

ERIKS Shaft Seals

Sealing Elements



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Shaft Seals

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1. Technical description

VR Radial lip seals for rotating shafts:

VR seals are specially designed to resist higher pressures than a classic oil seal. They are used with shaft velocities of maximum 40 m/s.

Advantages:

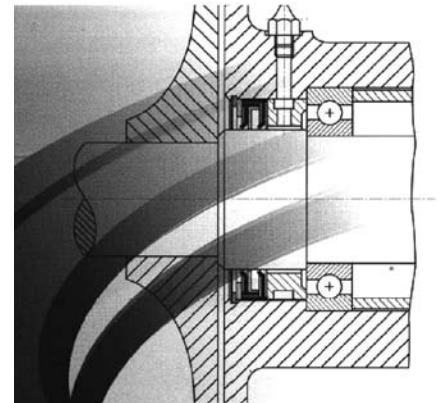
- Secure sealing on unpaved and stainless steel shafts
- No traces of damage on the surface
- No need for treatment of the shaft surface (coat, temper, nitrate, ...), nor the use of extra sleeves
- Thanks to the tangential and radial tension on the lip seal, no pump effect is provided.
- Low friction coefficient, low friction losses
- Longer duration of life

The sealing mechanism of VR seals

The operating principle of the VR radial lip seals without spring, is that a rubber diaphragm over a steel back-up ring or a back-up ring made of another material is stretched, whereby the amount of tension is controlled scrupulously careful. The sealing lip is placed in a certain angle with respect to the diaphragm and can both be pointed inwards and outwards, depending on the direction of the assembly and the direction where the pressure will work on the seal.

The seal is obtained by the tangential and radial pre-stressed diaphragm. This provides a tight spring between the membrane and the lip seal. In addition, the tangential and radial forces of the lip seal neutralize the tear forces, which arise as a result of the rotation of the shaft. Vibrations and random static and dynamic eccentricities are nullified directly in the surroundings of the locking lips. The partial neutralization of the lip seal during the rotation of the shaft, and the belonging pump effect, is seldom occurred with the use of this type of seal.

Different comparative measurements have proved that the radial forces, required for a VR seal ring, is only 1/3rd to 1/4th of the radial force compared to the requirements of a spiral seal with a spring, to become the same sealing degree. Consequently it is possible to use this type of seal on unpaved and stainless shafts, without leaving any traces or grooves on the shaft. Even after 1000 hours of service, there are only some polish traces perceptible on the shaft.

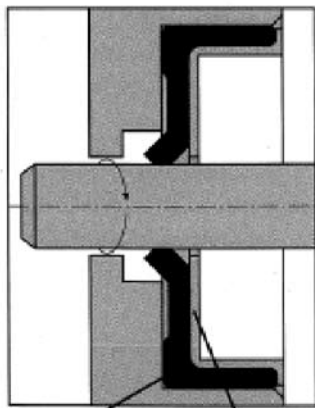


1. Technical description

VR-RWDR

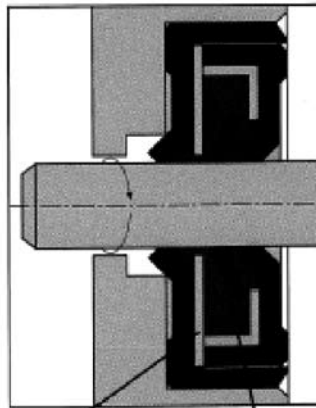
- Radial shaft seal ring with prestretched diaphragm
- Shaft velocity to 40m/s
- Pressure range (vacuum) to 1,5 MPa
- Temperature range: -50°C / +300°C
- Deviation: <0,4 mm
- Uncoated shafts
- Stainless steel shafts
- Unsharpened shafts
- Low friction losses
- Long duration of life

Single lip seal



Diaphragm Support ring

Double lip seal



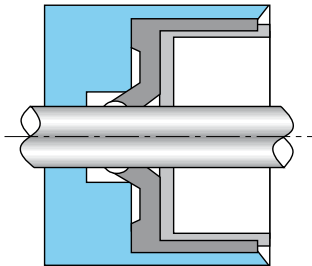
Support ring Oil chamber

2. Table of properties

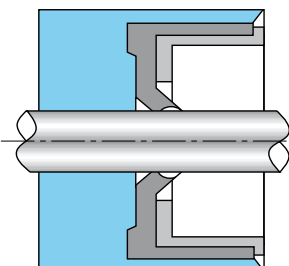
Material 75 +- 5° Shore A	Color	Temperature at the seal	Properties	VR. nr
NBR (Nitrile)	Black	-20°C / +100°C	<p>NBR (Perbunan) An acrylonitril-butadiene polymer which is excellent resistant against swelling in solvents based on aliphatic hydrocarbons, standard benzenes and mineral oils. The resistance against swelling depends on the quantity of acrylonitril. Wide temperature range: 120°C. Resistance against aging; low reformation under pressure. Applications: benzene, mineral oil, diluted acid and alkaline bases. Not applicable with: aromatics, chloral hydrocarbons, ketenes, esters and ether and brake fluids on a glycol base.</p>	1
FPM	Green	-30°C / +220°C	<p>FPM (Viton) Fluorocarbon Rubber Very good resistance against chemicals and temperatures. Thermal resistance against temperatures to 250°C. Applications: Oils, hydraulic fluids with low inflammability, fuels (premium benzene), aromatics, chloral hydrocarbons, concentrated acids and alkaline bases. Not applicable with: amines an fluid ammoniac, ketenes, esters, alcohols with a short chain.</p>	2
FPM/L	Anthracite	-30°C / +220°C	<p>FPM-Peroxide Idem (2), but can also be used in hot steam, hot water, alcohols and mineral oils. Excellent chemical resistance.</p>	9
FPM/P Peroxide	Grey	-30°C / +250°C	<p>FPM-PTFE Idem (2): fluoric rubber, with a PTFE insert. Low friction coefficient.</p>	7
FPM/T	White	-30°C / +220°C FDA	<p>VMQ (Silicone Rubber) Excellent thermal resistance. Can be used in dry heat to 280°C with long duration of life; stable in mineral oils to 150°C. Very ozone and oxygen resistant; no hardness in hypoid lubricants. Applicable for food.</p>	8
VMQ	Red	-50°C / +300°C FDA	<p>HNBR (Therban/HSN) Very good resistance against hot water and hot steam; also oil and high temperature resistant. Applications: benzene, diesel, oils with many additives, cooling water, acids and alkaline bases. Not applicable with: Benzene, mineral oils, aromatics, chloral hydrocarbons.</p>	6
HNBR Peroxide	Brown	-30°C / +150°C FDA	<p>EPDM (Ethylene-Propylene) Very resistant against aging, very strong. Applications: hot water, hot stem (200°C); ketenes, esters, acids, hydraulic fluids and brake fluids on a glycol base. Silicon based lubricants. Not applicable with: Benzene, mineral oils, aromatics, chloral hydrocarbons.</p>	5
EPDM Peroxide	Blue	-40°C / +80°C	<p>Like (1), (2), (5), with insert of graphite in the basis/matrix material. Application: Where lubrication is permitted (water, benzene, mineral oils, foods, etc). Extremely low friction coefficient, low moment loss thanks to an integrated lubrication.</p>	3
NBR-C	Anthracite	-25°C / 100°C		C1
HNBR-C	Anthracite	-40°C / +150°C		C2
FPM-C	Anthracite	-30°C / +220°C		C3

3. Lip configurations

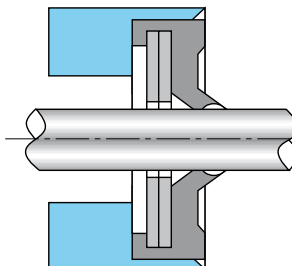
OOA



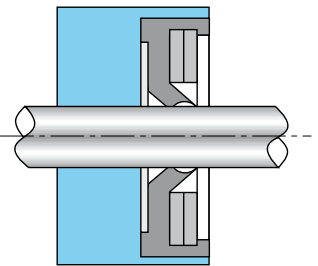
OOB



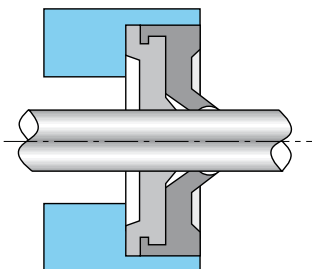
DOA



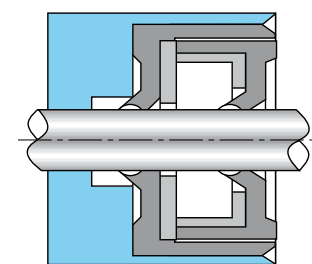
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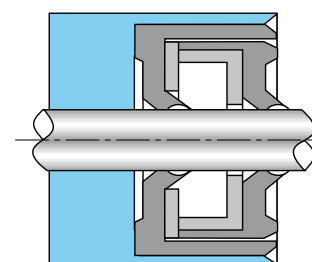
SOA



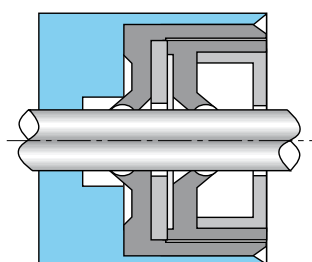
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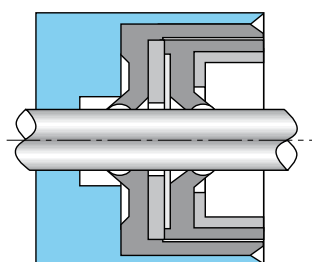
OBC



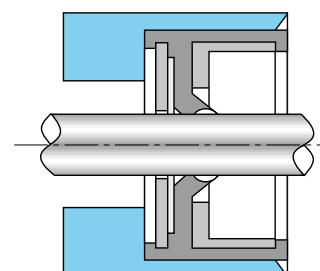
MAC



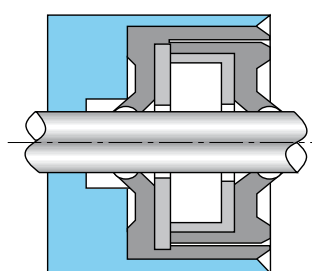
MSC



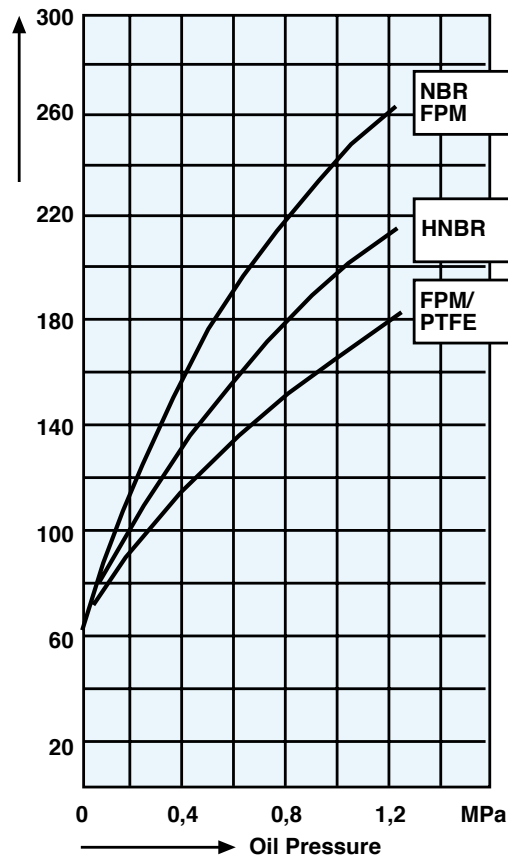
BSB



OAC



Tangential friction force/per meter circumference (N/m)



4. Materials of the support rings**Normal:**

- Carbon steel according to DIN 1624
- Stainless steel, material nr 1.4301 (AISI 304)

Special types:

- Aluminum
- Brass
- Stainless steel, material nr 1.4571 (AISI 316Ti)

