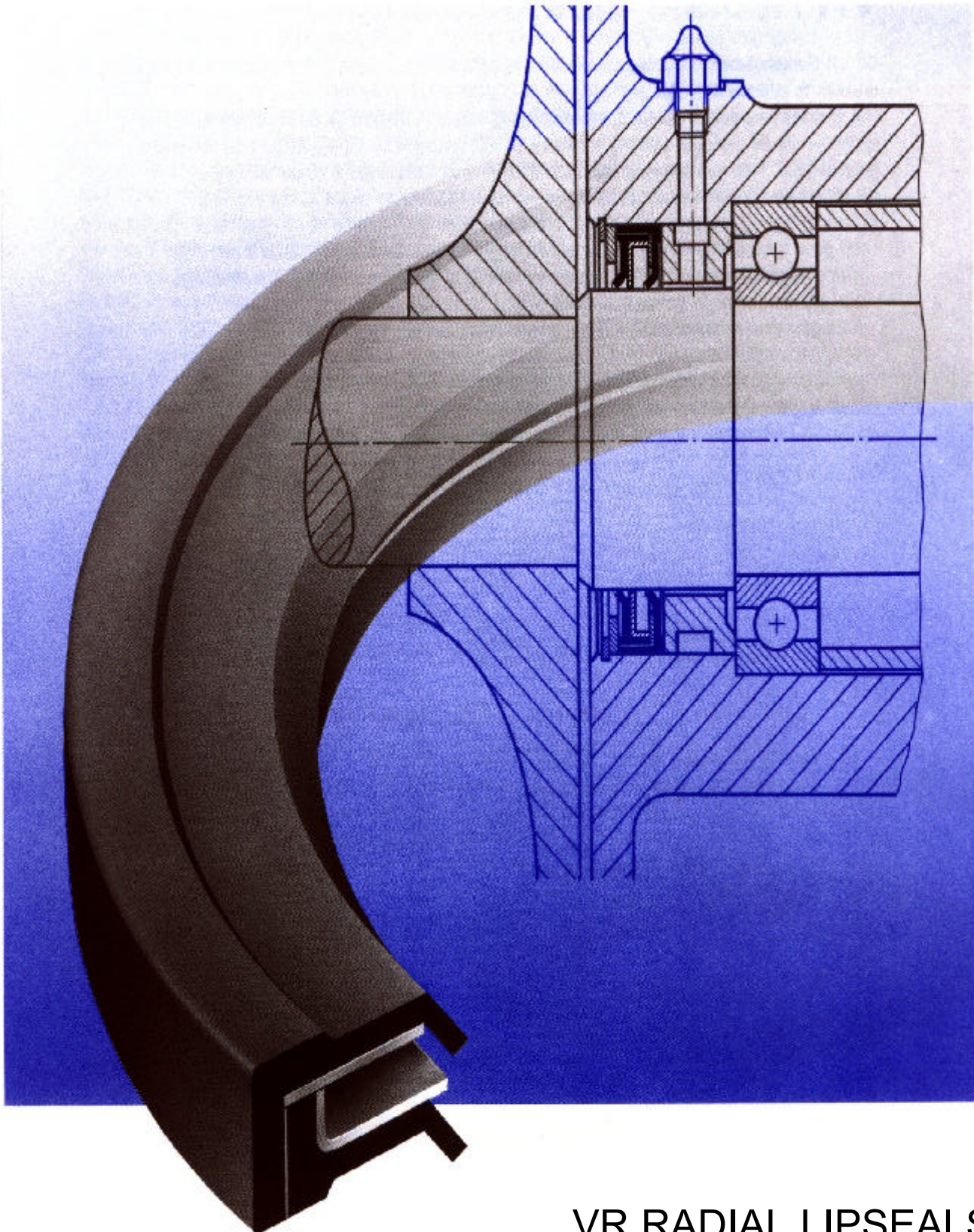




## VR DICHTUNGEN



## VR RADIAL LIPSEALS



## **VR DICHTUNGEN**



## **VR DICHTUNGEN**

### **VR RADIAL LIPSEALS WITH PRE-TENSIONED DIAPHRAGMS**

#### **VR LIPSEALS - SAFE SEALING**

# Rotational speed	0 up to 40 m/sec*
# Pressure	vacuum up to 150 bar*
# Temperature range	-50EC up to +300EC*
# True running deviation	up to 0,4 mm*

\* These data not at the same time

#### **VR LIPSEALS - SAFE SEALING**

**On unhardened shafts  
Even on stainless steel shafts**

#### **VR LIPSEALS - SAFE SEALING**

**Low friction losses**

break away	F0 . 0,4
sliding	F . 0,2

**Highest working life**

**Easy handling**



# VR DICHTUNGEN

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## VR DICHTUNGEN

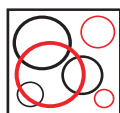
### YOUR RELIABLE PARTNER

Ever since the foundation of the company in Latvia in 1921, honesty and good salesmanship have always been keywords for A/S Gunnar Haagensen. Already in the twenties Gunnar Haagensen drew widespread activity from the company in Riga, but with the establishment of A/S Gunnar Haagensen in Denmark in the nineteen forties, the company developed the concept which has made its mark on it for three generations. A healthy instinct to combine good trade with a stable development, has enabled the company to meet the demands of time and to present itself today as a modern, dynamic supplier with a devoted and competent

staff. The present premises of the company were inaugurated in 1985 and expanded in 1990 to the present 1.200 square metres, housing management, administration and warehouse. A/S Gunnar Haagensen is specializing in gaskets and numerous technical articles and supplies to a large percentage of the machine, hydraulic, and process industry.

Due to the large storage capacity where we stock almost 21.000 item numbers, we are able to supply most orders, on a day to day basis. The company keeps in close contact with the market and keeps a continuous renewal programme running. The basic principle is still the same as when Gunnar Haagensen set

the course many years ago: The customer is the main target for our activities, and A/S Gunnar Haagensen will go a long way to get the right item at the right time and at the right price.



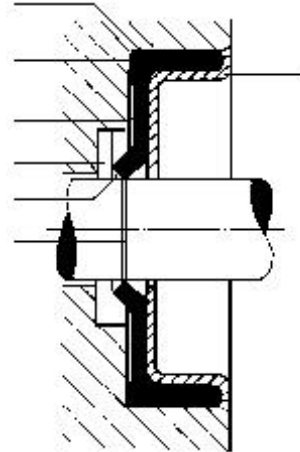
**A/S Gunnar Haagensen**  
ARTIKLER- FOR MASKIN-, HYDRAULIK- OG PROCESINDUSTRIEN



## VR DICHTUNGEN

### NAMEGIVING

Outside membrane  
Distance shoulder  
Diaphragm  
Free space for outward Turned Seal-lip  
Dynamic sealing line



Sealsupport cap

Static sealing surface

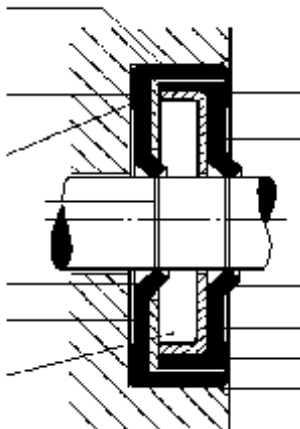
### Single-Lip Seal

Upper outside membrane

Distance shoulder

Membrane  
Dynamic Sealing line

Inwards turned inner membrane  
Seal support disk  
Grease chamber



Under outside membrane  
Inner membrane

Seal-lip outwards  
Seal support cap  
Distance shoulder  
Outside Static seal surface

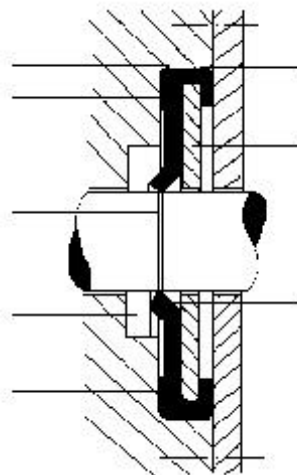
### Twin-Lip Seal

Outside membrane  
Distance shoulder

Dynamic Sealing line

Free rotation space for seallip

Membrane



Static Seal surface

Seal support pressure disc

Seal-lip turned outwards

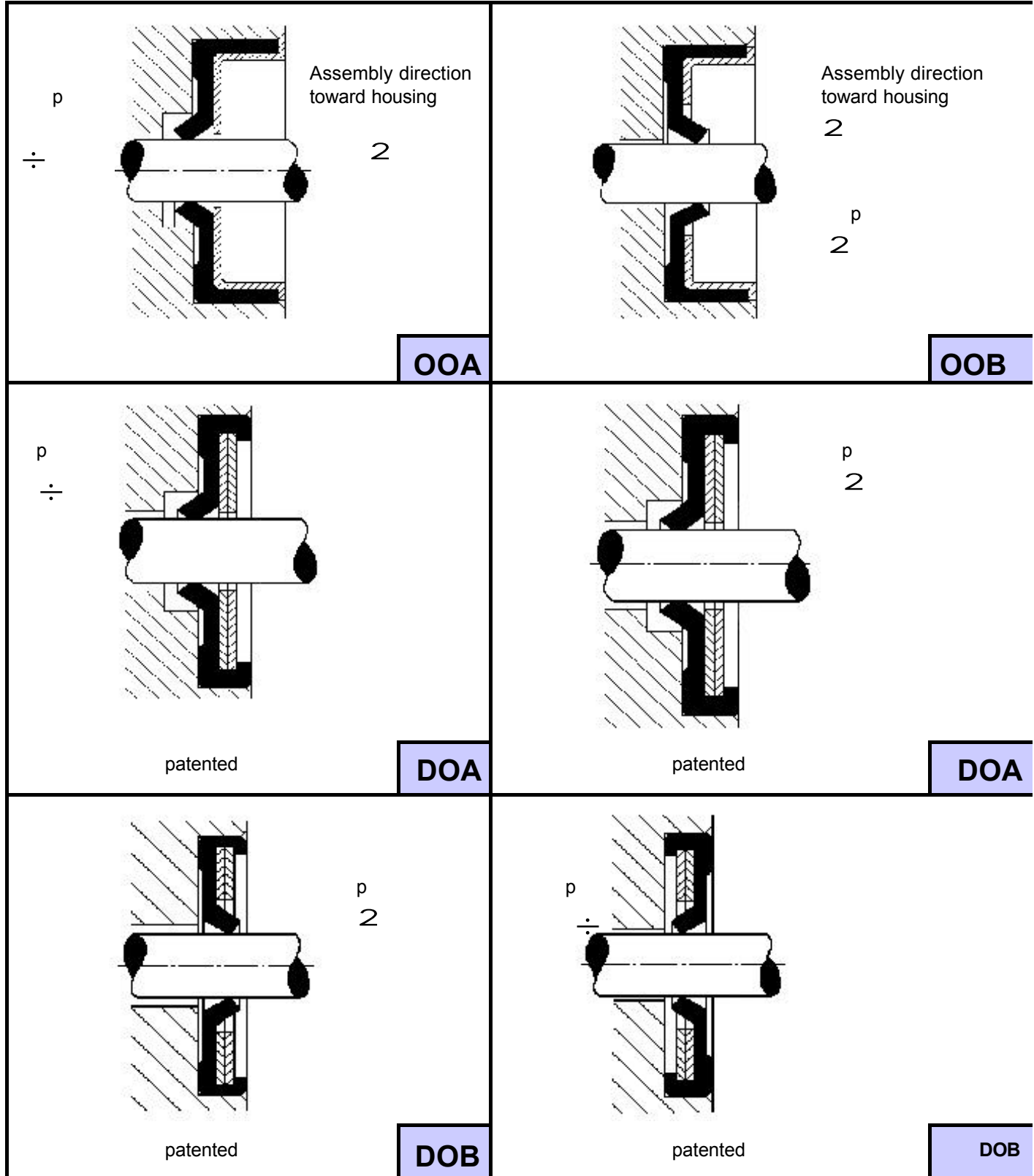
### Single-Lip Seal narrow type



# VR DICHTUNGEN

## SINGLE-LIPSEAL TYPES

The shown assembly directions are to be followed. The seal should not be mounted the other way around.

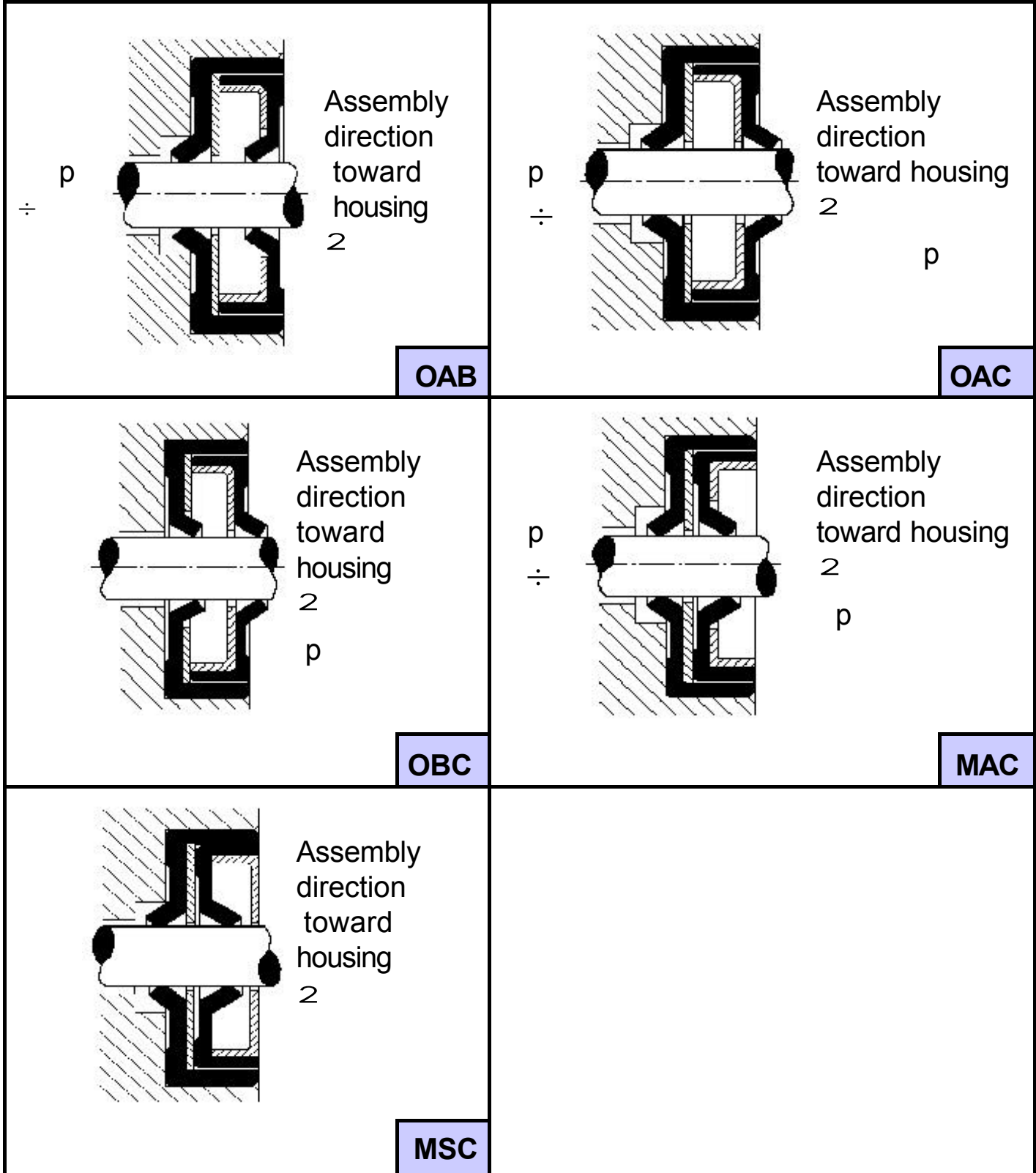




## VR DICHTUNGEN

### TWIN-LIPSEAL TYPES

The shown assembly directions are to be followed. The seal should not be mounted the other way around.

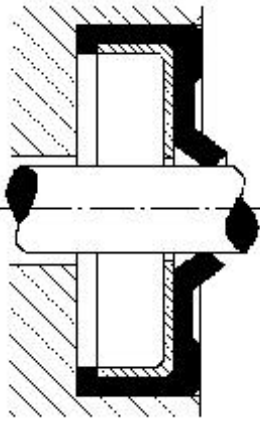
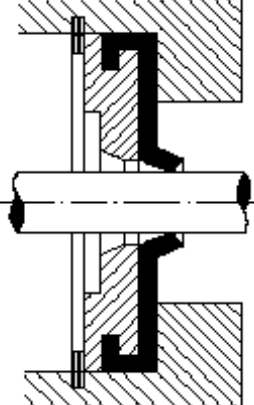
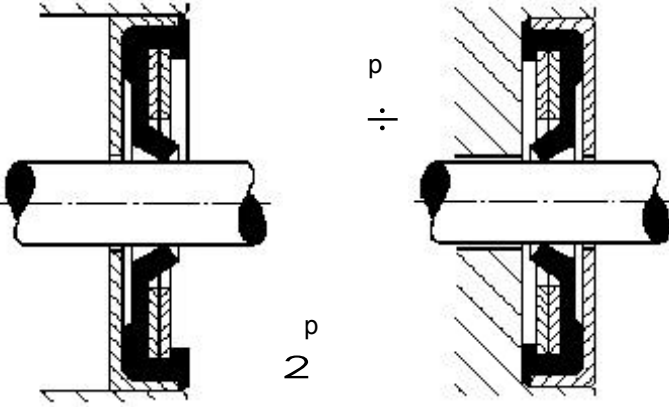
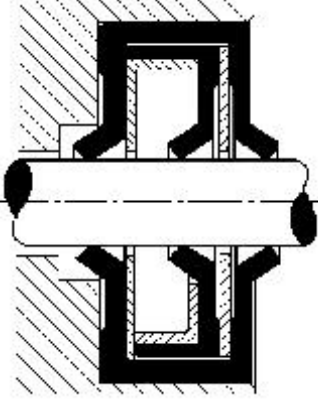
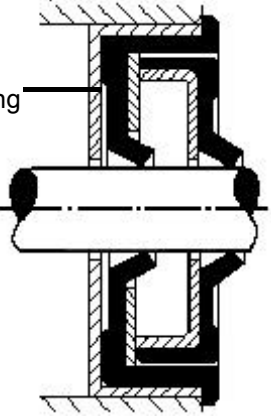
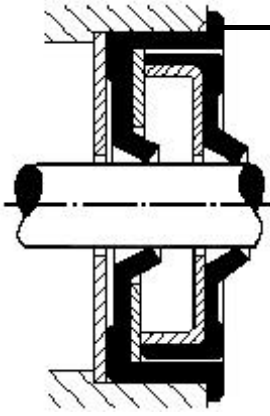






# VR DICHTUNGEN

## SPECIAL LIPSEAL TYPES - on request

 <p style="text-align: right;"><math>\frac{p}{2}</math></p>	 <p style="text-align: right;"><math>\frac{p}{2}</math></p> <p style="text-align: center;">patented</p>
<p>Kitchenmachines and Electric motor-seal</p>	<p>Seal for high pressure</p>
 <p style="text-align: right;"><math>\frac{p}{2}</math></p>	 <p style="text-align: right;"><math>\frac{p}{2}</math></p> <p style="text-align: right;"><math>\frac{p}{2}</math></p>
<p>Seal for tunnel assembly</p>	<p>Seal for pulsating pressure</p>
 <p style="text-align: right;"><math>\frac{p}{2}</math></p> <p>steel casing</p>	 <p style="text-align: right;"><math>\frac{p}{2}</math></p> <p>elastomer outside</p>
<p>Waterpump seal</p>	<p>Waterpump seal</p>



## VR DICHTUNGEN

### VR ELASTOMER MATERIALS

ELASTOMER 75 ± 5 SHORE A	COLOUR	TEMPERATURE RANGE IN ° CELSIUS	NOTES	VR CODE
<b>NBR</b> nitrile	Black	-20E tot +100E C food approved	A Butadien-Acrylnitrile-Mengpolymer with excellent swellresistance against solvents based on aliphatic hydrocarbons, normal petrol and mineral oils. Excellent aging resistance, only smaal pressure deformation. <i>To be used for:</i> petrol, mineral oils, domestic fuel, diluted acids and lye. <i>Not to be used for:</i> aromats, chlorated hydrocarbons, ketons, esters and ether, as well as brake fluids based on glycol.	-1
<b>FPM</b> viton	Green	-30E tot +220E C not for food	Excellent chemical- and temperature resistance. For thermic use up to 220° C. <i>To be used for:</i> oil, difficult flameable hydraulic fluids, petrols (superbenzin), aromats, chlorated hydrocarbons, concentrated acids and lyes. <i>Not to be used for:</i> amines and liwuid ammonia, ketons, esters, short alcohol strings and short carbonacid strings.	-2
<del><b>FPM L *</b> viton for food US Norm</del>	Grey-black	DISCONTINUED, see codes -5 or -8		<del>-9</del>
<b>FPM P *</b> viton peroxyde	Grey	-30E tot +250E C FDA approved	Equal to FPM (-2), also used for steam and hot water. Higher chemical resistance against most materials.	-7
<b>FPM T *</b> viton met PTFE	White	-30E tot +220E C FDA approved	Chemical resistance equal to FPM (-2), however with PTFE compound for a lower friction.	-8
<b>VMQ</b> silicone	Red	-50E tot +300E C FDA approved	Excellent temperature resistance. <i>To be used for:</i> dry heat, temperature up to 250° C. Resistant for mineral oils up to 150° C. Excellent resistance against oxygen and ozon. No hardening in hypoid oils.	-6
<b>THERBAN</b> HNBR	Brown	-30E tot +150E C FDA approved	Excellent resistance at hot water and steam. Oilresistant also at high temperatures. <i>Te be used for:</i> petrol, so called sauer gass, high legated oils, cooling water, glycol, acids and lyes. <i>Not to be used for:</i> aromats, chlorated hydrocarbons, ketons, esters and ether, as well as brake fluids, some <b>synthetic</b> proportions.	-5
<b>EPDM</b> ethylen-propylen	Blue	-40E tot +180E C	Use only <b>silicon based</b> greases. Very excellent aging resistance, high abrasiv resistance. <i>To be used for:</i> hot water, steam 200° C max., ketons, esters, acids, basen, hydraulic- and brake fluids at glycol basis. <i>Not to be used for:</i> petrol, mineral oils, aromats and chlorated hydrocarbons.	-3

\* Special materials with extended delivery times

- P Temperature range is for temperatur at the Seal Lip, so medium temperature plus friction.
- P Supports in steel or stainless steel are standard, in brass or aluminium, or other materials on request.
- P EPDM. Use only silicon based greases.
- P Therban (HNBR). Do not use synthetic oils or greases, only mineral contents, unless they are tested first.

STANDARD SEAL SUPPORTS	VR CODE	SPECIAL SEAL SUPPORTS	VR CODE
Steel DIN 1624 Stainless Steel/anti magnetic steel 1.4301	- . 1 of - . 2 - . 3 of - . 4	aluminium brass acid resistant stainless steel 1.4571	- . 5 - . 6



## SPECIFICATIONS THERBAN, FPM-P AND FPM-T

### THEBAN (HSN or HNBR) HYDROGENATED NITRILE RUBBER

Code -5

Brandnames: THERBAN/TORNAC and ZETPOL

Therban is a Butadien-Acrylonitrile polymerisatblend practically without double bindings which gives an excellent resistance against Oxydising influences and many chemical additives (e.g. amines). Very good resistance against Steam and Cooling fluids on Glycolbasis with a high Nitritpart and pH.

The material can be seen as a step in between Nitrile and FPM and especially because of the much better mechanical properties than ACM.

To be used for: petrol, even sour gasolin, oils, cooling water, acids and alkalines, Off Shore industry.

Not to be used for: aromats, chlorated hydrocarbons, ketons, esters and ether as well as brake fluids.

Continious temperature range: -30 up to 150 °C (Peaktemperatur + 170 °C)

Maximal short time temperatur: + 175°C

Manufactured according to the Food and Drugs Administration (FDA) guide lines.

Therban is not resistant against many synthetic oils and greases. Only mineral greases and oils are allowed, unless the therban is first tested for chemical resistance.

Examples in which the VR Lipseals are used in Therban:

Sugarindustry, Pumps for water/sand mixtures, off-shore applications, petrol, Euro leadfree petrol, etc.

### FPM SPECIAL QUALITIES

Standard (code -2 and -9): amino and bisphenol cured.

**Peroxyd cured:** temperature range -20 °C up to +250 °C

Code -7

- advantages:
- C steam- and hotwater resistant
  - C resistant against certain oil additives
  - C better mechanical prooprties than FPM code -2
  - C higher temperature range than standard FPM (25-50 °C higher)
  - C excellent chemical resistance

**FPM/PTFE compound:**

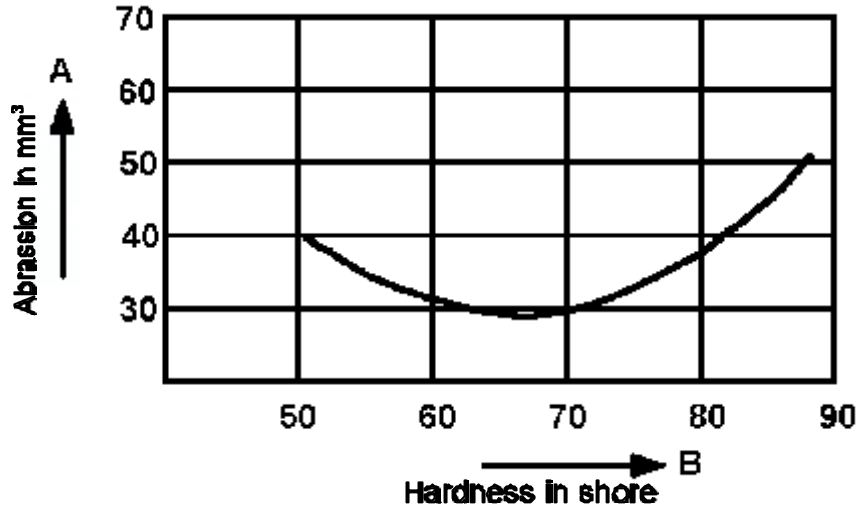
Code -8

- advantages:
- C lower friction
  - C by integrating PTFE filaments in the FPM structure, the lower fristion will be there during the entire working life of the seal
  - C chemical resistance of FPM and NOT of PTFE
  - C foodstuff approved

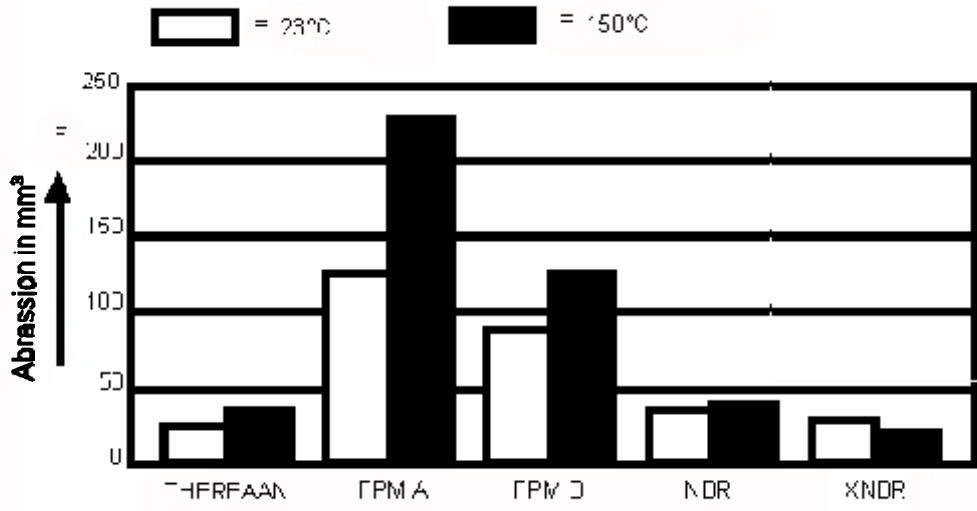
## VR DICHTUNGEN

### ABBRASSION RESISTANCE OF THERBAN

Picture 1: Abbrasion of Therban as function of hardness according to DIN standards



Picture 2: Abrassion of Therban, FPM, NBR and XNBR as function of temperature according to DIN standards



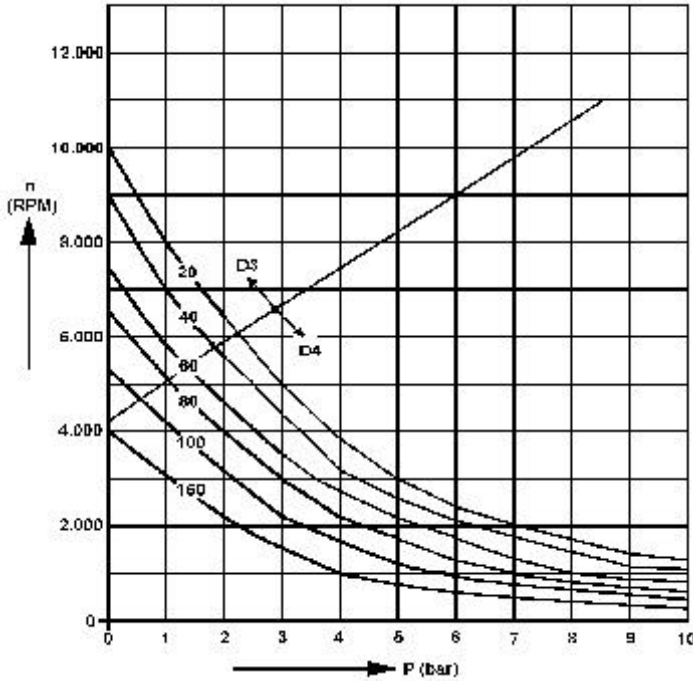
#### Resistance against abrrasion

A specific quality of Therban is the excellent resistance against mechanical loads. Picture 1 shows the abrrasive values of vulcanised Therban as a function of hardness. By comparison the abrrasion of a high quality cartyre in compatible circumstanes is 60 mm<sup>3</sup>. The abrrasionresistance of Therban is in contradiction with FPM hardly influenced by high temperatures. See picture 2.

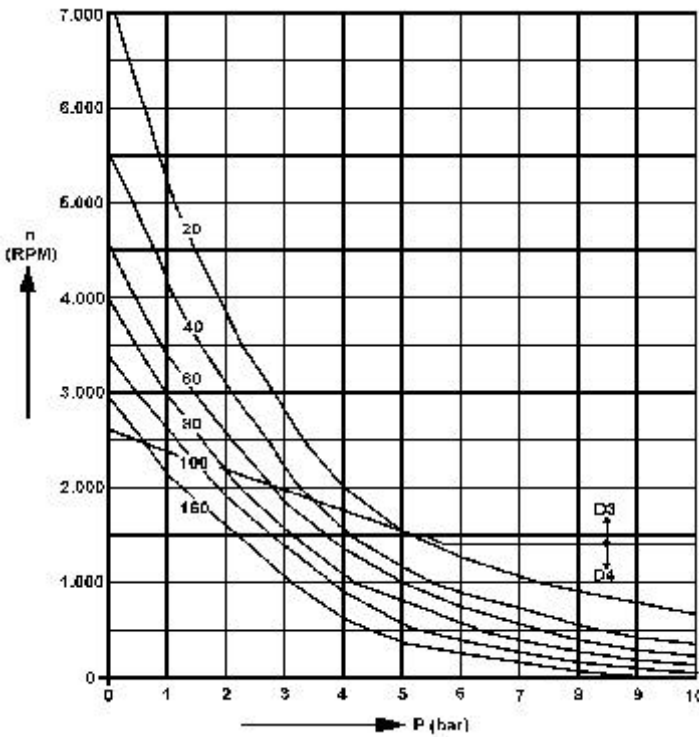
# VR DICHTUNGEN

## ROTATION-PRESSURE GRAPHICS

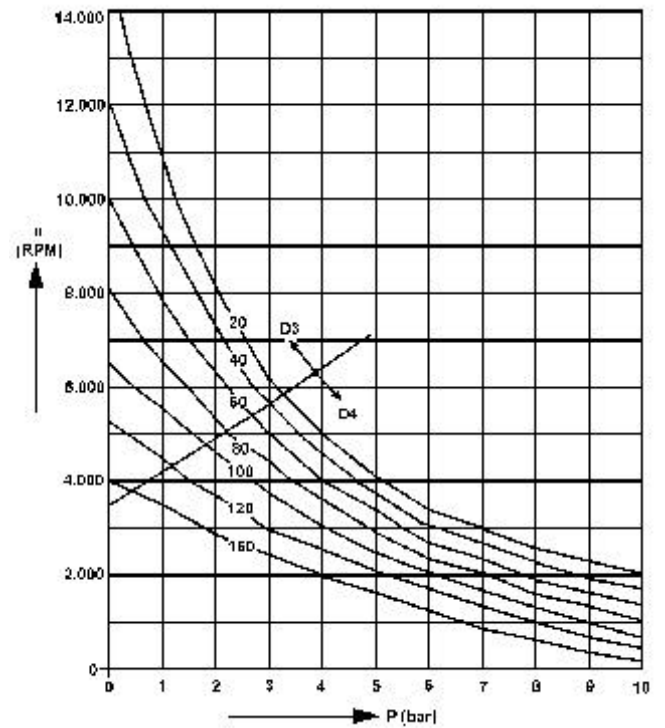
**Therban - HNBR**



**Nitrile - NBR**



**Standard Viton - FPM**



The tables indicate the theoretical values for which the D3 and D4 dimensions are applicable. The tables give only an indication. Technical aspects like rotational speed and pressure and circumstances like the medium, the true running deviation, the shaft roughness and material influence the choice of the elastomer.

The values in the tables are for the shaftsizes given in the tables.

The D3 and D4 dimensions are given in the dimension table on page 21.



## VR DICHTUNGEN

### PREPARATION OF SHAFT AND BORE

#### BORE

Wenn a material is used for the housing bore with a high temperature expansion coefficient, it can happen that a leakage occurs between the housing and the outside diameter of the seal, due to the expansion of the housing material.

Wenn a seal is mounted in a very thin walled bore, it is possible that the bore deforms.

Wenn in doubt, please contact us.

#### Surface

The necessary surface quality can be obtained by easy machining. Applicable for the surface are:

$R_t < 16 \mu\text{m}$  ( $R_a < 3 \mu\text{m} ? 120 \mu\text{inch}$ )  
 $4,0 \mu\text{m} < R_z < 8,0 \mu\text{m}$

**Housing bore tolerance:** ISO tolerance H8.

The housing bore shall always have a fase of 30° over a length of 2 mm minimum, to prevent damaging the seal during assembly. It is important, that machine components do not touch the sealing lip. A distance of at least 1 mm from the seallip must be kept. See tables on pages 26 to 29.

#### Please NOTE

As mentioned, normally the standard seal types OOA or OOB can seal perfectly. For very small spaces the types DOA and DOB can be used. For difficult sealing problems or dry running situations the twin-lip seals OAB, OBC, OAC, MAC or MSC can be used. For very high pressures and heavy duty the type SOA was developed.

#### SHAFT

#### Material

The in the machine industry standard used steel shaftmaterials can be used. As mentioned earlier, you don't have to harden or nitrate or likewise the shafts.

An exception to the rule is when there are many sharp particles in the medium, like sand, granulate, sugar or such.

#### Surface

The surface for the seal on the shaft should have an orientation free manufacture, which can be obtained by a slow moving chisel or mezzanine grinding.

Irregularities like rust, paint, scouring-powder or wedges can damage the sealing membranes and cause leakages. It is necessary to take precautions to prevent damage to the sealing membranes.

Upon finishing the shaft, caution should be taken, that sharp edges from thread, grooves, etc are rounded to prevent damage to the seal lip when the seal is mounted. In such cases a mounting hull is advisable. Always make a fase of at least 2 mm x 30° on the shaft end.

The shaft quality can be the same as for standard oilseals:

$R_t < 5 \mu\text{m}$  ( $0,8 < R_a < 1 \mu\text{m} ? 40 \mu\text{inch}$ )  
 $0,8 \mu\text{m} < R_z < 3,2 \mu\text{m}$

For high pressure or temperatures we advise::

$R_t < 3 \mu\text{m}$  ( $0,6 < R_a < 0,8 \mu\text{m} ? 24 \mu\text{inch}$ )  
 $0,8 \mu\text{m} < R_z ? 2,0 \mu\text{m}$

Deciding factor for the function of the seal is the quality from the shaft under the lip of the seal. Therefore measuring the  $R_t$  is the better method.

Shaftdiameter ISO tolerance h11.  
Borediameter ISO tolerance H8  
Shaftroundness ISO tolerance IT8.

#### GREASING

Only when sufficient grease is applied can a seal work good and can a long life be expected. In is always better when a seal does not run dry. If you have no other possibilities, contact us and send us the details. To prevent running dry it is advisable to grease the seal and shaft allready before mounting the seal or rotating the shaft.

The medium not only greases the seal, but also cools the system by transporting friction heat away from the seal.

Roller bearings, especially spherical roller bearings, but also gears can give, in working position, large suction or over pressures. Together with changing oilhighlights in the machine with varying dynamic streaming paterns can influence the greasing and working of the sealing. In these cases the twin'lip seal should be used which has its own greasing chamber in between the two sealing diaphragms. These types should also be used when the seal is in contact with a bad greasing medium as e.g. water and water alkaline solutions.

For greasing the sealing diaphragms greases with a high oil separation are to be used, NLG code 1 or 2. Roller bearing grease in the Classes NLG 1 and 2 (DIN 51818) are therefore best suitable.

With Ethylen-Propylen (**EPDM**) only greases on basis of silicon may be used!

For **Therban** only grease on a mineral basis shall be used. Therban is sensitive to many synthetic contents in greases. We recommend Therbalube.

Always check if the choosen elastomer is resistent for the choosen grease or oil.



# VR DICHTUNGEN

## VR LIPSEAL SEALING SITUATION QUESTIONNAIRE

<p><b>To:</b></p> <p><b>A/S Gunnar Haagensen</b> <b>Hejrevang 6</b> <b>3450 Allerød</b></p> <p>Telephone +45 48 17 65 00 Fax +45 48 17 17 37 E-mail <a href="mailto:gunnar@haagensen-as.dk">gunnar@haagensen-as.dk</a></p>	<p><b>From:</b></p> <p>Company .....</p> <p>Contactperson ..... m/f</p> <p>Address .....</p> <p>PC and City .....</p> <p>Phone .....</p> <p>Fax .....</p>
--	---

### SHAFT AT THE PLACE TO SEAL

Shaft diameter Ø..... mm

Material of shaft .....

Hardness of shaft .....

HRC

Rotational speed max ..... rpm

Rotation range from .....to ..... rpm

Axial movement ..... mm

Axial speed .....

mm/sec

Frequence ..... Hz

Massiv shaft yes / no

Hollow shaft yes / no

inside Ø ..... mm

Preparation running surface .....

Surface roughness Rt= ..... µm

True running deviation ..... mm

Excentricity of shaft ..... mm

### BORE

Bore diameter Ø..... mm

Bore deapth .....

mm

Fase at bore ..... ° x .....

mm

Surface roughness ..... µm

Material of the bore .....

### MEDIUM TO BE SEALED

Medium .....

Pressure ..... bar

Temperature ..... °C

If applicable: counterside:

Medium .....

Pressure ..... bar

Temperature ..... °C

Other influences (dirt, rain, oil, sunlight, etc.)  
.....

Wenn possible please send a drawing or a sketch of the surrounding of the seal.

Required quantity ..... pieces per  
at once - month - year

## VR DICHTUNGEN

Only a well mounted VR Radial Lipseal functions without leakage and with a long lifespan.  
To prevent flipping under and damage to the seallips, it is recommended to use the described mounting tools.

### Figure 1

Put a little grease on the mountinghull and inpres-spine before mounting.

The pressure during mounting shall be applied evenly over the outside surface of the seal. In no case pressure may be applied on the innerdiameter of the seal.

### Figures 2 and 3

If the shaft has a groove or other notches (sharp edges), shall these parts, before the seal is mounted, be covered with e.g. a mounting hull.

### Figure 4

If the shaft has to be mounted toward the seallips, a mounting tool or cone must be used or the shaft must be sufficiently beveled. The conediameter must be at least 1 to 2 mm smaller in diameter than the seallipdiameter.

### Figure 5

The mounted seal without the mounting hull.

## Mounting examples

Figure 1

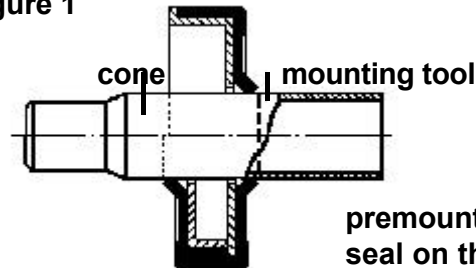


Figure 2

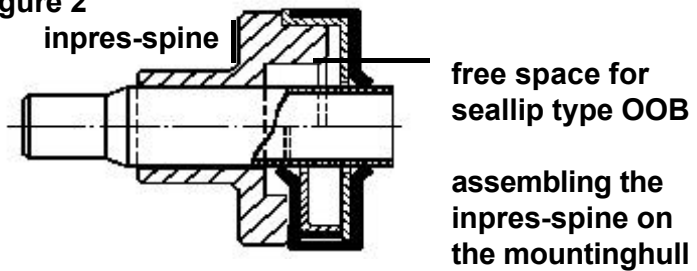


Figure 3

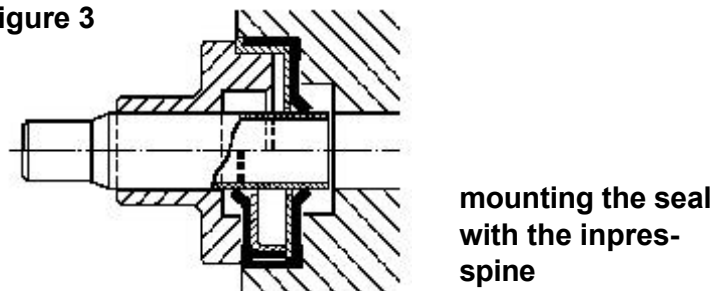


Figure 4

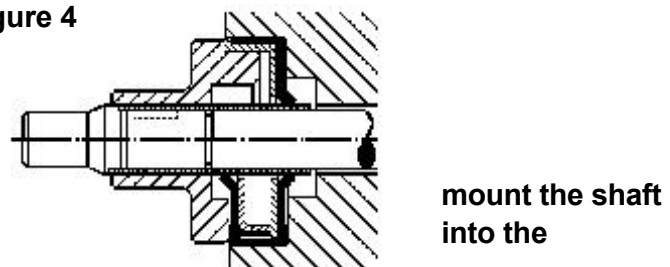
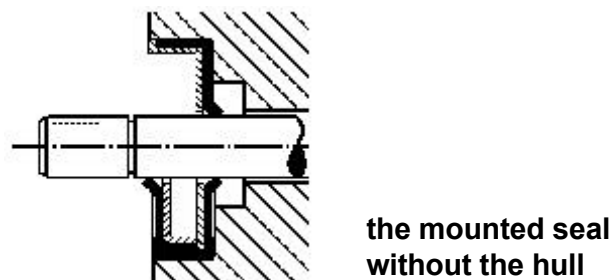


Figure 5

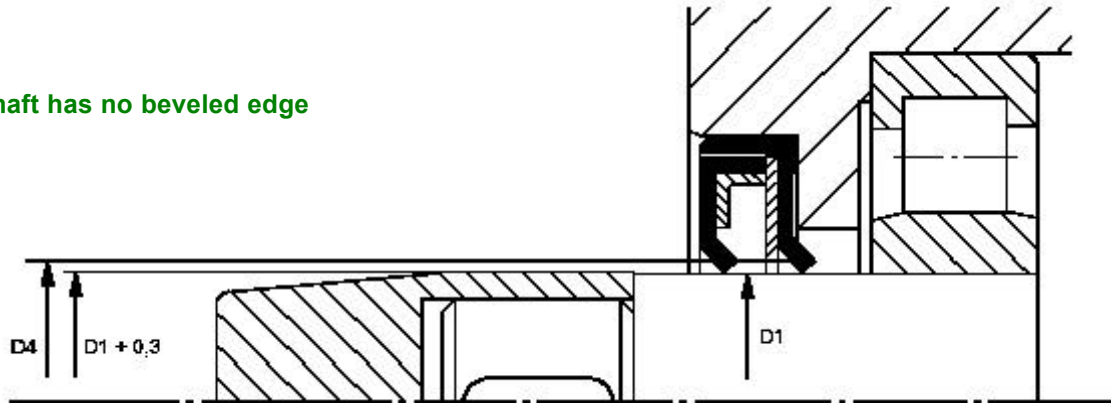




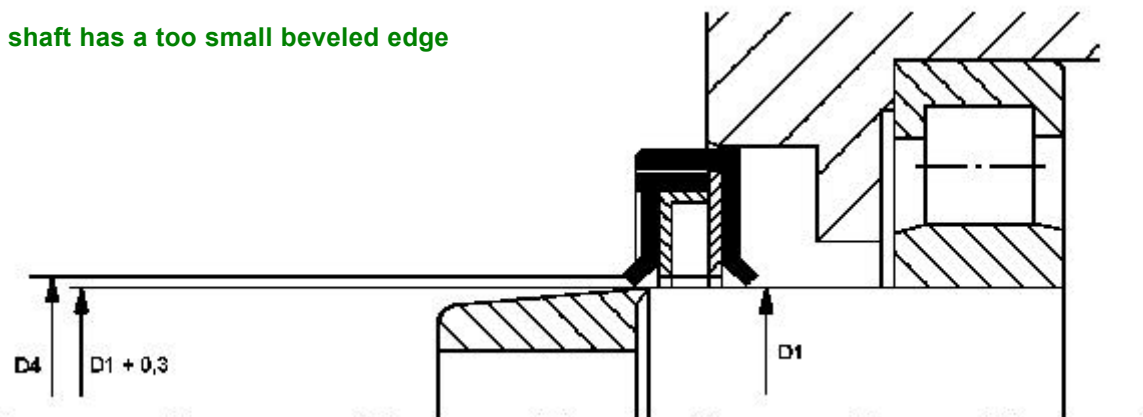
**MOUNTING HULL EXAMPLES**

Mountinghulls shall be applied, when:

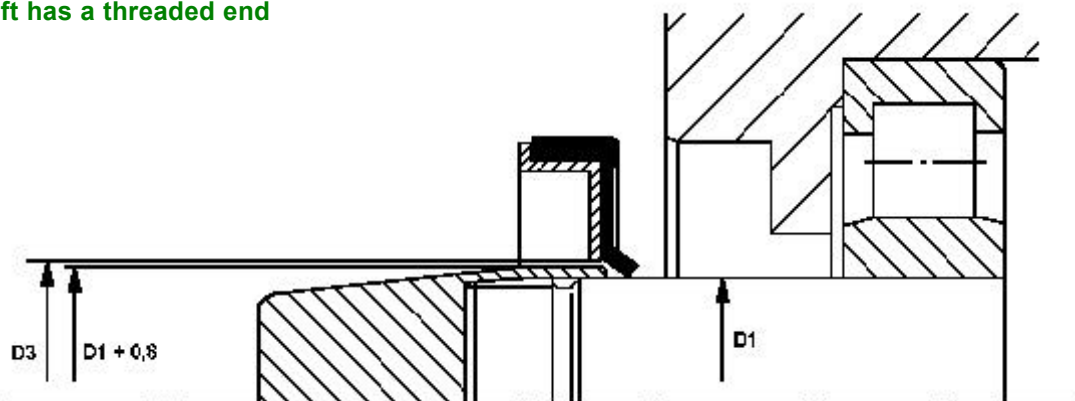
1. The shaft has no beveled edge



2. The shaft has a too small beveled edge

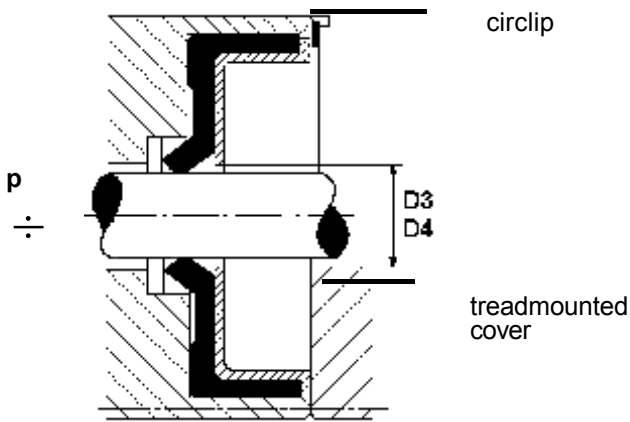


3. The shaft has a threaded end

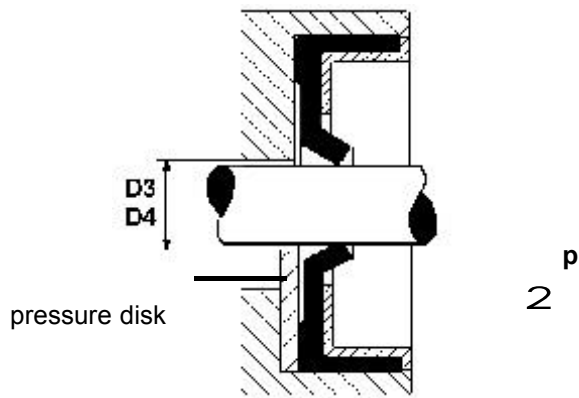


## V<sub>R</sub> DICHTUNGEN

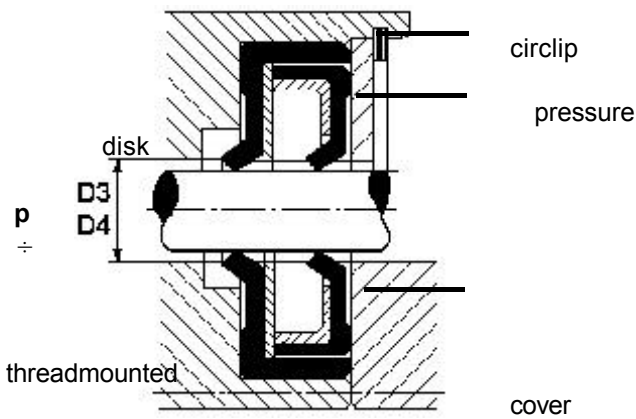
### APPLICATION EXAMPLES OOA, OOB, OAB, OAC and OBC



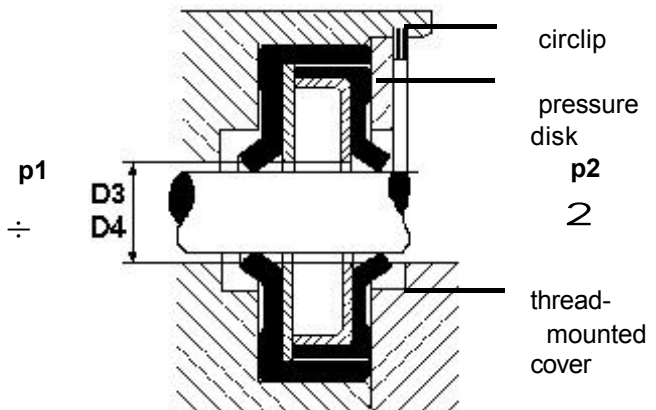
OOA



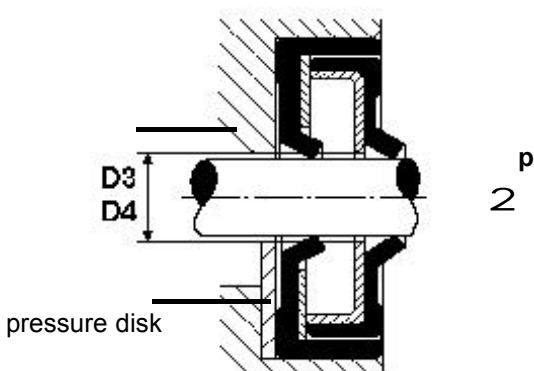
OOB



OAB



OAC



OBC

**TAKE NOTICE!**

The seal lip of the types OOB and DOB and the second seal lip of the types OBC and OAB will always have to be supported by a pressure disk.

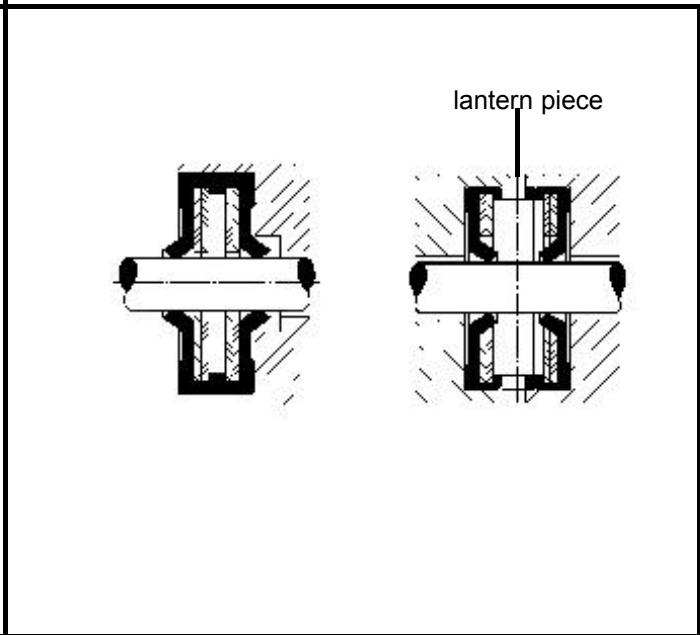
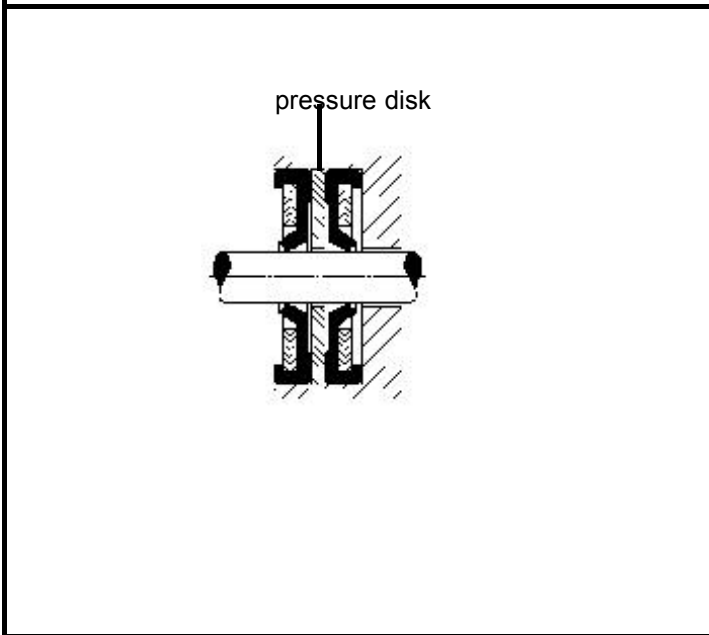
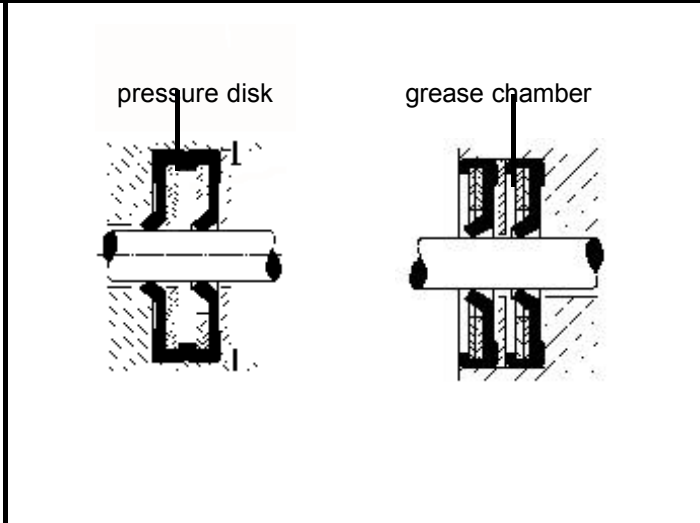
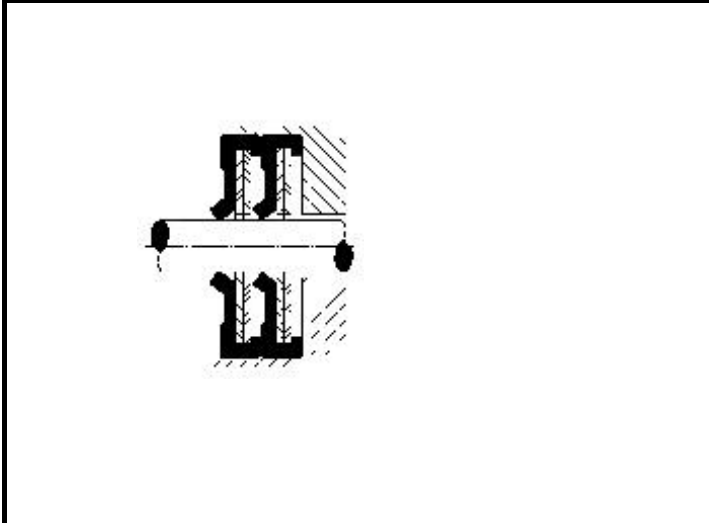
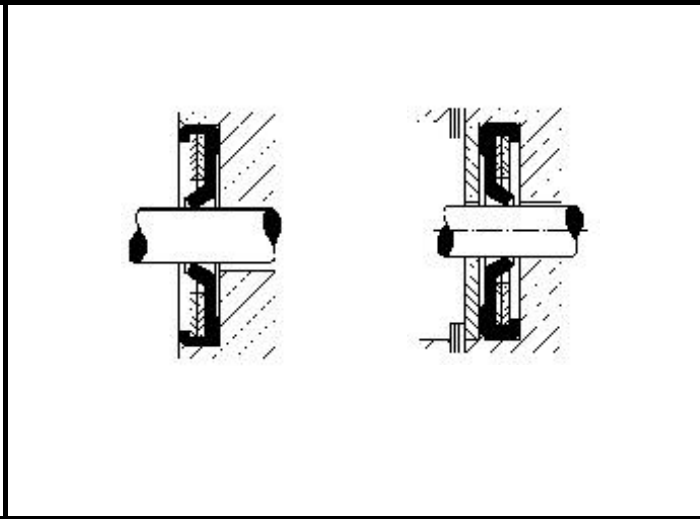
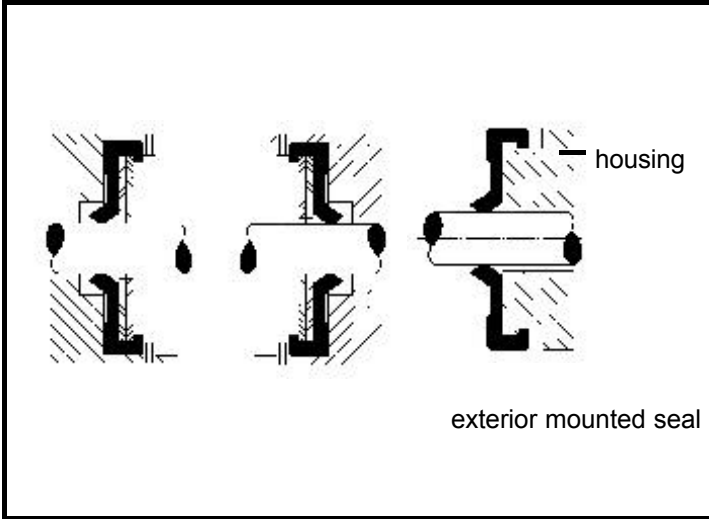
If a pressure disk is not mounted the seal lip will flip over when the smallest amount of pressure is applied and lose its function completely.

The seal can be pressed out of the bore by pressure, rotational speed or vibrations. It is recommended to guard the seal against this by use of a circlip or locking device.



# VR DICHTUNGEN

## APPLICATION EXAMPLES DOA and DOB

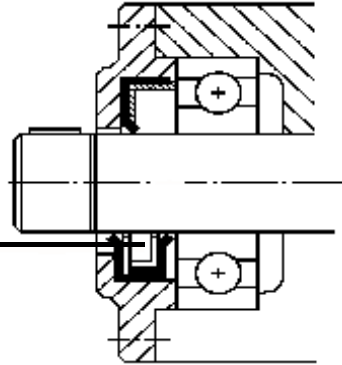


# VR DICHTUNGEN

## EXAMPLES FOR BEARING APPLICATIONS

**Above: VR lipseal type OOB**

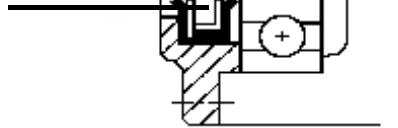
Sealing a bearing



**Below: VR Lipseal type OAC**

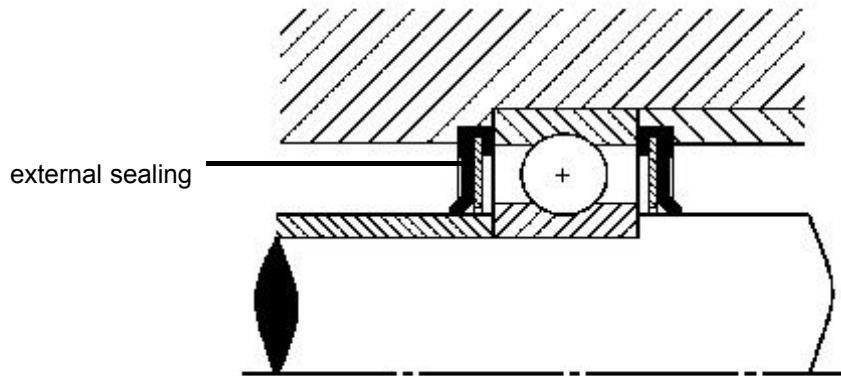
sealing the bearing and  
sealing against possible  
external pollution

grease chamber



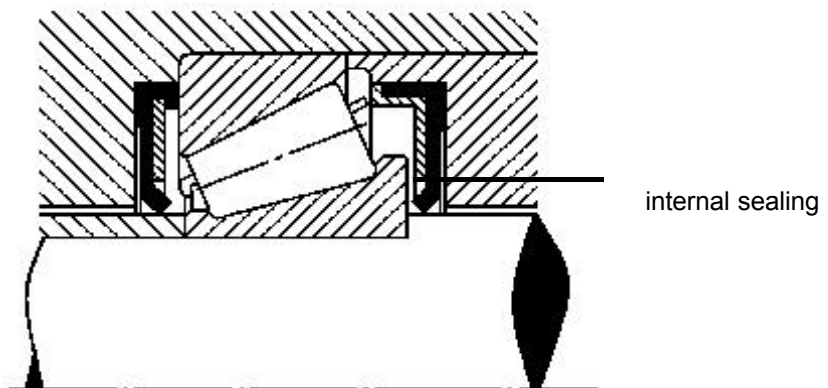
### Bearingseal

**VR Lipseal type DOA**



### Ballbearing seal

**Left: VR Lipseal type DOB**  
**Right: VR Lipseal type OOB**

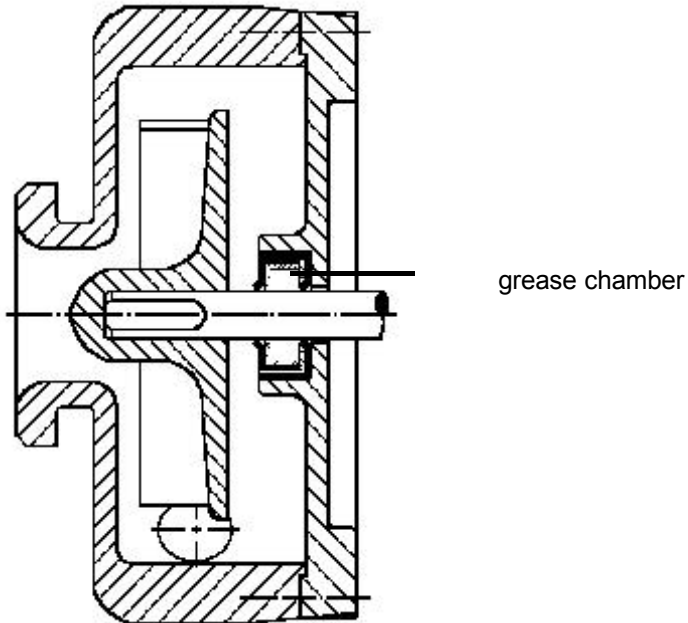


### Bearing seal

# VR DICHTUNGEN

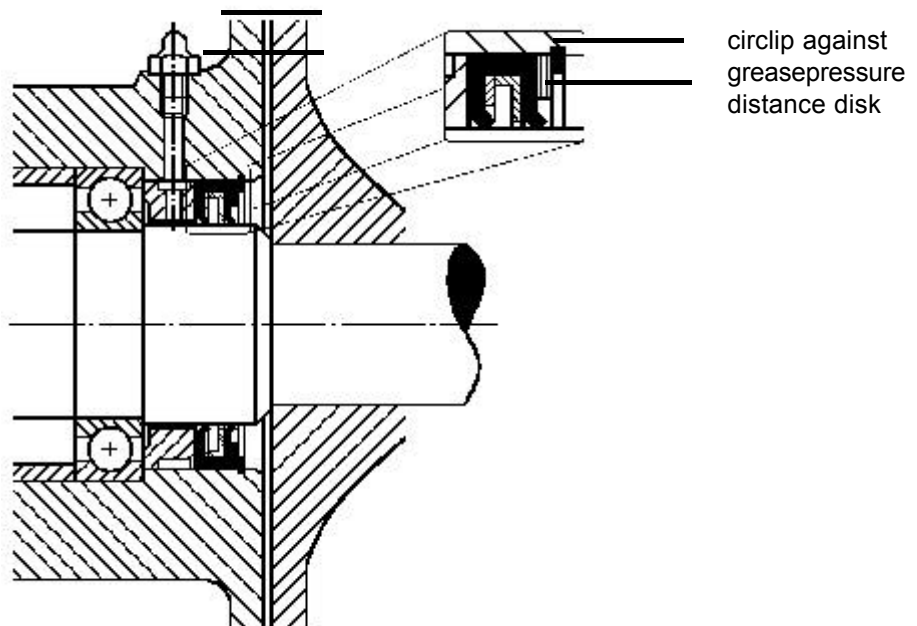
## APPLICATION EXAMPLES

VR Lipseal type OBC



Washing-machine seal

VR Lipseal type OAB



Pump seal

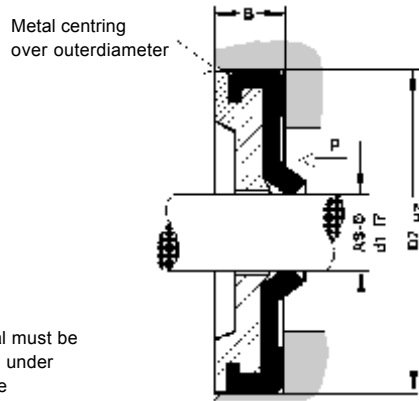


# VR DICHTUNGEN

## Special Lipseal

for high pressure up to 150 bar

## VR Lipseal Type SOA



The seal must be secured under pressure

The sealsupport is made from bronze and serves as glidebearing

D1	D2	B			D1	D2	B			D1	D2	B			D1	D2	B			
5	16	5,0			18	30	5,0			36	47	5,0			65	85	6,0			
	22					32					50					90				
						35					52	6,0				100				
6	16					40					62				68	90				
	22				20	30	5,0			38	52	6,0				100				
						32					55				70	90	6,0			
7	16					35					62					100				
	22					40				40	52	6,0			72	95				
8	16					47					55					100				
	22				22	32					62				75	95				
	24					35					72					100				
9	22					40				42	55	6,0			78	100				
	24					47					62				80	100				
	26				24	35					72					110	7,0			
10	22					37				45	60				85	110	7,0			
	24					40					62					120				
	26					47					65				90	110				
11	22				25	35					72					120				
	24					40				48	62				95	120				
	26					42					72					125				
12	22					47				50	65				100	120				
	24					52	6,0				68					125				
	26				26	37	5,0				72					130				
	28					42					80				105	130				
	30					47				52	68					140				
14	24				28	40					72				110	130				
	28					47				55	70					140				
	30					52	6,0				72				115	140				
	35				30	40	5,0				80					150				
15	26					42					85				120	150				
	30					45				56	70					160				
	32					47					72				130	160				
	35					50					80					170				
16	28					52	6,0				85				135	170				
	30					62				58	72				140	170				
	32				32	45	5,0				80				145	175				
	35					47				60	75				150	180				
17	28					52	6,0				80				160	190				
	30				35	47	5,0				85				170	200				
	32					50					90									
	35					52	6,0			62	85				Larger diameters on request.					
	40					62					90									
										63	85									
											90									

## VR DICHTUNGEN

### MIDRANGE PRESSURE SEAL TYPE SOA - 10 UP TO 150 BAR

The **type SOA** was developed after many requests for an elastomer seal with the same characteristics as the standard VR Lipseal, but suitable for a pressure in the midrange *and* at the same time with a rotational speed.

After extensive tests both at the VR factory and some selected customers, the **type SOA** was developed.

Some advantages of the **type SOA** are:

- / pressure resistant up to 150 bar
- / the rotational speed has not been defined exactly yet, please ask us
- / minimal bore depth required

The seal functions according to the non-returnvalve principle. Very important is to make sure that the elastomer part does not extrude between the seal support and shaft. To resist a pressure of 150 bar, a gap of 0.02 mm between shaft and sealsupport is required.

In this situation it is possible due to the wear of the bearing, that after a while the shaft touches the sealsupport. To avoid damage the sealsupport has been made of bearing bronze. If the sealsupport touches the shaft, the shaft will not be damaged so quickly.

At the same time the seallip is optimal supported by beveling the seal support.

Second important factor is that the elastomer is resistant to the enormous forces caused by the pressure and rotational speed. The best results are at the moment with membranes in the elastomers **Therban** and **grafitaded Therban**. The mechanical strength of these elastomers is big enough to overcome these big forces.

The outside of the seal is statically sealed by the oversize of about 0.4 mm from the external diameter of the seal versus the bore.

Due to the relatively low pressure with which the seallip presses on the shaft (no spring!) the shaft can easily rotate and less frictionheat is produced. The powerlosses are therefore relatively low.

This type is patented.

When you want to use the **type SOA** seal always contact NMF Technik.



# VR DICHTUNGEN

## Split-Seal

for in-line mounting

CURRENT STATUS, MARCH 2006, NOT YET AVAILABLE

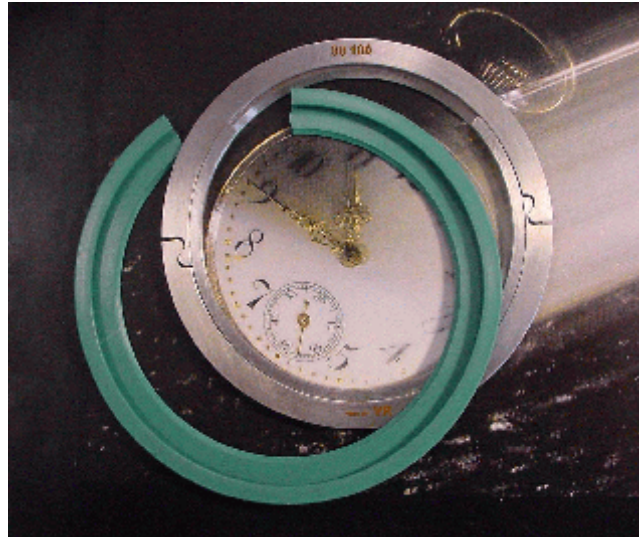
## VR Lipseal Type SPA

D1	D2	B			D1	D2	B			D1	D2	B			D1	D2	B		
60	80	6,0			130	160													
	85					170													
	90				135	170													
62	85				140	170													
	90				145	175													
63	85				150	180													
	90				160	190													
65	85				170	200													
	90				180	210													
	100				190	220	8,0												
68	90				200	230													
	100				210	240													
70	90				220	250													
	100				230	260													
72	95				240	270	9,0												
	100				250	280													
75	95				260	300	10,0												
	100				280	320													
78	100				300	340													
80	100				320	360													
	110	7,0			340	380													
85	110	7,0			360	400													
	120				380	420													
90	110																		
	120																		
95	120																		
	125																		
100	120																		
	125																		
	130																		
105	130																		
	140																		
110	130																		
	140																		
115	140																		
	150																		
120	150																		
	160																		



## VR DICHTUNGEN

### THE NEW VR SPLIT-SEAL



VR's Split-seal has specific advantages for the user:

- C the shaft does not have to be disassembled
- C the pressure the seal can withstand is 20 bar and in a special model up to 50 bar
- C much time can be saved changing seals and, time is money

The seal can be supplied:

- C shaft diameter  $d_1 = 80 \text{ mm } \varnothing$  and upwards, otherwise gluing will be too difficult
- C standard pressure 20 bar, a special model up to 50 bar
- C with seal supports in bronze and the springclip in stainless steel
- C in elastomers code -1, -2, -3, -5, -7, -9, **NOT** in silicon, viton/PTFE or grafitated elastomers
- C for a rotational speed up to 40 m/sec (depending on the pressure)
- C for a temperature range up to 150 °C

Assembly is done by first hanging the first half of the seal on the shaft. Next the membrane is decreased, put around the shaft and fixed on the seal support. On the seal support the membrane is glued (up to 100 °C with cyan glue and up to 150 °C with epoxyresin 2-components glue) and fixated with the glue-pincers. When the glue is dry, the glu-pincers are removed and membrane and seal support half are rotated around the shaft. Now the second seal support is put in place and is fixed with the springclip. The membrane can now be mounted over the support and pressed in the groove. The seal is ready to be put into place, fixated and put to work.

When you want to use this seal, always contact us for technical assistance before ordering.

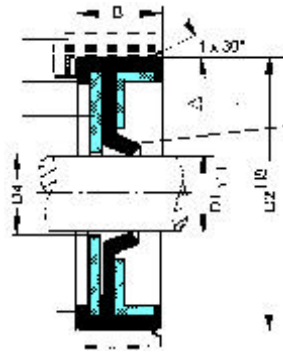
Telephone +45 48 17 65 00  
E-mail address: [gunnar@haagensen-as.dk](mailto:gunnar@haagensen-as.dk)

*patented*

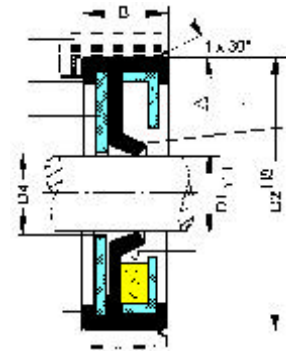


## VR DICHTUNGEN

Replacement Oilseal  
where no shaftrepair  
is necessary!  
Type BSB and MSB



Type BSB



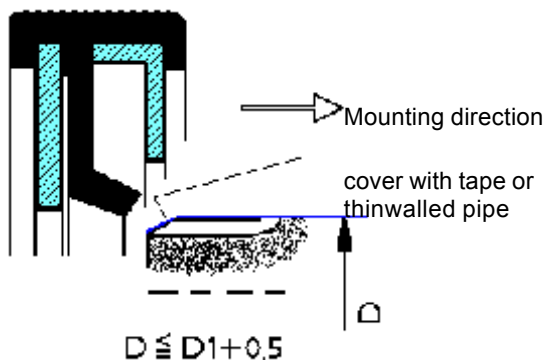
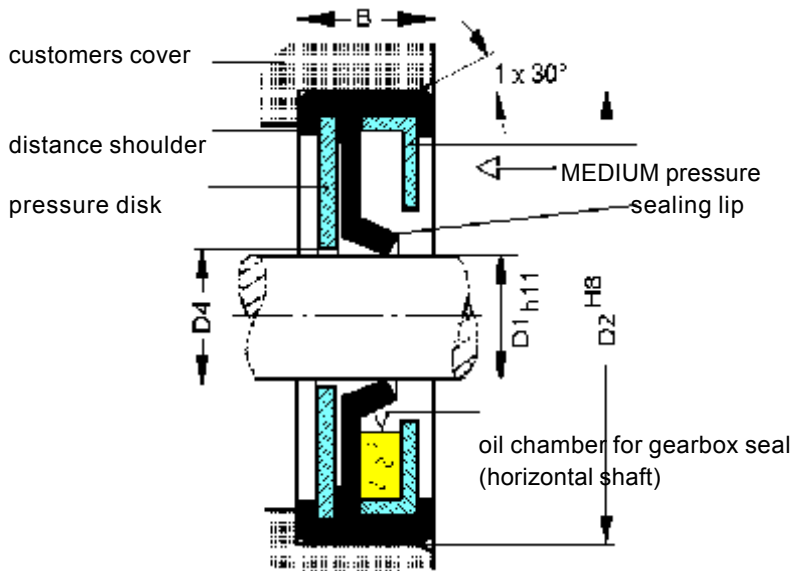
Type MSB

D1	D2	B			D1	D2	B			D1	D2	B			D1	D2	B		
					20	30	7,0			42	55	8,0			85	110	12,0		
						32					62					120			
5	16	7,0				35					72				90	110			
						40				45	60					120			
						47					62				95	120			
6	16				22	32					65					125			
	22					35					72				100	120			
						40				48	62					125			
7	22					47					72					130			
					24	35				50	65				105	130			
						37					68					140			
8	22					40					72	10,0			110	130			
	24					47					80	8,0				140			
9	22				25	35				52	68				115	140			
	24					40					72				120	150			
	26					42				55	70	8,0							
						47					70	10,0							
10	22					52					72	8,0							
	24										72	10,0							
	26				26	37					80	8,0							
11	22					42					85								
	26					47				56	70								
					28	40					72								
12	22					47					80								
	24					52					85								
					30	40				58	72								
	28					42					80								
	30									60	75								
14	24					47					80								
	28					50					85								
	30					52					85	10,0							
	35					62					90	8,0							
15	26				32	45				62	85								
	30					47					90								
	32					52				63	85								
	35				35	47					90								
16	28					50				65	85								
	30					52					90								
	32					62					100								
	35				36	47				68	90								
17	28					50					90								
	30					52				70	90								

# VR DICHTUNGEN

## Type BSB and MSB for repair jobs

## Assembling



It is important to make sure that the membrane does not flip over when the shaft is inserted and that the membrane is not damaged and clenched in between the shaft and the support of the seal itself.

Sharp edges and sharp corners (thread, splines, etc.) should be covered by tape or a thinwalled pipe. Grease the surfaces lightly before mounting the seal. During the insertion of the shaft, rotate the shaft or seal and at the same time move the shaft forward and backward a bit in order to ensure a correct mounting of the seal lip as well as to check whether the rotating movement is easy without obstruction.

With the type **MSB** it is also possible to mount the seal over the shaft and than to push the seal into the housing.

- L shaft protector only with shaft sizes  $D1 > 200 \text{ mm } \varnothing$ , if necessary



## VR DICHTUNGEN

### DIMENSIONAL TABLE OF THE VR RADIAL LIPSEALS

D1	D2	B	D3	D4	D5	A	C	E
3	10	5	4.0	3.5	6.5	2.0	3.5	1.0
4	10	5	5.0	4.5	7.0	2.0	3.5	1.0
5	10	5	6.0	5.5	7.5	2.0	3.5	1.0
5	16				10.5			
5	22				13.5			
6	10	7	7.0	6.5	8.0	2.0	3.5	1.0
6	16				11.0			
6	22				14.0			
7	16	7	8.0	7.5	11.5	2.0	3.5	1.5
7	22				14.5			
8	16	7	9.0		12.0	2.5	3.5	1.5
8	22			8.5	15.0			
8	24				16.0			
9	22	7	10.0	9.5	15.5	2.5	3.5	1.5
9	24				16.5			
9	26				17.5			
10	22	7	11.0	10.5	16.0	2.5	3.5	1.5
10	24				17.0			
10	26				18.0			
11	22	7	12.0	11.5	16.5	2.5	3.5	1.5
11	26				18.5			
12	22	7	13.0	12.5	17.0	2.5	3.5	1.5
12	24				18.0			
12	26				19.0			
12	28				20.0			
14	24	7	15.0	14.5	19.0	2.5	3.5	1.5
14	28				21.0			
14	30				22.0			
14	35				24.5			
15	26	7	16.0	15.5	20.5	2.5	3.5	1.5
15	30				22.5			
15	32				23.5			
15	35				25.0			
16	28	7	17.0	16.5	22.0	2.5	3.5	1.5
16	30				23.0			
16	32				24.0			
16	35				25.5			
17	28	7	18.0	17.5	22.5	2.5	3.5	1.5
17	30				23.5			
17	32				24.5			
17	35				26.0			
17	40				28.5			
18	30	7	19.0	18.5	24.0	2.5	3.5	1.5
18	32				25.0			
18	35				26.5			
18	40				29.0			

D1	D2	B	D3	D4	D5	A	C	E
20	30	7	21.0	20.5	25.0	2.5	3.5	1.5
20	32				26.0			
20	35				27.5			
20	40				30.0			
20	47				33.5			
22	32	7	23.0	22.5	27.0	3.0	3.5	1.5
22	35				28.5			
22	40				31.0			
22	47				34.5			
24	35	7	25.0	24.5	29.5	3.0	3.5	2.0
24	37				30.5			
24	40				32.0			
24	47				35.5			
25	35	7	26.0	25.5	30.0	3.0	3.5	2.0
25	40				32.5			
25	42				33.5			
25	47				36.0			
25	52	9			38.5			
26	37	7	27.0	26.5	31.5	3.0	3.5	2.0
26	42				34.0			
26	47				36.5			
28	40	7	29.0	28.5	34.0	3.0	3.5	2.0
28	47				37.5			
28	52	9			40.0		4.0	
30	40	7	31.0	30.5	35.0	3.0	3.5	2.0
30	42				36.0			
30	45				37.5			
30	47				38.5			
30	52	9			41.0			
30	62	10			46.0			
32	47	7	33.0	32.5	39.5	3.0	3.5	2.0
32	47				39.5			
32	52	9			42.0	4.0	4.5	2.0
35	47	7	36.0	35.5	41.0	3.0	3.5	2.0
35	50				42.5			
35	52	9			43.5	3.0	4.5	2.0
35	62	10			48.5			
36	47	7	37.0	36.5	41.5	3.0	3.5	2.0
36	50				43.0			
36	52	9			44.0	3.0	4.5	2.0
36	62	10			49.0			
38	52	9	39.0	38.5	45.0	3.0	4.5	2.0
38	55	10			46.5			
38	62				50.0			



**VR DICHTUNGEN**

D1	D2	B	D3	D4	D5	A	C	E
40	52	9	41.0	40.5	46.0	3.0	4.5	2.0
40	55	10			47.5			
40	62				51.0			
40	72				56.0			
42	55	10	43.0	42.5	48.5	3.0	4.5	2.0
42	62				52.0			
42	72				57.0			
45	60	10	46.0	45.5	52.5	3.0	4.5	2.0
45	62				53.5			
45	65				55.0			
45	72				58.5			
48	62	10	49.0	48.5	55.0	3.0	4.5	2.0
48	72				60.0			
50	65	10	51.0	50.5	57.5	3.0	4.5	2.0
50	68				59.0			
50	72				61.0			
50	80				65.0			
52	68	10	53.0	52.5	60.0	3.0	4.5	2.0
52	72				62.0			
55	70	10	56.0	55.5	62.5	3.0	4.5	2.0
55	72				63.5			
55	80				67.5			
55	85				70.0			
56	70	10	57.0	56.5	63.0	3.0	4.5	2.0
56	72				64.0			
56	80				68.0			
56	85				70.5			
58	72	10	59.0	58.5	65.0	3.0	4.5	2.0
58	80				69.0			
60	75	10	61.0	60.5	67.5	3.5	4.5	2.5
60	80				70.0			
60	85				72.5			
60	90				75.0			
62	85	10	63.0	62.5	73.5	3.5	4.5	2.5
62	90				76.0			
63	85	10	64.0	63.5	74.0	3.5	4.5	2.5
63	90				76.5			
65	85	10	66.0	65.5	75.0	3.5	4.5	2.5
65	90				77.5			
65	100				82.5			
68	90	10	69.0	68.5	79.0	3.5	4.5	2.5
68	100				84.0			
70	90	10	71.0	70.5	80.0	3.5	4.5	2.5
70	100				85.0			
72	95	10	73.0	72.5	83.5	3.5	4.5	2.5
72	100				86.0			

D1	D2	B	D3	D4	D5	A	C	E
75	95	10	76.0	75.5	85.0	3.5	4.5	2.5
75	100				87.5			
78	100	10	79.0	78.5	89.0	3.5	4.5	2.5
80	100	10	81.0	80.5	90.0	3.5	4.5	2.5
80	110				95.0		5.5	
85	110	10	86.0	95.5	97.5	3.5	5.5	2.5
85	120	12			102.5			
90	110	10	91.0	90.5	100.0	3.5	5.5	2.5
90	120	12			105.0			
95	120	12	96.0	95.5	107.5	3.5	5.5	2.5
100	120	12	101.0	100.5	110.0	3.5	5.5	2.5
100	125				112.5			
100	130				115.0			
105	130	12	106.0	105.5	117.5	3.5	5.5	2.5
105	140				122.5			
110	130	12	111.0	110.5	120.0	3.5	5.5	2.5
110	140				125.0			
115	140	12	116.0	115.5	127.5	3.5	5.5	2.5
115	150				132.5			
120	150	12	121.0	120.5	135.0	3.5	5.5	2.5
120	160				140.0			
125	150	12	126.0	125.5	137.5	3.5	5.5	2.5
125	160				142.5			
130	160	12	131.0	130.5	145.0	3.5	5.5	2.5
130	170				150.0			
135	170	12	136.0	135.5	152.5	3.5	5.5	2.5
140	170	12	141.0	140.5	155.0			
145	175	15	146.0	145.5	160.0			
150	180	15	151.5	151.0	165.0			
160	190	15	161.5	161.0	175.0			
170	200	15	171.5	171.0	185.0	3.5	6.5	2.5
180	210	15	181.5	181.0	195.0			
190	220	15	191.5	191.0	205.0			
200	230	15	201.5	201.0	215.0	4.0	6.5	3.0
210	240	15	211.5	211.0	225.0			
220	250	15	221.5	221.0	235.0	4.0	7.5	3.0
230	260	15	231.5	231.0	245.0			
240	270	15	241.5	241.0	255.0			
250	280	15	251.5	251.0	265.0			
260	300	20	260.1	261.0	280.0	5.0	8.5	4.0
280	320	20	281.5	281.0	300.0	5.0	10.5	4.0
300	340	20	301.5	301.0	320.0			
320	360	20	321.5	321.0	340.0			
340	380	20	341.5	341.0	360.0			
360	400	20	361.5	360.0	3.800,0			
380	420	20	381.5	381.0	400.0			

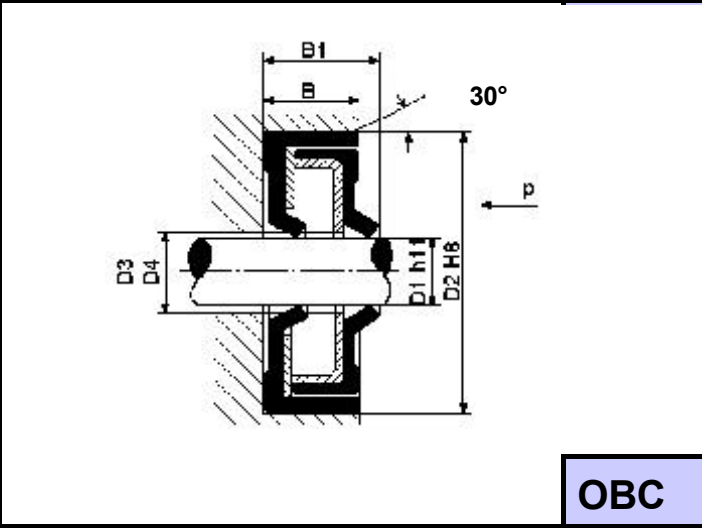
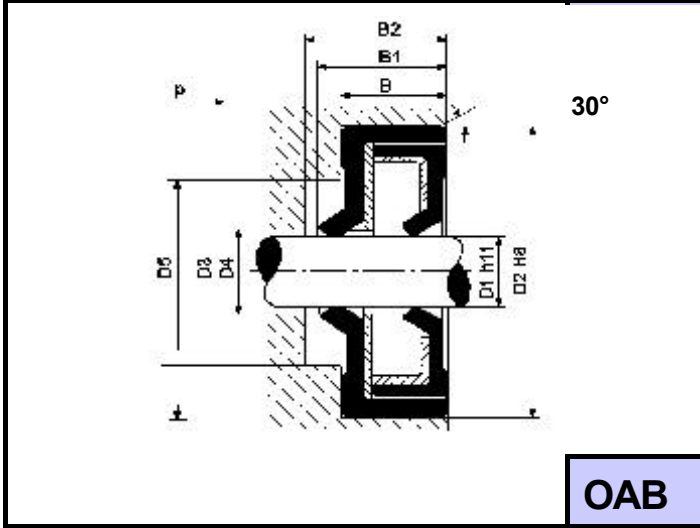
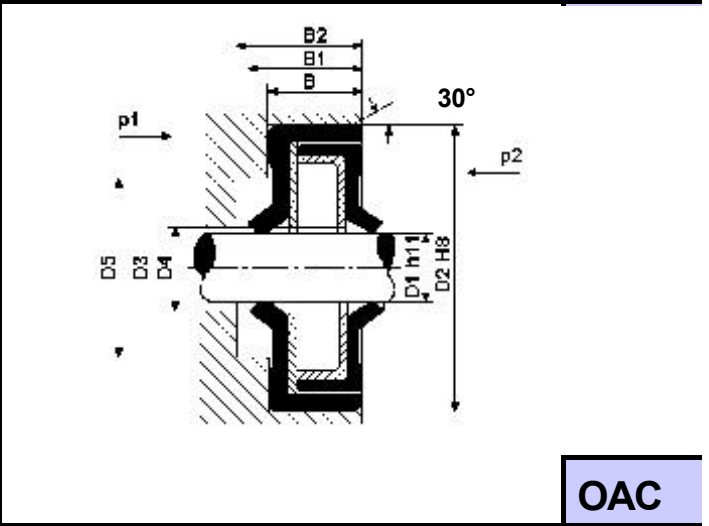
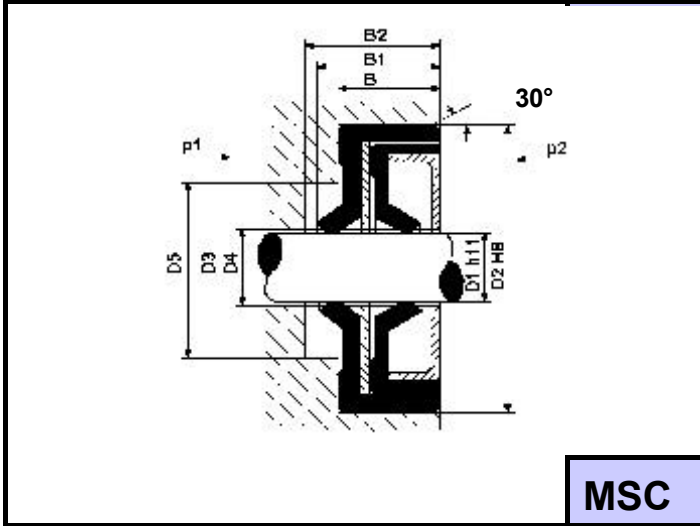
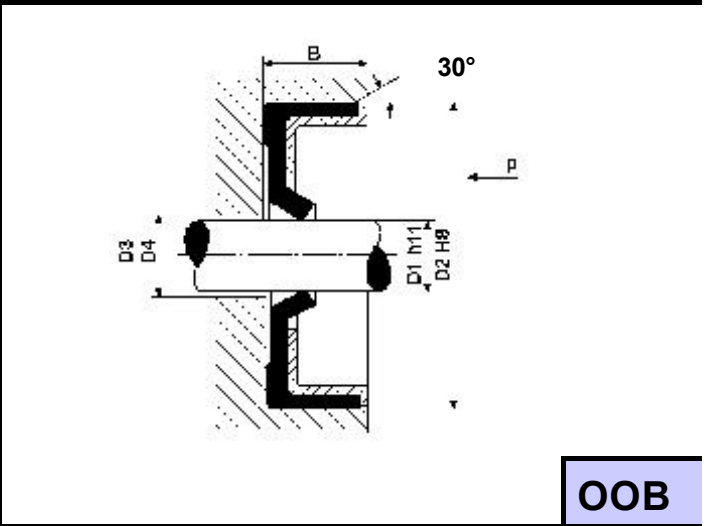
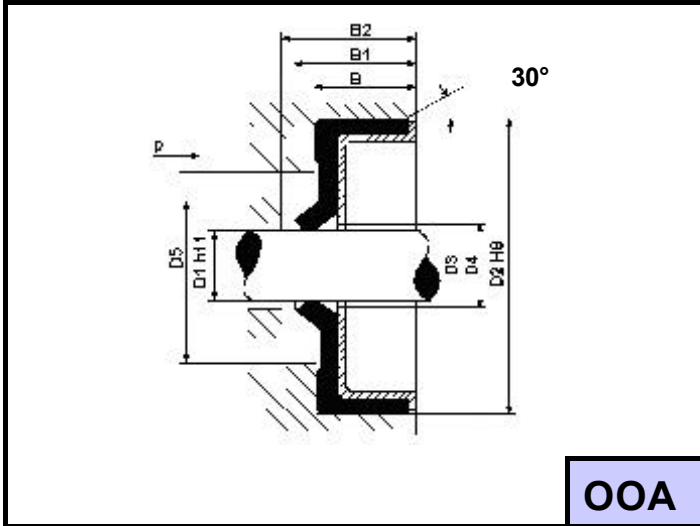
# VR DICHTUNGEN

## DIMENSION TABLE DEFINITIONS

$$\left. \begin{aligned} D3 &= D1 + 1,0\text{mm} \\ D4 &= D1 + 0,4\text{mm} \end{aligned} \right\} \text{upto } D1 = 145\text{mm}$$

$$\left. \begin{aligned} D3 &= D1 + 1,5\text{mm} \\ D4 &= D1 + 1,0\text{mm} \end{aligned} \right\} \text{from } D1 = 150\text{mm}$$

$$D5 \cong \frac{(D1 + D2)}{2}$$

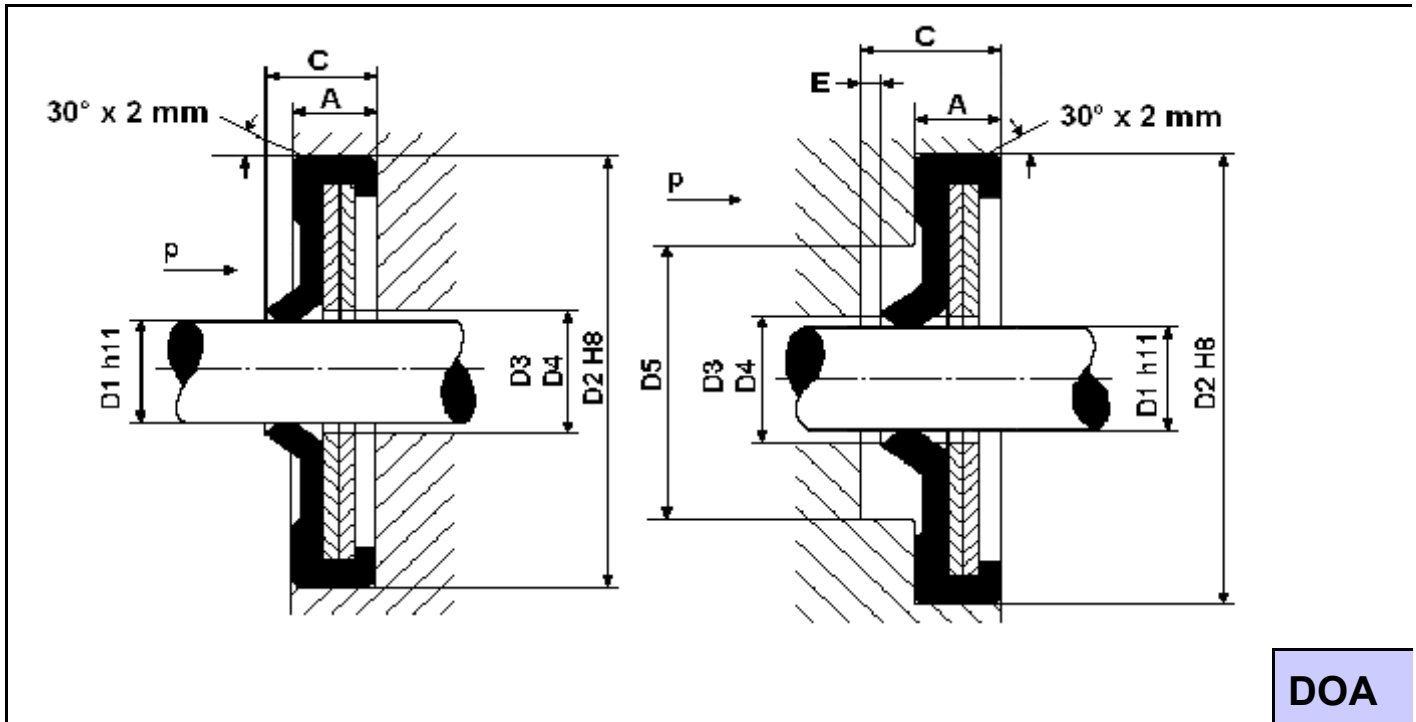


Dimensions not in these tables are on request

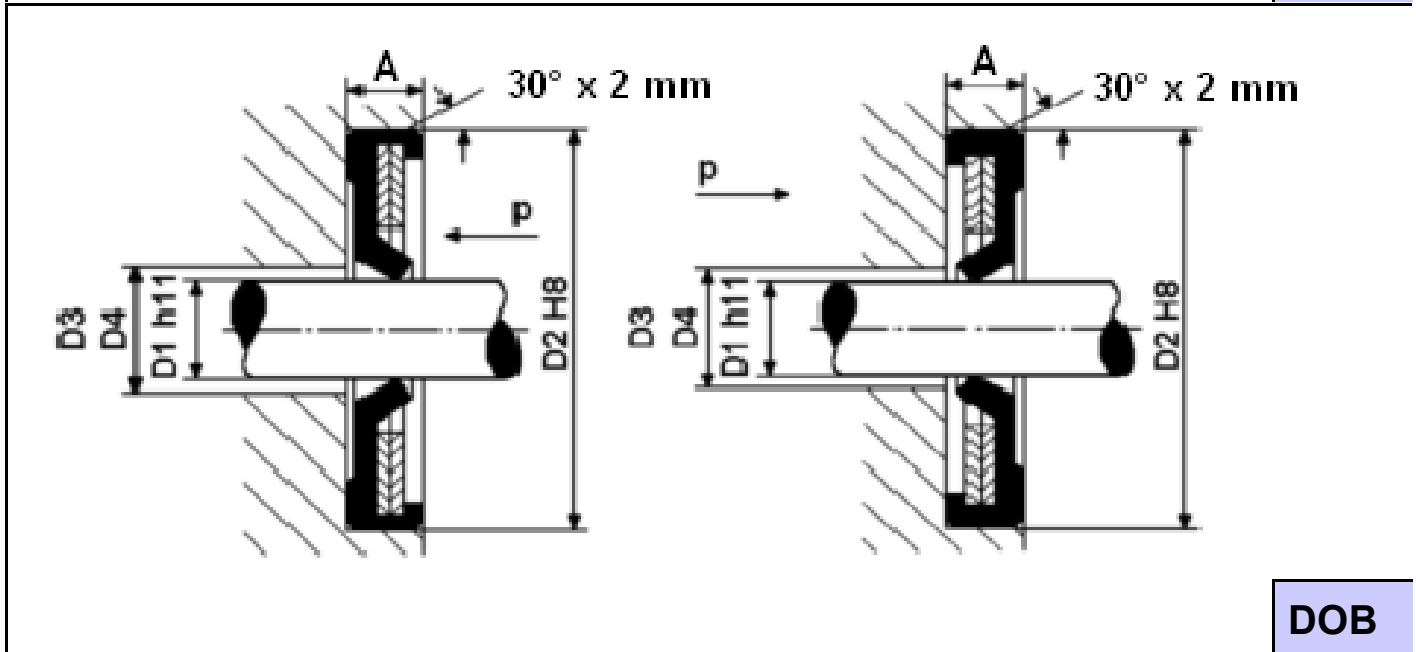
# VR DICHTUNGEN

## DIMENSION TABLE DEFINITIONS

$D3 = D1 + 1,0\text{mm}$ ? upto  $D1=145\text{mm}$       $D3=D1 + 1,5\text{mm}$ ? vanaf  $D1= 150 \text{ mm}$       $D5 = \frac{(D1 + D2)}{2}$   
 $D4 = D1 + 0,4\text{mm}$ ?      $D4=D1 + 1,0\text{mm}$ ?



**DOA**



**DOB**

correction on width code 26.04.2007



# VR DICHTUNGEN

## EXAMPLE ORDERING CODES

OOA . 006 . 010 . 05 - 13

### Support parts

- 1 = steel DIN 1624 with bore D4, high pressure
- 2 = steel DIN 1624 with bore D3, low pressure
- 3 = StSt 1.4301 with bore D4, high pressure
- 4 = StSt 1.4301 with bore D3, low pressure
- 5 = aluminium - special
- 6 = bronze - special

### Elastomers

- 1 = **NBR (nitrile)**
- 2 = **FPM (viton)**
- 3 = **EPDM**
  
- 5 = **Therban (HNBR)**
- 6 = **VMQ (silicon)**
- 7 = **FPM-peroxydic cured**
- 8 = **FPM with PTFE**
- 2C = **FPM grafitated**
- 5C = **Therban grafitated**

### Width of the lipseal in mm

### External diameter in mm Ø

### Shaft diameter in mm Ø

### Type

- 1-lip OOA - DOA - SOA
- 1-lip OOB - DOB
- 1-lip BSB - MSB
- 2-lips OAB - OBC - OAC
- 2-lips MAC - MSC



# VR DICHTUNGEN

## MOUNTING INSTRUCTIONS FOR VR RADIAL LIPSEALS

### Before the assembly

#### *Lipseal*

- S Check the mounting direction of the lipseal versus the housing or bore (see catalogue single- and twinlip types)
- S With a twin-lip seal fill the grease chamber for **b** with an appropriate lubricant. Check if the elastomer can chemically resist the lubricant
- S Check if any grease has come between the elastomer and the steel support. If so, push the grease away

#### *Shaft and Bore*

- S Shaft and bore to be chamfered 30 degrees over 1 to 2 mm (picture 1)
- S Remove or cover sharp edges or use a mounting hull
- S Grease shaft lightly

### During the assembly

#### *Bore*

- P If the seal has to be mounted deeply into a bore, use an inpress tool (see drawing)
- P Press only on the outside of the seal and not on the inner diameter with the inpress tool (D2-0,5 mm) or flat disk, without tilting the seal in the bore. A tilted seal doesn't function properly
- P If there is none or too little chamfering on the bore, you can use a conical accessory (D2+0,5 mm on D2H8 declining) on the edge of the bore. The seal can be pushed in the bore via the centring ring.

### Assembly at the sealplace, two possibilities

#### *The shaft through the seal*

- P Mount the seal with a rotating movement into the bore
- P Check that the seal lips do not flip under the sealsupports and get caught between supports and shaft, before the seal is put in its final situation
- P If the seal lip(s) are not properly mounted, jerk the shaft back a little, so the seal lips flip into the proper position. Then shove the shaft again slowly into the bore with a rotating movement
- P Take care that the sealsupport(s) do not damage the shaft surface

#### *The seal over the shaft*

- S Mount the seal with a rotating movement
- S If the seal lip(s) are mounted against the mounting direction, be sure the seal lips do not flip under between the sealsupports and the shaft. To make sure of this, jerk the seal back a little so the seal lips return in the proper position. Then mount the seal with a rotating movement
- S Take care that the sealsupport(s) do not damage the shaft surface

### After the assembly

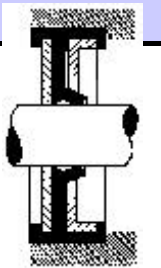
- S If the seal is mounted properly, the shaft can be easily rotated. Rotate the shaft to check this.

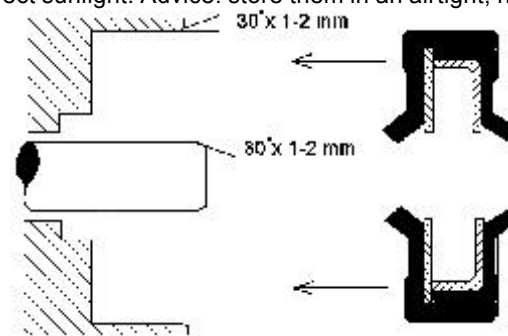
### Storage and shelf life

All elastomer seals have to be protected against dry-out and direct sunlight. Advice: store them in an airtight, non transparent bag in a dark place.

**New: VR radial lipseals type BSB**

- \* replaces oilseal
- \* reduces maintenance
- \* immediately mountable
- \* no shaft repair
- \* long life
- \* high rotational speed
- \* high pressure





**Afbeelding 1**