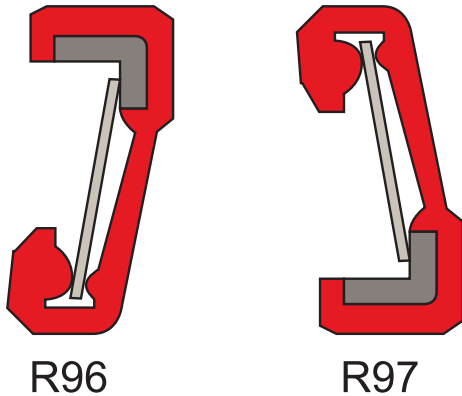


axial seal R96 & R97

seal spec



description

axial shaft seals are used primarily as a protective seal for roller bearings. their sizes are matched to those of roller bearings. if fluids are to be prevented from escaping, a design with an internal seal lip, is to be preferred.

the design with external sealing lip is suitable for sealing grease and for protection against dirt entering from the outside.

in both types of construction the elastomer seal lip is axially spring-loaded against the opposite mating face by a spider spring. the linear compressive force is lower than with an oil seal (about one third), but constant in operation. there is no reduction in contact force due to thermal expansion as with oil seals, and the larger diameter of the sliding seal edge has an unessential influence on the friction effect.

application



general

axial shaft seals are ready-to-install seal elements for sealing shafts, axles and bearings.

the axial shaft seal consists of an elastomer-elastic membrane with a vulcanised metallic reinforcement ring. the membrane has an axial sealing lip. the sealing lip is designed in a conical form to obtain a minimum contact area, thus considerably reducing friction, heat and wear. the sturdy form ensures a proper fit with the shaft or housing. a metallic spider spring is used to energize the seal lip (figure 1a).

characteristics

axial shaft seals have axial spring load against the mating surface. the seal requires very little mounting space and can be effectively used where space is limited.

method of operation

the sealing lip is pressed axially against the mating surface which must be perpendicular to the axis of the shaft. the seal membrane and the spider spring pressing against the back of the sealing lip ensure a uniform and vibration-free contact pressure.

the centrifugal force of fluid accelerated by the shaft reinforces the sealing effect.

static sealing against the shaft (R97) or in the housing bore (R96) is ensured by interference fit with the shaft or housing.

advantages

- low friction, minimum heat generation
- no shaft wear
- minimum installation space requirement
- simple installation
- high heat resistance
- high sliding speed
- suitable for a wide range of roller bearing series
- long service life

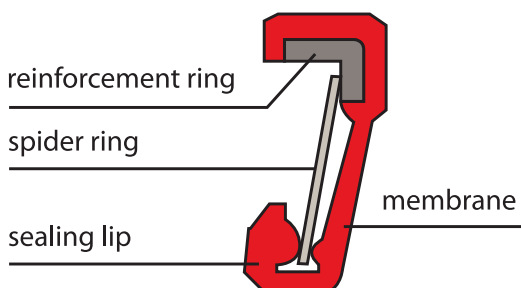


figure 1a. axial shaft seal



standard versions

R96

axial shaft seal with internal sealing lip, primarily for sealing of fluids (figure 1).

the seal is generally pressfitted in the housing with the sealing lip against the rotating shaft. the seal should always be installed so that the sealing lip is flushed by the fluid. dry running must be avoided.

the limits for speed, pressure and contact force of the sealing lip can be found in dimension table.

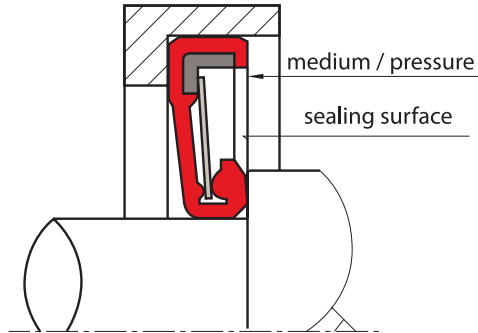


figure 1. R96 internal sealing

R97

axial shaft seal with external sealing lip for sealing against grease (figure 2).

at low speeds and with a very good, preferably ground or lapped contact surface, it can also be used for sealing against fluids.

the limits for speed, pressure and contact force of the sealing lip can be found in dimension table.

for fluid sealing, the maximum permissible speed is reduced to one-third of the value shown in the tables.

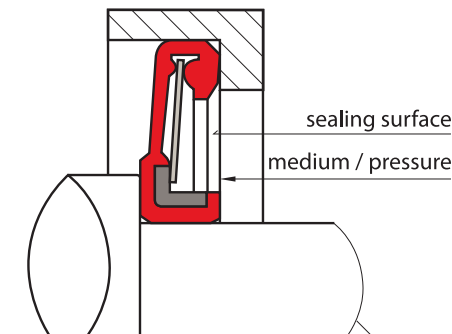


figure 2. R97 external sealing

applications

fields of application

axial shaft seals are used for sealing shafts, axles and bearings. their function is to prevent the ingress of dust, dirt, splash water, etc., and to prevent the escape of fluid or lubricant from the sealed chamber.

the fields of application of the individual types differ widely and are predominantly dependent on the type of lubricant and the operating conditions.

technical data

operating pressure : pressureless

speed : up to 30 m/s, depending on type and elastomer material

temperature : -30°C to +250°C, depending on elastomer material see table 1.

we offer special materials down to -40°C on request.

media:

mineral and synthetic oils and greases, water, hydrocarbons, acids, lyes, etc. (depending on elastomer material).

peripheral speed and rotational speed

to maintain acceptable heat generation and wear of the sealing lip, the peripheral speed must be limited according to the elastomer grade used.

the peripheral speed at the sealing lip must not exceed the following values:

R96	with s-mart NBR	22 m/s	R97	with s-mart NBR	10 m/s
	with s-mart FKM	30 m/s		with s-mart FKM	15 m/s



these values apply with adequate lubrication and heat dissipation at the seal surface. if these conditions are not satisfied, the above limits must be reduced according to the application.
figure 3 shows the maximum speed n as a function of the average sealing lip diameter d_m for the elastomer material acrylonitrile butadiene elastomer (NBR).

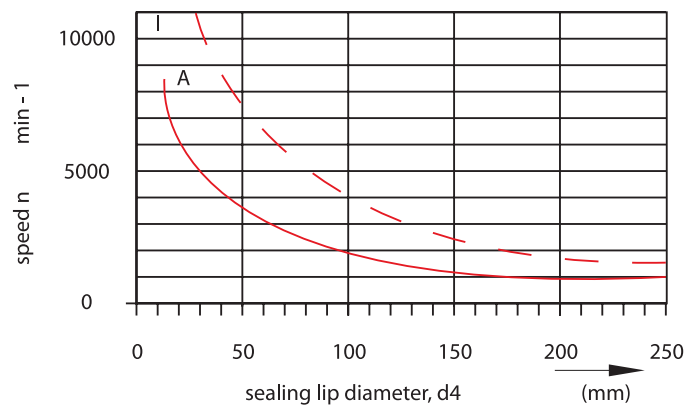


figure 3. Maximum revolutions n as a function of sealing lip diameter d_4

materials

table 1 shows the available standard materials. materials for elastomer and metal parts are selected according to the requirements for temperature and fluid resistance.

table 1 materials

	standard Materials
elastomers membrane and sealing lip	acrylonitrile butadiene elastomer (s-mart NBR) 75 shore A colour: black/anthracite temperature range: - 30 °C to + 120 °C
	fluoroelastomer (s-mart FKM) 75 shore A colour: anthracite (identification mark: yellow dot) temperature range: - 25° C to + 250° C
metal parts reinforcement ring + spider spring	reinforcement ring: steel 1.0338/st 14.03 star-type spring: spring steel 1.0605/C75

special materials are available on request.

design instructions

the design of the sealing area should be made according to the information on the individual types given in figure 1 and 2.
suitable mating faces for the sealing lip can be achieved in various ways, f.i. by using the hardened end face of a roller bearing. the bearing must not have identification marks on the side used as a mating face. other design possibilities are shaft collars, back-up washers, etc.
the mating face can be of steel, brass, bronze, aluminium alloys and ceramic materials. the mating surface must be clean and smooth without spiral grooves or scratches. recommended surface hardness for steel is HRC > 40, for other materials lower hardness can be employed.

surface roughnesses:

contact surface : with oil lubrication $R_{max} < 2.5 \mu m$ ($R_a \ 1.0 \mu m$, $R_z < 1.6 \mu m$)
with grease lubrication $R_{max} < 6.3 \mu m$ ($R_a \ 2.5 \mu m$, $R_z < 4.0 \mu m$)
radial runout of the shaft has very little influence on seal efficiency.
the axial runout - at the maximum permissible rotational speed - must not exceed 0.03 mm when sealing against oil and 0.05 mm when sealing against grease.

installation recommendation

before installation of the seal, the sealing surface should be cleaned and greased lightly to minimize wear during the run-in phase.
installation is, in most cases, performed "blind", i.e. uniform contact between the sealing lip and the mating face cannot be checked visually. during installation the sealing lip must not be damaged or deformed, and the seal must be installed parallel to the mating face. this is best ensured if the seal is installed against a seat in the housing with an assembly tool (figure 4).
optimal seal performance is obtained when the seal or mating face is positioned in line with the front end of the seal.

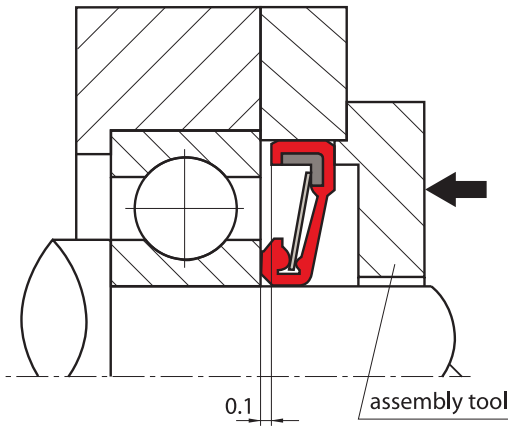


figure 4. installation of the axial shaft seal using an assembly tool.

seal & housing recommendations, type R96, internal sealing, for oil and grease

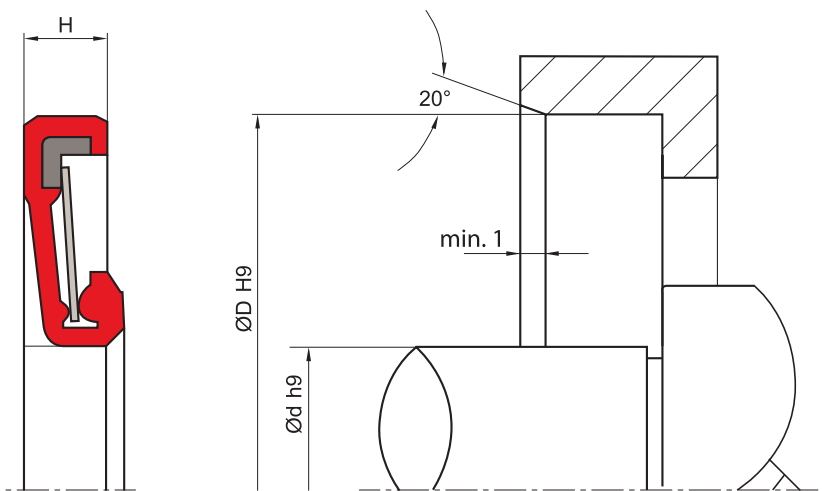


figure 5 installation drawing

seal & housing recommendations, type R97, external sealing, for grease only

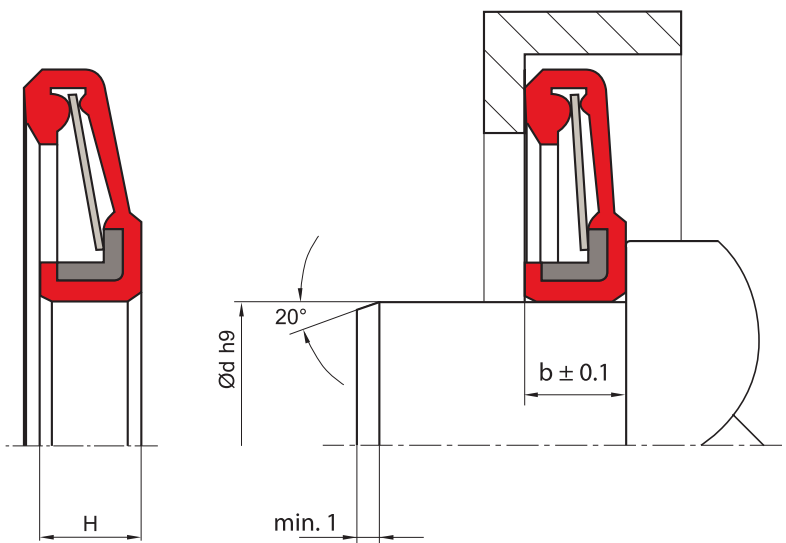


figure 6 Installation drawing