
17144	28	45	10	41371	32	46	8
36625	28	47	7	17276	32	47	7
17147	28	47	8	17280	32	47	10
18682	28	47	10	17283	32	48	7
24266	28	48	8	40260	32	48	8
82086	28	50	12	19712	32	50	7
82174	28	52	7	17292	32	52	7
60204	28	58	7	38357	32	52	8
17153	29	40	7	17296	32	52	10
19786	29	42.9	9.5	40261	32	52	12
19792	29	45	9.5	17302	32	55	10
17156	29	45	10	17307	32	56	10
65004	30	38	5	17309	32	60	10
41364	30	39	7	17315	32	65	10
17165	30	40	7	34861	34	46	8
17168	30	42	7	40266	34	47	9
41368	30	42	8	17330	34	52	7
17169	30	43	8	40267	34	52	8
41369	30	43	10	19082	34	52	10
40128	30	43.6	9	41377	35	45	5
17172	30	45	7	17347	35	45	7
17175	30	45	8	40270	35	46	8
19706	30	45	9.5	39248	35	47	5
17182	30	47	7	17349	35	47	6
59612	30	47	8	17352	35	47	7
17186	30	47	10	17354	35	47	10
93325	30	48	10	41378	35	47.5	5.5
17193	30	50	7	41379	35	49.4	4.5
17196	30	50	10	40272	35	49.5	9.5
17200	30	50	12	17358	35	50	7
41365	30	51	6	44281	35	50	8
17206	30	52	7	17361	35	50	10
17210	30	52	10	17365	35	50	12
16990	30	52	12	17371	35	52	7
17222	30	55	10	40274	35	52	8.7
17227	30	55	12	19805	35	52	8.8
19748	30	56	6	19714	35	52	9
17235	30	60	10	19715	35	52	10
17239	30	60	12	19716	35	52	12
18477	30	62	6	17386	35	55	8
17245	30	62	7	17389	35	55	10
37907	30	62	10	41376	35	55	11
44280	30	62	12	17391	35	55	12
41370	30	62	13	19717	35	56	10

WB

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
19106	35	56	12	17528	40	55	10
19850	35	57.15	10	24431	40	55	12
17405	35	58	10	95575	40	55.5	9
17408	35	58	13	17530	40	56	7
17411	35	60	10	17534	40	56	10
27574	35	62	5	19147	40	57.15	10
17415	35	62	5.5	17538	40	58	9
17417	35	62	7	17539	40	58	10
17419	35	62	8	17542	40	58	12
19109	35	62	10	17547	40	60	10
19721	35	62	12	24267	40	60	12
17431	35	65	10	19730	40	62	7
17434	35	65	12	41735	40	62	8
17439	35	70	10	17555	40	62	10
17441	35	70	12	41737	40	62	11
17445	35	72	10	17560	40	62	12
17450	35	72	12	17562	40	65	9
44282	35.8	68	10	17565	40	65	10
20226	36	47	7	17568	40	65	12
117884	36	50.8	8	22168	40	67	8
151462	36	52	7	17572	40	68	7
40278	36	52	9	38652	40	68	10
44283	36	54	10	40307	40	68	12
17464	36	56	10	17578	40	70	10
40281	36	62	8	17582	40	72	7
17471	36	68	10	17583	40	72	9
41380	37	57	10	17586	40	72	10
151452	37	62	8	17588	40	72	12
41381	38	47.7	4.8	17591	40	80	10
19750	38	50	7	17595	40	80	12
41382	38	50	8	19725	40	80	13
19722	38	52	7	17599	40	90	12
38650	38	52	8	40310	41	56	7
17481	38	52	10	17603	41	56	10
17484	38	54	10	41740	41	60.3	6.5
17487	38	55	7	20660	42	52	10
19723	38	55	10	17605	42	55	7
40283	38	55.5	9	38062	42	55	8
44284	38	56	10	40314	42	55	9
38651	38	56	12	17608	42	56	7
44285	38	58	10	40315	42	56	8
19726	38	62	7	19193	42	57.15	10
40288	38	62	8	19195	42	58	7
27001	38	62	12	17610	42	58	9
40291	38	65	12	17612	42	58	10
17503	38	70	10	19201	42	60	9
61728	38	70	12	17615	42	60	10
17507	38	72	10	17619	42	62	7
17509	38	72	12	40316	42	62	8
19859	38	74	10	17622	42	62	10
40296	39	55.5	9	17625	42	62	12
17516	40	52	7	17628	42	65	10
19141	40	52	8	17631	42	65	12
17522	40	55	7	41745	42	67	10
17525	40	55	8	17635	42	70	10

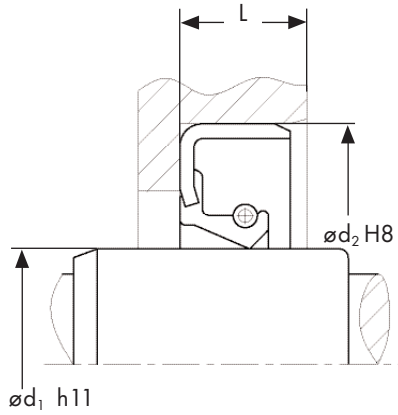
WB

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
17639	42	72	10	40341	48	62	9
17641	42	72	12	17732	48	62	10
19846	42.4	55	7	17734	48	65	10
40322	43	61	9	17737	48	65	14
19217	44	56	7	17738	48	66	10
35471	44	58	7	17739	48	68	10
49539	44	58.2	7	19284	48	70	12
41744	44	60	6	38666	48	72	8
19220	44	60	10	17747	48	72	10
19226	44	62	10	17749	48	72	12
19228	44	62	12	133715	50	62	5
40324	44	65	10	17762	50	62	7
41749	45	54	6.35	17763	50	62	10
18478	45	55	7	17766	50	65	8
41750	45	55	8	17768	50	65	10
41753	45	57	4	17770	50	65	12
81235	45	58	9	19755	50	68	8
19238	45	59.13	10	25968	50	68	10
19694	45	60	7	17778	50	68	14
17661	45	60	8	40351	50	70	8
42068	45	60	9	40352	50	70	9
17664	45	60	10	17780	50	70	10
17667	45	61	10	17783	50	70	12
38653	45	62	7	19306	50	70	14
40330	45	62	8	38667	50	72	8
42069	45	62	9	17787	50	72	10
17673	45	62	10	17790	50	72	12
17677	45	62	12	40196	50	75	9
42070	45	63.5	6.5	64113	50	75	10
18479	45	65	8	35791	50	80	8
17683	45	65	10	17797	50	80	10
17027	45	65	12	17799	50	80	12
17691	45	68	10	40198	50	80	13
17693	45	68	12	61729	50	85	10
17695	45	70	10	17807	50	85	12
17698	45	70	12	17812	50	90	10
38654	45	72	8	38668	50	90	13
17704	45	72	10	17818	52	68	7
17707	45	72	12	17819	52	68	8
17712	45	75	10	44287	52	68	13
19731	45	80	10	81238	52	70	9
19753	45	80	13	18483	52	72	8
38655	45	85	8	18481	52	72	10
17722	45	85	10	18482	52	72	12
2072	46	56	9	61730	52	75	10
19754	46	60	7	17834	52	80	10
19820	46	78	10	44288	52	85	10
42073	47	63	12	17845	53	68	10
42075	47	69.9	9	38669	54	70	10
40338	47	72	8	17847	54	72	10
18480	47	72	12	17849	54	72	12
57287	47.96	60	6	27008	54	74	8
44286	48	58	4	17853	54	80	10
19853	48	62	7	17855	54	80	12
25964	48	62	8	17857	54	80	13

WB

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
17862	55	68	8	18010	64	80	8
17866	55	70	8	18017	65	80	8
17868	55	70	10	18019	65	80	10
18484	55	72	8	18022	65	80	12
17874	55	72	10	40241	65	85	8
17876	55	72	12	18027	65	85	10
38670	55	75	10	18030	65	85	12
17881	55	75	12	18033	65	85	13
18485	55	80	8	18035	65	90	10
17890	55	80	10	18038	65	90	12
17894	55	80	12	18041	65	90	13
17898	55	80	13	18045	65	95	10
17901	55	85	8	18051	65	100	10
19359	55	85	13	42102	68	80	8
17911	55	90	13	57696	68	80	10
42097	56	68	11	17374	68	85	10
17916	56	72	8	118397	68	90	8
17921	56	90	13	40248	68	90	10
42099	57	73.5	14	19436	68	90	13
42101	57	75	9	18068	70	85	8
120794	57	85	12	18070	70	85	10
84202	58	70	8	18074	70	90	10
17927	58	72	8	18078	70	90	12
17928	58	75	8	18081	70	90	13
62961	58	75	10	21115	70	92	10
44289	58	80	10	18488	70	95	13
17935	58	85	10	18089	70	100	10
19388	58	90	13	68897	70	100	12
69627	60	70	7	19450	70	100	13
82238	60	72	7	18098	70	110	10
40216	60	72	7.5	22838	70	110	12
17941	60	72	8	18100	70	110	13
40217	60	74	7.5	38672	70	120	13
19861	60	74	8	18489	72	84	7
84884	60	75	7	40252	72	85.6	18
17943	60	75	8	38673	72	90	10
18486	60	80	8	40254	72	95	10
17951	60	80	10	40253	72	100	10
17954	60	80	12	26538	74	90	10
17957	60	80	13	40140	74	95	13
42538	60	82	12	19460	74	100	13
17960	60	85	8	18113	75	90	7
152996	60	85	10	25823	75	95	5
18487	60	85	13	18119	75	95	10
17967	60	90	8	18122	75	95	12
19738	60	90	10	60331	75	95	13
17970	60	90	12	18126	75	100	10
17973	60	90	13	18130	75	100	12
40224	61	75	8	19759	75	100	13
38671	62	75	10	18490	75	105	13
17986	62	80	10	35510	75	110	10
40225	62	85	8	38674	75	110	12
17991	62	85	10	18138	75	110	13
17997	62	90	10	19830	75	122	12
44290	62	90	13	59603	80	95	8

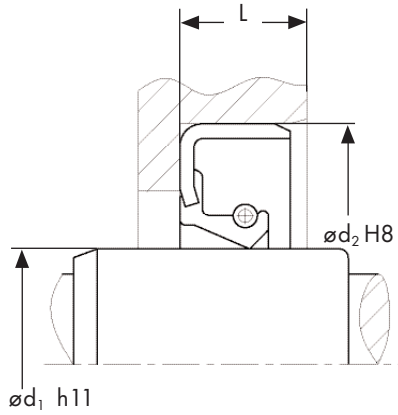
WB

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
40145	80	100	9	42820	100	120	15
18147	80	100	10	18294	100	125	12
18150	80	100	12	18295	100	125	13
18153	80	100	13	19522	100	130	12
18157	80	105	13	18300	100	130	13
76625	80	105	15	61398	100	150	12
18161	80	110	10	70888	100	150	13
18164	80	110	12	75014	105	120	7
18167	80	110	13	124705	105	120	15
18174	80	120	13	18306	105	125	10
18177	80	125	13	18307	105	125	12
18185	85	100	9	18309	105	125	13
18188	85	105	10	18312	105	130	12
40150	85	105	12	36624	105	130	13
18191	85	105	13	40167	105	135	14
18194	85	110	12	18317	105	140	12
18493	85	110	13	18319	105	140	13
18199	85	111	16	18322	105	145	13
18201	85	120	12	40168	105	145	15
75065	85	120	13	38677	110	128	9
42802	85	120	15	18328	110	130	12
18208	85	130	13	44291	110	130	13
70516	85	150	13	40130	110	130	15
40155	86	110	13	40131	110	132	12
18215	88	126	12	19536	110	135	12
18218	90	110	8	18334	110	140	12
18220	90	110	10	18336	110	140	13
18224	90	110	12	40133	110	142	12
18226	90	110	13	43078	110	145	15
24197	90	115	9	21566	112	130	8
40157	90	115	13	18349	115	130	13
38675	90	120	10	27685	115	135	13
18235	90	120	12	18351	115	140	12
18237	90	120	13	18354	115	140	13
18241	90	125	13	38678	115	140	15
18250	95	110	9	38026	115	190	15
18252	95	110	10	18363	118	136	13
18255	95	110	12	120688	118	140	13
18257	95	110	13	18365	120	140	13
18261	95	115	13	18368	120	150	12
18266	95	120	12	18370	120	150	13
18268	95	120	13	19658	120	150	15
18271	95	125	12	26037	120	160	12
18273	95	125	13	38679	125	150	12
17115	95	130	13	19659	125	150	13
40161	98	120	13	81884	125	160	12
27681	98	130	13	57315	125	160	13
42817	100	114	7	40170	128	150	15
40162	100	114	10	43085	130	150	10
18287	100	115	9	59789	130	155	10
19829	100	118	12	18389	130	160	12
38676	100	120	8	44292	130	160	13
18289	100	120	10	40171	130	160	15
19671	100	120	12	79318	130	160	16
36623	100	120	13	40173	130	170	15

WB

Sizes metric



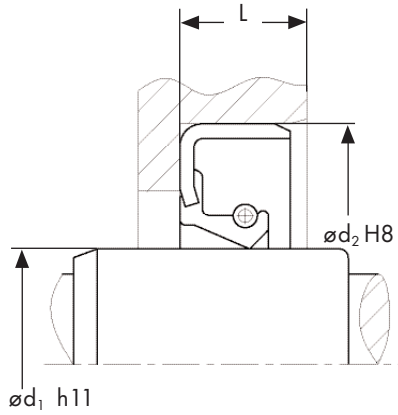
Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
18396	130	180	15	43105	255	315	25
44987	135	160	13	60276	260	300	15
18401	135	160	15	43107	260	300	18
75120	135	170	12	27688	260	300	20
40175	135	170	15	13291	260	300	22
40176	135	175	15	20794	270	300	15
44940	140	160	12	133752	275	294	12
18407	140	160	13	133170	280	320	15
18414	140	170	15	60281	280	320	18
42628	140	175	15	27689	280	320	20
18416	145	170	13	69924	290	330	20
40181	145	170	15	21116	315	360	18
35287	145	175	13	20879	320	360	15
40185	146	170	18	69926	335	375	25
18423	150	168	13	84441	340	372	16
18426	150	180	13	43110	340	380	16
40186	150	180	14	127386	340	380	20
19667	150	180	15	43109	350	380	16
18430	150	190	16	44917	360	400	20
40191	155	190	15	133608	370	410	15
35328	160	180	10	36561	380	410	12
18673	160	185	10	35420	390	430	18
19670	160	190	13	69927	400	425	15
19762	160	190	15	69928	400	440	18
18441	160	200	15	60923	400	440	20
23728	170	200	15	21315	420	460	20
18448	170	210	15	88201	435	465	18
26428	180	210	15	74550	440	480	20
27686	180	215	16	121315	460	500	22
20231	185	215	13	69929	470	520	25
69918	185	230	16	69930	480	520	20
43099	190	200	16	135144	500	540	20
35106	190	220	15	83598	520	580	25
40355	190	225	15	151637	580	630	25
40356	190	230	15	74551	710	760	20
75013	192	210	10				
35105	200	230	15				
60263	200	240	15				
44852	205	230	15				
57305	212	245	16				
19745	220	250	11				
40358	220	250	15				
69919	225	270	16				
43102	225	315	25				
40359	230	255	10				
18467	230	260	15				
69920	235	270	16				
27687	240	270	15				
90482	240	275	18				
20912	240	280	14				
69921	240	280	16				
40360	245	270	16				
26429	250	280	15				
69922	250	285	18				
69923	250	290	16				

WB**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
149617	6.35	19.05	6.35	0.25	0.75	0.25
60026	9.52	22.22	6.35	0.375	0.875	0.25
41204	10.71	20.14	4.76	0.422	0.793	0.187
121530	11.11	22.22	6.35	0.437	0.875	0.25
60027	12.7	25.06	6.35	0.5	0.987	0.25
41496	12.7	25.4	6.35	0.5	1	0.25
22235	12.7	25.4	7.93	0.5	1	0.312
41349	12.8	28.8	6.5	0.504	1.134	0.256
57042	13	27.2	6.3	0.512	1.071	0.248
60028	14.28	25.4	6.35	0.562	1	0.25
60029	14.28	26.98	4.76	0.562	1.062	0.187
60030	14.28	26.98	6.35	0.562	1.062	0.25
60031	15.87	23.81	4.76	0.625	0.937	0.187
60032	15.87	25.4	4.76	0.625	1	0.187
40238	15.87	25.4	6.35	0.625	1	0.25
56892	15.87	28.57	4.76	0.625	1.125	0.187
60033	15.87	28.57	6.35	0.625	1.125	0.25
46823	15.87	28.57	9.52	0.625	1.125	0.375
60034	15.87	31.75	6.35	0.625	1.25	0.25
60035	15.87	33.33	6.35	0.625	1.312	0.25
39729	15.87	34.92	7.93	0.625	1.375	0.312
60036	15.87	34.92	9.52	0.625	1.375	0.375
60037	16.67	34.92	7.93	0.656	1.375	0.312
149419	17.46	34.13	7.93	0.687	1.344	0.312
40105	17.46	34.92	7.93	0.687	1.375	0.312
60038	17.46	34.92	9.52	0.687	1.375	0.375
60039	19.05	28.57	4.76	0.75	1.125	0.187
60040	19.05	28.57	6.35	0.75	1.125	0.25
60041	19.05	31.75	4.76	0.75	1.25	0.187
60042	19.05	34.92	6.35	0.75	1.375	0.25
60043	19.05	34.92	9.52	0.75	1.375	0.375
60044	19.05	38.1	7.93	0.75	1.5	0.312
60045	19.05	38.1	9.52	0.75	1.5	0.375
60046	19.05	41.27	9.52	0.75	1.625	0.375
60047	19.45	31.5	4.76	0.766	1.24	0.187
60048	19.99	34.92	6.35	0.787	1.375	0.25
60050	22.22	28.57	4.76	0.875	1.125	0.187
60049	22.22	28.57	6.35	0.875	1.125	0.25
60051	22.22	31.75	6.35	0.875	1.25	0.25
60052	22.22	34.92	6.35	0.875	1.375	0.25
60053	22.22	38.1	9.52	0.875	1.5	0.375
60054	22.22	40.01	6.35	0.875	1.575	0.25
60055	23.81	41.27	6.35	0.937	1.625	0.25
75248	23.81	41.27	9.52	0.937	1.625	0.375
60056	24.13	34.52	6.99	0.95	1.359	0.275
60057	24.61	52.02	9.52	0.969	2.048	0.375
60058	25.4	31.75	3.17	1	1.25	0.125
75386	25.4	36.51	4.76	1	1.437	0.187
34956	25.4	38.1	6.35	1	1.5	0.25
60060	25.4	38.1	9.52	1	1.5	0.375
60061	25.4	41.27	6.35	1	1.625	0.25
60062	25.4	41.27	9.52	1	1.625	0.375
60063	25.4	42.86	6.35	1	1.687	0.25
60064	25.4	44.45	9.52	1	1.75	0.375
41360	25.4	50.8	6.35	1	2	0.25

WB

Sizes
inch



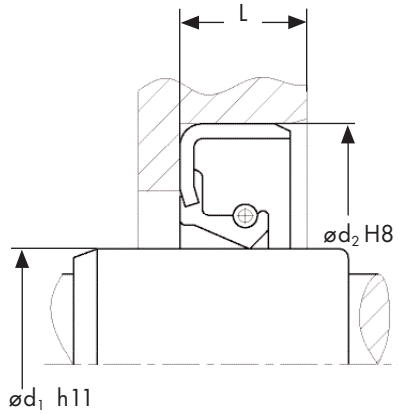
Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
60065	25.4	50.8	9.52	1	2	0.375
60066	25.4	50.8	12.7	1	2	0.5
60067	25.4	52.38	6.35	1	2.062	0.25
60068	26.04	42.86	7.14	1.025	1.687	0.281
60069	26.98	41.27	9.52	1.062	1.625	0.375
60070	26.98	50.8	6.35	1.062	2	0.25
57056	27.2	41.3	6.7	1.071	1.626	0.264
60071	28.57	41.27	6.35	1.125	1.625	0.25
60072	28.57	44.45	6.35	1.125	1.75	0.25
60073	28.57	44.45	7.93	1.125	1.75	0.312
60074	28.57	47.62	6.35	1.125	1.875	0.25
60075	28.57	47.62	9.52	1.125	1.875	0.375
60076	28.57	50.8	12.7	1.125	2	0.5
60077	29.44	55.68	6.35	1.159	2.192	0.25
37878	30.16	42.86	4.76	1.187	1.687	0.187
60078	30.16	44.45	9.52	1.187	1.75	0.375
60080	31.75	39.69	3.81	1.25	1.563	0.15
60081	31.75	42.8	6.35	1.25	1.685	0.25
60082	31.75	42.86	6.35	1.25	1.687	0.25
60079	31.75	42.86	7.93	1.25	1.687	0.312
79506	31.75	42.86	9.52	1.25	1.687	0.375
60083	31.75	44.45	6.35	1.25	1.75	0.25
60084	31.75	44.45	9.52	1.25	1.75	0.375
60086	31.75	47.62	7.93	1.25	1.875	0.312
60087	31.75	47.62	9.52	1.25	1.875	0.375
60088	31.75	49.68	11.11	1.25	1.956	0.437
60089	31.75	50.8	6.35	1.25	2	0.25
60090	31.75	50.8	9.52	1.25	2	0.375
60091	31.75	50.8	12.7	1.25	2	0.5
60092	31.75	53.97	6.35	1.25	2.125	0.25
60093	31.75	57.15	7.93	1.25	2.25	0.312
60094	31.75	57.15	9.52	1.25	2.25	0.375
60095	31.75	57.15	12.7	1.25	2.25	0.5
60096	31.75	61.91	6.35	1.25	2.437	0.25
60097	31.75	63.5	7.93	1.25	2.5	0.312
40263	32.54	51.43	9.52	1.281	2.025	0.375
60098	33.33	50.8	8.05	1.312	2	0.317
60099	33.33	50.8	9.52	1.312	2	0.375
60100	33.33	57.15	7.93	1.312	2.25	0.312
144053	33.33	57.94	12.7	1.312	2.281	0.5
27532	33.33	58.04	12.7	1.312	2.285	0.5
60101	33.58	56.57	9.52	1.322	2.227	0.375
60102	34.67	52.86	11.05	1.365	2.081	0.435
60486	34.92	47.62	6.35	1.375	1.875	0.25
60487	34.92	47.62	7.93	1.375	1.875	0.312
60488	34.92	50.4	7.93	1.375	1.984	0.312
37746	34.92	50.8	7.93	1.375	2	0.312
60489	34.92	50.8	8.33	1.375	2	0.328
60490	34.92	50.8	9.52	1.375	2	0.375
60491	34.92	53.97	7.93	1.375	2.125	0.312
35306	34.92	53.97	9.52	1.375	2.125	0.375
60492	34.92	57.15	9.52	1.375	2.25	0.375
60493	34.92	62	7.93	1.375	2.441	0.312
60494	34.92	63.5	17.46	1.375	2.5	0.687
60495	34.92	76.2	9.52	1.375	3	0.375

WB**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
37744	36.51	50.8	7.93	1.437	2	0.312
60496	36.51	63.5	12.7	1.437	2.5	0.5
60497	38.1	47.62	6.35	1.5	1.875	0.25
60498	38.1	50.4	7.93	1.5	1.984	0.312
60499	38.1	50.8	6.35	1.5	2	0.25
60500	38.1	52.38	6.35	1.5	2.062	0.25
60501	38.1	53.97	9.52	1.5	2.125	0.375
79893	38.1	54.96	7.14	1.5	2.164	0.281
60502	38.1	57.15	7.93	1.5	2.25	0.312
20678	38.1	57.15	9.52	1.5	2.25	0.375
60503	38.1	60.32	12.7	1.5	2.375	0.5
60504	38.1	61.91	7.93	1.5	2.437	0.312
60505	38.1	63.5	9.52	1.5	2.5	0.375
60506	38.1	63.5	12.7	1.5	2.5	0.5
60507	38.1	65.08	7.93	1.5	2.562	0.312
60508	39.68	53.97	9.52	1.562	2.125	0.375
60510	39.68	57.15	7.93	1.562	2.25	0.312
60509	39.68	57.15	9.52	1.562	2.25	0.375
60244	39.68	62	11.91	1.562	2.441	0.469
60511	41.27	50.8	6.35	1.625	2	0.25
72916	41.27	52.38	6.98	1.625	2.062	0.275
60512	41.27	53.97	6.35	1.625	2.125	0.25
60513	41.27	60.32	7.93	1.625	2.375	0.312
60253	41.27	60.4	9.25	1.625	2.378	0.364
26431	41.27	61.91	9.52	1.625	2.437	0.375
60514	41.27	63.5	7.93	1.625	2.5	0.312
60515	41.27	63.5	12.7	1.625	2.5	0.5
60516	41.27	65.08	9.52	1.625	2.562	0.375
60517	41.27	73.02	7.93	1.625	2.875	0.312
60518	41.27	73.02	12.7	1.625	2.875	0.5
60519	42.77	65.08	13.08	1.684	2.562	0.515
60520	43.26	78.13	12.7	1.703	3.076	0.5
60521	44.45	58.73	6.35	1.75	2.312	0.25
125702	44.45	60.32	7.93	1.75	2.375	0.312
60522	44.45	60.32	9.52	1.75	2.375	0.375
60523	44.45	61.91	7.93	1.75	2.437	0.312
26430	44.45	61.91	9.52	1.75	2.437	0.375
60524	44.45	63.5	7.93	1.75	2.5	0.312
60525	44.45	63.5	12.7	1.75	2.5	0.5
60526	44.45	65.08	7.93	1.75	2.562	0.312
60527	44.45	69.85	7.93	1.75	2.75	0.312
60528	44.45	69.85	12.7	1.75	2.75	0.5
60529	44.45	71.12	9.52	1.75	2.8	0.375
60530	44.45	73.02	9.52	1.75	2.875	0.375
41748	44.45	73.02	12.7	1.75	2.875	0.5
60531	44.45	80.96	7.93	1.75	3.187	0.312
60533	46.03	61.91	7.93	1.812	2.437	0.312
59470	46.03	63.5	9.52	1.812	2.5	0.375
60532	46.03	69.85	12.7	1.812	2.75	0.5
3995	47.62	60.32	6.35	1.875	2.375	0.25
60534	47.62	60.91	6.35	1.875	2.398	0.25
35365	47.62	66.67	7.93	1.875	2.625	0.312
60535	47.62	66.67	9.52	1.875	2.625	0.375
38368	47.62	66.67	11.51	1.875	2.625	0.453
60536	47.62	69.85	7.93	1.875	2.75	0.312

WB

**Sizes
inch**



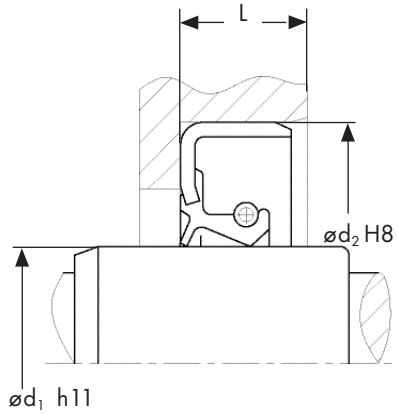
Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
60537	47.62	69.85	9.52	1.875	2.75	0.375
81365	47.62	69.85	11.91	1.875	2.75	0.469
60538	47.62	69.85	12.7	1.875	2.75	0.5
60539	47.62	73.02	7.93	1.875	2.875	0.312
37745	47.62	76.2	9.52	1.875	3	0.375
28010	49	77.5	11.23	1.929	3.051	0.442
60540	49.02	76.2	12.7	1.93	3	0.5
60543	49.21	61.91	6.35	1.937	2.437	0.25
60541	49.21	63.5	9.52	1.937	2.5	0.375
60542	49.21	76.2	7.93	1.937	3	0.312
156533	50.8	66.67	7.93	2	2.625	0.312
60544	50.8	68.26	12.7	2	2.687	0.5
60545	50.8	69.85	6.35	2	2.75	0.25
60546	50.8	69.85	12.7	2	2.75	0.5
60547	50.8	73.02	7.93	2	2.875	0.312
60548	50.8	73.02	12.7	2	2.875	0.5
60549	50.8	76.2	6.35	2	3	0.25
60550	50.8	76.2	7.93	2	3	0.312
42086	50.8	76.2	9.52	2	3	0.375
60551	50.8	76.2	12.7	2	3	0.5
60552	52.38	80.96	9.52	2.062	3.187	0.375
60553	53.97	73.02	9.52	2.125	2.875	0.375
60554	53.97	73.02	12.7	2.125	2.875	0.5
60555	53.97	76.2	9.52	2.125	3	0.375
60556	53.97	76.2	12.7	2.125	3	0.5
60557	53.97	82.55	9.52	2.125	3.25	0.375
60558	53.97	85.62	9.52	2.125	3.371	0.375
60559	53.97	88.9	9.52	2.125	3.5	0.375
60560	53.97	88.9	12.7	2.125	3.5	0.5
60561	55.56	82.55	9.52	2.187	3.25	0.375
35308	57.15	73.02	9.52	2.25	2.875	0.375
60562	57.15	76.2	9.52	2.25	3	0.375
60563	57.15	76.2	12.7	2.25	3	0.5
60564	57.15	82.55	12.7	2.25	3.25	0.5
60565	57.15	85.09	7.93	2.25	3.35	0.312
60724	57.15	85.72	12.7	2.25	3.375	0.5
60568	58.73	79.5	9.52	2.312	3.13	0.375
20225	58.73	84.93	7.93	2.312	3.344	0.312
60566	58.73	85.09	7.93	2.312	3.35	0.312
60567	58.73	85.32	7.93	2.312	3.359	0.312
60569	60.32	76.2	9.52	2.375	3	0.375
60570	60.32	79.37	9.52	2.375	3.125	0.375
60347	60.32	79.53	9.52	2.375	3.131	0.375
60571	60.32	85.72	12.7	2.375	3.375	0.5
60572	60.32	88.9	9.52	2.375	3.5	0.375
60573	60.32	88.9	12.7	2.375	3.5	0.5
60574	63.5	79.37	12.7	2.5	3.125	0.5
36622	63.5	80.16	7.93	2.5	3.156	0.312
42547	63.5	82.55	9.52	2.5	3.25	0.375
60575	63.5	82.55	12.7	2.5	3.25	0.5
60577	63.5	88.9	9.52	2.5	3.5	0.375
60578	63.5	88.9	10.32	2.5	3.5	0.406
60580	63.5	88.9	12.7	2.5	3.5	0.5
60581	63.5	89.9	12.7	2.5	3.539	0.5
60582	63.5	95.25	12.7	2.5	3.75	0.5

WB**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
60583	66.67	88.9	12.7	2.625	3.5	0.5
60584	68.26	95.25	12.7	2.687	3.75	0.5
60586	69.85	88.9	12.7	2.75	3.5	0.5
60587	69.85	95.25	12.7	2.75	3.75	0.5
20234	69.85	98.42	11.91	2.75	3.875	0.469
60588	69.85	101.6	12.7	2.75	4	0.5
60589	69.85	104.78	11.11	2.75	4.125	0.437
60590	71.65	89	9.52	2.821	3.504	0.375
60591	73.02	92.07	9.52	2.875	3.625	0.375
60593	73.02	101.6	12.7	2.875	4	0.5
60594	73.02	104.85	14.68	2.875	4.128	0.578
60595	74.3	100.01	12.7	2.925	3.937	0.5
49463	76.2	101.6	12.7	3	4	0.5
60596	76.2	114.3	12.7	3	4.5	0.5
40148	82.5	108	12.7	3.248	4.252	0.5
60597	82.55	101.6	12.7	3.25	4	0.5
60598	82.55	107.95	12.7	3.25	4.25	0.5
60599	82.55	114.3	12.7	3.25	4.5	0.5
60600	85.72	111.12	15.87	3.375	4.375	0.625
60601	88.9	114.3	12.7	3.5	4.5	0.5
39235	88.9	120.65	15.87	3.5	4.75	0.625
60602	92.07	114.3	12.7	3.625	4.5	0.5
60603	93.66	142.87	12.7	3.687	5.625	0.5
37693	95.25	111.12	8.33	3.75	4.375	0.328
60604	95.25	120.65	12.7	3.75	4.75	0.5
60605	100.01	136.52	17.46	3.937	5.375	0.687
42821	101.6	127	7.1	4	5	0.28
60606	101.6	127	12.7	4	5	0.5
36204	107.95	133.35	12.7	4.25	5.25	0.5
60607	114.3	139.7	12.7	4.5	5.5	0.5
60608	114.3	146.05	12.7	4.5	5.75	0.5
60609	120.65	146.05	12.7	4.75	5.75	0.5
60610	120.65	152.4	14.28	4.75	6	0.562
60611	127	158.75	14.28	5	6.25	0.562
60612	133.35	155.57	13.95	5.25	6.125	0.549
40174	133.35	155.57	14.28	5.25	6.125	0.562
60613	133.35	158.75	14.28	5.25	6.25	0.562
44459	146.05	177.8	12.7	5.75	7	0.5
60614	177.8	203.2	12.7	7	8	0.5
60615	177.8	215.9	19.05	7	8.5	0.75
60616	196.85	222.25	12.7	7.75	8.75	0.5
36484	215.9	247.65	19.05	8.5	9.75	0.75
36485	225.43	257.18	19.05	8.875	10.125	0.75
39573	241.3	279.4	19.05	9.5	11	0.75
40900	247.65	282.58	19.05	9.75	11.125	0.75
40901	263.53	295.28	22.23	10.375	11.625	0.875
36483	298.45	336.55	22.22	11.75	13.25	0.875
69925	323.85	374.65	19.05	12.75	14.75	0.75

WBS

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
70446	12	18	4.5	17034	25	35	8.5
85234	12	20	5	84507	25	35	10
41205	12	21	5	40115	25	38	7
41383	12	28	7	19699	25	40	7
38680	12	30	7	19746	25	40	8
46490	12	32	4.5	17051	25	40	10
19685	12	32	7	40116	25	41.2	7
36812	13	22	5	40117	25	41.25	7
74435	14	24	7	17056	25	42	7
18537	15	21	4.5	19700	25	42	10
36647	15	24	7	40118	25	45	8
130880	15	26	4	19989	25	45	10
149208	15	26	6	19701	25	47	7
37873	15	26	7	17077	25	47	10
16836	15	30	7	18498	25	52	7
117732	15	32	10	19704	25	52	10
18494	15	35	7	82206	26	35	7
149258	16	26	7	151453	26	37	7
18620	16	28	7	40121	26	40	7
41384	16	28.7	12.8	40122	26	45	10
82355	16	30	7	149064	26	47	10
37314	17	28	7	41387	27	37	5
16899	17	40	7	18964	27	43	9
16906	18	30	7	45084	28	35	5
16909	18	32	8	18974	28	40	8
18740	18	35	7	40126	28	43	6.5
64959	20	28	6	40127	28	44	7
41385	20	29	9.5	18978	28	44	8
134061	20	30	5	18499	28	47	10
130876	20	30	6	18985	28	48	11
89905	20	30	7	41390	28.5	36	8
19691	20	32	7	57061	28.6	43	6.5
18772	20	35	4.5	18999	30	42	7
40106	20	35	7	64978	30	43.5	10
18496	20	35	10	57063	30	43.7	9.5
40107	20	40	7	61727	30	44	7
16956	20	40	10	40129	30	44	9
19693	20	42	7	40256	30	45	6
16971	20	47	10	19708	30	45	10
78156	22	32	7	19709	30	47	7
38681	22	35	7	17184	30	47	8
18835	22	35	10	17187	30	47	10
41386	22	36	9	18638	30	50	7
18841	22	40	7	17197	30	50	10
40108	22	41.25	6	41394	30	50	11
40109	22	41.5	7	17201	30	50	12
40110	22	42	10	38682	30	52	7
74569	23	40	7	17211	30	52	10
35979	24	32	7	17215	30	52	12
40112	24	45	10	17220	30	55	7
18869	24	48	11	17223	30	55	10
69980	25	32	7	17228	30	55	12
40113	25	34	7	17236	30	60	10
40114	25	35	6	17240	30	60	12
19698	25	35	7	19710	30	62	7

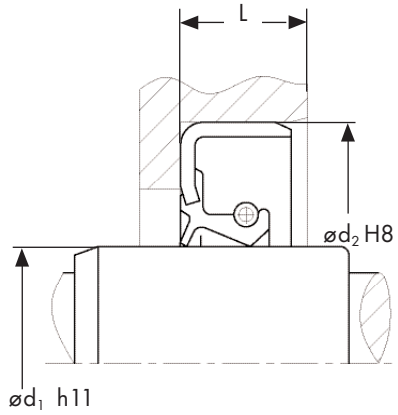
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
17249	30	62	10	41427	37	51	8
17253	30	62	12	39519	37	62	14
26357	30	72	7	17478	38	52	7
17257	30	72	10	40282	38	54	6
17260	30	72	12	41429	38	54	11
17268	31	52	12	40284	38	56	11
44665	32	40	5	40285	38	58	8
151986	32	42	5	40286	38	58	11
78248	32	42	7	41430	38	60	13
74445	32	44	10	40287	38	62	7
37579	32	47	7	17497	38	62	10
25966	32	47	10	40289	38	62	11
19052	32	52	10	40290	38	65	9
41395	32	52	11	40292	38	74	11
17299	32	52	12	40295	39	50.4	7
40262	32	58	12	55935	39	50.5	7
40264	33	50	8	41431	40	47	4
17323	33	50	12	151985	40	50	4
125797	33	52	10	19138	40	52	7
40265	33.5	55	9.5	40297	40	53	7
40268	35	44	7	19142	40	54	5.5
40269	35	45	6	40298	40	54	7
23724	35	47	7	40299	40	55	6
40271	35	48	8	40300	40	55	7
40273	35	49.5	12.5	40301	40	55	8
38683	35	50	7	19143	40	55	9
17362	35	50	10	40302	40	56	7
17366	35	50	12	38685	40	60	10
41425	35	51	9.5	40303	40	60	12
69012	35	52	7	18640	40	62	7
130877	35	52	8.8	40304	40	62	8
17375	35	52	9	39355	40	62	10
39047	35	52	10	41736	40	62	11
17382	35	52	12	18639	40	62	12
40275	35	55	8	40305	40	65	10
40276	35	55	11	17569	40	65	12
17395	35	56	10	40306	40	68	11
17400	35	56	12	17592	40	80	10
130878	35	57.15	10	18497	41	53	7
19720	35	62	7	40308	41	55	6
17423	35	62	10	40309	41	55	9
17427	35	62	12	19178	41	56	9
40277	35	65	12	41739	41	60	10
17443	35	72	7	40312	42	55	6
17446	35	72	10	40313	42	55	7
17451	35	72	12	18641	42	55	9
38684	35	80	13	19187	42	55	10
39048	36	50	7	19189	42	56	7
43928	36	50.8	8	19191	42	56	10
41426	36	51	12	19192	42	57	8
40279	36	54	7	17609	42	58	7
40280	36	55	11	17620	42	62	7
17462	36	56	9	38686	42	62	10
17472	36	68	10	40317	42	65	9
41428	37	50.8	8	40318	42	65	13

WBS

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
40319	42	72	10	56679	50	70	10
40320	42	72.5	12	40353	50	72	8
55936	43	54	7.5	40195	50	72	12
40321	43	61	9	40197	50	76	13
40323	44	60	7	122197	50	90	10
19230	44	65	10	40199	51	65	7
40326	44.5	70	10	40200	51	65	9
40327	45	58	9	19323	52	65	9
108508	45	60	6	46285	52	68	7
40328	45	60	10	18643	52	68	8
40329	45	61	10	40201	52	68	10
19242	45	62	7	72972	52	68	13.5
38687	45	62	8	40202	52	70	9
40331	45	62	9	78372	52	72	12
18642	45	62	10	26163	52	80	13
40332	45	62	12	19335	54	65	13
40333	45	63	7	19339	54	72.5	9
19247	45	65	8	144027	54	73	12.7
118624	45	65	10	19340	54	74	8
17686	45	65	12	40205	55	70	8
40334	45	68	12	40206	55	72	9
17701	45	72	8	44047	55	72	10
17708	45	72	12	39050	55	73	10
40335	45	74	12	40207	55	75	9
17710	45	75	8	40208	55	75	10
19697	45	75	10	42096	55	75	12
19256	45	75	12	40209	55	78	12
40336	45	75	12.5	68985	55	80	8
83756	45	80	13	17891	55	80	10
77686	47	66	6	40210	55	80	12
19267	47	68	13	18644	55	80	13
19269	48	62	7	40211	55	82	10
82728	48	62	8	17043	55	85	13
40340	48	62	9	40212	55	85	14
42077	48	62	12	40213	56	70	12
40342	48	65	10	18645	56	72	8
19275	48	65	12	60364	56	72	10
19277	48	66	13	7600	57	68	9
40343	48	70	9.5	40214	57	72	12
153258	48	70	12	19371	58	72	8
40344	48	74	11	20629	58	80	8
40345	48	82	12	155725	58	80	12
40346	48	82	13	40215	58	102	12
38688	50	62	10	42103	59	85	19
72659	50	65	8	40218	60	75	8
40347	50	65	9	150316	60	75	10
44046	50	65	9.8	40219	60	77	12
40348	50	65	10	19396	60	80	8
108507	50	68	8	38689	60	80	10
40349	50	68	9	40220	60	80	12
19736	50	68	10	40221	60	80	13
42081	50	68	12	40222	60	82	10
40350	50	68	14	42540	60	82	13
19303	50	70	8	40223	60	85	8
39049	50	70	9	38690	60	85	13

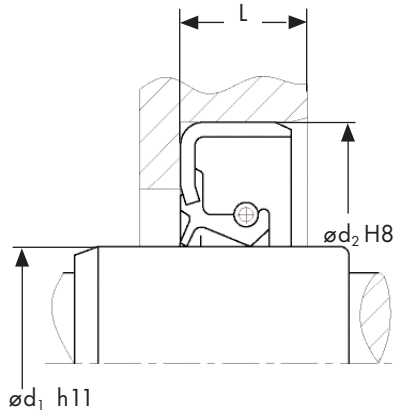
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
42539	60	85	18	18650	75	100	13
19740	60	90	10	18135	75	105	12
17974	60	90	13	38694	75	110	12
19741	61	85	13	40142	75	110	13
40226	62	80	10	42566	75	120	13
40227	62	85	8	40143	75	121	13
42544	62	85	13	42567	76	94	10
42546	63	75	6	40144	77	93	10
125416	63	80	12	42581	80	95	11
153820	63	85	9	18148	80	100	10
42549	63.5	82.7	15	44458	80	100	12
18011	64	80	8	19760	80	100	13
25969	64	90	13	77126	80	105	12
42551	64	92	13	25972	80	105	13
40239	64.5	89.2	13	40146	80	110	12
40240	65	78	12	18168	80	110	13
38691	65	80	8	40147	80	130	13
42553	65	83	10	40149	85	105	10
40242	65	85	10	40151	85	105	13
40243	65	85	12	19487	85	110	12
40244	65	88	12	40152	85	110	13
19743	65	90	10	42584	85	120	13
18647	65	90	13	42806	86	110	13
40245	65	90	15	40156	88	115	9.5
18646	65	100	13	18227	90	110	13
40246	67	89	13	18233	90	115	13
81277	68	85	8	40158	90	118	12
40247	68	88	9.5	18236	90	120	12
65402	68	90	10	18238	90	120	13
40249	68	90	12	42810	90	125	17
18061	68	92	12	121580	90	130	13
38692	68	110	13	117855	95	110	10
74240	69	85	10	42812	95	120	13
40250	69	85	12	42813	95	120	14
24346	70	85	8	40159	95	130	13
42556	70	86	10	42815	95	130	15
40251	70	88	12	135126	97	114	12
18075	70	90	10	40160	98	120	13
39051	70	92	14	42818	100	120	5.5
18648	70	95	13	40163	100	120	11
18092	70	100	12	60188	100	120	12
38693	72	84	7	60333	100	120	13
17055	72	90	10	40164	100	125	11
18649	72	95	13	40165	100	125	13
149252	72	105	10	55974	100	130	13
40255	72	105	13	74272	100	130	15
40139	73	90	8	40166	102	116	14
124792	73	90	10	133609	105	125	13
18111	74	90	10	60191	105	130	13
40141	75	90	13	42823	105	135	14
25971	75	95	10	19842	108	152.6	13
79361	75	95	12	36783	110	130	13
89351	75	96	11	40132	110	140	13
42564	75	100	8	19655	110	150	13
19463	75	100	10	69915	115	140	13

WBS

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
63442	115	140	16	18452	180	200	15
40134	115	150	13	56709	180	200	16
40135	115	150	15	40354	180	210	16
40136	116	132	12	153809	190	225	16
40137	120	140	10.5	40357	200	230	15
135100	120	140	12	38391	230	285	23
38695	120	140	13	80856	250	310	25
56009	120	145	15	56446	280	305	17
38696	120	150	12	60284	290	330	18
40138	120	150	13	43103	295	305	28
107929	120	180	15				
18379	125	150	13				
40169	125	150	14				
43082	125	155	14				
43086	130	150	13				
39052	130	150	14				
37111	130	160	13				
39053	130	160	14				
40172	130	170	13				
19229	135	162	13				
40177	140	160	13				
40178	140	160	14				
40179	140	165	14				
40180	140	170	14				
38697	140	175	13				
81016	140	180	15				
18417	145	170	13				
43091	145	170	14				
43090	145	170	18				
40182	145	175	13				
19555	145	175	14				
40183	145	180	15				
40184	146	170	18				
90050	150	170	15				
153806	150	180	14				
27382	150	180	15				
49614	150	190	13				
27690	150	190	15				
40187	155	172	14				
40188	155	180	14				
56024	155	180	15				
40189	155	180	17				
40190	155	185	14				
40192	155	190	17				
74107	160	180	10				
40193	160	180	15				
18435	160	185	13				
56517	160	190	13				
153807	160	190	16				
43096	160	200	14				
36817	165	190	13				
43097	170	195	18				
40194	170	200	15				
153808	170	200	16				
37453	180	200	13				

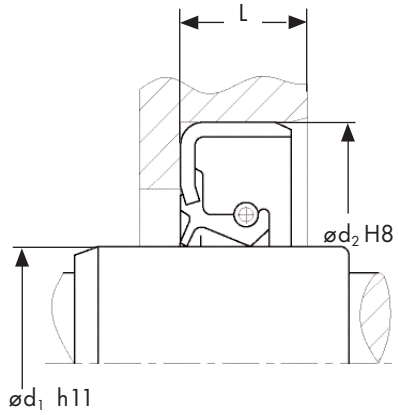
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**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
60617	11.07	23.01	6.3	0.436	0.906	0.248
60618	11.11	23.06	6.35	0.437	0.908	0.25
60619	12.7	19.05	4.76	0.5	0.75	0.187
60620	12.7	25.4	6.35	0.5	1	0.25
60621	12.7	28.57	6.35	0.5	1.125	0.25
156532	14.28	25.4	6.35	0.562	1	0.25
60622	15.87	25.4	6.35	0.625	1	0.25
60623	17.46	30.16	8.13	0.687	1.187	0.32
60624	19.05	31.75	6.35	0.75	1.25	0.25
60625	19.05	34.92	6.35	0.75	1.375	0.25
60626	19.05	41.27	6.35	0.75	1.625	0.25
60627	19.05	63.5	12.7	0.75	2.5	0.5
149420	20.24	34.92	6.35	0.797	1.375	0.25
60628	20.63	34.92	7.93	0.812	1.375	0.312
60629	22.22	34.92	6.35	0.875	1.375	0.25
60630	22.22	38.1	6.35	0.875	1.5	0.25
60631	22.22	38.1	9.52	0.875	1.5	0.375
60632	23.81	38.1	6.35	0.937	1.5	0.25
75025	23.81	42.86	7.93	0.937	1.687	0.312
60633	24.61	35.71	6.35	0.969	1.406	0.25
60634	24.99	38.07	6.35	0.984	1.499	0.25
60635	25.4	38.1	6.35	1	1.5	0.25
124960	25.4	38.1	7.93	1	1.5	0.312
60636	25.4	38.1	9.52	1	1.5	0.375
40119	25.4	41.27	7.5	1	1.625	0.295
40120	25.4	42.2	7.93	1	1.661	0.312
75024	25.4	42.86	6.35	1	1.687	0.25
60637	25.4	44.45	6.35	1	1.75	0.25
60638	25.4	50.38	7.93	1	1.983	0.312
60639	25.4	50.8	6.35	1	2	0.25
60640	25.4	50.8	9.52	1	2	0.375
60641	28.57	41.27	6.35	1.125	1.625	0.25
60642	28.57	41.27	7.93	1.125	1.625	0.312
60643	28.57	46.43	6.35	1.125	1.828	0.25
60644	28.57	47.62	6.35	1.125	1.875	0.25
41389	28.57	47.62	7.13	1.125	1.875	0.281
60645	28.57	50.8	12.7	1.125	2	0.5
60646	30.16	42.86	7.93	1.187	1.687	0.312
20254	30.16	43.65	12.7	1.187	1.719	0.5
60656	31.75	42.86	7.93	1.25	1.687	0.312
60657	31.75	44.45	6.35	1.25	1.75	0.25
60658	31.75	47.62	9.52	1.25	1.875	0.375
60659	31.75	50.4	6.35	1.25	1.984	0.25
40257	31.75	50.8	6.35	1.25	2	0.25
60660	31.75	50.8	11.11	1.25	2	0.437
60661	31.75	52.38	6.35	1.25	2.062	0.25
60662	31.75	53.97	6.35	1.25	2.125	0.25
60663	31.75	63.5	6.35	1.25	2.5	0.25
60664	33.05	51.99	12.45	1.301	2.047	0.49
60665	33.33	53.97	9.52	1.312	2.125	0.375
60666	33.33	55.56	9.52	1.312	2.187	0.375
60667	34.92	50.8	7.93	1.375	2	0.312
60668	34.92	53.49	7.93	1.375	2.106	0.312
60669	34.92	53.97	7.93	1.375	2.125	0.312
60670	34.92	57.15	7.93	1.375	2.25	0.312

WBS

**Sizes
inch**

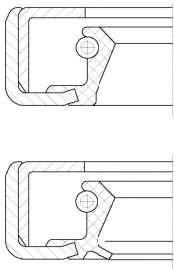


Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
60671	34.92	57.25	7.93	1.375	2.254	0.312
60672	34.92	63.5	9.52	1.375	2.5	0.375
60673	34.92	63.5	12.7	1.375	2.5	0.5
60674	34.92	68.99	7.93	1.375	2.716	0.312
60762	36.51	52.38	7.93	1.437	2.062	0.312
24848	36.51	55.66	12.7	1.437	2.191	0.5
60675	37.85	59.06	9.83	1.49	2.325	0.387
157028	38.1	47.62	4.76	1.5	1.875	0.187
60677	38.1	50.8	9.52	1.5	2	0.375
60676	38.1	59.13	9.83	1.5	2.328	0.387
60679	38.1	60.32	11.5	1.5	2.375	0.453
60678	38.1	60.32	14.28	1.5	2.375	0.562
60680	38.1	63.5	9.52	1.5	2.5	0.375
60681	38.1	63.55	7.93	1.5	2.502	0.312
60682	38.1	65.08	7.93	1.5	2.562	0.312
40294	38.1	65.08	12	1.5	2.562	0.472
60684	39.68	63.5	7.93	1.562	2.5	0.312
60685	39.68	73.02	9.52	1.562	2.875	0.375
60686	41.27	57.15	7.93	1.625	2.25	0.312
60687	41.27	60.32	7.93	1.625	2.375	0.312
60688	41.27	60.32	9.52	1.625	2.375	0.375
60689	41.27	61.91	7.93	1.625	2.437	0.312
60691	41.27	63.5	7.93	1.625	2.5	0.312
60692	41.27	63.5	9.52	1.625	2.5	0.375
40311	41.27	66.67	12.7	1.625	2.625	0.5
60694	42.86	59.13	7.93	1.687	2.328	0.312
60695	42.86	62.23	8.99	1.687	2.45	0.354
107898	42.86	69.85	9.52	1.687	2.75	0.375
60696	43.66	65.08	12.7	1.719	2.562	0.5
60697	44.45	57.15	9.52	1.75	2.25	0.375
60698	44.45	57.15	12.7	1.75	2.25	0.5
60699	44.45	60.32	9.52	1.75	2.375	0.375
81669	44.45	63.5	9.52	1.75	2.5	0.375
40325	44.45	65	10	1.75	2.559	0.394
60700	44.45	65.08	7.93	1.75	2.562	0.312
60701	44.45	69.85	7.93	1.75	2.75	0.312
41746	44.45	69.85	12.7	1.75	2.75	0.5
76506	44.45	70.15	9.52	1.75	2.762	0.375
60702	44.45	71.38	7.93	1.75	2.81	0.312
41747	44.45	76.2	12.7	1.75	3	0.5
130879	45	59.13	10	1.772	2.328	0.394
40337	46	81.03	10	1.811	3.19	0.394
60703	46.03	66.67	9.52	1.812	2.625	0.375
60704	46.84	69.85	9.52	1.844	2.75	0.375
60706	47.62	66.67	7.93	1.875	2.625	0.312
60707	47.62	69.85	7.93	1.875	2.75	0.312
60705	47.62	69.85	9.52	1.875	2.75	0.375
40339	47.62	70.65	13.5	1.875	2.781	0.531
60708	47.62	77.75	7.93	1.875	3.061	0.312
60709	47.98	62.99	8.99	1.889	2.48	0.354
60710	49.21	76.2	7.93	1.937	3	0.312
60711	50.8	66.67	7.93	2	2.625	0.312
60712	50.8	69.85	7.93	2	2.75	0.312
60713	50.8	69.85	9.52	2	2.75	0.375
60714	50.8	76.2	7.93	2	3	0.312

WBS

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
60715	50.8	76.2	9.52	2	3	0.375
42085	50.8	76.2	12.7	2	3	0.5
116386	53.97	69.85	9.52	2.125	2.75	0.375
60716	53.97	73.02	11.11	2.125	2.875	0.437
40203	53.97	85.13	10	2.125	3.352	0.394
60717	53.97	85.62	11.91	2.125	3.371	0.469
40204	53.98	81	11.9	2.125	3.189	0.469
19857	56	73.15	10	2.205	2.88	0.394
42100	57	82.6	12.8	2.244	3.252	0.504
60718	57.15	76.2	9.52	2.25	3	0.375
60719	57.15	76.2	11.11	2.25	3	0.437
60720	57.15	80.96	11.11	2.25	3.187	0.437
42098	57.15	85.09	15.08	2.25	3.35	0.594
60721	57.15	85.72	9.52	2.25	3.375	0.375
60722	57.15	85.72	12.7	2.25	3.375	0.5
60723	58.73	79.37	9.52	2.312	3.125	0.375
60725	58.73	85.09	7.93	2.312	3.35	0.312
60726	59.92	85.72	12.7	2.359	3.375	0.5
124708	60.32	79.37	9.52	2.375	3.125	0.375
42541	60.32	79.37	12.7	2.375	3.125	0.5
42542	60.32	79.5	10	2.375	3.13	0.394
60727	60.32	85.09	11.11	2.375	3.35	0.437
60728	69.85	95.25	11.11	2.75	3.75	0.437
49464	69.85	95.25	15.87	2.75	3.75	0.625
60729	73.02	92.07	9.52	2.875	3.625	0.375
37876	73.02	98.58	9.52	2.875	3.881	0.375
60731	74.61	95.25	9.52	2.937	3.75	0.375
60730	74.61	101.6	12.7	2.937	4	0.5
42562	74.61	101.6	16.91	2.937	4	0.666
42569	76.2	101.6	11	3	4	0.433
42572	76.2	104.78	14.28	3	4.125	0.562
42574	79.37	104.77	14.28	3.125	4.125	0.562
78292	82.55	120.65	12.7	3.25	4.75	0.5
60732	85.72	114.3	15.87	3.375	4.5	0.625
60733	88.9	111.12	15.87	3.5	4.375	0.625
60734	92.07	127	9.52	3.625	5	0.375
60735	95.25	120.65	12.7	3.75	4.75	0.5
60736	98.02	136.52	12.7	3.859	5.375	0.5
42816	99.87	150.2	12.7	3.932	5.913	0.5
42822	101.6	133.35	12.7	4	5.25	0.5
60737	101.6	133.35	15.87	4	5.25	0.625
60738	107.95	133.35	12.7	4.25	5.25	0.5
43088	133.35	165.1	15.87	5.25	6.5	0.625
60739	139.7	158.75	12.7	5.5	6.25	0.5
43095	152.4	171.45	11.9	6	6.75	0.469
36880	158.75	190.5	15.87	6.25	7.5	0.625
60740	171.45	196.85	19.05	6.75	7.75	0.75



WC/WCS

Rotary shaft seal in standard design with a metal outer surface, a metal insert and a spring-energised sealing lip made of elastomer. In addition, the standard model is also available with a protective lip (WCS) on the air side.

Standard materials

NBR 70
Colour: black
Energised spring: non-alloy spring steel according to DIN EN 10270-1
Metal housing: non-alloy steel according to DIN EN 10139
Metal insert: non-alloy steel according to DIN EN 10139

Areas of application

Heavy engineering, agricultural and forestry machinery, wind energy converters and rolling mills.
As a result of its greater rigidity the WC/WCS is particularly suitable for larger dimensions as well as difficult installation conditions and severe operating conditions.

Function

The WC/WCS is a single action rotary shaft seal for rotating or pivoting shafts with optional protective lip sealing action (WCS) on the side facing away from the medium, against dirt accumulation from the outside. The additional metal insert gives the rotary shaft seal more rigidity and the metal outer casing guarantees tight and accurate fitting. The WC/WCS model has limited sealing action with thin fluid or gaseous media and with split housings.

To guarantee a high degree of static sealing on the outer surface, better surface treatment of the housing bore is required or an additional coat of paint should be applied to the metal outer casing.

Media

Good chemical resistance to various mineral oils and greases. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): $\leq 0.05/0.5$
Temperature ($^{\circ}\text{C}$): -40 to $+100$
Peripheral speed (m/s): ≤ 12
Please also refer to our rotational speed diagram on page 20 of this catalogue.

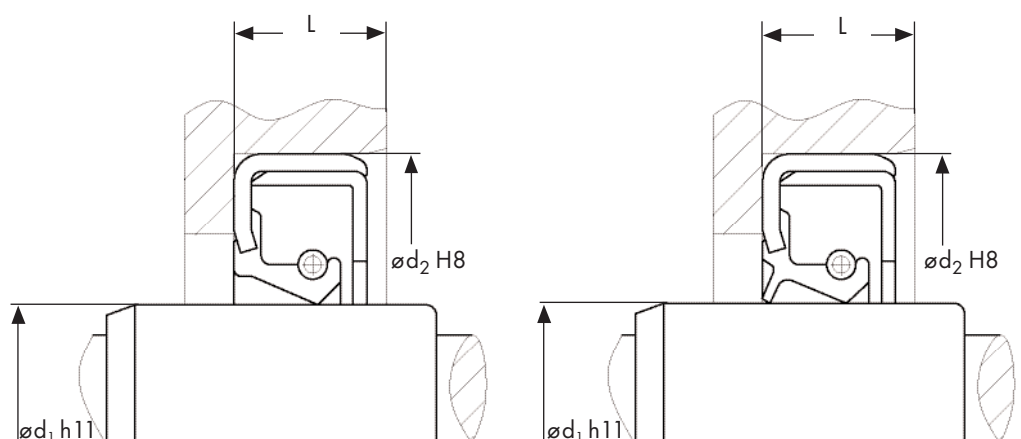
Installation

Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. double dust protection lip, spiral on the sealing lip, spring or metal insert made of other steel grades can be produced as well as all kinds of special designs. WC/WCS are available with an additional coat of paint. Minimum quantities may be obligatory for dimensions outside of the standard.



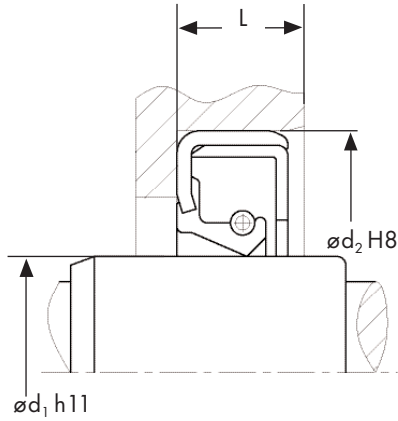
WC

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
40361	10	22	8	19707	30	45	9.5
38739	15	30	10	17176	30	45	10
7697	15	42	10	17178	30	46	10
38738	16	30	10	25663	30	47	9
16862	16	32	10	17188	30	47	10
16883	17	32	10	17198	30	50	10
16891	17	35	10	17202	30	50	12
19689	17	40	8.5	17208	30	52	9
16902	17	40	10	17212	30	52	10
16915	18	35	10	17216	30	52	12
16941	20	35	10	17224	30	55	10
16946	20	38	8	17229	30	55	12
16957	20	40	10	17232	30	56	10
40662	20	42	7	17233	30	56	12
16962	20	42	10	69757	30	60	7
40661	20	47	7	17237	30	60	10
16972	20	47	10	17241	30	60	12
16976	20	52	10	17247	30	62	9
16997	22	40	10	17250	30	62	10
17000	22	42	10	17254	30	62	12
17004	22	47	9	17258	30	72	10
17007	22	47	10	17261	30	72	12
17013	23	40	10	17278	32	47	9
17014	23	42	10	17281	32	47	10
40362	24	37	9	48727	32	50	8
38737	24	40	10	17287	32	50	10
17023	24	42	10	17289	32	50	12
17048	25	40	9	17294	32	52	9
17052	25	40	10	17297	32	52	10
40363	25	42	9	34887	32	52	12
17060	25	42	10	17300	32	54	10
61725	25	43	9	17303	32	55	10
61726	25	44	7	17304	32	55	12
17065	25	45	10	17308	32	56	10
17073	25	47	9	19713	32	56	12
17078	25	47	10	17310	32	60	10
17081	25	50	10	17311	32	60	12
38736	25	50	12	17313	32	62	10
17088	25	52	9	17314	32	62	12
17091	25	52	10	17316	32	65	10
17095	25	52	12	17317	32	65	12
17099	25	62	10	17325	33	62	10
17100	25	62	12	19749	33	62	12
40364	26	42	9	37075	33	72	12
17106	26	42	10	17329	34	50	10
38735	26	47	9	17334	34	52	10
19747	26	47	10	17338	34	58	13
48726	26	50	12	17340	34	62	10
40365	27	47	10	17341	34	62	12
17135	28	40	10	17342	34	72	10
24720	28	47	8	17343	34	72	12
40366	28	47	9	40788	35	47	7
34886	28	47	10	17355	35	47	10
60203	28	50	10	40373	35	50	9
40367	28	52	9	17363	35	50	10

WC

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
17367	35	50	12	17508	38	72	10
40374	35	52	7	17510	38	72	12
17376	35	52	9	40384	40	50	7
17380	35	52	10	41732	40	52	8
17383	35	52	12	17526	40	55	9
38734	35	55	8	17529	40	55	10
17390	35	55	10	19729	40	55	12
17392	35	55	12	17532	40	56	9
17396	35	56	10	17535	40	56	10
17401	35	56	12	17537	40	56	12
40375	35	58	10	19752	40	58	9
17407	35	58	12	17540	40	58	10
17409	35	58	13	17543	40	58	12
17412	35	60	10	17548	40	60	10
17414	35	60	12	17549	40	60	12
17420	35	62	9	17551	40	62	8
17424	35	62	10	17552	40	62	9
17428	35	62	12	17556	40	62	10
17432	35	65	10	17561	40	62	12
17435	35	65	12	38484	40	63.5	12.5
17440	35	70	10	17566	40	65	10
17442	35	70	12	17570	40	65	12
17447	35	72	10	17574	40	68	10
17452	35	72	12	17576	40	68	12
17453	35	80	12	17579	40	70	10
17454	35	80	13	17580	40	70	12
60257	36	50	9	17584	40	72	9
41432	36	54	7	17587	40	72	10
37202	36	54	7.5	17589	40	72	12
40377	36	56	12	25723	40	78	10
36571	36	62	9	17593	40	80	10
38733	36	62	10	17596	40	80	12
40378	36	72	12	17598	40	80	13
40379	37	52	10	75265	40	82.57	13
40380	37	55	9	38731	40	85	10
40381	37	58	13	73079	40	90	8
74257	37	62	8	60251	40	90	9
40382	37	62	9	17600	40	90	12
17475	37	80	13	17601	40	90	13
17482	38	52	10	48730	40	95	10
17485	38	54	10	41741	41	60.5	8
17488	38	55	9	17616	42	60	10
19751	38	55	10	17617	42	60	12
19724	38	55	12	17623	42	62	10
17491	38	56	10	17626	42	62	12
17492	38	56	12	83467	42	65	8
17493	38	58	12	17629	42	65	10
17495	38	60	10	17632	42	65	12
38732	38	60	12	17636	42	70	10
19727	38	62	9	38730	42	70	12
17498	38	62	10	17640	42	72	10
17500	38	62	12	17642	42	72	12
17502	38	65	10	17644	42	80	12
17504	38	70	10	17645	42	80	13
17505	38	70	12	40387	43	72	10

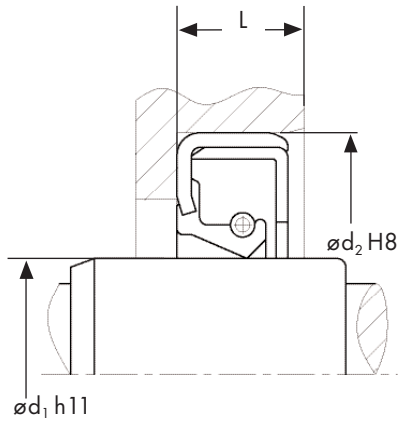
WC

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
38729	44	60	10	42083	50	74	8
17653	44	62	12	17792	50	75	10
39061	44	65	12	17794	50	75	12
38728	44	70	12	17798	50	80	10
25724	44	72	12	17800	50	80	12
17665	45	60	10	17803	50	80	13
17666	45	60	12	17805	50	85	10
17674	45	62	10	17809	50	85	13
17678	45	62	12	17813	50	90	10
17684	45	65	10	17814	50	90	12
17687	45	65	12	17816	50	90	13
17692	45	68	10	83469	50	95	10
17694	45	68	12	60357	52	68	8
17696	45	70	10	17820	52	68	10
17699	45	70	12	17821	52	68	12
17705	45	72	10	17823	52	69	12
17709	45	72	12	17824	52	70	10
17713	45	75	10	17827	52	72	10
17714	45	75	12	17829	52	72	12
17715	45	75	13	17830	52	75	10
117854	45	78	13	17832	52	75	12
17717	45	80	10	17835	52	80	10
17718	45	80	12	17836	52	80	12
17720	45	80	13	17838	52	80	13
17723	45	85	10	17840	52	85	10
17724	45	85	13	17841	52	85	12
34354	45	90	10	17842	52	85	13
40390	46	65	10	17843	52	90	13
41441	47	65	12	40394	53	68	10
25967	47	72	10	40395	53	80	13
48736	47	75	12	38723	54	70	12
19732	48	62	13	17848	54	72	10
17735	48	65	10	17850	54	72	12
17736	48	65	12	17854	54	80	10
38727	48	68	10	17856	54	80	12
38726	48	68	12	17858	54	80	13
19874	48	70	10	17860	54	85	10
17743	48	70	12	25725	54	90	13
19733	48	72	10	49517	55	70	9
17750	48	72	12	17869	55	70	10
85237	48	78	10	17870	55	70	12
17752	48	80	10	17875	55	72	10
17754	48	80	13	17877	55	72	12
17760	48	90	13	17879	55	75	10
38724	50	62	10	17882	55	75	12
17769	50	65	10	17886	55	78	12
17771	50	65	12	38722	55	78	13
69486	50	68	9	75272	55	80	8
17775	50	68	10	17040	55	80	10
17777	50	68	12	17895	55	80	12
44566	50	70	8	17899	55	80	13
17781	50	70	10	17903	55	85	10
17784	50	70	12	17904	55	85	12
17788	50	72	10	17906	55	85	13
17791	50	72	12	17912	55	90	13

WC

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
17913	55	100	13	38488	64	85	13
38721	56	72	10	40405	64	90	10
19757	56	80	10	38715	64	90	13
38720	56	80	13	25726	64	100	10
56399	56	85	10	25727	64	100	13
17922	56	90	13	40404	65	75	8
40398	57	72	10	18020	65	80	10
40399	57	80	12	18023	65	80	12
17924	57	85	13	18024	65	80	13
17925	57	90	13	18028	65	85	10
40400	58	72	8	18031	65	85	12
17929	58	75	12	19679	65	85	13
40401	58	78	13	18036	65	90	10
17932	58	80	10	18039	65	90	12
17933	58	80	12	18042	65	90	13
38719	58	80	13	18046	65	95	10
17936	58	85	10	18048	65	95	13
17938	58	85	13	18052	65	100	10
17940	58	90	13	18054	65	100	12
38718	60	75	8	18056	65	100	13
17945	60	75	12	59437	66	90	10
39065	60	78	13	40406	66	90	13
38487	60	80	8	40407	67	80	13
17952	60	80	10	37736	67	85	10
17955	60	80	12	19758	68	90	10
17958	60	80	13	25976	68	90	12
38717	60	85	8	38489	68	100	12
17963	60	85	10	83471	68	110	13
17964	60	85	12	18071	70	85	10
19739	60	85	13	18076	70	90	10
48740	60	85.1	12	18079	70	90	12
19404	60	90	10	18082	70	90	13
17971	60	90	12	151328	70	92	12
17975	60	90	13	18084	70	95	10
17977	60	95	10	18086	70	95	13
17978	60	95	13	40447	70	98	13
17980	60	100	12	18090	70	100	10
17982	60	100	13	18093	70	100	12
75276	60	110	13	18095	70	100	13
17985	61	85	13	18097	70	105	13
38716	62	75	10	18101	70	110	13
17987	62	80	10	48742	70	120	13
17989	62	80	12	40446	72	90	10
72519	62	82	10	18107	72	90	13
17992	62	85	10	56726	72	95	10
17993	62	85	12	60329	72	95	12
17995	62	85	13	38490	72	95	13
17998	62	90	10	36924	72	100	10
18000	62	90	12	40445	72	110	13
18003	62	100	13	40443	73	95	10
56472	63	85	10	40442	73	100	13
18004	63	85	12	40441	74	95	10
56048	63	90	13	40440	74	100	13
42548	63.5	94	14	18116	75	90	10
40403	64	85	10	18117	75	90	12

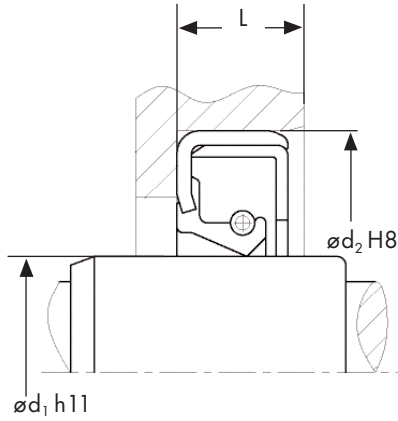
WC

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
18120	75	95	10	48750	88	120	13
18123	75	95	12	48751	89	120	13
20950	75	95	13	18219	90	110	8
18127	75	100	10	18221	90	110	10
18131	75	100	12	18225	90	110	12
18133	75	100	13	18228	90	110	13
74602	75	105	12	22252	90	110	15
18136	75	105	13	19674	90	112.7	13
18139	75	110	13	18230	90	115	9
17103	75	115	13	38711	90	115	13
38714	77	95	10	48752	90	120	12
40438	77	95	13	18239	90	120	13
72922	77	100	10	19675	90	120	15
36443	78	95	13	18242	90	125	13
40437	78	100	10	18244	90	130	13
38713	78	100	12	18245	90	140	13
40436	78	105	13	18248	92	120	13
18149	80	100	10	40427	93	110	13
18151	80	100	12	48753	93	130.2	10
18154	80	100	13	40424	94	120	13
40435	80	105	12	18251	95	110	9
18158	80	105	13	18253	95	110	10
18162	80	110	10	18256	95	110	12
18165	80	110	12	18258	95	110	13
18169	80	110	13	61734	95	115	9
38491	80	110	14	34363	95	115	10
18172	80	120	12	18262	95	115	13
18175	80	120	13	92212	95	120	12
18178	80	125	13	18269	95	120	13
38492	82	105	13	60186	95	120	15
18183	82	110	13	18274	95	125	13
18184	83	110	12	41440	95	125	15
38200	83	110	13	18277	95	130	13
38493	83.5	105	13	48757	95	133	14
38495	84	105	13	40423	97	120	13
55937	84	110	12	83473	98	120	12
18186	85	100	12	48758	98	125	13
18187	85	100	13	38501	98.4	125	13
18189	85	105	10	42819	100	120	5.5
18192	85	105	13	18290	100	120	10
18195	85	110	12	38710	100	120	12
18197	85	110	13	18292	100	120	13
35305	85	110	14	18296	100	125	13
38496	85	110	15	18301	100	130	13
19676	85	115	13	19673	100	130	15
38712	85	120	12	37675	100	135	13
18203	85	120	13	18303	100	140	13
59788	85	120	15	36923	100	150	13
18205	85	125	13	48760	100	160	15
18209	85	130	13	22839	102	125	13
40432	87	100	13	48764	102	130	13
36062	87	110	10	18305	103	125	13
40431	87	110	13	72782	105	120	15
25973	88	110	13	18310	105	125	13
64376	88	120	10	40422	105	130	12

WC

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
18313	105	130	13	18380	125	150	13
18314	105	130	15	38708	125	150	15
18320	105	140	13	20217	125	152.4	15
40421	105	150	15	18382	125	160	13
75325	106.4	130	10	18384	125	160	15
42824	107	133.5	11	83482	125	162	15
38503	108	130	13	38707	125	170	13
83475	108	133.4	13	18385	125	170	15
83476	108	140	13	38509	128	150	15
18326	110	128	9	115842	130	150	11
38504	110	130	12	56732	130	150	14
18330	110	130	13	36925	130	155	10
19654	110	130	15	83483	130	155	12
40420	110	133.3	13	18390	130	160	13
18332	110	135	13	18392	130	160	15
83477	110	140	12	40450	130	165	13
18337	110	140	13	18394	130	170	13
18339	110	140	15	35102	130	170	15
40419	110	140	15.5	83484	130	170	16
27464	110	145	13	18397	130	180	15
18342	110	150	13	38706	132	160	13
38505	110	150	15	40451	132	160	15
83478	110	152	15	38705	135	155	13
21098	112	140	13	18399	135	160	13
48767	112	200	10	18402	135	160	15
19657	113	140	13	19643	135	165	13
123551	113	160	12	40453	135	165	15
18347	114	140	13	40454	135	170	13
152971	115	135	9	22113	135	170	15
18352	115	140	12	55997	138	160	15
18355	115	140	13	18408	140	160	13
18356	115	140	15	19661	140	160	15
18360	115	150	13	18409	140	165	12
18361	115	150	15	48775	140	165	12.5
48769	115	150	16	34888	140	165	15
130487	115	155	13	38510	140	170	12
40416	115	160	15	18411	140	170	13
38506	119	140	15	18412	140	170	14
38507	120	140	10	18415	140	170	15
18366	120	140	13	19611	140	180	15
40415	120	145	13	83488	140	190	15
60196	120	145	14.5	83489	143	170	10
38709	120	145	15	38511	144.8	175	12
43080	120	146	16	19663	145	165	13
40414	120	150	12	40456	145	165	15
18371	120	150	13	83490	145	170	10
18372	120	150	15	19662	145	170	13
83480	120	152	16	18419	145	170	15
18374	120	160	13	35387	145	175	13
18376	120	160	15	38704	145	175	15
40413	120	170	15	43092	145	180	13
40412	122	150	13	20634	145	180	15
83481	122	150	15	48777	146	170	15
48772	124	150	15	18421	148	170	15
38249	125	150	12	40457	148	180	15

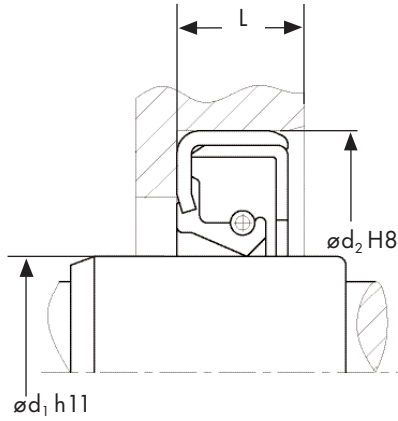
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
40458	148	190	15	22009	180	220	16
38539	149	180	15	60258	180	250	15
19664	150	170	15	22019	185	210	13
38702	150	180	12	19644	185	215	15
18427	150	180	13	22010	185	230	16
18429	150	180	15	92224	186	215.9	12
19669	150	190	15	92878	186	216	12
48778	150	195	15	92879	188	215	16
40459	150	200	15	38544	190	215	15
83491	152	190	15	18456	190	215	16
38542	152	195	15	38546	190	220	12
18431	155	180	12	19612	190	220	15
18432	155	180	15	19613	190	220	16
37024	155	190	15	40466	190	225	15
48779	155	193.9	15.5	19744	190	230	16
48780	155	200	15	92883	194	222	12
43094	157	181	11.5	38548	195	220	16
43093	157	186.5	14.6	22011	195	230	15
83492	157	190.5	16	22842	195	230	16
40460	158	180	15	69751	200	225	12
83493	158.8	190	12	38549	200	225	12.5
48781	159	185	16	18463	200	230	15
19637	160	180	15	43927	200	230	16
38701	160	185	10	148663	200	230	18
19638	160	190	13	92884	200	240	15
19639	160	190	15	57320	200	240	16
48783	160	200	14	20672	200	245	15
38700	160	200	15	19614	200	250	15
92870	162	190	10	43939	200	250	16
40461	162	190	15	38550	203	230	14
18443	165	190	13	38551	205	230	15
34889	165	190	15	22012	205	230	16
38699	165	200	15	22013	205	250	16
40462	168	190	15	92886	209.6	235	12.7
92872	168	200	12	92888	210	230	16
38698	168	200	15	38552	210	235	12
38543	169	190	10	18464	210	240	15
18444	170	190	15	38553	210	240	16
19630	170	200	13	40467	210	250	13
18447	170	200	15	44607	210	250	15
40463	170	210	20	19615	210	250	16
22248	170	215	16	38554	210	260	15
92873	170	225	16	153518	210	260	16
48785	170	245	16	48799	210	260	25
40464	172	200	15	43100	212	250	15
18450	175	200	15	34389	214	241.5	15
92874	175	210	15	48804	215	240	12
19640	175	215	16	92890	215	245	16
92875	178	200	12	38555	215	250	15
40465	178	200	15	92892	215	250	16
40583	178	215	16	152168	216	260	16
19641	180	200	15	40468	218	250	16
19642	180	210	15	19616	220	250	15
37099	180	215	15	40561	220	260	15
19610	180	215	16	92894	220	260	18

WC

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
92895	220	260	22	60280	280	310	15
20889	220	270	15	19627	280	310	16
148918	220	300	15	48824	280	316	18
48808	225	250	12.5	34410	280	320	16
22014	225	250	16	60282	280	320	18
69913	225	260	15	19649	280	320	20
40470	225	270	16	26242	280	324	25
38557	229	255	15	48825	280	380	20
19645	230	255	10	75284	280	400	15
36793	230	255	15	22017	285	310	16
19646	230	260	15	38560	285	320	16
19617	230	270	15	75285	285	325	15
69544	230	270	16	48826	285	325	16
22015	230	280	16	48827	285	330	20
92897	230	285	23	48828	290	330	15
92898	235	270	15	56316	290	330	16
19618	235	270	16	19628	290	330	18
19619	240	270	15	48829	290	334	20
35383	240	270	16	48831	290	350	25
20655	240	275	18	38564	295	335	16
18470	240	280	16	92904	295	335	18
22016	240	290	16	19629	300	332	16
21118	240	300	18	19650	300	335	18
19620	245	270	16	56317	300	340	16
48811	245	285	16.5	68886	300	340	18
44608	250	280	14	18474	300	340	20
19621	250	280	15	34417	300	342	16
26371	250	280	16	48833	300	344	20.5
20656	250	285	18	44152	300	350	18
48813	250	290	15	42645	300	350	19
19622	250	290	16	92905	300	350	20
39225	250	310	25	38565	300	360	18
48814	255	290	16	92906	300	400	18
60283	258	290	16	92907	300	420	20
20233	260	280	16	43108	301	328	15
19623	260	290	16	38566	305	340	18
48816	260	290	20	56971	305	345	20
40562	260	300	16	38567	310	350	18
19648	260	300	20	36644	310	370	28
74724	260	310	16	48836	315	355	16.5
92902	260	320	25	44957	315	355	18
60277	260	330	20	69545	315	365	16
43106	264	290	15	37361	315	365	20
69543	265	290	15	40037	320	350	16
19624	265	290	16	18475	320	350	18
75277	265	300	16	92909	320	360	15
38558	265	310	16	19651	320	360	18
75282	267	300	20	20221	320	360	20
38559	268	300	16	48838	320	360	25
19625	270	310	16	48839	320	360	32
19873	270	310	18	48840	320	380	20
48819	270	330	25	59530	320	380	25
48820	272	310	16	59790	325	360	16
21954	275	310	15	38569	325	365	16
19626	275	310	16	92910	330	360	15

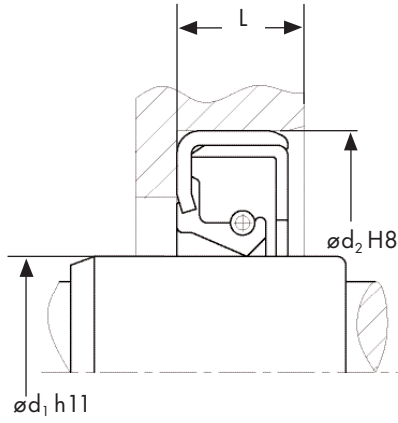
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
23771	330	370	18	48866	425	475	22
69857	330	370	20	44605	425	480	15
21567	330	380	20	92914	430	480	22
92911	330	385	18	92915	430	480	25
19632	340	372	16	92916	430	495	25
38570	340	380	16	38583	440	470	20
19633	340	380	18	38589	440	480	20
19634	340	380	20	48868	440	490	17
48841	340	390	20	38590	440	490	20
21658	340	400	25	48869	445	480	16
60289	350	380	16	21868	445	480	18
38571	350	390	18	39362	448	480	15
34422	355	395	32	48870	450	490	18
34428	355	405	15	21194	450	490	20
48846	360	390	20	117011	450	500	20
48847	360	392	20	38591	450	500	25
44168	360	400	18	48871	455	495	20
19635	360	400	20	44980	459	522	27
59469	360	400	25	38592	460	500	20
48850	360	425	20	48872	460	510	25
48851	365	395	15	48873	460	520	26
38574	365	405	18	20712	461	500	20
38575	365	410	20	24282	467	510	20
38576	370	400	10	20711	470	510	20
35846	370	410	15	48874	470	520	18
48852	370	410	20	48875	470	520	20
48853	370	415	15	37259	470	520	22
36973	375	420	18	77774	475	530	18
48854	375	430	18	38593	480	520	20
38577	380	420	18	92917	480	550	25
19636	380	420	20	117784	482	530	20
38578	380	430	19	37586	485	535	22
43111	380	445	15	48878	490	530	20
38579	390	430	18	41115	500	520	12
48857	390	440	25	92918	500	535	12
48858	394	420	16	38594	500	540	20
38052	395	430	15	92919	500	550	20
35443	395	430	18	37585	500	550	22
38820	400	430	26	38596	500	560	20
37258	400	438.5	17	48880	510	550	20
35984	400	440	15	38597	510	572	20
21173	400	440	16	152084	520	560	14
72649	400	440	18	48881	520	580	20
37477	400	440	20	56899	530	565	20
92913	400	450	18	38598	530	570	20
27630	400	450	20	38599	540	580	20
48859	400	470	20	48883	540	590	22
48860	400	500	25	38600	540	590	25.5
48862	410	454	20.5	36560	550	590	20
48864	410	460	15	48884	550	600	22
69631	410	460	22	38601	555	600	20
38581	420	460	15	38602	560	610	20
20714	420	460	18	117012	560	610	25
38582	420	460	20	38603	560	620	20
59333	420	480	15	48885	560	620	25

WC

**Sizes
metric**



Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L
55919	565	630	20
36643	570	620	22
48886	570	630	25
35584	580	615	20
48888	580	630	20
48889	580	636	25
48890	580	640	25
48892	580	640	30
48893	595	635	20
38604	600	640	20
72903	600	640	22
48895	600	650	25
38606	610	650	20
38607	610	660	20
42664	620	660	20
56286	620	670	25
48898	620	680	25
37584	620	684	25
48899	628	655	20
38608	630	670	20
38609	630	680	20
20710	630	690	30
38610	630	700	20
48900	632	672	20
48901	640	680	20
69858	640	690	25
48902	645	677	16
48903	650	690	18
38120	650	690	20
44641	650	700	20
48905	650	710	25
48906	660	700	18
92920	660	704	22.5
48907	670	710	20
92921	670	730	25
38611	695	740	20
38612	700	740	20
38613	710	760	20
38614	740	780	20
36648	750	790	23
92922	750	800	25
38615	760	800	20
55895	790	830	23
37819	840	880	20
44950	860	900	20
20253	880	940	32
48909	950	1000	20
48910	1060	1100	20

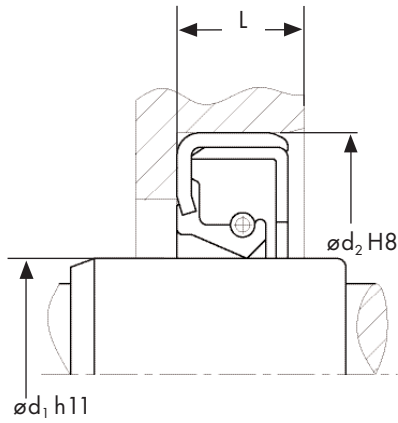
WC

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
60827	14.28	25.4	6.35	0.562	1	0.25
60828	15.87	25.4	6.35	0.625	1	0.25
60829	15.87	28.57	7.93	0.625	1.125	0.312
27404	15.87	28.57	9.52	0.625	1.125	0.375
60830	19.05	39.37	7.93	0.75	1.55	0.312
60831	20.63	31.75	9.52	0.812	1.25	0.375
60832	25.4	41.27	11.11	1	1.625	0.437
60833	25.4	44.45	9.52	1	1.75	0.375
60834	28.57	47.62	11.11	1.125	1.875	0.437
60835	31.75	44.45	7.93	1.25	1.75	0.312
40369	31.75	44.45	9.52	1.25	1.75	0.375
40370	31.75	44.68	9.52	1.25	1.759	0.375
120761	31.75	50.8	9.52	1.25	2	0.375
40371	33.33	50.9	11.11	1.312	2.004	0.437
60836	34.92	50.8	8.73	1.375	2	0.344
60837	34.92	53.97	11.11	1.375	2.125	0.437
40372	34.92	54.08	9.52	1.375	2.129	0.375
60838	34.92	68.26	12.7	1.375	2.687	0.5
48728	35.2	57.3	12.7	1.386	2.256	0.5
120757	38.1	53.97	11.11	1.5	2.125	0.437
40383	38.1	57.15	9.52	1.5	2.25	0.375
74245	38.1	57.2	12.7	1.5	2.252	0.5
120760	38.1	60.32	9.52	1.5	2.375	0.375
60840	39.68	63.5	12.7	1.562	2.5	0.5
60839	39.68	64.29	12.7	1.562	2.531	0.5
60841	39.68	73.13	7.93	1.562	2.879	0.312
48729	39.69	61.9	11.9	1.563	2.437	0.469
75264	39.69	63.5	12	1.563	2.5	0.472
60842	41.27	60.32	12.7	1.625	2.375	0.5
120759	41.27	61.91	9.52	1.625	2.437	0.375
48731	41.27	63.65	7.95	1.625	2.506	0.313
36645	41.27	66.67	12.7	1.625	2.625	0.5
60844	41.53	63.5	7.93	1.635	2.5	0.312
92203	42.67	76.2	9.65	1.68	3	0.38
40389	44.45	63.5	9.52	1.75	2.5	0.375
40388	44.45	68.33	12.7	1.75	2.69	0.5
48733	44.45	76.2	9.53	1.75	3	0.375
60209	44.5	60.43	9.25	1.752	2.379	0.364
60845	47.62	63.5	12.7	1.875	2.5	0.5
35366	47.62	66.67	7.93	1.875	2.625	0.312
60846	47.62	70.66	11.11	1.875	2.782	0.437
75266	47.62	73.02	7.93	1.875	2.875	0.312
75267	47.62	76.2	7.93	1.875	3	0.312
75268	47.62	80.96	11.11	1.875	3.187	0.437
75269	47.62	90.96	11.11	1.875	3.581	0.437
48737	49.2	79.38	9.65	1.937	3.125	0.38
157003	49.21	68.26	9.52	1.937	2.687	0.375
60847	49.21	76.2	12.7	1.937	3	0.5
74246	49.21	76.2	14.7	1.937	3	0.579
38725	49.21	90.11	12.7	1.937	3.548	0.5
60893	49.21	95.25	12.7	1.937	3.75	0.5
60848	50.01	73.02	11.91	1.969	2.875	0.469
60849	50.8	68.99	11.91	2	2.716	0.469
60850	50.8	69.85	7.93	2	2.75	0.312
60894	50.8	69.85	9.52	2	2.75	0.375

WC

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
83468	50.8	69.85	12.7	2	2.75	0.5
60851	50.8	73.02	12.7	2	2.875	0.5
48738	50.8	76.2	12.7	2	3	0.5
120758	50.8	80.97	9.52	2	3.188	0.375
60852	52.38	76.2	12.7	2.062	3	0.5
42089	53	76.2	12.8	2.087	3	0.504
60853	53.97	76.2	11.11	2.125	3	0.437
40396	53.97	76.2	12.5	2.125	3	0.492
60854	53.97	85.62	11.11	2.125	3.371	0.437
38485	55.56	77.78	9.52	2.187	3.062	0.375
75271	55.56	77.79	9.52	2.187	3.063	0.375
38486	57.15	74.42	12.7	2.25	2.93	0.5
49504	57.15	76.2	11.11	2.25	3	0.437
60855	57.15	76.2	12.7	2.25	3	0.5
80736	57.15	77.78	11.11	2.25	3.062	0.437
48739	57.15	79.38	9.65	2.25	3.125	0.38
60856	57.15	80.96	11.11	2.25	3.187	0.437
60857	57.15	82.55	12.7	2.25	3.25	0.5
60858	57.15	85.09	11.11	2.25	3.35	0.437
83470	57.15	85.09	11.9	2.25	3.35	0.469
143837	57.15	88.9	12.7	2.25	3.5	0.5
21143	57.15	92.07	11.11	2.25	3.625	0.437
40402	58.73	85.22	7.93	2.312	3.355	0.312
60859	58.73	88.9	12.7	2.312	3.5	0.5
75275	60.02	88.9	12.7	2.363	3.5	0.5
60860	60.32	86.38	11.11	2.375	3.401	0.437
60861	60.32	88.4	11.11	2.375	3.48	0.437
118307	60.32	92.07	11.11	2.375	3.625	0.437
40503	60.32	92.07	12.7	2.375	3.625	0.5
60862	60.32	98.42	11.91	2.375	3.875	0.469
60863	63.5	80.96	11.11	2.5	3.187	0.437
40455	63.5	82.55	12.7	2.5	3.25	0.5
42550	63.5	85.72	9.52	2.5	3.375	0.375
60864	63.5	88.9	11.11	2.5	3.5	0.437
60865	63.5	92.07	11.91	2.5	3.625	0.469
60866	63.5	95.25	11.11	2.5	3.75	0.437
48741	68.26	95.25	12.7	2.687	3.75	0.5
60867	69.85	95.25	11.11	2.75	3.75	0.437
40411	69.85	95.25	12.7	2.75	3.75	0.5
60868	69.85	95.65	11.11	2.75	3.766	0.437
60869	69.85	98.42	11.11	2.75	3.875	0.437
60870	71.43	95.25	11.11	2.812	3.75	0.437
40444	72.24	101.8	12.7	2.844	4.008	0.5
83472	73.02	98.42	11.11	2.875	3.875	0.437
74041	73.02	98.43	11.11	2.875	3.875	0.437
41526	73.02	101.6	9.52	2.875	4	0.375
42560	73.02	101.6	12.7	2.875	4	0.5
60871	73.02	114.3	11.11	2.875	4.5	0.437
38373	74.61	101.6	16.27	2.937	4	0.641
60872	74.61	104.77	9.52	2.937	4.125	0.375
59532	76.2	98.43	11.11	3	3.875	0.437
42571	76.2	98.6	12	3	3.882	0.472
60873	76.2	101.6	9.52	3	4	0.375
24663	76.2	101.6	11.11	3	4	0.437
40439	76.2	101.6	12.7	3	4	0.5

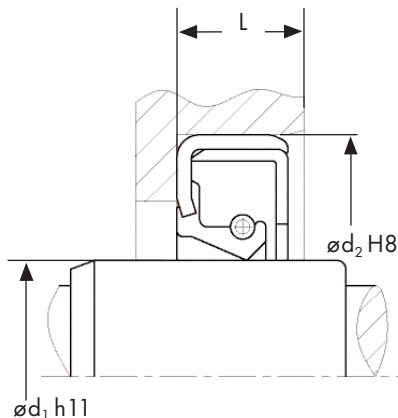
WC

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
60874	76.2	114.3	11.11	3	4.5	0.437
48745	79.37	117.47	12.7	3.125	4.625	0.5
134607	82.55	107.95	11.9	3.25	4.25	0.469
48748	82.55	107.95	15.87	3.25	4.25	0.625
36273	82.55	133.35	12.7	3.25	5.25	0.5
60875	84.13	114.3	11.91	3.312	4.5	0.469
60876	85.72	114.3	11.11	3.375	4.5	0.437
37681	85.72	117.47	12.7	3.375	4.625	0.5
42807	87.5	111.12	12.7	3.445	4.375	0.5
40430	88.9	111.12	12.7	3.5	4.375	0.5
48749	88.9	114.3	11.9	3.5	4.5	0.469
60877	88.9	117.47	9.52	3.5	4.625	0.375
60878	88.9	117.47	12.7	3.5	4.625	0.5
38497	88.9	120.65	10	3.5	4.75	0.394
69152	88.9	120.7	10	3.5	4.752	0.394
38498	90.09	119.86	24.34	3.547	4.719	0.958
38499	92.07	117.47	15.87	3.625	4.625	0.625
69553	92.2	126.7	11.6	3.63	4.988	0.457
42811	92.25	114.45	12.7	3.632	4.506	0.5
40425	93.66	114.45	12.7	3.687	4.506	0.5
40426	93.66	130.18	12.7	3.687	5.125	0.5
38500	93.66	142.87	12.7	3.687	5.625	0.5
37694	95.25	111.12	8.33	3.75	4.375	0.328
74868	95.25	127	11.11	3.75	5	0.437
48759	100	136.53	12.7	3.937	5.375	0.5
38502	101.6	127	12.7	4	5	0.5
69029	101.6	133.35	15.87	4	5.25	0.625
48762	101.6	136.68	11.13	4	5.381	0.438
48763	101.6	139.7	14.29	4	5.5	0.563
59435	101.6	146.05	14.28	4	5.75	0.562
83474	107.95	139.7	14.28	4.25	5.5	0.562
60879	111.12	152.4	12.7	4.375	6	0.5
48765	111.25	136.65	12.7	4.38	5.38	0.5
83479	114.3	139.7	12.7	4.5	5.5	0.5
68161	114.3	146.05	22.22	4.5	5.75	0.875
40418	114.3	152.4	19.05	4.5	6	0.75
35927	117.47	146.05	14.28	4.625	5.75	0.562
84945	117.47	152.4	15.87	4.625	6	0.625
60880	119.06	149.23	12.7	4.687	5.875	0.5
38508	127	152.4	12.7	5	6	0.5
43083	127	158.75	14.28	5	6.25	0.562
48491	127	158.75	15.87	5	6.25	0.625
60881	129.77	155.32	12.7	5.109	6.115	0.5
60181	130.17	161.92	12.7	5.125	6.375	0.5
77867	133.35	158.75	12.7	5.25	6.25	0.5
134608	133.35	158.75	14.28	5.25	6.25	0.562
83485	133.35	165.1	12.7	5.25	6.5	0.5
83486	139.7	165.1	12.7	5.5	6.5	0.5
83487	139.7	174.6	14.28	5.5	6.874	0.562
74369	139.7	184.15	15.87	5.5	7.25	0.625
37610	146.05	171.45	12.7	5.75	6.75	0.5
38512	146.05	174.5	12.7	5.75	6.87	0.5
60882	146.05	177.8	15.87	5.75	7	0.625
60883	152.4	180.98	15.87	6	7.125	0.625
38540	152.4	182.56	19.05	6	7.187	0.75

WC

Sizes
inch



Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
38541	152.4	190.7	15	6	7.508	0.591
60233	157.1	190.55	6.35	6.185	7.502	0.25
83494	158.75	190.5	12.7	6.25	7.5	0.5
83495	158.75	196.85	15.87	6.25	7.75	0.625
48782	160.33	187.32	12.7	6.312	7.375	0.5
92871	165.1	190.5	14.28	6.5	7.5	0.562
77866	165.1	196.85	12.7	6.5	7.75	0.5
60884	168.28	206.38	15.87	6.625	8.125	0.625
48787	171.4	209.5	15.8	6.748	8.248	0.622
60885	171.45	203.2	15.87	6.75	8	0.625
43098	173	200.3	15.87	6.811	7.886	0.625
48788	177.8	203.2	15.88	7	8	0.625
48789	177.8	222.25	19.05	7	8.75	0.75
48790	179.95	209.55	18.25	7.085	8.25	0.719
92876	180.97	206.38	15.87	7.125	8.125	0.625
48791	180.97	219.3	19.05	7.125	8.634	0.75
39581	184.15	215.9	15.87	7.25	8.5	0.625
92877	184.15	222.25	14.28	7.25	8.75	0.562
92880	190.5	215.9	15.75	7.5	8.5	0.62
60886	190.5	215.9	15.87	7.5	8.5	0.625
92881	190.5	228.6	19.05	7.5	9	0.75
48794	193.67	219.07	14.28	7.625	8.625	0.562
92882	193.7	219.08	12.7	7.626	8.625	0.5
38547	190.5	222.25	15	7.5	8.75	0.591
48795	196.85	234.95	14.28	7.75	9.25	0.562
48796	196.85	241.3	19.05	7.75	9.5	0.75
60887	200.03	241.3	19.05	7.875	9.5	0.75
39582	203.2	228.6	15.87	8	9	0.625
92885	203.2	241.3	19.05	8	9.5	0.75
60888	209.55	241.3	15.87	8.25	9.5	0.625
92887	209.55	249.8	15.08	8.25	9.835	0.594
37682	212.72	247.65	19.05	8.375	9.75	0.75
48801	212.72	250.82	14.28	8.375	9.875	0.562
92889	215.9	241.3	12.7	8.5	9.5	0.5
60889	215.9	241.3	15.87	8.5	9.5	0.625
92891	215.9	247.65	19.05	8.5	9.75	0.75
34875	215.9	254	14.28	8.5	10	0.562
92893	219.1	244.5	12.7	8.626	9.626	0.5
92896	225.43	257.18	19.05	8.875	10.125	0.75
38556	228.6	254	19.05	9	10	0.75
48809	234.95	273.05	15.88	9.25	10.75	0.625
75062	241.3	279.4	19.05	9.5	11	0.75
39572	241.3	280	30	9.5	11.024	1.181
60273	241.3	292.1	25.4	9.5	11.5	1
92899	241.3	317.7	20.6	9.5	12.508	0.811
48812	247.65	279.4	15.87	9.75	11	0.625
92900	247.65	282.58	19.05	9.75	11.125	0.75
92901	254	279.4	12.7	10	11	0.5
60890	254	292.1	19.05	10	11.5	0.75
75279	254	304.8	15.87	10	12	0.625
75280	263.53	295.28	22.22	10.375	11.625	0.875
92903	263.53	295.28	22.23	10.375	11.625	0.875
48818	266.7	304.8	19.05	10.5	12	0.75
75281	266.7	317.5	15.87	10.5	12.5	0.625
48821	273.05	323.85	25.4	10.75	12.75	1

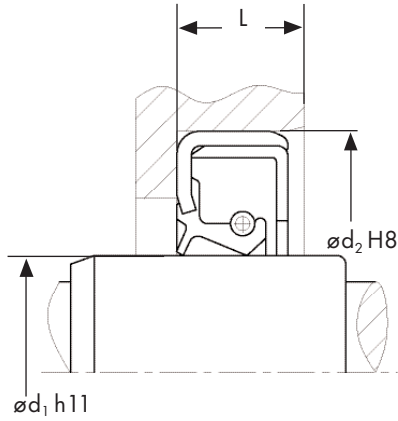
WC

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
75283	279.4	304.8	12.7	11	12	0.5
59571	279.4	317.5	19.05	11	12.5	0.75
37322	285.75	323.85	19.05	11.25	12.75	0.75
37640	298.45	336.55	22.22	11.75	13.25	0.875
48834	304.8	330.2	12.7	12	13	0.5
48835	304.8	355.6	25.4	12	14	1
38568	317.5	349.25	19.05	12.5	13.75	0.75
92908	317.5	349.25	19.5	12.5	13.75	0.768
21560	330.2	381	23.79	13	15	0.937
56354	349.25	381	19.05	13.75	15	0.75
38572	361.95	400.05	19.05	14.25	15.75	0.75
38573	361.95	412.75	25.4	14.25	16.25	1
59471	366.72	406.4	17.46	14.438	16	0.687
127110	374.65	419.1	22.22	14.75	16.5	0.875
74447	381	431.8	25.4	15	17	1
44606	381	438.15	22.22	15	17.25	0.875
92912	393.7	444.5	20.57	15.5	17.5	0.81
36559	400	451	17.46	15.748	17.756	0.687
26906	412.75	450.85	17.46	16.25	17.75	0.687
155760	412.75	457.2	19.05	16.25	18	0.75
48865	425.45	463.55	17.46	16.75	18.25	0.687
35847	457	508	25.4	18	20	1
42643	457.2	495.3	19.05	18	19.5	0.75
38595	500.06	549.91	19.84	19.687	21.65	0.781
49490	508	558.8	25.4	20	22	1
21639	520.7	571.5	22.5	20.5	22.5	0.886
37089	533.4	584.2	22.22	21	23	0.875
36545	546	596.9	19.05	21.496	23.5	0.75
44334	549.28	600.08	25.4	21.625	23.625	1
38605	609.6	660.4	22.22	24	26	0.875
48908	850.9	914.4	22.2	33.5	36	0.874
92249	933.45	984.25	22.22	36.75	38.75	0.875
48911	1181.1	1231.9	22.23	46.5	48.5	0.875

WCS

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
19686	15	30	10	17688	45	65	12
41422	22	42	11	80801	46	65	13
17053	25	40	10	39062	47	65	12
17061	25	42	10	39063	48	62	9
41423	25	45	12.5	40391	50	68	9
19702	25	47	10	40392	50	70	7
17092	25	52	10	68263	50	70	8
118860	25	62	10	40393	50	73	9
40452	28.6	40	8	56900	50	80	10
41424	29	43	8	17804	50	80	13
44360	30	43	8	42091	54	79.2	12.8
17177	30	45	10	40397	55	72	12
17189	30	47	10	19756	55	76.2	10
40368	30	50	7	17892	55	80	10
17199	30	50	10	61799	55	80	13
17203	30	50	12	75274	60	80	8
17213	30	52	10	19990	60	80	12
17217	30	52	12	44359	60	82	12
17225	30	55	10	144025	60	85	13
17230	30	55	12	131150	60	90	12
17238	30	60	10	6449	62	80	16
17242	30	60	12	39066	62	85	10
17251	30	62	10	42543	62	85	13
17255	30	62	12	42545	62	100	13
17262	30	72	12	56587	63	85	10
144026	34	62	15	61731	64	90	13
41419	35	45	12	41411	65	90	12
17364	35	50	10	44406	65	100	13
17368	35	50	12	40408	68	88	10
41420	35	51	12	40409	68	90	10
17377	35	52	9	40410	68	90	13
38747	35	52	10	42555	69	88	10
17384	35	52	12	36573	70	90	10
17397	35	56	10	18080	70	90	12
17402	35	56	12	38616	70	95	13
17429	35	62	12	19872	72	90	10
118861	35	72	12	18128	75	100	10
40376	36	50	7	18134	75	100	13
75263	36	63	12	48743	75	105	12
40449	37	62	14	92939	75	115	13
41421	38	52	8	42568	76	101.8	12
39060	40	52	7	35534	78	100	10
41734	40	54	11	48746	80	100	10
38749	40	55	12	38703	80	100	13
38748	40	60	10	65445	80	108	10
17557	40	62	10	38740	80	110	13
61343	40	65	10	107920	80	120	13
17571	40	65	12	42804	82.5	108	11
40385	40	72	10	126961	85	105	12
38750	40	80	13	38617	85	110	12
40386	41	53	7	18198	85	110	13
17675	45	62	10	35653	87	110	10
17679	45	62	12	18229	90	110	13
34353	45	64	12	42809	90	115	13
144528	45	65	10	40429	90	118	12

WCS

**Sizes
metric**

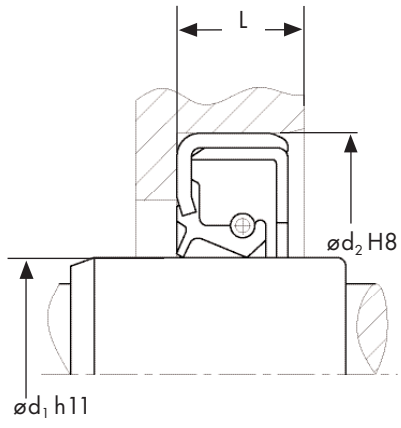
Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
18240	90	120	13	76592	170	200	13
69555	90	120	15	123128	170	200	15
56970	90	130	13	48784	170	200	16
40428	90	135	15	92930	175	210	15
69554	92	120	10	156932	180	210	15
20851	95	120	13	38621	180	215	15
48756	95	125	12	48792	180	220	15
74390	98	130	13	92933	190	220	12
61826	100	120	10	74060	190	230	15
67999	100	125	13	20757	200	230	15
87165	100	130	13	92934	200	230	18
39067	100	130	15	92925	200	240	15
19653	105	140	13	48797	200	240	20
144024	110	130	15	92926	203	230	12
38741	110	135	13	63078	210	240	15
18338	110	140	13	92928	210	250	15
46202	110	160	16	48798	210	250	20
20756	115	140	13	40469	220	250	15
48768	115	145	16	43101	220	250	16
40417	115	150	13	48805	220	250	18
83324	115	150	15	48806	220	260	22
43079	117.5	152	16	92929	230	250	20
48770	118	150	12	62329	230	270	16
34693	120	140	13	21078	240	270	15
38742	120	150	15	62330	240	280	16
48771	120	155	16	34393	240	280	20
85481	125	143	13	38622	250	280	15
92940	125	150	10	43104	250	290	16
38743	125	150	13	149406	260	280	16
56010	125	152.4	15	92923	260	290	16
38744	125	160	15	75278	260	300	20
92941	125	162	12	48817	260	320	25
43084	127	160	16	56652	270	310	16
38745	130	155	10	62331	280	310	16
22220	130	160	15	38623	280	320	16
21953	130	170	15	38624	280	320	20
38746	132	160	13	22844	300	332	16
43087	133	165	16	35589	300	340	20
143325	135	180	15	43112	320	360	18
48774	140	160	13	48837	320	360	20
92943	140	170	12	56449	330	370	18
107939	140	170	13	62332	340	372	16
19761	140	170	15	62333	340	380	20
85482	145	167	13	48842	350	390	18
48776	145	180	15	48843	350	390	20
37909	148	170	14.5	48848	360	392	20
29076	148	180	15	74889	360	400	20
92945	149	170	14.5	22843	370	410	20
82952	150	170	15	155168	380	420	16
19666	150	180	13	62334	380	430	19
19668	150	180	15	92924	390	425	18
56237	160	180	15	48856	390	435	18
19763	160	190	15	38580	400	450	25
27383	165	190	13	46484	420	460	20
38620	165	190	15	48876	480	520	20

WCS

Part No. Dimensions in mm
 $\varnothing d_1$ $\varnothing d_2$ L

**Sizes
metric**

87130	530	580	22
92935	600	640	22



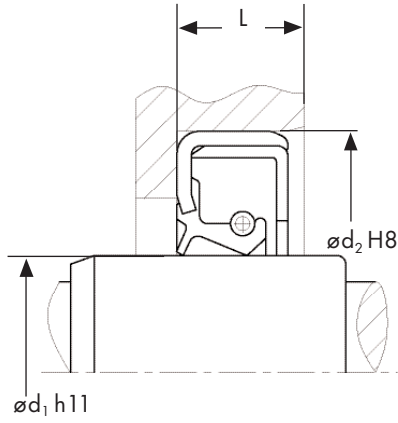
WCS

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
36775	12.7	25.4	9.52	0.5	1	0.375
61038	14.28	35.03	10.31	0.562	1.379	0.406
60891	15.87	34.92	7.93	0.625	1.375	0.312
106824	22.22	34.92	7.93	0.875	1.375	0.312
20657	31.75	53.38	11.11	1.25	2.102	0.437
75262	34.92	53.38	11.11	1.375	2.102	0.437
60892	38.1	57.4	10.31	1.5	2.26	0.406
36779	39.68	57.15	9.52	1.562	2.25	0.375
36778	39.68	60.32	9.52	1.562	2.375	0.375
85400	39.68	60.32	12.7	1.562	2.375	0.5
36776	44.45	63.5	12.7	1.75	2.5	0.5
36777	44.45	66.67	12.7	1.75	2.625	0.5
42082	50	73.03	15.7	1.969	2.875	0.618
75270	50.4	76.2	12.7	1.984	3	0.5
130471	50.8	69.09	11.89	2	2.72	0.468
60895	50.8	77.78	12.7	2	3.062	0.5
148587	50.8	85.72	9.52	2	3.375	0.375
42090	54.1	77.72	15.87	2.13	3.06	0.625
75273	57.15	76.2	12.7	2.25	3	0.5
130174	57.15	80.96	11.11	2.25	3.187	0.437
157000	60.32	85.09	11.11	2.375	3.35	0.437
60896	60.32	85.72	11.11	2.375	3.375	0.437
60897	60.32	88.4	11.11	2.375	3.48	0.437
60898	60.32	88.9	9.52	2.375	3.5	0.375
60899	63.5	82.55	11.11	2.5	3.25	0.437
36207	63.5	85.72	12.7	2.5	3.375	0.5
60900	63.5	88.9	11.11	2.5	3.5	0.437
60901	63.5	88.9	12.7	2.5	3.5	0.5
60902	63.5	95.25	12.7	2.5	3.75	0.5
60903	65.08	91.89	12.7	2.562	3.618	0.5
60904	66.67	85.72	9.52	2.625	3.375	0.375
60905	69.85	89.99	11.11	2.75	3.543	0.437
144028	69.85	92	14	2.75	3.622	0.551
60906	69.85	95.25	12.7	2.75	3.75	0.5
60907	69.85	101.6	11.11	2.75	4	0.437
60908	69.85	107.95	11.11	2.75	4.25	0.437
60909	73.02	95.25	11.11	2.875	3.75	0.437
24104	74.61	101.6	15.87	2.937	4	0.625
38372	74.61	101.6	16.27	2.937	4	0.641
60910	74.61	104.77	9.52	2.937	4.125	0.375
42570	76	98.58	12	2.992	3.881	0.472
60911	76.2	101.6	11.11	3	4	0.437
155758	76.2	101.8	11.88	3	4.008	0.468
42573	76.2	104.78	14.28	3	4.125	0.562
42575	79.37	101.6	11.11	3.125	4	0.437
60912	79.37	114.3	12.7	3.125	4.5	0.5
37030	82.55	107.95	9.52	3.25	4.25	0.375
42803	82.55	114.3	11.5	3.25	4.5	0.453
133303	82.55	117.47	12.7	3.25	4.625	0.5
60913	85.72	117.47	11.11	3.375	4.625	0.437
60914	88.9	114.3	11.11	3.5	4.5	0.437
90329	92.07	114.3	12	3.625	4.5	0.472
60915	95.25	114.3	11.91	3.75	4.5	0.469
60916	95.25	136.52	13.46	3.75	5.375	0.53
37201	101.6	127	12.7	4	5	0.5

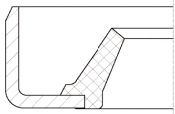
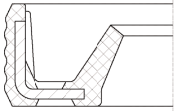
WCS

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
48761	101.6	127.1	12.7	4	5.004	0.5
46004	101.6	136.53	12.7	4	5.375	0.5
38618	101.6	139.7	12.7	4	5.5	0.5
124576	106.36	127	9.52	4.187	5	0.375
127688	107.95	133.38	11	4.25	5.251	0.433
38619	117.47	152.4	12.7	4.625	6	0.5
43081	123.82	158.75	14.28	4.875	6.25	0.562
78175	127	152.4	12.7	4.875	6	0.5
60917	127	158.75	14.28	5	6.25	0.562
60918	133.35	165.1	15.87	5.25	6.5	0.625
60919	139.7	160.35	30.17	5.5	6.313	1.188
92942	139.7	165.1	12.7	5.5	6.5	0.5
43089	139.7	171.45	15	5.5	6.75	0.591
83813	146.05	168.28	15.87	5.75	6.625	0.625
92944	146.05	168.28	19.05	5.75	6.625	0.75
83558	146.05	171.5	14.28	5.75	6.752	0.562
92932	165.1	234.95	19.05	6.5	9.25	0.75
56546	184.15	215.9	15.87	7.25	8.5	0.625
92927	203.2	254	15.87	8	10	0.625
61825	209.55	270.23	19.05	8.25	10.639	0.75
155759	234.95	285.75	19.05	9.25	11.25	0.75
60920	241.3	317.5	20.64	9.5	12.5	0.813
39368	266.7	304.8	19.05	10.5	12	0.75
60921	273.05	339.73	31.75	10.75	13.375	1.25
48823	279.4	330	19.05	11	12.992	0.75
38821	342.9	368.3	12.7	13.5	14.5	0.5
35590	431.8	469.9	19.05	17	18.5	0.75





WAO/WBO

Rotary shaft seal in standard design with a grooved elastomer outer sheath covering a metal insert without an energised spring on the sealing lip. The WBO model is provided with a metal outer surface.

Standard materials

NBR 70
Colour: green/black
Metal insert: non-alloy steel according to DIN EN 10139

Areas of application

Secondary sealing e.g. as a dust, dirt or spray protection seal in electric engines, as a grease retainer.

Function

The WAO/WBO is a single action rotary shaft seal for rotating or pivoting shafts. The sealing lip design without a spring produces less friction. As a result the sealing action in comparison to rotary shaft seals with energised springs is reduced. The elastomer outer sheath provides good static sealing, good thermal expansion balance e.g. in light-metal housings, better sealing with greater roughness and secure sealing for split housings as well as good static sealing with thin fluid or gaseous media.

Tight and accurate fitting is achieved by the metal outer casing. The WBO model has limited sealing action with thin fluid or gaseous media and in split housings. To guarantee a high level of static sealing on the outer surface, better surface treatment of the housing bore is necessary.

Media

Good chemical resistance to various mineral oils and greases. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): 0/0
Temperature (°C): -40 to +100
Peripheral speed (m/s): ≤ 6
Please also refer to our rotational speed diagram on page 20 of this catalogue.

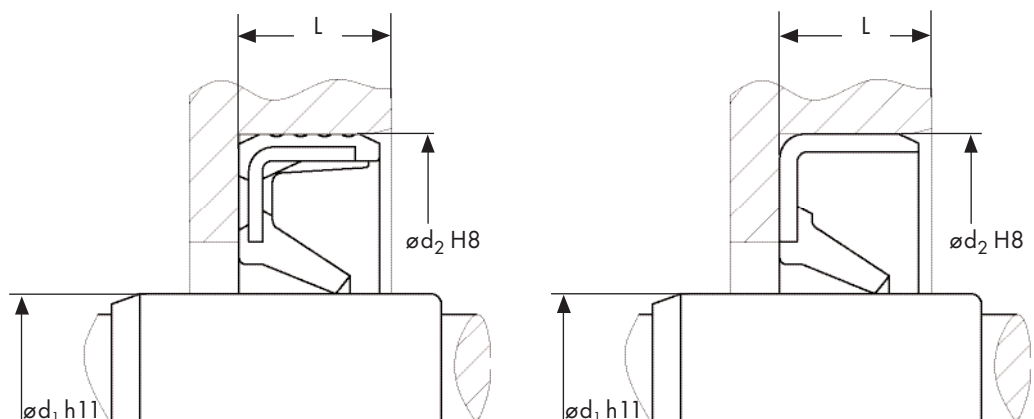
Installation

Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. double dust protection lip, spiral on the sealing lip, springs or metal inserts made of other steel grades can be produced as well as all kinds of special designs. Minimum quantities may be obligatory for dimensions outside of the standard.



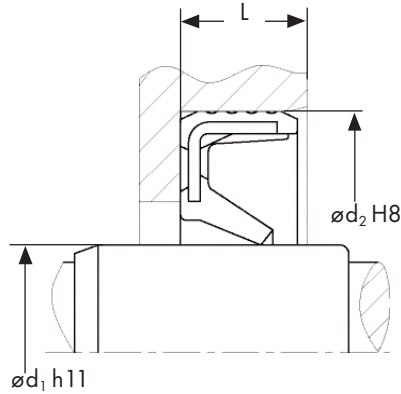
WAO

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
157122	2.3	10	3	116521	12	28	7
22037	4	8	2	39292	12	35	4.5
22038	5	9	2	39291	12	35	14
22039	5	10	2	19585	12	37	7
134053	5	11	3	39294	12.7	19	3
39257	5	15	5	39321	13	18	3
22040	6	10	2	22053	13	19	3
22041	6	12	2	19572	13	22	5
64714	6	12	3	39296	13	26	4
40471	6	15	4	36642	14	18	3
72502	6	16	7	22054	14	20	3
39262	6	21	8	19571	14	20	5
39259	6.5	19	5.5	22055	14	21	3
22042	7	11	2	22056	14	22	3
39261	7	12.7	3	19573	14	22	4
22043	7	14	2	39015	14	24	5
131111	7	16.7	3	39325	14	24.5	6
83778	7	17	7	39327	14	27	3
22044	8	12	3	22057	15	21	3
39264	8	12.8	3.2	44142	15	21	4
59462	8	13	3.5	39330	15	21	5
83938	8	14	4	39332	15	22	3
22045	8	15	3	39333	15	22	4
123340	8	16	3	39334	15	23	2.5
131117	8	18	4	22058	15	23	3
39263	8.5	15	3.5	131122	15	23	4
152787	9	13	2	39335	15	23	5
22046	9	13	3	40472	15	24	7
39013	9	15	3	77606	15	25	3
22047	9	16	3	131112	15	26	7
39270	9	22	4	133464	15	35	7
39268	9	22.5	5	39331	15.5	22	3
22048	10	14	3	22059	16	22	3
131118	10	16	3	19574	16	22	4
39271	10	16	4	39341	16	23	4
39014	10	16	5	22060	16	24	3
22049	10	17	3	19575	16	24	4
46405	10	17	4	19576	16	24	5
150695	10	20	2.7	22061	16	25	3
77303	10	21	4	39835	17	21	3
48924	10	22	3	22062	17	23	3
39277	10	26	5	57050	17	23	4
39278	10	30	6	40473	17	23	5
22050	12	16	3	19577	17	24	4
131121	12	17	4	35092	17	24	7
22051	12	18	3	22063	17	25	3
38480	12	18	4	117898	17	26	4
39284	12	18	4.5	128095	17	28	3.5
131107	12	18	5	19581	17	30	5
77246	12	18	5.5	131119	17	32	6
22052	12	19	3	19584	17	35	5
69015	12	20	4	22064	18	24	3
39285	12	20	5	19578	18	24	4
39286	12	22	4	75201	18	25	3
131106	12	24	4	39843	18	25	4

WAO

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
22065	18	26	4	152832	25	37	5
39844	18	26	5	40478	25	38	5
48931	18	27	4	40611	25	40	7
39846	18	27	5	40689	25	45	4
40474	18	37	5	40692	25	47	5
39852	18	48	10	40693	25	47	6
39853	19	26	5	22076	26	34	4
22066	19	27	4	40697	27	33.7	4
39855	19	28	7	40696	27	35.5	5
39854	19	28.7	5	40699	27	36	4
39863	19	32	8	40700	27	37	5
39871	19.1	25.4	3	40479	27	40	3
82490	20	24	2.5	40705	27	43	9
22067	20	26	4	131105	27	53	7
26511	20	26	10	40480	28	33	6
39872	20	28	3.5	40706	28	34	4
22068	20	28	4	22077	28	35	4
39873	20	28	4.5	40707	28	35	7
39875	20	28	10	68265	28	36	5
131123	20	30	4	22078	28	37	4
39876	20	30	5	40713	28	38	7
131113	20	30	7	40481	28	40	5
40476	20	32	4	40716	29	35	3.5
39880	20	32	5	22079	29	38	4
40505	20	32	7	40718	29	39	4
19777	20	35	5	40719	29	40.5	4
40509	20	35	6	80807	30	36	4
40515	20	42	6	131097	30	36	5
40518	21	27	3	93287	30	37	3.2
22069	21	29	4	22080	30	37	4
40520	21	33	7	40483	30	37	8
22070	22	28	4	123746	30	38	4
75912	22	28	4.5	56784	30	40	4
80411	22	28	5	40720	30	40	5
40524	22	28.5	4	131115	30	40	7
83734	22	29	4	40722	30	42	5
22071	22	30	4	40485	30	45	6
40525	22	30	5	40726	30	50	5
26512	22	30	10	40486	30	62	6
40527	22	32	4.5	40737	31	38.5	4
88218	23	28	3	40742	31.7	38.1	4
40535	23	31	5	22081	32	42	4
22072	24	32	4	22082	32	45	4
40477	24	33	4	156106	33	40	3
40549	24.5	29.8	4	40764	33	42	5
117155	25	30	7	40765	33	47.5	9.1
40551	25	31	4	85235	33	52	2
40552	25	31	5	22083	35	42	4
22073	25	32	4	40487	35	42	8
22074	25	33	4	40775	35	43	5
40554	25	33	6	22084	35	45	4
40555	25	33	8	40781	35	47	4
22075	25	35	4	128152	35	47	5
40553	25	35	6	40786	35	50	4
131114	25	35	7	40787	35	50	5

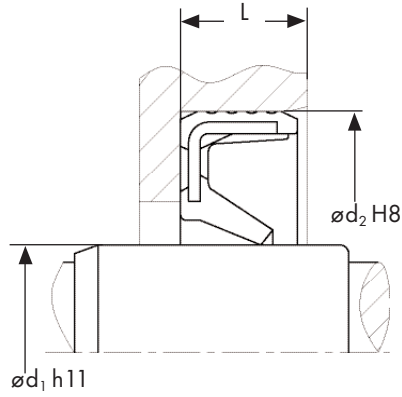
WAO

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
40794	35	50	8	40968	55	70	6
131108	35	52	7	19785	55	72	7
40488	35	55	5	40970	55	75	12
40806	35	62	5	21504	60	70	10
68267	36	44	4	40996	60	70	13.5
68268	36	44	5	49315	60	72	4
22085	37	47	4	41001	60	80	4
22086	38	48	4	41006	60	110	4
40489	38	48	6	20675	62	70	10
40818	38	53	5	68269	63	73	5
39016	38	58	5	41014	63	75	5
124841	38	62	4	49323	65	75	5
39017	38	62	12	40790	65	88	5
22087	40	47	4	40791	65	88	12
46418	40	47	5	22097	70	78	5
92834	40	48	4	68270	70	80	5
22088	40	50	4	81349	70	81.5	6
131120	40	50.15	4	41035	70	83.5	3
22089	40	52	5	41036	70	85.6	5.3
131116	40	52	7	41060	70	92	5
40491	40	54	5	40789	70	95	5
40492	40	54	7	39020	74	95	7
39018	40	55	5	44594	75	90	6
40836	40	55	10	92937	80	90	5
40837	40	58	6	20653	80	90	12
40493	40	62	5	41088	80	95	5
40846	41	47	4	41092	80	105	7
40849	42	50	10	41096	81	88	3.8
22090	42	52	4	41103	85	105	9
131098	42	52	5	41117	90	105	6
81261	42	52	5.5	41118	90	110	7
22091	43	53	4	41119	90	115	5
26513	44	52	10	41122	90	115	13
40867	44	55	5	41123	90	120	8
22092	45	52	4	41129	95	120	8
22093	45	55	4	40504	95	135	13
40495	45	60	6	68271	100	110	5
40881	45	68	5	60187	100	115	15
40886	46	58	5	127469	125	140	7
40889	47	54	3.5	41410	133	159	6
115463	48	55	3.5	41412	135	165	14
19588	48	58	4	41413	150	180	14
19780	48	62	5	41414	176	214	12
40497	48	72	12	120902	178	194	8
22094	50	58	4	41415	210	236	12
40935	50	60	4				
22095	50	62	5				
19783	50	68	7				
19784	50	72	5				
40945	50	75	6				
40950	52	65	6				
40956	53	70	6				
144153	53.3	65	5				
40963	54	76.5	13				
22096	55	63	5				

WAO

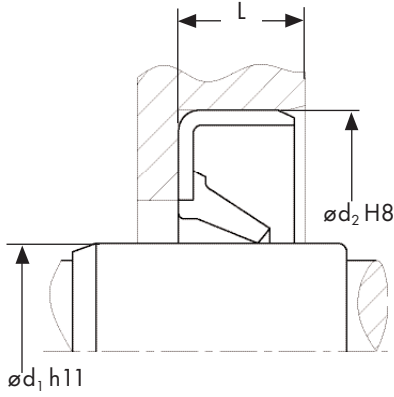
**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
131109	2.3	12.7	6.4	0.091	0.5	0.252
131110	3.18	12.7	6.4	0.125	0.5	0.252
118578	6.35	12.7	3.17	0.25	0.5	0.125
39258	6.35	19.05	6.35	0.25	0.75	0.25
60021	7.93	12.57	2.92	0.312	0.495	0.115
36138	9.52	15.87	3.17	0.375	0.625	0.125
84281	9.52	17.46	3.56	0.375	0.687	0.14
144105	12.7	17.46	2.4	0.5	0.687	0.094
60022	12.7	22.22	3.17	0.5	0.875	0.125
60023	14.28	19.05	2.92	0.562	0.75	0.115
144293	15.87	20.63	2.38	0.625	0.812	0.094
92938	17.46	23.81	3.18	0.687	0.937	0.125
156359	25.4	31.75	3.9	1	1.25	0.154
149007	26.98	34.03	4.26	1.062	1.34	0.168
60024	30.16	41.33	6.35	1.187	1.627	0.25
60025	31.75	50.8	9.92	1.25	2	0.391
39019	40.08	50.85	4.1	1.578	2.002	0.161
37749	41.27	50.8	6.35	1.625	2	0.25
41071	74.61	88.9	7.93	2.937	3.5	0.312
41416	241.3	304.8	25.4	9.5	12	1

WBO

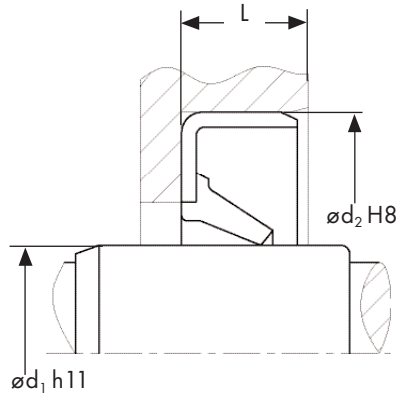
**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
84122	4	8	2	41221	17	22	3
89828	5	9	2	20942	17	23	3
92830	5	10	2	110710	17	25	3
74145	6	10	2	41222	18	24	3
92831	6	12	2	41223	18	25.5	6
19765	6	13	4.5	41224	18	28.5	4.5
92832	7	11	2	41225	19	24	3
92833	7	14	2	41226	19	27	3.5
19766	8	11.5	3	41227	19	30	3
73883	8	12	3	40475	19	40	5
73080	8	14	3	89238	20	24	2.5
125653	8	14	6	41228	20	25.45	4
48922	8	15	3	126429	20	26	3
41206	9	13	3	56001	20	26	4
19767	9	16	4	110709	20	28	3
19570	10	14	3	19775	20	28	4
19768	10	15	3	117515	20	28	5
19769	10	15.5	3	19776	20	30	4
19770	10	16	4	41229	20	32	5
48923	10	17	3	41230	21	28	5
131126	11	17	3	75080	21	28	5.5
41207	11	18	15	41231	21	37	6
77946	12	16	3	61768	22	28	4
19771	12	18	3	61769	22	30	4
41209	12	18	5	41232	22	31.5	4.5
41208	12	19	2.5	153022	22.2	28.5	3
48925	12	19	3	41233	22.2	28.7	3
19773	12	20	4	73958	23	28	3
41210	12	22	6	41235	23	30	4
20658	12	25	3	41234	23	32	5
19774	12	30	5	80829	24	30	3
41211	12	35	4.5	39054	24	32	5
41213	13	18	3	41238	24.5	28.5	2.5
41214	13	19	3	80516	24.7	30	4
41215	13	19	5	65028	25	31	2.5
57041	13	25	7	41241	25	32	3
131128	14	18	3	41242	25	32	4
110708	14	22	3	41239	25	32	4.5
41216	14	22	6	19778	25	32	5
57043	14	24	4	41240	25	32	7
48928	15	21	2	41237	25	33	4
48926	15	21	3	129868	25	35	4
41217	15	22	3	41243	25	35	6
41218	15	23	3	41244	25	35	8
131124	15	23	3.8	41236	25	38	3
57045	15	24.5	5	39055	25	45	5
131127	15	25	3.8	20659	25	46.5	4.8
117978	15	26	4.5	72780	26	31	3
57046	15	28	3	41246	26	35	5
19582	15	32	5.5	41247	26	36	3
44211	16	20	2.5	115803	27	32	3
41220	16	21	3	41248	27	33	3
41219	16	22	3	55931	27	34	3
110711	16	24	3	41249	28	33.3	3.5
56910	16	25	4	41250	28	35	4

WBO

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
41251	28	35	5	41743	42	47	6
41252	28	36	5	41742	42	60	7
110712	28	37	4	110707	43	53	4
41253	28.2	35	3.3	19779	45	50	3
41254	29	37	6	121261	45	52	3
150143	29.5	37	4	79602	45	52	4
41255	30	35	3	41751	45	55	5
72895	30	37	3	40494	45	55	6
40482	30	37	4	41752	45	57	4
41256	30	37	4.5	39057	45	65	5
41257	30	39	7	42071	45	69	9
48932	30	40	4	40496	45	72	12
41258	30	40	5	42074	47	55	10
40484	30	40	6	42076	48	62	6
41259	30	42	5	42078	49	56	9
41260	30	45	6	74073	50	58	4
41261	30	55	15	42080	50	58	5
77838	31	37	3	143527	50	62	5
41262	31.5	45	5.5	19782	50	65	6
41264	32	40	5	83591	50	90	6
41266	32	42	4	42084	50.8	65	6
41271	32	42	14	42087	51	58	4
41265	32	42.5	6.5	42088	52	69	11
41267	32	48	6	61089	55	63	5
41268	32	58	6.5	42092	55	65	5
78714	33	40	3	42093	55	67	5
41270	33	45	5.5	40499	55	70	9
41269	33.4	58	6.4	42095	55	70.8	4
41272	34	42	14	42094	55	74	6
77585	34.5	40	4	40498	55	82	10
84044	35	42	1.9	83947	55	90	6
79601	35	42	3.5	132700	58	65	3.5
110713	35	42	4	79603	60	67	4
35083	35	45	4	42535	60	75	5
41274	35	45	6	42536	60	75	6
87077	35	47	5	42537	60	75	10
41273	35	48	5	40501	60	78	7
39056	35	55	5	40502	60	78	10
129722	36	42	3.5	42552	65	77	4
41276	38	42	3	42554	65	85	5
35385	38	43	3	60349	65	88	6
46548	38	45	3	42558	70	82	7
125202	38	45	4	42557	70	85	8.5
41277	38	47	9	42559	71	86	5
116657	38	48	4	42563	75	90	5
41275	38	57.2	9.5	156488	80	85	3
143411	40	47	4	42579	80	95	5
41278	40	48	3	42580	80	100	7
34469	40	48	4	42578	80	100	8
41279	40	48	6	42576	80	100	10
41280	40	50	4	42582	80	106	8
40490	40	50	6	42577	80	110	10
41733	40	55	6	42805	86	110	13
41738	41	52	5.5	42808	89	120.8	6.5
152706	41.5	49	4	156449	90	95	3

WBO

Part No. Dimensions in mm
 $\varnothing d_1$ $\varnothing d_2$ L

Sizes metric

84929 125 140 7

WBO

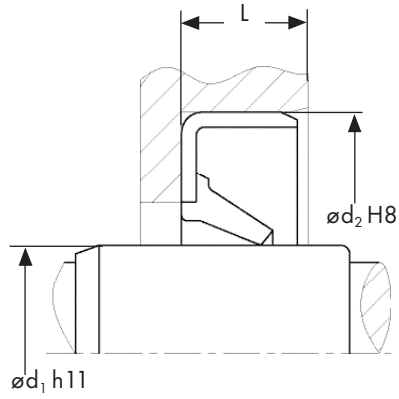
Part No. Dimensions in mm Dimensions in inch
 $\varnothing d_1$ $\varnothing d_2$ L $\varnothing d_1$ $\varnothing d_2$ L

Sizes inch

134975	6.35	12.7	3.17	0.25	0.5	0.125
90064	6.35	12.7	4.76	0.25	0.5	0.187
83024	9.52	14.28	2.38	0.375	0.562	0.094
89320	9.62	14.28	2.38	0.379	0.562	0.094
60741	11.11	19.05	3.17	0.437	0.75	0.125
60742	11.11	20.98	4.76	0.437	0.826	0.187
41212	12.5	22.3	6.5	0.492	0.878	0.256
60743	12.7	17.46	3.17	0.5	0.687	0.125
60826	12.7	22.22	3.17	0.5	0.875	0.125
78375	14.28	20.64	4	0.562	0.813	0.157
60744	15.87	23.81	4.76	0.625	0.937	0.187
130048	15.87	25.4	4	0.625	1	0.157
60745	17.46	22.22	3.17	0.687	0.875	0.125
60746	17.46	25.4	3.17	0.687	1	0.125
57052	19.05	25.4	3.17	0.75	1	0.125
60747	19.05	27	4.6	0.75	1.063	0.181
60748	19.05	28.57	3.17	0.75	1.125	0.125
60749	19.05	31.75	3.17	0.75	1.25	0.125
60750	19.05	31.75	6.35	0.75	1.25	0.25
60751	22.22	28.57	3.17	0.875	1.125	0.125
60752	22.22	34.92	4.76	0.875	1.375	0.187
57055	25.4	31.75	3.17	1	1.25	0.125
41245	25.4	38	3.2	1	1.496	0.126
144100	25.4	39.68	4.76	1	1.562	0.187
60754	25.4	45.24	11.91	1	1.781	0.469
81153	28.57	34.92	3.17	1.125	1.375	0.125
84024	28.57	35	2.2	1.125	1.378	0.087
79604	28.57	35.1	4	1.125	1.382	0.157
60755	28.57	38.1	4.76	1.125	1.5	0.187
60756	28.57	41.27	12.7	1.125	1.625	0.5
46824	30.16	50.8	6.35	1.187	2	0.25
60757	30.96	50.27	6.35	1.219	1.979	0.25
41263	31.7	38.1	3.2	1.248	1.5	0.126
61692	31.75	38.1	3.96	1.25	1.5	0.156
60758	31.75	42.86	4.76	1.25	1.687	0.187
42641	31.75	44.45	6.35	1.25	1.75	0.25
60759	31.75	50.01	11.11	1.25	1.969	0.437
60760	34.92	50.4	6.35	1.375	1.984	0.25
157029	38.1	47.62	4.76	1.5	1.875	0.187
153170	39.69	52.38	5.31	1.563	2.062	0.209
127689	42.86	59.13	12.7	1.687	2.328	0.5
60763	42.86	66.62	9.52	1.687	2.623	0.375
60764	43.66	65.08	12.7	1.719	2.562	0.5
124952	44.45	57.15	6.35	1.75	2.25	0.25
75800	44.45	57.15	12.7	1.75	2.25	0.5

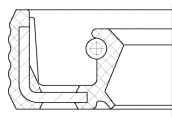
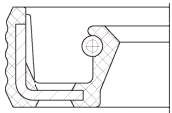
WBO

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
60765	44.45	68.99	9.12	1.75	2.716	0.359
57163	47.62	63.65	6.35	1.875	2.506	0.25
60766	49.21	63.75	7.14	1.937	2.51	0.281
79539	50.8	60.32	4.76	2	2.375	0.187
60767	50.8	60.32	6.35	2	2.375	0.25
46825	53.97	73.02	6.35	2.125	2.875	0.25
60768	53.97	85.72	7.93	2.125	3.375	0.312
115606	53.97	93	6.35	2.125	3.661	0.25
40500	57.15	73.02	7.93	2.25	2.875	0.312
60769	57.15	85.72	9.52	2.25	3.375	0.375
60770	57.15	87.38	6.35	2.25	3.44	0.25
60771	58.73	76.2	6.35	2.312	3	0.25
76102	114.3	130.17	7.93	4.5	5.125	0.312





WAK/WAG

Rotary shaft seal with a grooved elastomer outer sheath covering a metal insert as well as a spring-energised sealing lip. In addition, the standard model is available with a protective lip (WAG) on the air side.

Standard materials

NBR 70

Colour: black

Energised spring: non-alloy spring steel according to DIN EN 10270-1

Metal insert: non-alloy steel according to DIN EN 10139

Areas of application

Sealing of rotating machine elements such as shafts, hubs and axles.

Function

The WAK/WAG is a rotary shaft seal for rotating or pivoting shafts with optional protective lip sealing action (WAG) on the side facing away from the medium, against dirt accumulation from the outside. The grooved outer sheath provides improved static sealing for housings with greater thermal expansion because it has a higher degree of press fitting. It also prevents permanent skew of the rotary shaft seal. In addition, installation is facilitated because less press-fit force is required.

Media

Generally good chemical resistance to many mineral oils and greases. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): max. 0.05/0.5

Temperature (°C): -40 to +100

Peripheral speed (m/s): max. ≤ 12

Please also refer to our rotational speed diagram on page 20 of this catalogue.

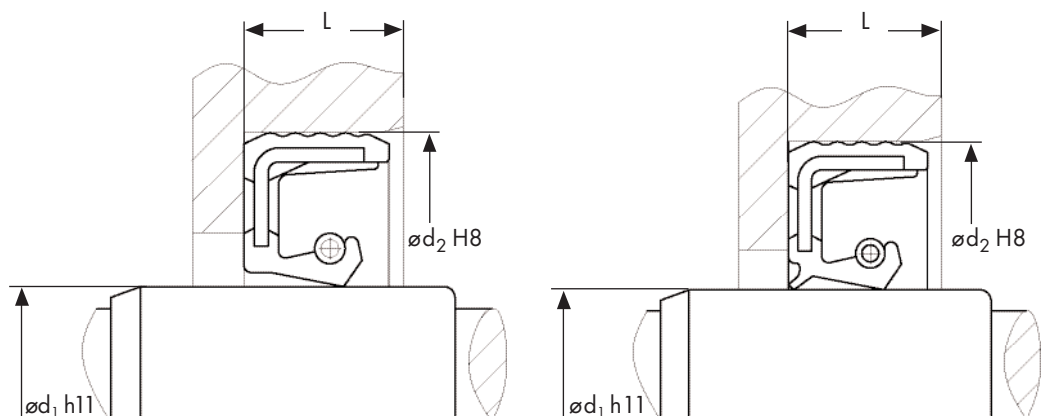
Installation

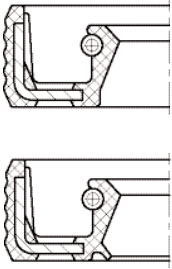
Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

National/international standard dimensions up to 600 mm outer diameter are available on request. However, minimum quantities may be obligatory.

Other dimensions and different designs, e.g. double dust protection lip, spiral on the sealing lip, springs or metal inserts made of different steel grades can be produced as well as all kinds of special designs.





VIAK/VIAG

Rotary shaft seal with a grooved elastomer outer sheath which fully encases a metal insert as well as a spring-energised sealing lip. In addition, a (VIAG) model with a protective lip on the air side is available.

Standard materials

FPM 80

Colour: brown

Energised spring: non-alloy spring steel according to DIN EN 10270-1

Reinforcement ring: non-alloy steel according to DIN EN 10139

Areas of application

Sealing of rotating machine elements such as shafts, hubs and axles.

Function

The VIAK/VIAG is a rotary shaft seal for rotating or pivoting shafts with optional protective lip sealing action (VIAG) on the side facing away from the medium, against dirt accumulation from the outside. The grooved outer sheath provides improved static sealing for housings with greater thermal expansion because it has a higher press fit allowance. It also prevents permanent skew of the rotary shaft seal. In addition, installation is facilitated because less press-fit force is required.

Media

Mineral oils and greases, synthetic oils and greases, engine, transmission and ATF oils, fuels, aromatic and chlorinated hydrocarbons, broad chemicals and solvents resistance. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): max. 0.05/0.5

Temperature (°C): -30 to +200

Peripheral speed (m/s): ≤ 35

Please also refer to our rotational speed diagram on page 20 of this catalogue.

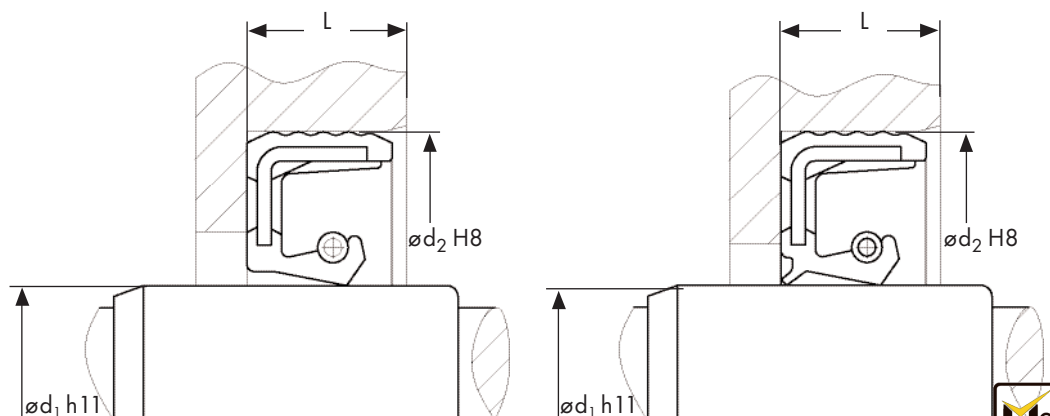
Installation

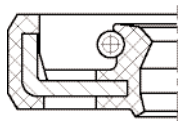
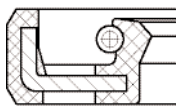
Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on Page 30 of this catalogue.

Remarks

National/international standard dimensions up to 600 mm outer diameter are available on request. However, minimum quantities may be obligatory.

Other dimensions and different designs, e.g. double dust protection lip, spiral on the sealing lip, springs or metal inserts made of other steel grades can be produced as well as in all kinds of special designs.





WAY/WASY

Rotary shaft seal equivalent to WA type in the Y design, pressurisable. It has a shorter, stronger, spring-energised sealing lip. In addition, this model is available with a protective lip (WASY) on the air side.

Standard materials

NBR 80

Colour: black

Colour WASY: blue

Energised spring: non-alloy spring steel according to DIN EN 10270-1

Metal insert: non-alloy steel according to DIN EN 10139

Areas of application

Sealing of rotating machine elements such as shafts, hubs and axles when pressurised. The main area of application is in pressurised systems such as pumps and hydro-motors.

Function

The WAY/WASY is a single action rotary shaft seal for rotating or pivoting shafts with optional protective lip sealing action (WASY) on the side facing away from the medium, against dirt accumulation from the outside. The shorter, thicker, spring-energised sealing lip enables pressure application of up to 10 bar (depending on the rotational speed). The elastomer outer sheath provides good static sealing, good thermal expansion balance, e.g. in light-metal housing, better sealing with greater roughness and secure sealing for split housings as well as good static sealing with thin fluid or gaseous media.

Media

Good chemical resistance to many mineral oils and greases. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): ≤ 10 bar depending on the rotational speed
Temperature ($^{\circ}\text{C}$): -40 to $+100$
Peripheral speed (m/s): ≤ 10
Please also refer to our rotational speed diagram on page 20 of this catalogue.

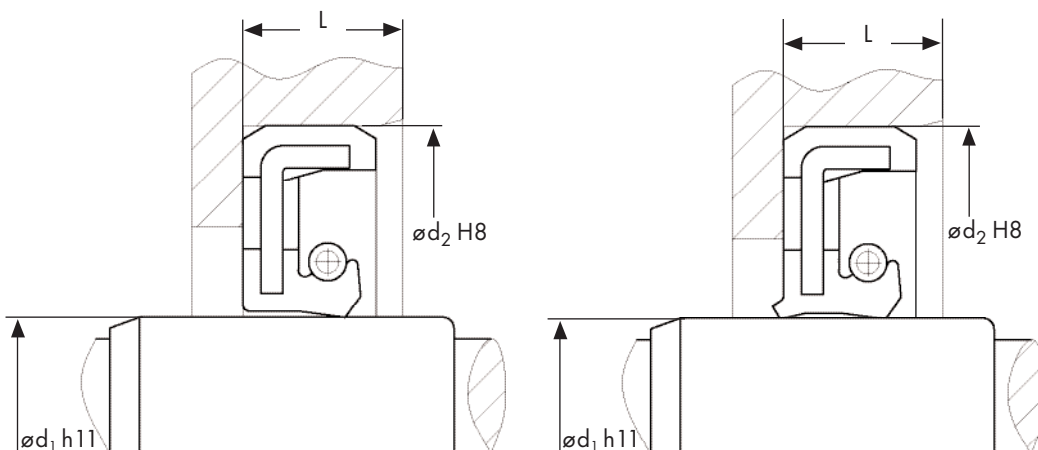
Installation

Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. springs or metal inserts made of other steel grades can be produced as well as some special designs. Minimum quantities may be obligatory for dimensions outside of the standard.



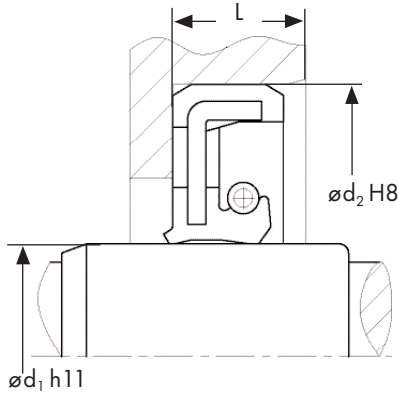
WASY

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
129964	7	20	7	157294	22	32	7
129965	8	18	7	24348	22	35	6
78301	8	22	6	130521	22	35	7
129966	8	22	7	129978	22	35	8
118681	9	20	6	143688	22	40	8
157286	10	20	6	129979	22	42	11
118682	10	22	6	153104	22	47	7
129967	10	25	7	129980	23	42	11
132607	11	22	7	124844	24	33	5
81240	12	22	5.5	24352	24	40	6
77834	12	22	6	116485	24	40	7
131157	12	22	7	129981	24	40	8
157287	12	24	7	126226	24	47	7
129968	12	25	7	34898	25	33	6
107740	12	28	7	72947	25	35	6
107741	12	32	7	118690	25	36	6
120668	12.7	22	6	118691	25	37	6
129969	13	28	7	34899	25	40	6
157288	14	24	7	44364	25	40	7
129970	14	28	7	129982	25	40	8
107742	15	24	7	118692	25	42	6
118683	15	25	6	129983	25	45	11
157289	15	25	7	84958	25	47	6
116484	15	30	7	56152	25	52	7
118684	15	32	7	129984	26	42	8
118685	15	35	6	157295	27	42	7
150473	16	26	7	27343	27	44	7
157290	16	28	7	129985	27	47	11
128113	16	30	4.5	34896	28	40	6
129972	16	30	7	157276	28	40	7
157291	17	28	6	118693	28	40	8
157292	17	28	7	118694	28	40	9
24350	17	30	6	129986	28	48	11
126041	17	30	7	126224	30	40	5
43719	17	35	7	149520	30	40	7
129975	17	35	8	46488	30	42	6
118686	18	30	6	126225	30	42	7
131159	18	30	7	44660	30	45	7
44454	18	32	6	157296	30	47	7
129806	18	35	5	45109	30	50	7
118687	18	35	6	129987	30	50	11
129973	18	35	8	118695	30	52	7
124965	19	35	5	157297	32	44	7
129974	19	35	8	34897	32	47	6
118688	20	30	4.5	157298	32	47	7
157293	20	30	5	38332	32	48	7
133950	20	30	7	133486	32	52	6
118689	20	32	7	56233	32	52	7
129976	20	32	8	129988	32	52	11
24347	20	35	6	156191	32	72	10
127087	20	35	7	129989	34	54	11
129977	20	40	11	34815	35	47	6
125012	20	42	6	121488	35	47	7
124966	22	31	6.5	7839	35	50	7
78169	22	32	6	24349	35	52	6

WASY

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
129990	35	55	11	127197	60	75	8
157299	35	62	7	157304	60	75	10
156900	35	72	10	24353	60	80	7
156899	35	80	7	130000	60	82	12
129723	36	48	5	12252	60	85	8
45116	38	50	6	47915	60	90	7
129991	38	58	11	90494	62	75	7.5
157300	38	62	7	79697	62	85	7
117597	40	52	7	130001	62	85	12
129992	40	52	11	157305	65	80	7
36815	40	55	6	157306	65	85	8
116375	40	55	7	118324	65	85	10
118696	40	58	8	152006	65	85	13
151804	40	60	7	48534	65	90	7
84059	40	60	10	48538	65	90	10
78452	40	62	6	133603	65	90	13
134218	40	62	11	157307	68	90	10
128176	40	72	7	24354	70	90	7
118697	42	62	7	157308	70	90	10
157301	42	62	8	130002	70	95	13
129993	42	65	12	157309	70	100	10
46620	45	55	7	116032	72	95	10
120968	45	58	6	48988	75	90	10
118698	45	58	7	118702	75	95	7
129769	45	62	6	81720	75	95	10
24351	45	62	7	117565	75	100	8
35654	45	65	7	157279	75	100	11
7367	45	65	8	130003	75	100	13
129994	45	68	12	24355	80	100	7
118699	47	62	7	130004	80	105	13
157302	47	65	10	127332	80	110	10
129995	48	70	12	44100	85	105	7.5
126723	48	72	10	51001	85	105	12
44457	50	65	7	117566	85	110	8
90610	50	65	8	130005	85	110	13
118700	50	68	7	118703	85	120	7.5
47284	50	68	8	151686	85	120	8
75381	50	70	10	74399	90	110	7.5
79626	50	72	7	128177	90	110	10
129996	50	72	12	39217	90	110	12
157277	52	68	10	130006	90	115	13
130047	52	72	12	157280	90	120	10
129997	52	75	12	51839	90	125	12
120658	55	70	7	118704	95	120	12
155727	55	70	7.5	130007	95	120	13
47561	55	70	8	157310	97	125	12
36816	55	72	7	118705	100	120	7.5
32409	55	72	8	157311	100	120	12
157278	55	75	7	130008	100	125	13
133901	55	75	10	56614	105	130	7.5
129998	55	78	12	130009	105	135	14
107857	55	80	13	157312	105	140	12
157303	58	80	10	48594	110	130	12
129999	58	80	12	155880	110	140	12
118701	60	72	7	157281	110	140	13

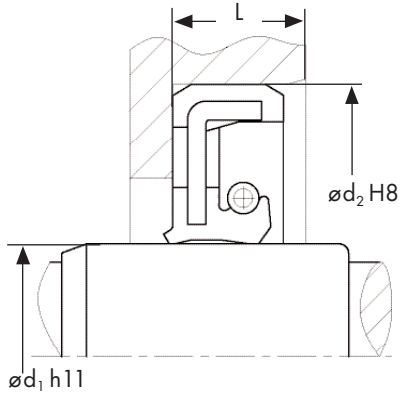
WASY

Part No.	Dimensions in mm		
	ød ₁	ød ₂	L
130010	110	140	14
118706	110	150	8
134219	115	145	14
118707	120	140	7.5
118708	120	140	10
157313	120	140	13
155881	120	150	10
157314	120	150	12
134220	120	150	14
157315	120	150	15
134221	125	155	14
118709	130	150	7.5
144300	130	160	7.5
157316	130	160	12
134222	130	160	14
127333	135	160	13
134223	135	165	14
118710	140	160	10
134224	140	170	14
48596	140	170	15
157282	140	180	12
118456	146	193.7	10
118711	150	180	8.5
134225	150	180	14
118712	160	185	8.5
157317	160	190	8
157283	160	200	10
157284	170	200	12
157285	170	200	14
115176	170	200	15
131746	170	200	16
118713	180	210	8.5
134896	190	220	15
134226	190	225	16
118714	200	230	13
134891	200	230	15
134892	220	250	15
118715	240	270	8.5
134893	240	270	15
118716	260	280	10
134894	270	300	15
124821	280	303	17
134895	300	340	20
149022	400	450	20
150843	460	500	20

**Sizes
metric**

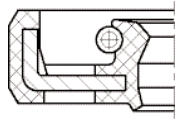
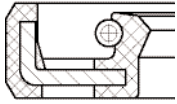
WASY

**Sizes
inch**



Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
150376	12.7	22.22	6.35	0.5	0.875	0.25
148809	15.9	28.55	8	0.626	1.124	0.315
130465	17.46	28.57	6.35	0.687	1.125	0.25
149913	19.05	30.16	6.35	0.75	1.187	0.25
132902	19.05	31.75	6.35	0.75	1.25	0.25
133546	19.05	33.33	7.93	0.75	1.312	0.312
148810	19.8	44.45	7.9	0.78	1.75	0.311
134560	24.59	42.85	7.95	0.968	1.687	0.313
148811	24.8	44.45	7.9	0.976	1.75	0.311
132903	31.75	44.45	6.35	1.25	1.75	0.25
132904	38.1	57.15	7.93	1.5	2.25	0.312
118455	109.59	158.75	10	4.315	6.25	0.394





VIAY/VIASY

Rotary shaft seal same as type VIA in the Y model, pressurisable. It has a shorter, more stable, spring-energised sealing lip. In addition, this design is available with a protective lip (VIASY) on the air side.

Standard materials

FPM 80
Colour: brown
Energised spring: non-alloy spring steel according to DIN EN 10270-1
Metal insert: non-alloy steel according to DIN EN 10139

Areas of application

Sealing of rotating machine elements such as shafts, hubs and axles when pressurized. The main application lies within the area of pressurized units e.g. pumps and hydro-electric engines.

Function

The VIAY/VIASY is a single acting shaft seal for rotating or pivoting shafts with optional protective lip sealing action (VIASY) on the side facing away from the medium against dirt accumulation from the outside. Pressure application of up to 10 bar (depending on the rotational speed) is possible due to the shorter, thicker, spring-energised sealing lip. The elastomer outer sheath provides good static sealing, good thermal expansion balance e.g. in light-metal housings, better sealing with greater roughness and secure sealing for split housings as well as good static sealing with thin fluid or gaseous media. FPM is superior to the NBR materials for high temperature applications, high peripheral speeds and chemically aggressive media.

Media

Mineral oils and greases, synthetic oils and greases, engine, gear and ATF oils, fuel, aromatic and chlorinated hydrocarbons, broad chemicals and solvents resistance. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (MPa/bar): ≤ 10 bar depending on the rotational speed
Temperature (°C): -30 to +170
Peripheral speed (m/s): ≤ 35
Please also refer to our pressure / rotational speed diagram on pages 19/20 of this catalogue.

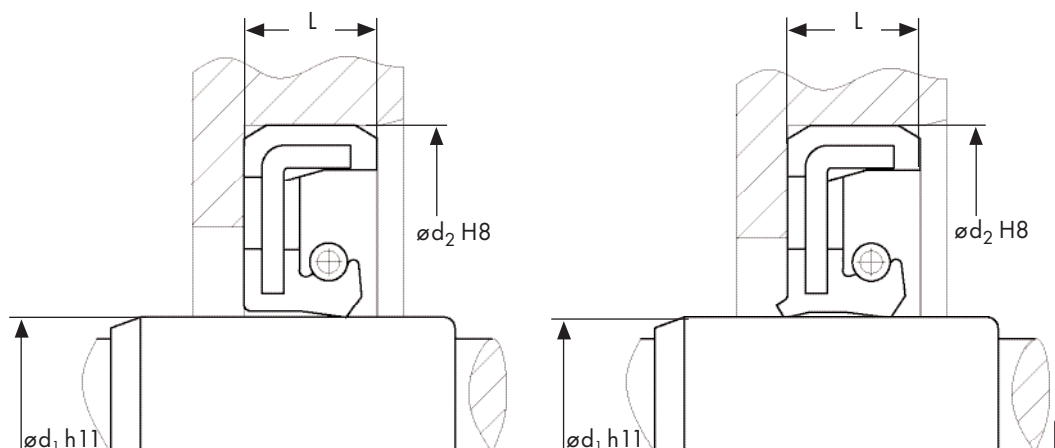
Installation

Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. springs or metal inserts made of other steel grades can be produced as well as some special designs. Minimum quantities may be obligatory for dimensions outside of the standard.



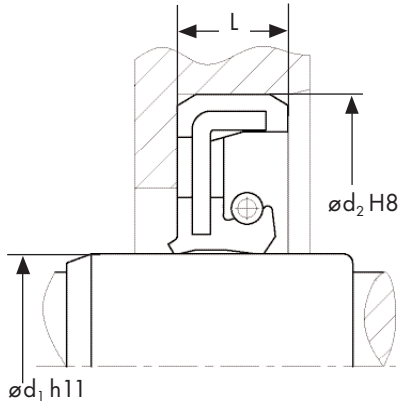
VIASY

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
132612	8	16	6	157243	27	42	7
133578	8	22	6	80969	27	44	7
132611	8	22	7	133400	28	40	6
157230	9	20	6	157244	28	40	7
126467	10	18	7	157216	28	40	8
132613	10	19	6	157245	30	40	7
127707	10	19	7	88172	30	42	6
48598	10	20	6	157246	30	47	7
133579	10	22	6	157247	30	50	7
157231	11	22	7	83556	30	52	7
131168	12	22	6	157248	32	44	7
133556	12	24	6	133559	32	47	6
157232	12	24	7	157249	32	47	7
157233	14	24	7	80970	32	48	7
157234	15	24	7	132614	32	52	7
150472	15	25	6	77326	32	55	9
157235	15	25	7	133560	35	47	6
149911	15	30	7	157250	35	47	7
133557	15	35	6	48621	35	52	6
129709	15	35	6.75	131165	35	55	11
134474	15	35	7	150826	35	62	7
152183	16	28	7	157251	38	50	6
150474	16	40	10	157252	38	62	7
48605	17	28	6	48628	40	52	5
157236	17	28	7	157253	40	52	7
133558	17	30	6	128171	40	55	6
157237	17	35	7	48630	40	55	7
134473	17	40	7	60114	40	55	8
150475	18	30	6	157254	40	56	6
157238	18	30	7	157255	40	60	10
48608	18	35	6	48634	40	62	6
152184	19	30	7	128169	40	72	7
150476	19	35	6	128172	42	62	7
56645	19	35	7	48639	42	62	8
117905	19.5	30	6	157256	45	55	7
157239	20	30	5	157257	45	58	7
157240	20	30	7	129768	45	62	6
135035	20	32	6	48641	45	62	7
132610	20	32	6.5	92854	45	65	7
80966	20	35	6	157258	45	65	8
153204	20	35	7	131167	45	68	12
157212	20	40	7	48648	47	62	7
117899	20	45	7	157259	47	65	10
90137	22	32	6	87185	50	65	7
157241	22	32	7	157260	50	65	8
128168	22	35	6	157217	50	68	7
121038	22	47	7	157261	50	68	8
80967	24	40	6	79894	50	72	7
157242	24	40	7	134472	50	80	8
48612	25	35	6	117903	52	72	7
157213	25	40	7	130046	52	72	12
157214	25	42	6	48654	55	70	8
127732	25	47	6	48655	55	72	7
157215	26	40	6	134888	55	72	8
144518	26	42	8	133594	55	75	7

VIASY

Sizes metric

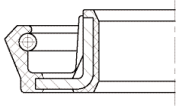


Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
152497	55	75	12	128174	90	110	10
143308	55	80	8	157268	90	110	12
92170	58	80	10	133599	90	115	10
133889	60	75	8	157269	90	125	12
34297	60	75	10	157220	95	120	12
80302	60	80	7	157270	95	120	13
79895	60	80	8	157271	97	125	12
131169	60	80	14	133600	100	120	7.5
128173	62	85	7	157272	100	120	12
157262	65	80	7	133601	105	130	7.5
48658	65	85	8	157273	105	140	12
133595	65	90	7	157274	110	130	12
157263	65	90	10	133602	120	140	7.5
157264	68	90	10	48668	120	140	13
115717	70	90	7	157221	120	150	10
134889	70	90	10	157275	120	150	12
157265	70	100	10	48669	120	150	15
157266	75	90	10	148463	130	160	7.5
133596	75	95	7	48676	130	160	12
144219	75	95	10	157222	140	170	15
157218	75	100	11	157223	140	180	12
115718	80	100	7	48696	160	190	8
134890	80	100	10	157224	160	200	10
133597	80	105	7.5	157225	170	200	14
153060	82	105	12	157226	172	190	8.5
157267	85	105	12	157227	180	210	8.5
157219	85	110	8	124928	200	230	13
48662	85	120	7.5	157228	240	270	8.5
133598	85	120	8	157229	260	280	10
48663	90	110	7.5	48721	400	450	25

VIASY

Sizes inch

Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
131166	17.46	28.58	6.35	0.687	1.125	0.25
134000	24.61	54.28	9.52	0.969	2.137	0.375



WAX

The WAX rotary shaft seal is a special type with the sealing lip on the outside (exterior sealing). It consists of a metal insert with an elastomer inner sheath as well as a spring-energised sealing lip facing outwards.

Standard materials

NBR 70

Colour: black

Energised spring: non-alloy spring steel according to DIN EN 10270-1

Metal insert: non-alloy steel according to DIN EN 10139

Areas of application

Sealing of rotating machine parts, either against stationary or rotating housings, such as axle sealing in agricultural and construction machinery.

Function

The WAX is a single action rotary shaft seal for stationary or rotating housings. The elastomer inner sheath (shaft side) provides good static sealing, good thermal expansion balance, optimal sealing with greater roughness and thin fluid or gaseous media.

As a result of the centrifugal force at higher revolutions, the sealing lip of the WAX design is pressed outwards which intensifies the friction and sealing action.

Media

Good chemical resistance to many mineral oils and greases. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): $\leq 0.05/0.5$

Temperature ($^{\circ}\text{C}$): -40 to $+100$

Peripheral speed (m/s): ≤ 10

Please also refer to our rotational speed diagram on page 20 of this catalogue.

Installation housing

The installation housing of a WAX should be executed as for a standard shaft seal in accordance with DIN 3760. Consideration must be given to the fact that the static grip of the rotary shaft seal is on the shaft and the contact surface in the housing. The surface qualities must be observed accordingly.

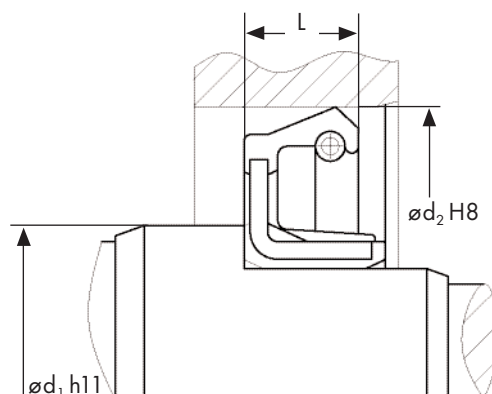
Installation

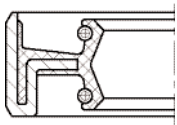
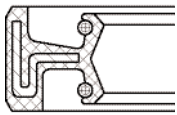
Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

National/international standards up to 600 mm inner diameter are available on request. However, minimum quantities may be obligatory.

Other dimensions and different designs, e.g. dust protection lip or the energised spring and/or metal insert made of other steel grades can be produced as well as some special designs.





WAD/WBD

Rotary shaft seal with an elastomer outer sheath and a metal insert as well as two spring-energised, back-to-back sealing lips. The WBD design is provided with a metal outer surface.

Standard materials

NBR 70
Colour: black
Energised spring: non-alloy spring steel according to DIN EN 10270-1
Metal housing: non-alloy steel according to DIN EN 10139

Areas of application

Sealing of rotating machine elements such as shafts, hubs and axles. Particularly for the separation of two media or extreme dirt accumulation from the outside.

Function

The WAD/WBD rotary shaft seal is used for the separation of two media or extreme dirt accumulation from the outside for rotating or pivoting shafts.

The WAD is a double action rotary shaft ring for rotating or pivoting shafts. The elastomer outer sheath provides good static sealing, good thermal expansion balance e.g. in light-metal housings, better sealing with greater roughness and secure sealing for split housings as well as good static sealing with thin fluid or gaseous media.

Tight and accurate fitting is achieved by the metal outer casing. The WBD model has limited sealing action with thin fluid or gaseous media and in split housings.

To guarantee high static sealing on the outer surface, better surface treatment of the housing bore is necessary or an additional coat of paint should be applied to the outer casing.

Media

Good chemical resistance to many mineral oils and greases. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): $\leq 0.03/0.3$
Temperature (°C): -40 to +100
Peripheral speed (m/s): ≤ 6
Please also refer to our rotational speed diagram on page 20 of this catalogue.

Installation

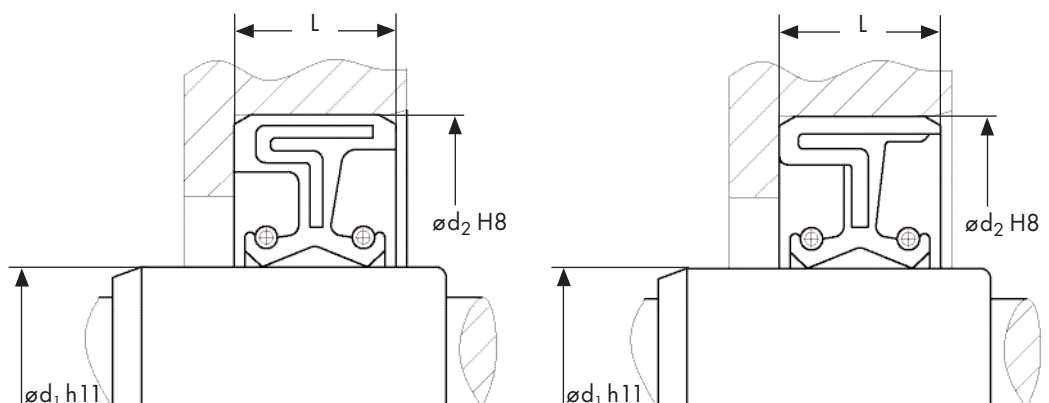
Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. The space between the sealing lips must be 2/3 filled with grease. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. springs or metal inserts made of other steel grades can be produced as well some special designs. Minimum quantities may be obligatory for dimensions outside of the standard.

The WAD/WBD models can also be produced in fluoro rubber (FPM).



WAD

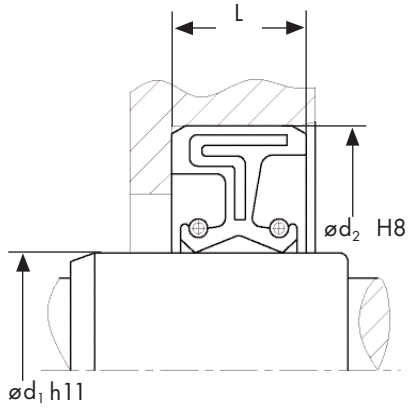
**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
151201	10	20	8	41524	30	50	10
39021	10	26	7	39035	30	51	10
80863	11	30	10	78462	30	52	10
36568	12	22	7	77918	30	62	10
151202	12	22	8	45832	30	62	14
43590	12	24	10	39036	32	44	8
72616	14	28	7	45835	32	52	7
157866	14	32	7.4	39037	35	44	7
158177	14	32.4	7.4	76550	35	47	10
39022	15	24	7	17381	35	52	12
121783	15	28	7	44563	35	62	7
79790	15	35	7	39249	35	62	10
116402	16	26	8	45836	35	62	14
77868	17	28	7	127145	40	52	7
35676	17	28	8	77679	40	55	7
39023	17	29	7	45837	40	58	10
156216	17	30	7	35507	40	62	13
149847	17	32	8	75866	40	62	14
39024	17	35	7	29770	40	65	20
65022	17	40	7	39038	42	55	7
130607	18	30	8	46512	44	55	10
19583	18	32	8	19589	45	60	10
78433	20	30	7	44041	45	62	8
39025	20	35	7	39039	45	62	11
39026	20	35	8	76551	45	62	14
39027	20	40	7	19590	45	65	10
16952	20	40	8	19591	48	72	15
39028	21.7	66.5	10	39250	50	65	8
82377	22	40	7	127146	50	65	10
155942	22	40	8.5	37691	50	72	13
39029	24	42	8	17802	50	80	13
130489	25	35	7	79810	55	75	15
88250	25	35	8	19593	55	80	10
62892	25	35	10	17897	55	80	13
39030	25	38	8	19595	55	90	10
43759	25	40	8	127723	60	75	8
75864	25	40	10	41041	60	82	12
44532	25	42	10	121708	60	85	13
39031	25	45	10	150228	65	82	13
45830	25	45	14	41040	65	85	10
45918	25	47	12	35655	70	85	16
117499	25	52	9	152108	70	90	11
77950	25	52	10	27539	75	90	15
39032	26	37	10.5	118718	75	95	12
116403	27	43	8	35403	75	95	14
79435	28	40	7	39040	75	95	15
39033	28	40	8	61262	80	100	10
39034	28	47	8	77839	80	100	12
150477	28	56	8	39041	85	105	13
76549	30	40	10	39042	86	120	15
636	30	42	7	46555	95	125	15
45831	30	45	8.5	41187	100	120	12
24223	30	45	12	25950	100	120	13
88220	30	47	10	55920	100	125	13
75865	30	47	14	90741	100	130	13

WAD

**Sizes
metric**

Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L
38951	110	130	13
29774	110	150	18
41186	115	145	18
45840	118	140	16
39043	125	150	12
34893	140	165	12
65067	150	180	15
40053	150	180	18

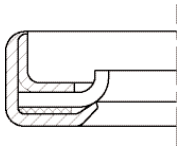


WAD

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
70427	17.46	28.57	7.93	0.687	1.125	0.312
131195	17.46	28.57	8	0.687	1.125	0.315
43717	17.46	31.75	7.93	0.687	1.125	0.312
159293	19.05	25.58	6.8	0.75	1.007	0.268
7601	44.45	68.32	19.4	0.75	2.69	0.764
121439	50.8	69.85	9.52	2	2.75	0.375
116184	69.85	88.9	15.8	2.75	3.5	0.622
92936	76.2	104.78	12.7	3	4.125	0.5





WCP21

Rotary shaft seal with a PTFE sealing lip and an elastomer pre-tension ring which is clamped between two metal cages. Non-mould production.

Standard materials

Sealing lip: PTFE + fibreglass/MoS₂

Colour: grey

Metal cages: steel 1.4404 (AISI 316L)

Elastomer ring: FPM

Areas of application

Sealing of rotating machine elements, such as shafts, hubs and axles at high peripheral speeds, high pressures and/or high temperatures.

Sealing of aggressive chemicals due to the excellent chemical resistance of PTFE. For dry operation or applications with insufficient lubrication due to the very good friction coefficient of PTFE.

Function

The WCP21 is a single action rotary shaft seal for rotating or pivoting shafts with a very long lifespan. Good sealing action is guaranteed by the pre-stressed PTFE sealing lip on the shaft. The very low friction coefficient of the PTFE material prevents a stick-slip effect, lowers the starting resistance and is therefore also a good choice for dry operation or applications with insufficient lubrication. The WCP21 can be used at high peripheral speeds as limited thermal development occurs. It is suitable for larger pressure loads, optionally 5/10/25 bar.

Tight and accurate fitting is achieved by the metal outer casing. The WCP21 design has limited sealing action with thin fluid and gaseous media and in split housings. To guarantee a high degree of static sealing on the outer surface, better surface treatment of the housing bore is required or an additional coat of paint should be applied to the metal outer casing.

Media

All types of oil, water, water/oil emulsion, hot air, broadest chemical resistance to almost all aggressive media.

Operational application limits

Pressure (Mpa/bar): SP1 5 bar /

SP2 10 bar / SP3 25 bar

Temperature (°C): -90 to +250

Peripheral speed (m/s): ≤ 40

(noting $p \times V$ factor)

Installation

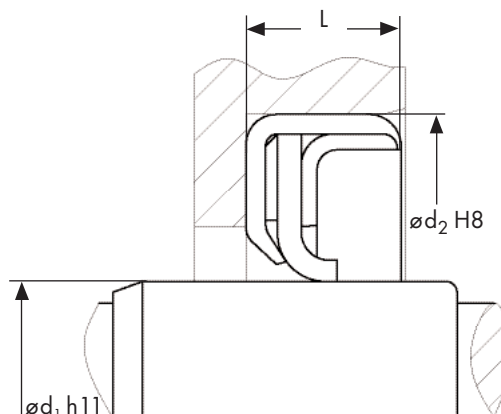
The outer diameter of the metal outer casing is centralised in the housing by press-fitting. The installation housing tolerances are in accordance with those in DIN 3760. Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. The PTFE sealing lip must not be damaged during installation. For this reason, we recommend using an installation cone. Please also refer to our general installation instructions for the WCP21 on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. dust protection lip or metal cages made of other steel grades can be produced as well as some special designs.

Thanks to the non-mould production, delivery at short notice and small quantities are possible.



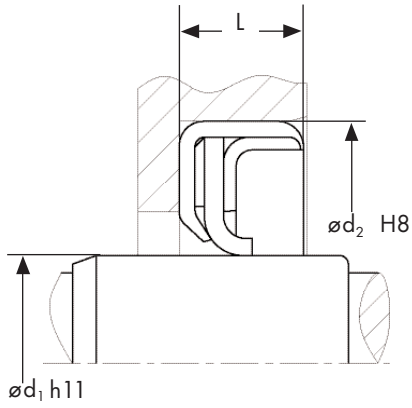
WCP21

**Sizes
metric**

SP	Part No.	Dimensions in mm			SP	Part No.	Dimensions in mm		
		ød ₁	ød ₂	L			ød ₁	ød ₂	L
1	155859	10	22	7	2	157521	60	85	8
1	126491	15	30	7	2	127656	60	85	12
2	150986	16	32	10	2	24270	60	90	10
1	127562	16	35	7	2	156459	62	80	8
1	124588	18	30	7	2	118749	65	85	8
2	83025	20	32	7	1	124845	65	85	13
1	46197	20	35	7	2	143996	65	90	10
2	121788	20	35	8	2	159647	65	90	13
1	156707	20	42	7	2	116438	68	90	8
1	121780	22	32	7	2	134590	68	90	9
1	134804	22	35	7	2	130883	68	90	10
1	152790	25	37	7	2	117967	70	85	8
2	115776	25	40	7	2	133540	70	90	10
2	122126	25	42	8	2	127468	70	90	13
2	118940	25	47	10	2	159648	70	95	13
2	134972	28	47	10	2	35793	70	100	10
1	151230	30	47	7	2	150469	70	100	13
1	6542	32	45	7	1	124846	74	90	10
2	115775	32	47	7	2	121814	75	95	13
1	28495	35	47	7	2	121733	80	100	10
1	135277	35	47	8	1	128026	80	105	10
2	148771	35	50	7	2	127482	84.7	110	12
1	148484	35	50	10	1	124847	85	105	12
2	143780	35	52	8	2	115491	85	110	10
3	4417	36	52	7	2	143659	90	110	8
1	149058	40	50	5	2	127655	90	110	10
1	117217	40	52	7	2	159300	90	110	12
2	156901	40	60	10	3	82736	90	120	12
2	125719	40	62	8	2	126924	95	120	12
2	122211	40	62	10	2	124153	100	120	12
2	159378	40	72	8	2	133916	100	126	10
1	42922	42	55	8	2	157175	100	130	12
1	153167	45	57	5	2	126827	105	130	13
2	153166	45	60	7	2	125823	110	130	12
2	117021	45	60	8	2	133924	110	136	10
2	156590	45	60	10	2	116553	110	140	12
2	133055	45	62	8	2	125285	115	140	12
2	153177	45	62	10	2	150365	115	140	13
2	117022	45	65	8	1	125720	120	140	12
2	159445	45	65	10	2	128212	120	150	12
2	115719	47	72	12	3	82737	120	160	12
1	149059	50	58	6	2	121812	125	150	12
1	82410	50	60	10	2	152349	130	160	12
1	157038	50	62	6	2	143570	130	160	13
2	134860	50	65	8	2	143657	140	160	10
2	148485	50	72	8	2	121718	140	165	10
2	155912	50	72	10	2	124521	140	170	15
1	117469	50	72	12	2	127653	150	180	13
2	117036	52	72	10	2	127039	150	180	15
2	74279	55	72	8	2	130263	160	185	12
2	150392	55	80	13	2	125860	160	190	15
2	159301	56	70	8	2	150575	164.4	178.4	8
2	150612	57	72	8	2	132563	170	200	15
2	150367	58	72	8	2	150574	179.4	198	8
2	118875	60	75	8	2	134395	180	210	15

WCP21

**Sizes
metric**



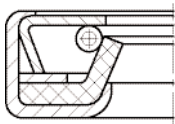
SP	Part No.	Dimensions in mm		
		$\varnothing d_1$	$\varnothing d_2$	L
2	128118	190	220	15
2	149442	200	230	12
2	160079	220	250	12
2	126083	230	260	15
2	155772	260	290	16
2	155771	285	310	16
2	79329	320	360	18
2	159753	340	380	16
2	159018	390	418	16
2	158811	460	500	20
2	159017	570	600	17
2	159016	840	880	18
2	127654	860	900	20

WCP21

**Sizes
inch**

SP	Part No.	Dimensions in mm			Dimensions in inch		
		$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
2	130527	50.8	72.23	9.52	2	2.84	0.37
1	134121	63.5	73.76	6.35	2.5	2.9	0.25
1	134120	88.9	98.93	6.35	3.5	3.89	0.25





WCL

Rotary shaft seal with a spring-energised elastomer sealing lip clamped between two metal cages. Non-mould production.

Standard materials

NBR 75
Colour: black
FPM 75
Colour: black
Energised spring: non-alloy spring steel
Metal cages: steel 1.4404 (AISI 316L)

Areas of application

Sealing of rotating machine elements, such as shafts, hubs and axles at high pressures. Good chemical resistance and higher temperature resistance is achieved with a sealing lip made of FPM. As a result of its greater rigidity the WCL is particularly suitable for larger dimensions as well as difficult installation conditions and severe operating conditions.

Function

The WCL is a single action rotary shaft seal for rotating or pivoting shafts. The elastomer sealing lip with its prestressed spring guarantees good sealing. It is suitable for higher pressure loads of up to 5/10 bar. The additional metal insert provides greater rigidity. Tight and accurate fitting is achieved by the metal outer casing. The WCL model has limited sealing action with thin fluid or gaseous media and with split housings.

To guarantee a high degree of static sealing on the outer surface, better surface treatment of the housing bore is required or an additional coat of paint should be applied to the outer casing.

Media

NBR: Good chemical resistance to many mineral oils and greases.
FPM: Mineral oils and greases, synthetic oils and greases, engine, transmission and ATF oils, fuels, aromatic and chlorinated hydrocarbons, broad chemicals and solvents resistance. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Pressure (Mpa/bar): 0.5/5
Optionally up to 1Mpa/10 bar
Temperature (°C):
NBR -40 to +100
FPM -30 to +200
Peripheral speed (m/s):
NBR ≤ 12, FPM ≤ 15

Installation

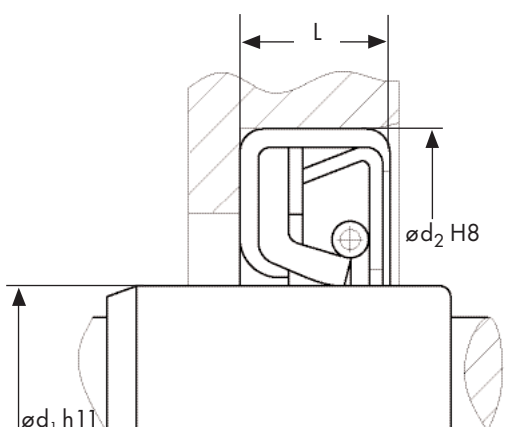
The outer diameter of the metal outer casing is centralised in the housing by press-fitting. The installation housing tolerances are in accordance with those in DIN 3760. Suitable tools should be used for installation. It is recommended that the installation housing is designed to provide the rotary shaft seal with axial support. The elastomer sealing lip must not be damaged during installation. For this reason, we recommend using an installation cone. Please also refer to our general installation instructions on page 30 of this catalogue.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions.

Other dimensions and different designs, e.g. dust protection lip, energised springs or metal cages made of other steel grades can be produced as well as some special designs.

Thanks to the non-mould production, delivery at short notice and small quantities are possible.



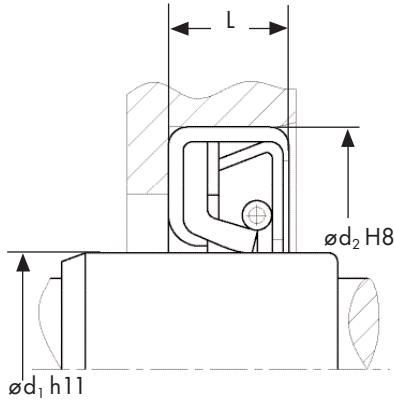
WCL

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
60200	27	45	10	35591	120	150	15
60201	27	50	8	77317	120	160	18
143275	32	57	10	127475	120	180	16
60229	38	52	12	60179	125	150	14
60247	40	62	10	49133	125	165	12
60250	40	80	13	77664	125	165	15
20661	42	64	12	26369	125	180	15
21861	43	78	10	118786	125	185	12
60360	50	68	10	20669	125	190	10
130346	50	120	12	69169	125	200	13
25642	52	90	12	127467	125	200	14
25643	52.5	80	11	84335	125	290	16
60363	55	80	12	60180	128	146	13.5
20663	55	120	12	36694	130	150	14
60368	57	80	12	92802	132	162	12
158037	60	85	15	60182	135	160	14
20664	63	80	12	60184	135	168	15
25639	66.5	102	11	57184	135	200	12
72416	67	85	10	117635	136	165.5	16
25718	68	90	12	135124	140	160	13
20665	70	100	15	25802	140	165	15
60330	72	95	13	25953	140	170	15
24113	74	100	13	60185	140	180	13
26175	80	102	13	108075	145	167	17
60337	80	125	13	60197	145	170	15
25951	82	100	13	151309	145	175	15
24699	85	100	13	60199	145	192	20
60340	85	115	13.02	77318	145	195	18
26099	85	155	15	77732	146	178	14
60344	88	126	12	48432	148	190	15
25875	90	133	14	78349	150	174	12
20666	90	133.5	12.5	60231	150	180	15
70363	90	160	15	72840	150	200	20
20667	92	112	15	22840	152	180	15
22111	95	130	12	7451	154	178	18
95650	95	170	32	22386	155	180	15
72417	96	125	13	60234	160	180	13
60189	100	125	15	21661	160	190	11
77316	100	140	18	21662	160	190	12
20668	105	130	24.7	37647	160	190	16
131201	105	135	13	73861	160	195	18
23763	105	135	14	43965	165	200	15
43968	105	170.5	12	57185	166	200	15
43967	110	135	15	57018	168	212.6	19.2
60193	110	150	13	57318	170	200	11
25952	110	160	14	26363	170	200	16
82503	110	170	13	127223	170	205	16
116333	111	146	17	25992	170	210	16
84351	112	150	14	22954	170	210	17
70269	112	150	15	73860	170	210	20
77120	114	140	15	20219	170	215	16
119037	115	140	12	26370	170	220	15
42644	115	160	15	22841	172	200	15
127660	120	140	16	22265	175	205	15
84337	120	150	14	37992	175	211	20

WCL

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
49582	175	215	16	46306	230	255	12
7787	177	210	20	46192	230	255	15
60230	180	215	15	115867	230	260	15
60241	180	220	15	74365	230	260	20
26364	180	220	16	79794	230	265	15
21866	185	215	15	126927	230	265	16
22112	185	215	16	80860	230	265	18
75040	185	225	16	20662	230	280	12
150293	185	225	16.5	37641	230	280	15
126768	185	225	17	77582	230	280	20
60260	185	230	16.4	77583	230	280	25.4
38663	186	216	12	108093	235	265	15
73137	190	210	12	60271	235	270	16
79784	190	210	15	35599	235	286	19
60261	190	220	13	64391	238	280	16
26365	190	220	16	89818	240	265	15
127568	190	220	22	37642	240	275	18
26368	190	230	15	78257	240	300	25
78577	200	220	15	26240	245	285	16
69750	200	225	12	127661	250	280	22
76534	200	230	14	76533	250	290	14
26366	200	230	16	60275	250	290	16
21136	200	230	17	93457	250	310	20
35444	200	230	18	85384	250	310	25
37991	200	239	22	93308	255	280	12
84909	205	245	16	156172	255	280	15
129708	205	250	16	93369	255	290	16
45864	205	290	16	130486	255	295	16
90787	210	235	12	81640	255	320	25
133311	210	240	12	37645	260	285	18
22029	210	240	14	76532	260	300	14
115950	210	245	16	117745	260	300	15
151601	210	245	18	90323	260	300	16
43966	210	250	17	84168	260	305	22
70438	210	250	20	45399	260	310	20
153517	210	260	16	63862	260	320	25
118717	210	375	16	56448	265	300	16
20220	215	245	16	133397	265	300	20
20911	215	250	15	127221	265	305	18
92947	215	250	16	25942	270	300	15
68338	215	270	25	6383	270	310	13
76104	220	240	12	37741	270	310	16
57319	220	240	16	37648	270	310	20
119038	220	250	15	130355	270	312	26
25734	220	250	16	44400	270	320	16
21135	220	250	17	45164	270	320	18
133613	220	255	16	44401	270	320	20
44887	220	260	15	37990	270	320	24
40043	220	260	22	35853	270	330	22.7
79783	220	265	12	74366	270	330	25
90692	220	270	15	60279	272	310	16
60270	225	250	16	144197	274	309	16
68096	225	290	16	132572	274	335	25
83720	225	300	25	57016	279	330	25.4
135006	228	275	15	63325	280	300	20

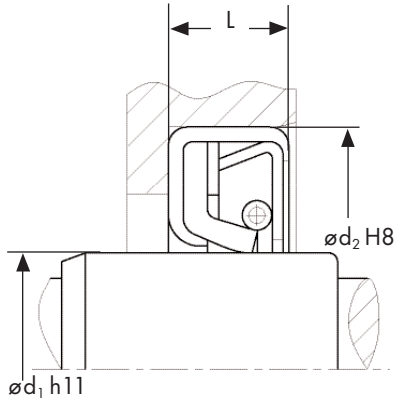
WCL

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
88238	280	310	16	74382	330	390	28
78809	280	310	20	56274	335	375	18
26367	280	320	16	60288	335	375	25
63077	280	320	22	77315	340	370	20
122469	280	324	20	24682	340	372	16
81315	285	325	16	44202	340	380	18
46308	290	320	15	22030	340	380	20
44519	290	330	15	122468	340	384	20
44562	290	330	16	63075	340	400	28
60285	290	330	20	119034	343	407	26
26991	290	350	20	128101	345	370	16
56283	290	350	25	26007	350	380	16
144127	292	317	13	85419	350	380	25
21568	292	343	23	56419	350	394	20
68965	295	335	18	115821	350	394	35
60291	298	340	17	44620	350	400	20
76212	300	325	38	61836	350	400	25
44851	300	330	16	75982	350	410	25
127569	300	330	22	63076	350	410	28
64112	300	332	16	134618	350	414	35
25715	300	340	16	157058	353	385	18
115829	300	350	18	119033	354	407	26
44461	300	350	19	149399	360	380	20
75980	300	350	25	72679	360	390	20
78221	300	355	18	78082	360	392	20
82661	300	356	18	76535	360	400	16
85488	300	356	20	38327	360	400	18
60108	300	360	22.7	130367	360	410	22
75981	300	360	25	80414	360	420	20
67967	300	365	18	38782	360	420	25
88154	305	330	16	83098	365	405	18
74759	310	335	18	6081	370	400	15
118831	310	340	12	68885	370	410	20
78312	310	340	16	21948	370	414	25.5
34785	310	350	18	66169	375	415	20
127222	310	370	28	149827	375	420	16
44781	315	355	18	79313	375	420	18
60286	315	360	18	75891	380	412	16
37644	315	365	20	24177	380	420	15
152784	316	340	16	37938	380	420	18
90118	320	350	10	44201	380	420	20
77944	320	350	15	77911	380	420	25
36033	320	350	18	107761	380	424	20
129932	320	350	20	90324	380	430	19
76531	320	360	16	57017	380	440	20
37643	320	360	20	37646	390	430	18
152283	320	360	25	78070	390	440	20
72923	320	364	20	61837	390	450	25
76590	320	380	18	107838	392.8	420	16
64172	325	365	16	65368	395	430	18
107829	330	354	12	60290	400	425	15
125011	330	360	18	126242	400	430	18
56914	330	370	18	83313	400	440	16
90310	330	374	19	783	400	440	18
88237	330	374	22	150867	400	445	20

WCL

Sizes metric



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
75342	400	450	15	115610	490	530	16
84058	400	450	20	84271	490	550	29
118816	400	500	25	152823	493	543	26
74400	405	450	20	90117	495	535	20
116015	410	440	20	46164	500	540	20
27978	410	450	18	38328	500	550	20
75142	410	460	22	84068	500	550	21
27565	410	470	25	78882	500	550	22
56636	415	455	20	77297	500	550	25
41476	420	460	20	144564	510	560	22
83839	420	470	20	73927	515	560	20
35243	420	480	25	37306	515	565	22
74383	420	480	28	116013	520	560	20
44618	430	460	15	77945	520	570	22
7591	430	460	16	118794	520	580	25
117560	430	460	18	9872	525	555	18
81297	430	470	14	90755	530	580	20
22122	430	470	16	76768	530	580	25
68323	430	470	20	35643	540	579	20
81298	430	480	14	108091	540	580	20
84167	430	480	30	90601	540	590	20
116551	440	470	15	126243	540	590	25
65455	440	470	20	118189	550	600	25
43963	440	480	20	24693	550	610	22.7
89989	440	480	26.6	9885	555	595	19.3
86503	440	490	22	108085	560	600	20
155777	440	490	25	65456	560	610	20
38032	440	505	23	69931	560	610	25
119032	441.5	483	18	9887	570	610	20
27936	445	470	20	144132	570	620	22
82638	445	485	16	124782	571	622	22
85429	450	480	18	124567	580	630	22
134707	450	490	20	129746	580	630	25
82113	450	500	20	37307	580	636	25
90445	450	500	24	153014	582	635	20
77296	450	500	25	149552	582	642	20
36930	460	500	20	132972	585	620	20
79126	460	510	22.5	108087	590	630	20
118793	460	520	25	121664	590	640	20
21880	465	490	15	108095	590	640	22
108086	467	510	20	35360	600	640	20
107828	470	494	13	115627	600	640	22
35571	470	510	16	62962	600	650	25
118663	470	520	20	121414	604	640	22
60294	470	520	25	116014	610	660	20
118792	470	530	25	116748	610	660	24
61635	475	530	18	14116	610	660	25
35572	480	520	20	157183	615	665	24.5
60292	480	520	22.7	60295	620	660	20
90073	480	530	20	151078	620	670	25
129745	480	530	22	64711	620	680	25
76769	480	530	25	151504	630	670	20
80584	480	540	22.7	118827	630	680	20
9886	482	530	20	121193	630	690	30
84939	490	530	13	41477	640	680	20

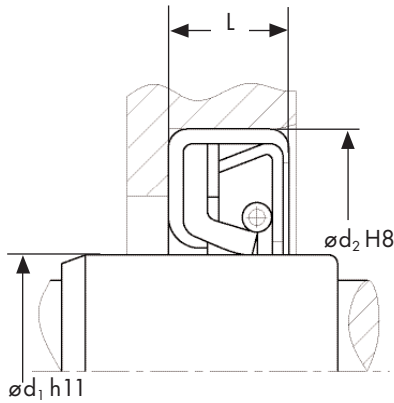
WCL

**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
124662	640	684	20.5	46054	1000	1050	25
127414	640	690	25	143857	1060	1100	20
38031	640	705	23	46148	1060	1110	25
88155	645	690	20				
119070	650	690	20				
115693	650	700	20				
86501	650	700	22				
144463	660	690	18				
35242	665	729	25				
9888	670	710	20				
82112	670	730	25				
116189	680	720	20				
115500	680	740	30				
126923	680	744	25				
134252	690	730	20				
38030	700	740	20				
79125	700	750	25				
46497	700	760	25				
44832	710	760	20				
134258	710	760	22				
57067	710	760	25				
107891	710	770	30				
45156	720	760	20				
156952	720	780	25				
120979	720	784	25				
156935	730	780	25				
116533	735	799	25.6				
135051	740	796	25				
159396	750	790	20				
46152	750	800	25				
83375	750	810	30				
57066	750	814	28				
78541	760	800	20				
79124	775	839	25				
143858	780	820	17.5				
40616	799	860	25				
118629	800	840	20				
122795	800	850	25				
38520	810	850	20				
126145	820	864	20				
118785	820	870	25.3				
127430	825	860	20				
82693	830	880	20				
118795	830	894	25				
152852	850	900	25				
95655	860	920	25				
152826	870	920	20				
80799	875	927	22				
117506	880	924	20				
46875	886	930	25				
46153	900	950	25				
90053	920	958	19				
155697	930	994	25				
118746	940	980	20				
84980	960	1020	30				

WCL

**Sizes
inch**

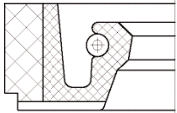
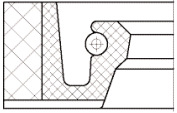
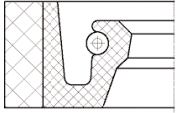


Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
60206	28.57	52.48	11.5	1.125	2.066	0.453
60220	31.75	50.8	11.11	1.25	2	0.437
60228	37.3	52.48	7.93	1.469	2.066	0.312
130209	41.27	76.2	9	1.625	3	0.354
60211	42.86	63.5	12.7	1.687	2.5	0.5
25637	42.86	69.85	12.7	1.687	2.75	0.5
43978	42.9	88.9	11.11	1.689	3.5	0.437
43979	49.21	76.2	12.7	1.937	3	0.5
60358	50.8	77.88	11.11	2	3.066	0.437
78817	57.15	82.55	11.11	2.25	3.25	0.437
25638	57.15	82.7	12.7	2.25	3.256	0.5
43980	57.2	84.9	12.7	2.252	3.343	0.5
43981	58.7	85.7	12.7	2.311	3.374	0.5
43982	60.32	88.9	11.11	2.375	3.5	0.437
78821	66.67	92.07	12.7	2.625	3.625	0.5
155626	74.61	98.43	9.52	2.937	3.875	0.375
78819	85.72	117.47	12.7	3.375	4.625	0.5
25644	88.9	114.3	12.7	3.5	4.5	0.5
76361	92.07	117.47	11.11	3.625	4.625	0.437
130444	93.66	120.65	14.28	3.687	4.75	0.562
78818	95.25	142.87	12.7	3.75	5.625	0.5
22390	98.42	123.98	15.87	3.875	4.881	0.625
60190	101.6	126.94	11.91	4	4.998	0.469
25640	101.6	126.97	12.7	4	4.999	0.5
24726	101.6	130.17	12.7	4	5.125	0.5
25732	101.6	133.5	15.87	4	5.256	0.625
92803	101.62	133.5	12.7	4.001	5.256	0.5
49581	112.71	152.79	12.7	4.437	6.015	0.5
25977	114.3	139.7	14.28	4.5	5.5	0.562
25641	114.3	146.05	12.7	4.5	5.75	0.5
84081	114.3	152.4	12.7	4.5	6	0.5
25733	120.65	146.2	12.7	4.75	5.756	0.5
35651	120.65	165.1	15.87	4.75	6.5	0.625
25978	123.82	158.75	15.87	4.875	6.25	0.625
74063	125.41	146.05	12.7	4.937	5.75	0.5
45366	127	152.4	14.28	5	6	0.562
34800	127	152.4	15.87	5	6	0.625
43977	127	190	31.75	5	7.48	1.25
79584	139.7	158.75	14.28	5.5	6.25	0.562
21114	139.7	171.45	15.87	5.5	6.75	0.625
120789	139.7	177.8	15.87	5.5	7	0.625
35413	139.7	177.8	19.05	5.5	7	0.75
22335	139.7	184.15	15.87	5.5	7.25	0.625
133436	153.98	180.97	12.7	6.062	7.125	0.5
38150	157.9	196.8	12.4	6.217	7.748	0.488
121203	165.1	203.2	19.05	6.5	8	0.75
156307	168.23	206.38	15.87	6.623	8.125	0.625
21113	168.28	206.37	19.05	6.625	8.125	0.75
27543	168.28	206.38	15.87	6.625	8.125	0.625
24713	171.45	196.85	15.87	6.75	7.75	0.625
121773	171.45	203.2	19.05	6.75	8	0.75
92804	174.62	212.72	19	6.875	8.375	0.748
85421	177.8	203.2	12.7	7	8	0.5
46513	177.8	209.55	19.05	7	8.25	0.75
86507	177.8	215.9	19.05	7	8.5	0.75
35921	177.8	250.82	12.7	7	9.875	0.5
150933	184.15	216	15.87	7.25	8.504	0.625
24268	190.5	215.9	12.7	7.5	8.5	0.5

WCL

**Sizes
inch**

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
27544	190.5	228.6	19.05	7.5	9	0.75
69325	196.85	225.42	14.28	7.75	8.875	0.562
84911	203.2	234.95	15.87	8	9.25	0.625
60266	209.55	291.31	19.05	8.25	11.469	0.75
57015	219	272.8	25.4	8.622	10.74	1
130354	219.08	257.18	14.28	8.625	10.125	0.562
150932	222.25	254	15.87	8.75	10	0.625
85420	222.25	260.35	14.28	8.75	10.25	0.562
117501	227.4	254	12	8.953	10	0.472
117500	227.4	254	16	8.953	10	0.63
28812	234.95	263.52	15.87	9.25	10.375	0.625
78220	234.95	285.75	16.5	9.25	11.25	0.65
59528	247.5	282.6	19.05	9.744	11.126	0.75
24269	247.65	285.75	19.05	9.75	11.25	0.75
46215	254	279.4	14.28	10	11	0.562
82729	254	279.4	19.05	10	11	0.75
27326	254	292.1	14.28	10	11.5	0.562
44064	254	317.5	16	10	12.5	0.63
59529	263.53	295.28	19.05	10.375	11.625	0.75
46212	273.05	298.45	14.28	10.75	11.75	0.562
151355	292.1	330.2	18	11.5	13	0.709
158007	266.7	318	25	10.5	12.52	0.984
37026	292.1	342.9	20.63	11.5	13.5	0.812
84910	304.8	342.9	19.05	12	13.5	0.75
42503	304.8	355.6	19.05	12	14	0.75
49116	315.92	349.25	19.05	12.438	13.75	0.75
37250	317	355.6	19.05	12.48	14	0.75
22373	317.5	349.25	19.05	12.5	13.75	0.75
60287	323.85	374.65	19.05	12.75	14.75	0.75
83681	330.2	368.3	17.45	13	14.5	0.687
85487	330.2	368.3	19.05	13	14.5	0.75
151465	336.5	374.6	15.88	13.248	14.748	0.625
42985	342.9	381	19.05	13.5	15	0.75
24727	361.95	400.05	19.05	14.25	15.75	0.75
24728	361.95	412.75	25.4	14.25	16.25	1
125991	390.52	428.62	17.46	15.375	16.875	0.687
24385	393.7	431.8	19.05	15.5	17	0.75
117339	406.4	456.9	20.63	16	17.988	0.812
130095	410	448.1	19.05	16.142	17.642	0.75
118182	430.2	465.15	14.29	16.937	18.313	0.563
78758	533.39	584.19	22.22	21	23	0.875
116522	533.4	577.85	20.64	21	22.75	0.813
117906	533.4	584.2	22.22	21	23	0.875
118862	558.8	596.6	19.5	22	23.488	0.768
71025	558.8	609.6	19.05	22	24	0.75
70081	581.03	609.6	19.05	22.875	24	0.75
75012	584.19	634.99	22.22	23	25	0.875
84308	609.6	660.4	22.23	24	26	0.875
21074	685.8	736.85	22.2	27	29.01	0.874
70080	711.2	774.7	19.05	28	30.5	0.75
83565	730.3	781.05	22.7	28.752	30.75	0.894
35244	749.3	812.8	28.57	29.5	32	1.125
77671	850.9	914.4	22.22	33.5	36	0.875
60293	850.9	914.4	25.4	33.5	36	1
90424	889	952.5	22.23	35	37.5	0.875
93363	910	967.13	17.86	35.827	38.076	0.703
90012	927.1	977.9	22.23	36.5	38.5	0.875
150417	1009.65	1073	22.23	39.75	42.244	0.875



WE

Rotary shaft seal made of elastomer which has an outer casing reinforced with impregnated fabric. The fabric reinforcement is bonded firmly to the elastomer component. The sealing ring is energised by a spring.

Standard materials

NBR 80 / outer sheath: NBR 80 with impregnated cotton fabric
FPM 80 / outer sheath: FPM 80 with impregnated cotton fabric
Energised spring: rust and acid-resistant steel 1.4301 (AISI 304)

Areas of application

Sealing of rotating machine elements such as shafts, hubs and axles in large machinery and plant construction, e.g. wind energy generators, construction machinery, rolling mills and shipbuilding. In addition, WEs can be used in difficult installation conditions.

Function

The WE types are rotary shaft seals for rotating or pivoting shafts. The WE5 is the standard model.

The WE6 type has a groove running vertically to the axle.

The WE7 type has a circular groove on the outside diameter in addition to the vertically running groove as in the WE6. The WE6 and WE7 types are applied back to back in pairs wherever relubrication from the outside is necessary, e.g. when separating of media or protecting against the invasion of dust, dirt and water spray. WEs are distinguished by a robust adhesive part, high radial contact pressure as well as good wear resistance.

Large-diameter WEs are alternatively available in split form in order to facilitate installation, i.e. the WE can be installed around the built-in shaft.

Media

NBR: good chemical resistance to many mineral oils and greases.

FPM: mineral oils and greases, synthetic oils and greases, engine, transmission and ATF oils, fuels, aromatic and chlorinated hydrocarbons, broad chemicals and solvents resistance. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

NBR 80

Pressure (Mpa/bar): 0.05/0.5
Temperature (°C): -30 to +100
Peripheral speed (m/s): ≤ 20

FPM 80

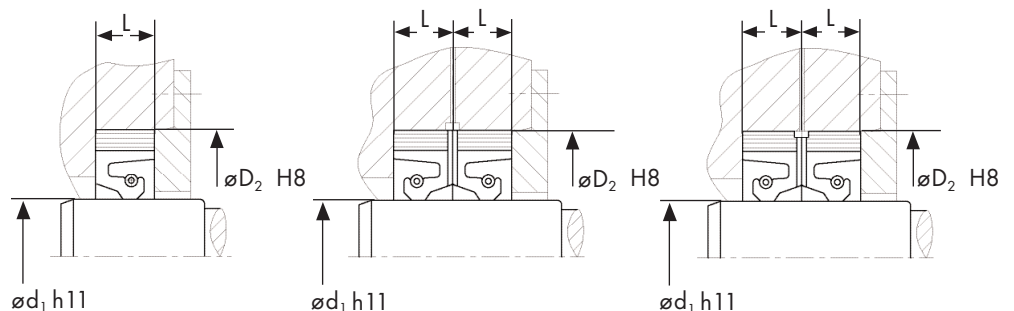
Pressure (Mpa/bar): 0.05/0.5
Temperature (°C): -20 to +180
Peripheral speed (m/s): ≤ 25

Installation

Suitable tools should be used for the installation. WEs are slightly squashed into the axially accessible housing bore. WEs have surplus height and are additionally axially pressed into the installation housing. Increased radial pressure is guaranteed by the radial and axial deformation. WE6 and WE7 rotary shaft seals are both installed back to back. Special values apply with regard to the requirements for shafts, housing bores and eccentricities. These details can be coordinated with our engineering department. Please also refer to the example in the special installation types chapter on page 31.

Remarks

The nominal widths mentioned on the following pages represent the standard dimensions. Other dimensions and energised springs made of different steel grades can be produced.



WE5

WE6

WE7

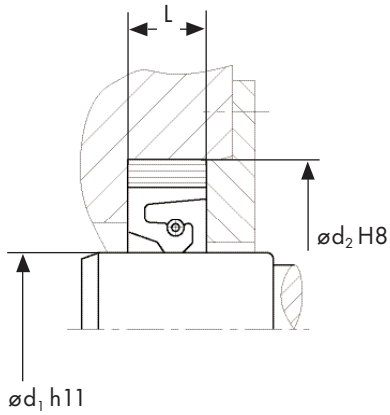
WE5

Sizes
metric

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
108097	8	22	7	108142	125	155	12.2
108106	10	25	7	108145	125	160	12
120762	25	40	8	128104	125	165	16
108107	30	55	12	108146	130	160	15
124401	35	52	8	108147	130	160	16
108108	45	60	10	108149	130	165	18
108109	45	62	8	11244	130	170	16
108110	45	70	11	129861	133	165	12.5
117893	50	65	8	108148	135	160	15
108111	50	70	10	144425	135	170	12
129841	50	75	11	108143	140	155	10
151116	55	68	8	120649	140	170	14
108101	60	80	10	108391	140	170	16
108102	65	90	11	134017	140	172	14
108103	65	90	12.5	108151	140	180	16
108385	65	95	16	108390	145	165	10
129844	65	100	12	129842	145	167	12
108118	70	102	12.5	108152	145	175	15
108112	74	90	10	118846	150	180	12
108113	75	95	12.5	108155	150	180	13
108114	75	97	12.5	108156	150	180	15
108116	80	100	10	108158	150	190	16
108117	80	100	12	108161	155	195	16
108119	80	105	12.2	108157	160	185	10
108122	80	115	12	46467	160	190	15
108120	85	110	12	108163	160	200	16
108124	85	117	12.5	80512	160	200	16.5
129845	90	110	12	108159	165	190	13
108121	90	110	13	108160	165	190	15
108123	90	115	12.2	108162	165	195	15
129846	90	115.4	9.5	48688	170	200	15
108127	90	122	12.5	151377	170	200	16.8
108128	93	127	13	108165	170	205	16
108387	95	127	12.5	108168	170	210	16
108125	100	120	8	108167	175	205	15
108126	100	120	13	132956	177	230	16
108386	100	125	12.5	108169	180	210	12
56586	100	127	11	129864	180	220	16
129847	100	130	15	108175	184	224	15.5
108132	100	132	12.5	108176	185	225	12
108133	100	135	16	108184	189	251	13
108134	100	140	16	129863	190	210	14
108129	105	130	15.3	108172	190	220	13
108139	105	145	16	108174	190	220	16
108130	110	130	9	157117	190	225	18
108131	110	130	12	108177	190	230	16
108135	110	140	13	108171	190	245	24.5
108136	114	140	13	64565	195	225	14.7
129843	115	140	12	108179	195	235	16
108137	115	140	15	108180	196	235	16
108144	115	160	16	132957	200	230	15
108138	120	140	12	118730	200	235	18
108140	120	147	12	33377	200	240	16
108141	120	150	13	151119	203	230	12
120648	120	150	14	108181	210	240	12

WE5

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
144439	210	240	15	108223	300	340	20
108393	210	245	18.2	46142	300	344	20
74799	210	249	22	151120	300	350	22
118847	210	250	16	132978	310	340	14.5
108182	218	250	16	117785	310	350	18
108183	220	250	15	108224	310	350	20
144335	220	255	18	134154	310	355	20
108185	220	256	22	46468	311	345	18
108186	220	260	16	108226	315	355	16
46466	220	260	16.5	108228	315	360	16
74798	220	260	20	108225	317	350	19
132835	220	260	22	108227	320	358	19
108187	220	270	16	108229	320	360	18
108193	226	276	22	121212	320	360	20
108554	230	260	15.7	108231	320	364	20
64566	230	260	16	108232	330	370	20
108189	230	270	16	108233	330	374	19
108190	230	270	22	132847	340	372	18
108194	230	280	15	108236	340	380	20
144440	235	265	15	108237	340	384	20
132839	236	261	12.5	108241	343	394	19
108191	240	270	15	108239	350	390	20
120650	240	275	16	108242	350	394	20
108192	240	275	18	132855	350	400	25
108195	240	280	16	108240	360	390	18
132846	240	280	18	132979	360	400	16
157116	240	290	25	108244	360	404	20
108197	250	280	16	108246	362	404	19.5
108199	250	285	18	132856	362	406	19.5
108200	250	290	16	149535	370	410	16
108395	250	294	20	108248	370	410	20
108204	250	300	20	132857	370	414	20
108201	260	290	16	132911	370	414	25
64567	260	290	16.3	132912	375	415	20
129704	260	300	18	108249	380	410	14
108205	260	300	20	108251	380	420	18
108207	260	304	20	108252	380	420	20
132841	265	290	16	108397	380	424	20
108213	265	315	18	71677	390	434	20
108203	270	295	10.5	108261	390	450	25
108206	270	300	15	108254	395	430	18
108211	270	310	20	108255	395	432	20
108212	270	314	20	151121	400	440	14
108208	272	304	16.5	108256	400	440	18
132708	275	315	18	108258	400	440	20
108215	275	320	15	108260	400	444	20
130522	280	310	15	152665	400	450	22
132842	280	320	16	135143	400	450	25
108217	280	320	20	108262	400	460	30
108218	280	324	20	132913	405	445	20
156035	290	330	18	108263	410	460	22
46471	290	330	20	108264	410	460	25
108219	290	334	20	149536	413	445	16
108220	300	335	18	132914	420	460	20
108221	300	340	16	132980	420	470	22

WE5

Sizes
metric

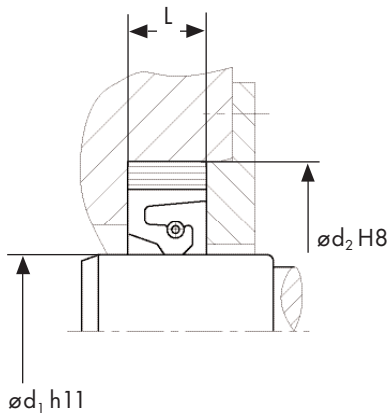
Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
108266	420	470	25	108405	635	695	25
81198	430	480	22	144445	640	684	20
108400	435	485	22	108323	640	690	22
108272	440	490	22	108324	650	690	18
108268	445	485	20	108325	650	700	22
108274	445	495	22	108330	650	714	25
108399	448	480	15	108329	657	711	20
84859	450	500	22	41842	660	700	18
108275	450	500	25	108326	660	704	20
108276	456	500	20	134508	665	729	25
108277	460	500	20	108333	670	734	25
108279	460	510	22	132919	680	730	20
108281	460	510	25	108335	680	744	25
144442	467	510	20	108332	685	725	20
144443	467	510	25	108337	700	760	30
108282	470	510	18	108340	700	764	25
108283	470	520	22	108338	710	760	25
108285	470	520	25	82647	710	760	25.7
85401	480	520	18	108345	730	794	25
108286	480	530	22	108347	735	799	25
132981	485	525	18	108343	740	780	20
108290	485	535	22	108350	750	810	30
108294	493	543	26	116198	760	800	20
108292	495	540	25	108352	760	820	25
108293	500	540	20	108353	776	820	20
108295	500	544	20	85402	780	820	18
151045	500	550	20	108354	780	830	25
81588	500	550	22	108358	780	844	25
149403	510	560	25	108360	790	845	25
132982	520	560	18	126008	790	845	25.7
132916	520	570	22	108362	800	864	25
108297	530	555	12.5	108363	820	870	22
108296	530	580	22	108365	820	884	25
108301	530	580	25	151123	820	884	28
132917	540	580	18	108364	840	880	20
89811	540	590	22	108368	850	910	30
108302	550	600	22	108369	854	918	25
132983	550	600	23.5	108366	860	900	18
108307	550	600	25	117703	870	920.8	20
108403	560	600	17.2	108372	875	939	25
108308	560	604	20	144447	880	930	25
108309	560	610	22	144448	880	944	25
144444	565	615	25	108373	890	940	25
108312	570	620	22	108375	900	960	30
108314	570	620	25	132925	900	964	25
82646	580	630	25	132926	920	984	25
108315	585	625	20	108376	950	1000	22
108316	590	640	22	108377	950	1000	30
132918	600	640	20	144429	990	1054	25
84861	600	650	22	132927	1000	1050	25
108317	600	650	25	108381	1090	1140	25
132984	605	655	22	108382	1110	1150	20
108320	620	670	22	144428	1110	1160	22
132985	620	684	25	108384	1110	1174	25
108321	625	670	20	144427	1130	1194	25

WE5

Part No. Dimensions in mm
 $\varnothing d_1$ $\varnothing d_2$ L

**Sizes
metric**

133169 1900 1964 25



WE5

Part No. Dimensions in mm Dimensions in inch
 $\varnothing d_1$ $\varnothing d_2$ L $\varnothing d_1$ $\varnothing d_2$ L

**Sizes
inch**

108511	55.56	76.2	12.7	2.187	3	0.5
130616	69.9	88.9	12.7	2.752	3.5	0.5
151117	72.7	120	12.7	2.862	4.724	0.5
108512	73.02	88.9	7.93	2.875	3.5	0.312
108513	76.2	95.25	9.52	3	3.75	0.375
108514	82.55	114.3	12.7	3.25	4.5	0.5
108515	88.9	114.3	12.7	3.5	4.5	0.5
108516	92.07	117.47	12.7	3.625	4.625	0.5
108517	98.42	123.82	12.7	3.875	4.875	0.5
108518	98.5	123.9	10	3.878	4.878	0.394
108519	101.6	127	10	4	5	0.394
56773	101.6	127	10.25	4	5	0.404
108388	101.6	127	12.7	4	5	0.5
108520	101.6	130.17	12.7	4	5.125	0.5
151118	101.6	160	14.3	4	6.299	0.563
108521	107.95	133.35	12.7	4.25	5.25	0.5
71676	114.3	139.7	12.7	4.5	5.5	0.5
108523	125.4	157.2	12.7	4.937	6.189	0.5
108522	127	146.05	9.52	5	5.75	0.375
108525	127	158.75	15.87	5	6.25	0.625
108528	127	165.1	15.87	5	6.5	0.625
108526	130.17	161.92	12.7	5.125	6.375	0.5
108527	131.76	163.5	15.87	5.187	6.437	0.625
108529	133.35	171.45	15.87	5.25	6.75	0.625
108530	146.05	171.45	12.7	5.75	6.75	0.5
108531	146.05	177.8	15.87	5.75	7	0.625
108532	150.81	182.56	12.7	5.937	7.187	0.5
144426	152.4	184.2	15.87	6	7.252	0.625
108533	152.4	190.5	15.87	6	7.5	0.625
143984	152.4	190.5	17	6	7.5	0.669

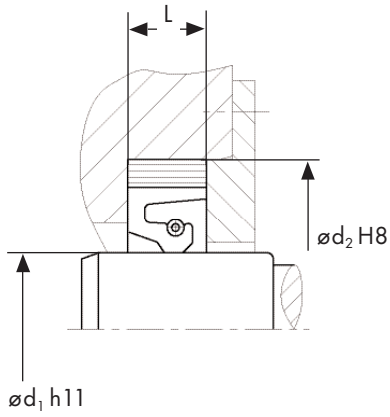
WE5

Sizes
inch

Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
108535	160	198.1	12.7	6.299	7.799	0.5
108534	165.1	190.5	14.28	6.5	7.5	0.562
108539	168.28	206.38	17.46	6.625	8.125	0.687
108540	171.45	209.55	15.87	6.75	8.25	0.625
132955	177.8	203.2	12.7	7	8	0.5
108545	177.8	222.25	19.05	7	8.75	0.75
108537	180	205.4	10.2	7.087	8.087	0.402
108538	180	205.4	12.7	7.087	8.087	0.5
108544	180	218.1	15.87	7.087	8.587	0.625
108541	184.15	212.72	19.05	7.25	8.375	0.75
108543	185	216.8	15.87	7.283	8.535	0.625
108542	190.5	215.9	15.87	7.5	8.5	0.625
108546	196.7	222.3	16.4	7.744	8.752	0.646
108547	197.1	230.1	16	7.76	9.059	0.63
108548	200	238.1	19	7.874	9.374	0.748
108549	203.2	241.3	19.05	8	9.5	0.75
108550	209.55	241.3	12.7	8.25	9.5	0.5
108552	209.55	247.65	15.87	8.25	9.75	0.625
108555	209.55	260.35	19.05	8.25	10.25	0.75
108556	209.55	260.35	25.4	8.25	10.25	1
108551	215.9	241.3	12.7	8.5	9.5	0.5
108553	215.9	254	15.87	8.5	10	0.625
151508	215.9	254	19.05	8.5	10	0.75
151509	228.6	266.7	19.05	9	10.5	0.75
151510	228.6	279.4	19.05	9	11	0.75
108557	234.95	266.7	15.87	9.25	10.5	0.625
156638	234.95	292.1	19.05	9.25	11.5	0.75
108558	241.3	266.7	12.7	9.5	10.5	0.5
108560	241.3	279.4	17.46	9.5	11	0.687
108559	244.48	269.88	12.7	9.625	10.625	0.5
108561	247.65	285.75	19.05	9.75	11.25	0.75
108562	247.65	292.1	19.05	9.75	11.5	0.75
108563	249	292.1	16	9.803	11.5	0.63
132840	254	271.5	9.5	10	10.689	0.374
132977	254	330.2	20.64	10	13	0.813
108564	260	298.05	19.05	10.236	11.734	0.75
108565	260.35	298.45	19.05	10.25	11.75	0.75
108568	266.7	317.5	25.4	10.5	12.5	1
108569	273.05	323.85	14.28	10.75	12.75	0.562
132849	282.1	336.5	19	11.106	13.248	0.748
108571	282.18	336.55	20.64	11.109	13.25	0.813
132843	286.4	330.2	19	11.276	13	0.748
108570	286.54	330.2	19.05	11.281	13	0.75
132852	290	340.8	20.6	11.417	13.417	0.811
108573	290.11	340.79	20.64	11.422	13.417	0.813
108574	292.1	342.9	23.02	11.5	13.5	0.906
108575	298.45	349.25	22.22	11.75	13.75	0.875
108577	304.8	355.6	19.05	12	14	0.75
108576	311.15	349.25	19.05	12.25	13.75	0.75
108572	317.5	339.73	14.28	12.5	13.375	0.562
108578	317.5	361.95	19.05	12.5	14.25	0.75
108579	317.5	368.3	25.4	12.5	14.5	1
115735	323.85	368.3	19.05	12.75	14.5	0.75
108592	342.9	387.35	19.05	13.5	15.25	0.75
108593	361.95	400.05	19.05	14.25	15.75	0.75

WE5

**Sizes
inch**



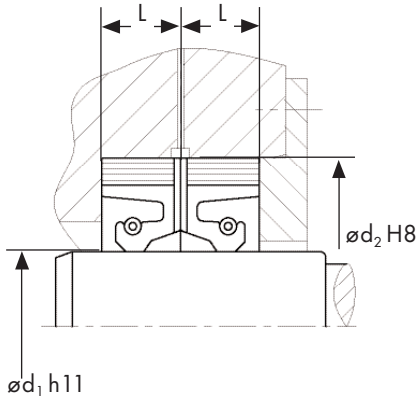
Part No.	Dimensions in mm			Dimensions in inch		
	ød ₁	ød ₂	L	ød ₁	ød ₂	L
108595	393.7	438.15	19.05	15.5	17.25	0.75
108594	393.7	444.5	23.6	15.5	17.5	0.929
108596	406.4	450.85	19.05	16	17.75	0.75
108598	406.4	457.2	20.64	16	18	0.813
108599	406.4	457.2	22.22	16	18	0.875
144441	406.4	457.2	28.57	16	18	1.125
135226	406.4	457.2	29.2	16	18	1.15
108597	415	453.1	19	16.339	17.839	0.748
108600	431.8	457.2	12.7	17	18	0.5
108601	431.8	482.6	20.64	17	19	0.813
151122	508	558.8	20.6	20	22	0.811
148612	508	558.8	20.63	20	22	0.812
108602	508	558.8	22.22	20	22	0.875
108603	520.06	570.8	20.64	20.475	22.472	0.813
108604	520.7	571.5	22.22	20.5	22.5	0.875
153245	527.05	558.8	15.87	20.75	22	0.625
108605	533.4	588.8	19.05	21	23.181	0.75
78869	571.5	609.6	25.4	22.5	24	1
108606	587.4	638.2	20.64	23.126	25.126	0.813
108607	609.6	660.4	22.22	24	26	0.875
108608	630	680.8	19	24.803	26.803	0.748
144446	660.4	711.2	25.4	26	28	1
148611	800.1	850.9	25.4	31.5	33.5	1
108609	838.2	901.7	22.22	33	35.5	0.875
108610	876.3	927.1	22.22	34.5	36.5	0.875
108611	889	952.5	22.22	35	37.5	0.875
108612	971.55	1016	20.64	38.25	40	0.813

WE6

Part No. Dimensions in mm
 $\varnothing d_1$ $\varnothing d_2$ L

Sizes metric

108098	190	230	16
132845	275	319.5	19
108214	280	320	16.5
108234	330	374	20
117117	340	380	19
108245	360	404	20
108259	400	440	22
108401	445	495	22
117013	460	510	22
108402	500	550	22
108298	515	565	22
132986	605	655	22
108319	610	660	22
108406	650	700	22
108334	676	740	25

**WE6**

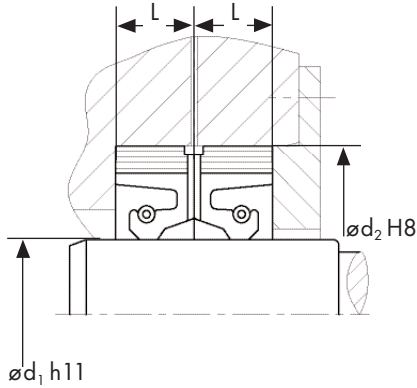
Part No. Dimensions in mm Dimensions in inch
 $\varnothing d_1$ $\varnothing d_2$ L $\varnothing d_1$ $\varnothing d_2$ L

Sizes inch

108616	275	319.48	19.05	10.827	12.578	0.75
123846	533.4	584.2	22.22	21	23	0.875

WE7

Sizes metric



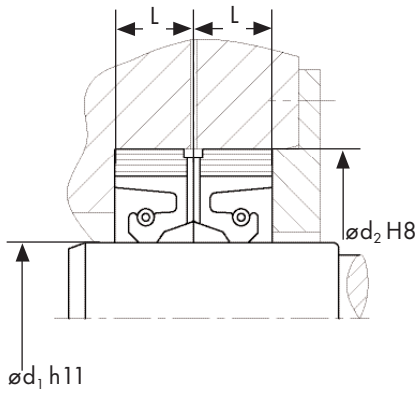
Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
130217	120	140	13	108287	485	525	18
108389	133	165	12.5	108291	485	535	22
129862	150	190	16	108289	490	534	20
108099	160	200	18.3	108299	525	575	22
108164	170	200	13	108300	530	580	22
108166	175	205	14.3	108303	540	590	22
64564	175	205	14.7	108304	540	590	25
108392	175	215	16	108305	550	590	18
108170	180	210	14	108306	550	600	22
108173	190	220	15	132988	560	604	20
48687	200	230	14.5	108310	560	610	22
132837	200	240	16	132989	565	615	22
108394	215	255	16	108311	570	614	20
108178	220	260	16	108313	570	620	22
108188	220	270	19	108404	590	640	22
108196	240	280	18	108318	596	660	32
108198	250	280	16	151133	600	650	25
144432	250	290	16	108322	630	680	22
108202	255	295	18	108328	640	704	25
108396	260	300	14	108331	650	714	25
151135	266	310	18	108407	650	714	28
108210	270	310	18.3	144436	655	700	20
108216	280	320	18	108327	660	700	18
132848	300	335	18	151131	670	720	22
48689	300	340	18	132915	670	734	25
108222	300	344	20	108336	696	760	32
108230	320	360	18	130566	700	750	25
144433	330	370	20	132922	700	764	25
132851	330	374	20	144437	710	760	22
108235	333	377	20	108339	710	760	25.5
108238	340	384	20	151130	710	760	30
108243	350	394	20	108341	710	774	25
130565	360	400	20	108346	730	794	25
108398	360	404	20	108348	735	799	25
108247	370	410	18	108342	740	780	16
108250	375	420	20.5	108344	750	790	18
108253	380	424	20	151129	750	810	30
144434	385	425	18	108351	750	814	25
135276	385	425	18.2	108349	760	804	20
144435	400	440	14	108408	762	810	20
108257	400	440	18	108355	766	830	32
108265	420	460	18	108409	775	838	31
132987	420	470	22	108357	775	839	25
108267	430	474	20	108356	780	830	22
108269	430	480	22	108359	780	844	25
108270	435	485	22	108361	790	854	25
151132	440	490	22	132923	820	870	22
108271	446	486	16	144438	820	870	25
108273	450	490	18	151128	820	884	25
118834	454	504.8	21	14075	840	904	25
108278	460	504	20	108367	860	924	25
108280	460	510	22	132990	870	934	25
108284	470	520	22	108374	880	944	25
108468	480	530	22	108371	890	930	18
108288	480	530	25	132924	933.4	984.4	25

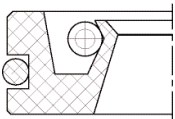
WE7

Part No.	Dimensions in mm		
	$\varnothing d_1$	$\varnothing d_2$	L
108378	970	1034	25
108379	985	1045	24.5
132928	1000	1050	25
108380	1030	1094	25
151126	1050	1110	25
132932	1060	1124	25
108383	1100	1164	25

Sizes metric**WE7**

Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
108524	127	158.75	12.7	5	6.25	0.5
132838	241.3	336.5	20.6	9.5	13.248	0.811
108613	241.3	336.55	20.64	9.5	13.25	0.813
108567	254	292.1	15.87	10	11.5	0.625
108614	406.4	450.85	19.05	16	17.75	0.75
59663	660	710.8	22.22	25.984	27.984	0.875

Sizes inch



WEPO

is a PTFE rotary shaft seal with a spring-energised sealing lip and an O-ring as static housing sealing. Non-mould production.

Standard materials

Seal: PTFE/carbon/graphite

Compound D 32

O-Ring: elastomer FPM 80

Spiral spring: rust and acid-resistant steel 1.4571

Area of application

For sealing of rotating and pivoting shafts, reciprocating and combined (lifting and rotating) movements.

Function

The WEPO is a single action rotation seal with an outstanding lifespan. Its very good dynamic sealing action is supported by a pre-tension spring designed specially for this purpose. The O-ring placed on the outside diameter performs a double function: axial sealing and the prevention of spiraling in the housing. Slight swelling of the FPM O-ring caused by the medium has no negative effect on the sealing function.

Media

All types of hydraulic oils, water, water and oil emulsion, hot air, broadest chemical resistance to almost all aggressive media.

Operational application limits

Pressure (MPa/bar): 1/10

Temperature (°C): -20 to +205

Peripheral speed (m/s): ≤ 15

Surface hardness

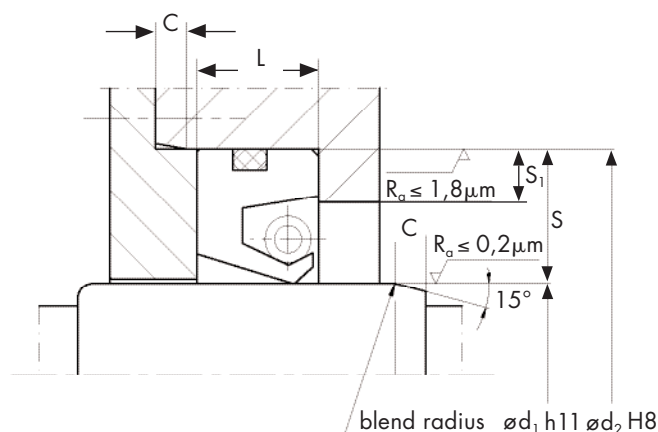
Depending on the lubricating properties of the medium and the expected contamination, shaft hardness between 45 and 60 HRC is to be selected. At higher peripheral speeds the surface hardness should not be below 55 HRC. The shaft surface must be spiral-free.

Installation

The outside diameter of the PTFE component is produced with a plus tolerance and is centralized in the housing by press fitting. Axial protection must be undertaken on the non-pressure side in accordance with the operational pressure. Please also refer to the general installation instructions on page 30 of this catalogue or the special installation instructions in our PTFE catalogue.

Remarks

The sizes mentioned on the following pages represent the standard dimensions. In addition, we are able to produce any other dimensions required. For operational conditions other than the standard applications, further PTFE compounds, springs made of other steel grades and O-Rings made of other elastomers are available.



Installation dimensions

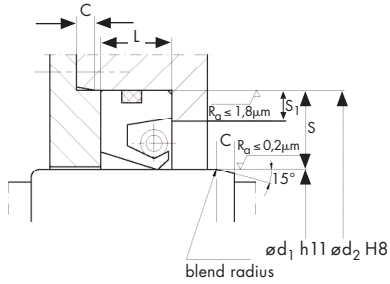
	Series No.					
	001	002	003	004	005	006
$\varnothing d_1$ h11	6-45	45-65	65-85	85-125	125-200	200-300
$\varnothing d_2$ H8	d +9 to 35	d +12 to 35	d +15 to 35	d +19 to 35	d +20 to 35	d +30 to 40
L +0.2						
Standard range	7	8	10	12	15	15
Non-standard range	5.5-10	6-12	7-13	8-15	9-20	10-25
C	2	2.5	3	3	4	4
S₁ min	3	3	4	4	5	5

WEPO

	Part No.	Dimensions in mm			Part No.	Dimensions in mm		
		$\varnothing d_1$	$\varnothing d_2$	L		$\varnothing d_1$	$\varnothing d_2$	L
Sizes metric	22269	5	15	6	81759	15	35	7
	30288	5	16	7	90469	15	35	10
	48558	6	16	7	83677	16	26	7
	89122	7	16	7	81760	16	30	7
	81743	8	18	5	151687	16	30	10
	30144	8	22.15	7	81761	16	35	7
	9628	9.7	22	7	116747	17	28	6
	122472	10	19	7	81762	17	28	8
	134576	10	20	8	88962	17	30	7
	81744	10	22	7	81763	17	35	7
	81746	10	24	7	81764	17	35	8
	81745	10	25	7	151139	18	28	7
	81747	10	28	7	81765	18	30	7
	81748	12	22	7	81766	18	32	7
	81749	12	24	7	81767	18	35	7
	144404	12	25	6	151737	19	32	7
	81750	12	25	7	81768	20	30	7
	150214	12	26	7	116378	20	30	9
	81751	12	28	7	74938	20	32	6
	81752	12	28	8	81769	20	32	7
	81753	12	30	7	81770	20	35	7
	148902	13	25	6	81771	20	35	8
	117318	14	24	8	81772	20	40	7
	81754	14	30	7	150743	20	40	10
	84247	15	24	7	81773	20	47	7
	118349	15	24	9	90086	20	47	10
	81755	15	26	7	134161	21	32	5
	81756	15	30	7	81774	22	35	7
	81757	15	30	8	81775	22	40	7
	81758	15	32	7	81776	22	40	8

WEPO

**Sizes
metric**



Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ϕd_1	ϕd_2	L		ϕd_1	ϕd_2	L
81777	22	47	7	81810	38	62	8
134160	23	35	6	81811	40	52	8
117317	24	35	8	81812	40	55	7
152993	24	42	7	81813	40	55	8
152994	24	45	8	81814	40	55	10
81778	25	35	7	81815	40	60	8
81779	25	35	8	81816	40	60	10
117707	25	35	9	72896	40	62	8
81780	25	38	7	77755	40	62	9
81781	25	40	7	81817	40	62	10
75130	25	42	7	118041	40	67	7
81782	25	42	8	83693	42	55	7
81783	25	47	7	81818	42	55	8
83224	25	47	10	84123	42	58	7
81784	25	52	7	81819	42	60	8
84352	25	52	10	81820	42	60	10
7620	27	47	7	81821	42	62	8
153176	28	40	6	153812	43	60	10
81785	28	40	7	84124	45	58	7
124692	28	42	7	81822	45	60	8
90470	28	44	10	89104	45	62	7
81786	28	47	7	81824	45	62	8
81787	28	47	10	81825	45	62	10
81788	28	52	7	81826	45	65	8
81789	30	40	7	81827	45	65	10
151054	30	42	6	134920	45	72	8
81790	30	42	7	143701	45	72	10
81791	30	45	7	125296	47	65	10
81792	30	47	7	126052	48	62	8
93318	30	47	8	150599	48	62	10
81793	30	47	10	117874	48	65	8
81794	30	50	7	81828	48	65	10
81795	30	52	7	35384	48	68	10
81796	32	45	8	148665	48	72	10
81797	32	47	7	120671	48	72	12
81798	32	47	8	81829	50	62	8
81799	32	47	10	83806	50	65	8
81800	32	52	8	81830	50	65	10
125939	32	54	8	75333	50	68	8
153811	33	45	7	81831	50	70	8
120950	34	44	7	81832	50	70	10
83804	35	47	7	81833	50	72	8
81801	35	47	8	81834	50	72	10
81802	35	50	7	73119	50	75	10
81803	35	50	8	120670	50	78	12
81804	35	50	10	118043	50	80	7
89103	35	52	6	89341	52	68	8
83805	35	52	7	81835	52	72	8
81805	35	52	8	81836	55	70	8
81806	35	55	8	118720	55	70	10
81807	35	62	8	81837	55	72	8
83043	35	72	8	81838	55	72	10
85427	37	50	10	81839	55	80	8
81808	38	55	8	143700	55	80	10
81809	38	58	8	118044	55	90	7

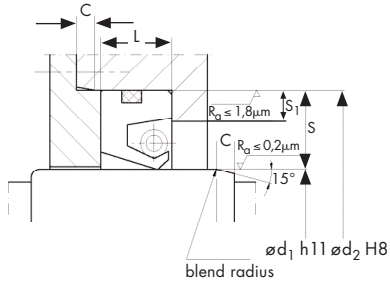
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**Sizes
metric**

Part No.	Dimensions in mm			Part No.	Dimensions in mm		
	ød ₁	ød ₂	L		ød ₁	ød ₂	L
116645	55	90	10	128112	105	130	8
120669	58	78	12	81866	105	130	12
110541	58	80	8	118019	110	128	9
134958	60	72	8	128136	110	130	8
84125	60	75	7	81867	110	130	12
81840	60	75	8	81868	110	140	12
157159	60	80	5	81869	110	140	13
151055	60	80	7	69697	115	140	12
81841	60	80	8	81870	115	150	12
81842	60	80	10	81871	120	140	12
150633	60	82	12	72793	120	140	13
81843	60	85	8	81872	120	150	12
151074	60	85	10	69471	125	150	12
118042	60	106	7	21322	125	150	15
81844	62	80	8	81873	125	160	12
81845	62	80	10	86050	130	150	15
122116	63	90	10	81874	130	160	12
81846	65	80	10	21323	130	160	15
81847	65	85	8	127956	130	170	15
69635	65	85	10	21324	135	170	15
81848	65	90	10	81875	140	165	10
83807	65	100	10	21325	140	170	15
115636	70	85	8	118766	150	180	12
151056	70	90	7	7641	150	180	14
157325	70	90	8	69741	150	180	15
74772	70	90	9	73140	155	190	15
81849	70	90	10	116524	156	190	15
81850	70	95	10	77130	160	190	15
81883	70	100	10	72792	170	200	15
81851	72	100	10	90430	175	205	15
81852	75	95	10	74767	180	210	15
81853	75	95	13	69742	200	230	15
81854	75	100	10	156832	220	250	10
81855	80	100	10	115741	220	250	15
81856	80	110	10	151771	250	280	16
118252	82	105	14	150368	250	280	18
121282	84	110	12	85467	260	300	20
81857	85	100	12				
81858	85	110	10				
123543	85	110	12				
81859	85	120	12				
87142	86	105	10				
126310	90	110	6				
81860	90	110	10				
26585	90	110	12				
90471	90	110	13				
127349	90	115	13				
81861	90	120	12				
81863	95	120	12				
48483	95	125	12				
69470	100	120	12				
118253	100	120	13				
81862	100	125	12				
81864	100	130	12				
81865	100	130	13				

WEPO

**Sizes
inch**

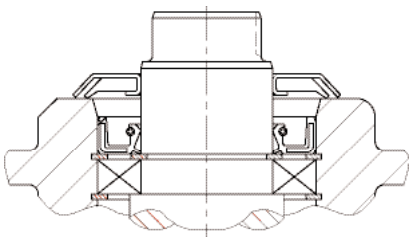
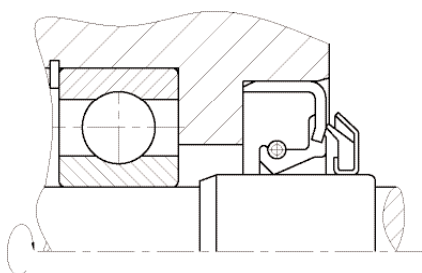
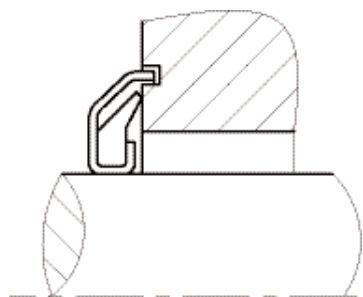
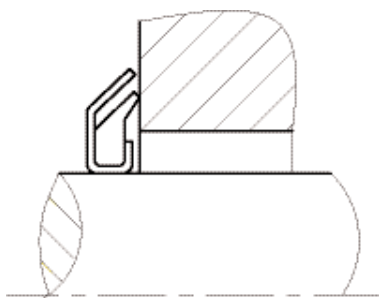
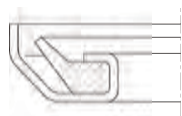


Part No.	Dimensions in mm			Dimensions in inch		
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_1$	$\varnothing d_2$	L
83988	12.7	28.57	7.93	0.5	1.125	0.312
125766	25.4	41.8	7.9	1	1.646	0.311
143776	28.5	41.2	6.5	1.122	1.622	0.256
95625	38.1	57.15	9.52	1.5	2.25	0.375
133117	41.27	60.32	7.93	1.625	2.375	0.312
133118	44.45	63.5	7.93	1.75	2.5	0.312
143775	47.6	66.6	8	1.874	2.622	0.315
130240	47.62	66.67	7.93	1.875	2.625	0.312
130241	76.2	95.25	9.52	3	3.75	0.375
69472	88.9	114.3	11.11	3.5	4.5	0.437
117162	114.3	133.35	11.11	4.5	5.25	0.437
69473	146.05	171.45	12.7	5.75	6.75	0.5





VRM 01/02



The VRM 01 and VRM 02 are axial seals consisting of two sections, one coated metal ring and one mould-vulcanised elastomer sealing element. The metal ring protects the elastomer seal against damage, serves as a stand and support for the elastomer seal and simultaneously acts as a flinger. The elastomer seal is not firmly bonded to but stretched over the metal ring and is additionally held by the axial flange.

With the VRM 02 the metal ring is extended in an axial direction on the outer sheath. Additional labyrinth sealing is created in combination with the circulating groove in the sliding surface.

Standard materials

Elastomer sealing element:
NBR 70 black, FPM 70 brown,
Other elastomer materials are
available on request.

Metal ring: deep-drawn, coated
steel 1.0204 (SAE 1008), galvanised,
also available in rust and acid-resistant
steel 1.4301 (SAE 304). For general
technical data and material properties,
see "Materials" (page 7).

Area of application

VRM axial seals are mainly used in combination with rotary shaft seals. They are applied as modular sealing elements affixed in series to seal against dirt, dust, grease and water spray from the outside. VRM axial seals have been successfully used in drive technology and mechanical engineering for many years, e.g. in electric engines, transmissions, pumps, power saws, prop shafts, wheel hubs and axles, agricultural machinery, construction machinery, machine tools, roller bearing housings and washing machines.

Function

The VRM axial seal fits tightly on the shaft (press fit) and must be installed at a precisely defined distance from the metal sliding surface to guarantee the defined axial prestress of the elastomer sealing element.

In rotation, the sealing lip rubs axially against the metal sliding surface at the contact pressure resulting from the selected prestress. The required sealing function is thus achieved. The total axial contact pressure results from the prestress in the installation housing, the geometry of the sealing

lip as well as the elasticity and tensile properties of the elastomer.

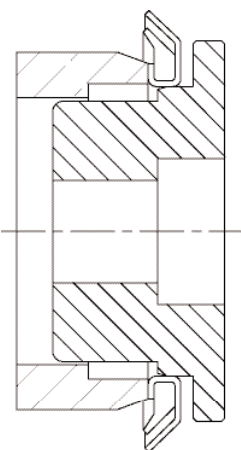
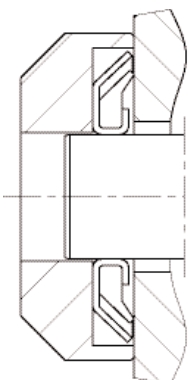
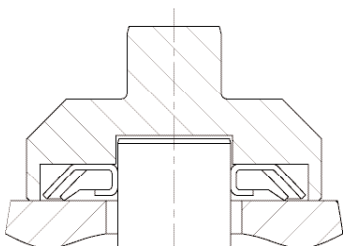
The VRM axial seal creates a centrifugal effect which contributes to the good sealing function. Dust, dirt and water spray from the outside are, for the most part, flung away.

With increasing peripheral speeds, the centrifugal force pushes the elastomer sealing element outwards which decreases the contact pressure. Above a certain peripheral speed the sealing lip lifts up from the metal sliding surface completely. The VRM axial seal then operates only as a gap ring and flinger.

The VRM 02 additionally functions as a labyrinth seal. To achieve this, the sliding surface must be provided with a groove in which the extended metal ring can run. The VRM 02 provides additional protection due to the labyrinth in the housing groove and is used for applications with very high demands.

Advantages of VRM axial seals

- simple sealing element with narrow installation width
- sealing against grease, dirt, dust and water spray
- additional sealing function due to the centrifugal action of the metal ring
- good in combination with rotary shaft seals
- low demands on the sliding surface with regard to the surface quality
- simple installation
- the metal ring protects the elastomer sealing element against damage
- the friction decreases with increasing peripheral speed as a result of centrifugal force
- good dynamic sealing action
- no additional axial stop required



Media

NBR: good chemical resistance to many mineral oils and greases
 FPM: mineral oils and greases, synthetic oils and greases, engine, transmission and ATF oils, fuels, aromatic and chlorinated hydrocarbons, broad chemicals and solvents resistance. Please also refer to our media resistance tables on page 22 of this catalogue.

Operational application limits

Peripheral speeds:
 NBR ≤ 12 m/s, FPM ≤ 12 m/s,
 Temperature:
 NBR -40°C to $+100^{\circ}\text{C}$
 FPM -30°C to $+180^{\circ}\text{C}$
 Pressure: designed for pressureless operation The above-mentioned operating parameters are maximum values and may not occur simultaneously. Each is dependent on the other operating parameters.

Sliding surface

The VRM axial seal runs against a sliding surface placed at right angles to the shaft, e.g. the flange cover or end wall of a bearing housing. The metal air side of a rotary shaft seal (type WB, WC) is often also used as a sliding surface. The demands on the sliding surface are lower than with rotary shaft seals.

The sliding surface should have a machine-finished surface with a surface quality of max. $R_a = 2 \mu\text{m}$ (adequate for many applications).

Prefabricated injection mould or moulded light-metal alloy parts as well as reshaped sheet steel can also function as sliding surfaces without additional treatment. These should, however, not have any surface abnormalities or faults such as sharp edges, burrs, cavities, corrugation, elevations or damage.

Shaft

The shaft should be produced with a tolerance acc. to ISO h9 (or the standard tolerance for roller bearings acc. to ISO g6 or n6) to guarantee the required press fit and good, secure positioning on the shaft. No further axial fixing is necessary.

To achieve the correct prestress of the elastomer seal when installing, it may be advisable to use an axial stop in the form of a shaft shoulder or a retaining ring.

The surface roughness of the shaft should not exceed $R_a = 4 \mu\text{m}$. The shaft should be provided with a $10\text{-}20^{\circ}$ chamfer to facilitate installation. Sharp edges and burrs should be avoided, i.e. the transition should be polished. The sliding surface of the sealing lip should not be above $R_a = 2 \mu\text{m}$.

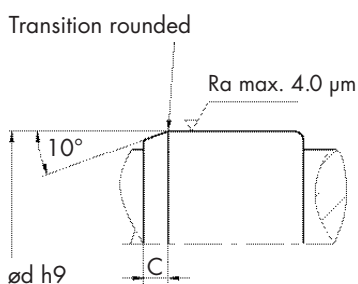
In comparison to other rotary seals VRM axial seals are relatively insensitive to eccentricity, shaft imbalance and skew of the shaft.

Installation

The VRM axial seal is simple to install. The elastomer sealing element should be greased before installation to improve the dynamic friction coefficient and thus to ensure a longer lifespan (preventing excessive wear due to abrasion). This also avoids adhesion after a longer standstill period.

The VRM should be pressed into the correct installation position with the aid of an appropriate installation tool and applying even pressure. To avoid damage, the use of a hammer for installation is not permissible. If there is no provision for an axial stop, the installation tool must be appropriately constructed so that the axial prestress is maintained according to the requirements.

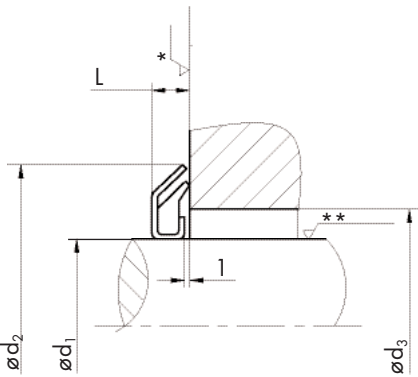
The sealing lip must under no circumstances be damaged or deformed while in storage.



VRM 01

Part No.	Dimensions in mm			
	$\varnothing d_1$	$\varnothing d_2$	L	$\varnothing d_3$
126576	10	24	3,5	15
45826	11	26	3,5	17
58846	12	26	3,5	17
126577	14	30	4	21
126578	15	30	4	21
126579	16	32	4	23
58850	17	32	4	23
126580	18	33	4	24
126581	20	35	4	26
58853	22	40	4	31
126582	24	40	4	31
126583	25	40	4	31
58856	26	40	4	31
126584	28	43	4	34
126585	30	47	4.5	37
126586	32	49	4.5	39
126587	35	52	4.5	42
126588	38	55	4.5	45
126589	40	57	4.5	47
58863	41	57	4.5	48
58864	42	59	4.5	49
126590	45	62	4.5	52
58866	48	65	4.5	55
126591	50	70	5.5	58
126592	52	72	5.5	60
126593	55	75	5.5	63
126594	58	78	5.5	66
126770	60	80	5.5	68
126595	62	82	5.5	70
126596	65	85	5.5	73
58874	68	88	5.5	76
126771	70	90	5.5	78
58876	72	92	5.5	80
126597	75	95	5.5	83
126598	78	98	5.5	86
126599	80	100	5.5	88
126600	85	105	5.5	93
126601	90	110	5.5	98
126602	95	115	5.5	103
126603	100	120	5.5	108
126604	105	125	5.5	113
58885	135	159	6.5	145

Sizes metric

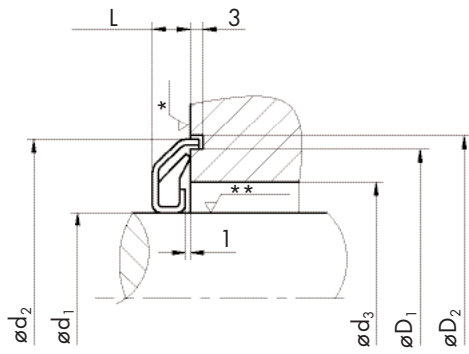


* R_a max. 2.0
 ** R_a max. 4.0

VRM 02

Part No. Dimensions in mm
 $\varnothing d_1$ $\varnothing d_2$ L $\varnothing d_3$ $\varnothing D_1$ $\varnothing D_2$

Sizes metric



* R_a max. 2.0

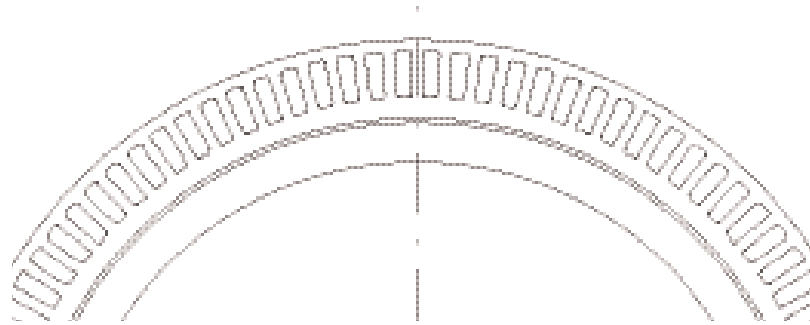
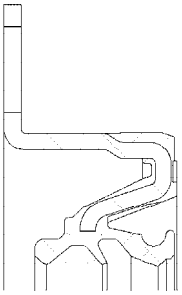
** R_a max. 4.0

126605	15	32	4	21	29	34
58888	17	34	4	23	31	36
58889	20	37	4	26	34	39
58890	25	42	4	31	39	44
126606	30	48	4.5	37	45	50
126607	35	53	4.5	42	50	55
126608	40	58	4.5	47	55	60
126609	45	63	4.5	52	60	65
126610	50	72	5.5	58	68.5	74
126611	55	77	5.5	63	73.5	79
126612	60	82	5.5	68	78.5	84
126613	65	87	5.5	73	83.5	89
126614	70	92	5.5	78	88.5	94
58900	75	97	5.5	83	93.5	99
126615	80	102	5.5	88	98.5	104
58902	85	107	5.5	93	103.5	109
58903	90	112	5.5	98	108.5	114
58904	95	117	5.5	103	113.5	119
126616	100	122	5.5	108	118.5	124

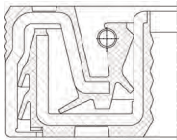


Special models

Any special model required can be manufactured according to the customer's specifications or developed by our engineering department according to the customer's requirements and made ready for production.



Example: Rotary shaft seal with an incremental wheel sensor function



Cassette seals

At Dichtomatik, cassette seals are special models that are available on request only.

Areas of application

Cassette seals are highly rigid and robust sealing systems. They are employed for very heavy duty use and in dirty environments, e.g. commercial vehicles, materials handling equipment, and agricultural, forestry and construction machinery.

Frequent uses:

Hubs, prop shafts, wheel bearings, drive shafts, axles.

Function

Cassette seals are fully encapsulated and on the inside they form a grease-filled labyrinth with several sealing and dirt lips (radial and axial). The main sealing lip is spring-energised. In this way the penetration of dirt, mud, water and dust is effectively prevented. The grease filling reduces wear, increases service life and thereby extends maintenance intervals for heavy-duty applications. The cassette seals also contain a fully pre-treated sealing contact surface. This means that the shaft does not have to be specially hardened and grounded. Additional dirt seals are not required either.

Media

Cassette seals are designed for the sealing of grease and oil on the machine elements named above.

NBR 70 – good chemical resistance to numerous mineral oils and grease.

FPM 80 – mineral oils and greases, synthetic oils and greases, engine, gear and ATF oils, fuels, aromatic and chlorinated hydrocarbons, broad chemicals and solvents resistance.

Installation

Dichtomatik's cassette seals are self-contained sealing systems that guarantee simple installation thanks to the integrated contact surface.

