

## Description

V-rings are rotary seals that can perform a variety of tasks when sealing rotating shafts:

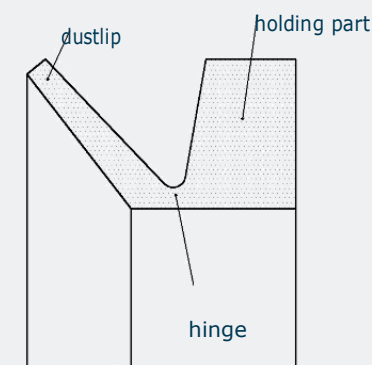
- Seals against the ingress of dirt, dust or water, e.g. water-like contaminants
- Combination with other sealing elements, e.g. protection of a radial shaft seal against external contamination
- Seal against grease leaking from a housing se

## Advantages of V-rings

- Versatile application possibilities
- No high demands on shaft and housing machining
- Low friction
- High circumferential speeds possible due to friction reduction
- Relatively insensitive to coaxiality and eccentricity
- Long lifespan
- Easy assembly

## Construction and operation

V-rings are made entirely of elastomeric material. Their V-shaped profile consists of a relatively solid retaining part and a flexible sealing lip connected to a "hinge", which forms the connection point of the "V".

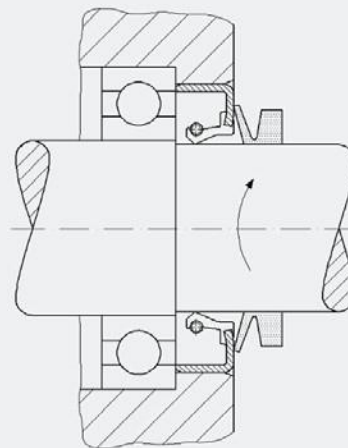


Profile V-ring type VR-A10

V-rings are expanded during assembly and slid into the intended position on the shaft and hold themselves on the surface of the shaft due to their own tension.

V-rings rotate with the shaft and seal in the axial direction against a vertically standing counter face. Due to the versatility of the application options for V-rings, the counter face can be formed, for example by

- the housing itself
- a housing cover
- a pressed plate
- the front of a roller bearing outer ring
- the metal stiffening ring of a radial shaft seal ring



Protection of a radial shaft seal against external

When the shaft is stationary, the sealing lip rests against the counter bearing with an initial pressing pressure. With the beginning of rotation of the shaft, the centrifugal force acts in radial direction on the sealing lip and the discharge pressure decreases with increasing circumferential speed.

From a circumferential speed of approx. 15-20m/s, the lip starts to lift from the counter face and the pressing pressure drops to zero. The friction losses increase to approx.


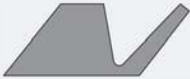

10m/s increases almost linearly with increasing circumferential speed. Between 10 and 12m/s the friction losses start to decrease and fall in the range of 15-20m/s to zero.

The sealing effect of a V-ring is based on the contact between the sealing lip and counter face and further on the swinging effect due to the rotation of the V-ring.

From the moment the sealing lip lifts at a very high circumferential speed, the V-ring acts as a gap seal and pendulum disc.

## Building shapes

To cover the wide range of possible applications, we offer 3 standard construction forms ex warehouse, each in 2 materials (NBR and FKM).

	Type V-ring	Dimensions[mm]	Comments
	<b>VR-A10</b>	3 - 1000 >1000 Op aanvraag	The most commonly used standard construction with straight sealing back
	<b>VR-S10</b>	5 - 199	In the lip area of the same design as VR-A10 with additional conically extended retaining part, therefore more secure on the shaft
	<b>VR-L10</b>	110 - 600 >600 Op aanvraag	Small profile geometry for a compact installation situation, uniform profile for all diameters

More building types, for example:

**VR-E10**

**VR-AX10**

we are happy to offer you on request.

## Materials

We offer V-rings from stock in 2 different materials:

### NBR 60

- Standard material with wide application range
- Thermally loadable from -40 to +100°C
- Good wear and corrosion resistance
- Resistant to many media, e.g. mineral based oils and greases, water

### FKM 60

- Can be used at higher temperatures and more aggressive media
- Thermally loadable from -20 to +200°C
- Very good resistance to many chemicals
- Very good aging, ozone, weather resistance

Material	NBR	FKM
Hardness [Shore A]	60	60
Color	Zwart	Bruin
Temperature [°C]	-40 to +100	-20 to +200

Other elastomers, such as CR, EPDM and HNBR, are available on request.

## Shaft design

The requirements for the design of the shaft are relatively simple because the V-ring rotates with the shaft and is only statically sealed towards the shaft.

## Diameter tolerance

A V-ring can be used for a wide range of nominal shaft diameters. For that reason a precise tolerance does not apply for the chosen nominal diameters.

When selecting the shaft diameter or When choosing the size of the V-ring for an existing shaft diameter, it must be taken into account that with increasing expansion, the pressing force of the lip against the counteracting surface also increases. For less wear and longer service life, therefore, the smallest possible expansion (within the values specified in the size charts) should be selected.

## Surface roughness

For a large number of applications, shaft surfaces with  $Ra \leq 6.3\mu\text{m}$  are sufficient.

For sealing thin media, the roughness value  $Ra \leq 3.2\mu\text{m}$  must be observed.

## Design of the counter face

The dynamic sealing takes place between the sealing lip and the counter face. The closing function of the

The V-ring therefore depends to a large extent on the design of the counter face.

## Evenness tolerance

De afwijking van het ideaal effen tegenloopvlak mag voor 100mm niet meer dan 0,4mm bedragen.

## Surface roughness

The roughness must be selected depending on the circumferential speed and the media to be sealed.

Liquid media in combination with high circumferential velocities (from 10 m/s) require a high surface area with  $Ra = 0.4 - 0.8 \mu\text{m}$ .

For sealing against grease and dust at low peripheral speeds (up to 1m/s), a value of  $Ra \leq 2.5\mu\text{m}$  is sufficient.

## Materials of the counter tread

Suitable steels, stainless steels and casting materials such as gray cast iron or aluminum cast iron are eligible. The choice of material depends primarily on the medium to be sealed and on the peripheral speed.

When sealing water or other corrosive media, the surface must be protected (e.g. by chrome plating), or a stainless steel must be selected.

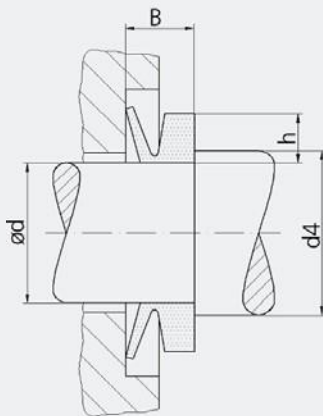
A hardness of . is sufficient for standard applications  $>120\text{HB}$ . At high circumferential speeds and/or corrosive particles in the medium, harder materials must be used.

## Construction Instructions

### Axial lock

Under certain conditions of use, it is necessary to axially support the V-ring on the shaft to prevent the V-ring from "moving":

- at higher peripheral speeds (NBR >8 m/s / FKM > 6m/s)
- with very little expansion of the V-ring
- with oil seal
- for simplification of installation (easy compliance with target size B after installation)

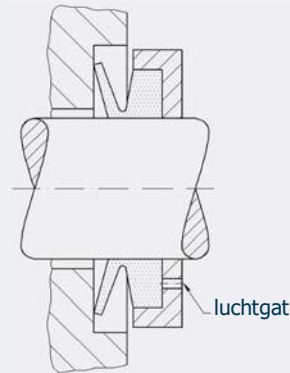


Axial lock

$$d4 \text{ min.} = \text{ød} + 0,5 \times h$$

### Radial lock

Radial locking of the V-ring on the shaft is required at higher circumferential speeds (depending on the pretension NBR >12 m/s / FKM > 10m/s). For this purpose, the V-ring can for instance be fastened to the retaining part.

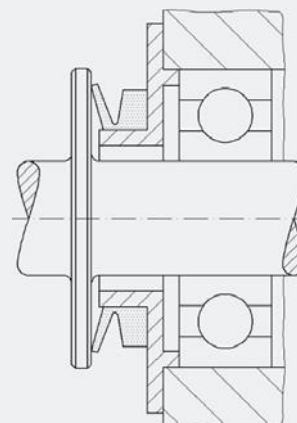


Radial lock

### Stationary use

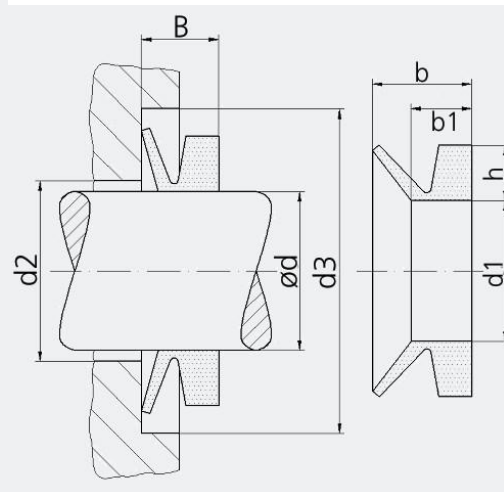
In stationary use, the V-ring is mounted on a stationary housing part and seals against a surface rotating with the shaft. In addition, there is no centrifugal force on the V-ring, which allows use above 10 - 12m/s to 20m/s. In stationary use, a higher friction is created, because the pressure of the sealing lip does not decrease with increasing speed. Compared to a rotating V-ring, the service life is therefore somewhat limited.

The surface roughness of the counter face and the expansion of the V-ring at the inner diameter should be chosen low.



Stationair gebruik

## Installation dimensions VR-A10



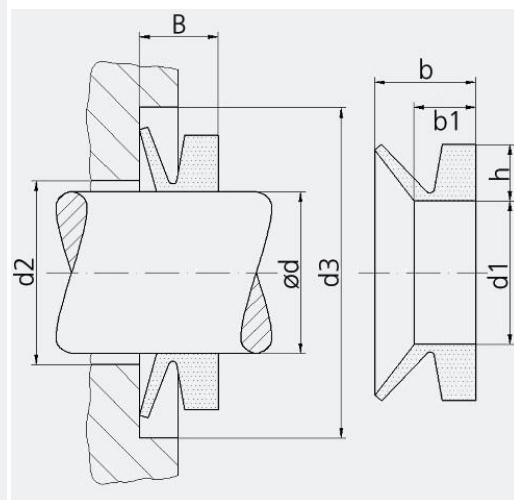
Type	Suitable for as - ø d	Dimensions in untensioned size				Target size after instal B	d2 max	d3 max
		d1	h	b1	b			
VR-A10- 3	2,7-3,5	2,5	1,5	2,1	3	2,5 ±0,3	d+1	d+4
VR-A10- 4	3,5-4,5	3,2	2	2,4	3,7	3,0 ±0,4	d+1	d+6
VR-A10- 5	4,5-5,5	4	2	2,4	3,7	3,0 ±0,4	d+1	d+6
VR-A10- 6	5,5-6,5	5	2	2,4	3,7	3,0 ±0,4	d+1	d+6
VR-A10- 7	6,5-8	6	2	2,4	3,7	3,0 ±0,4	d+1	d+6
VR-A10- 8	8-9,5	7	2	2,4	3,7	3,0 ±0,4	d+1	d+6
VR-A10- 10	9,5-11,5	9	3	3,4	5,5	4,5 ±0,6	d+2	d+9
VR-A10- 12	11,5-12,5	10,5	3	3,4	5,5	4,5 ±0,6	d+2	d+9
VR-A10- 14	13,5-15,5	12,5	3	3,4	5,5	4,5 ±0,6	d+2	d+9
VR-A10- 16	15,5-17,5	14	3	3,4	5,5	4,5 ±0,6	d+2	d+9
VR-A10- 18	17,5-19	16	3	3,4	5,5	4,5 ±0,6	d+2	d+9
VR-A10- 20	19-21	18	4	4,7	7,5	6,0 ±0,8	d+2	d+12
VR-A10- 22	21-24	20	4	4,7	7,5	6,0 ±0,8	d+2	d+12
VR-A10- 25	24-27	22	4	4,7	7,5	6,0 ±0,8	d+2	d+12
VR-A10- 28	27-29	25	4	4,7	7,5	6,0 ±0,8	d+3	d+12
VR-A10- 30	29-31	27	4	4,7	7,5	6,0 ±0,8	d+3	d+12
VR-A10- 32	31-33	29	4	4,7	7,5	6,0 ±0,8	d+3	d+12
VR-A10- 35	33-36	31	4	4,7	7,5	6,0 ±0,8	d+3	d+12
VR-A10- 38	36-38	34	4	4,7	7,5	6,0 ±0,8	d+3	d+12
VR-A10- 40	38-43	36	5	5,5	9	7,0 ±1,0	d+3	d+15
VR-A10- 45	43-48	40	5	5,5	9	7,0 ±1,0	d+3	d+15
VR-A10- 50	48-53	45	5	5,5	9	7,0 ±1,0	d+3	d+15
VR-A10- 55	53-58	49	5	5,5	9	7,0 ±1,0	d+3	d+15
VR-A10- 60	58-63	54	5	5,5	9	7,0 ±1,0	d+3	d+15
VR-A10- 65	63-68	58	5	5,5	9	7,0 ±1,0	d+3	d+15
VR-A10- 70	68-73	63	6	6,8	11	9,0 ±1,2	d+4	d+18
VR-A10- 75	73-78	67	6	6,8	11	9,0 ±1,2	d+4	d+18
VR-A10- 80	78-83	72	6	6,8	11	9,0 ±1,2	d+4	d+18
VR-A10- 85	83-88	76	6	6,8	11	9,0 ±1,2	d+4	d+18
VR-A10- 90	88-93	81	6	6,8	11	9,0 ±1,2	d+4	d+18

# V-rings



Type	Suitable for as - ø d	Dimensions in untensioned size				Target size after instal B	d2 max	d3 max
		d1	h	b1	b			
VR-A10- 95	93-98	85	6	6,8	11	9,0 ±1,2	d+4	d+18
VR-A10- 100	98-105	90	6	6,8	11	9,0 ±1,2	d+4	d+18
VR-A10- 110	105-115	99	7	7,9	12,8	10,5 ±1,5	d+4	d+21
VR-A10- 120	115-125	108	7	7,9	12,8	10,5 ±1,5	d+4	d+21
VR-A10- 130	125-135	117	7	7,9	12,8	10,5 ±1,5	d+4	d+21
VR-A10- 140	135-145	126	7	7,9	12,8	10,5 ±1,5	d+4	d+21
VR-A10- 150	145-155	135	7	7,9	12,8	10,5 ±1,5	d+4	d+21
VR-A10- 160	155-165	144	8	9	14,5	12,0 ±1,8	d+5	d+24
VR-A10- 170	165-175	153	8	9	14,5	12,0 ±1,8	d+5	d+24
VR-A10- 180	175-185	162	8	9	14,5	12,0 ±1,8	d+5	d+24
VR-A10- 190	185-195	171	8	9	14,5	12,0 ±1,8	d+5	d+24
VR-A10- 199	195-210	180	8	9	14,5	12,0 ±1,8	d+5	d+24
VR-A10- 200	190-210	180	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 220	210-235	198	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 250	235-265	225	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 275	265-290	247	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 300	290-310	270	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 325	310-335	292	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 350	335-365	315	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 375	365-390	337	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 400	390-430	360	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 450	430-480	405	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 500	480-530	450	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 550	530-580	495	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 600	580-630	540	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 650	630-665	600	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 700	665-705	630	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 725	705-745	670	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 750	745-785	705	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 800	785-830	745	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 850	830-875	785	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 900	875-920	825	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 950	920-965	865	15	14,3	25	20 ±4,0	d+10	d+45
VR-A10- 1000	965-1015	910	15	14,3	25	20 ±4,0	d+10	d+45

## Installation dimensions VR-S10



Type	Suitable for as - ø d	Dimensions in untensioned size				Target size after instal	d2 max	d3 max
		d1	h	b1	b	B		
VR-S10-5	4,5-5,5	4	2	3,9	5,2	4,5 ±0,4	d+1	d+6
VR-S10-6	5,5-6,5	5	2	3,9	5,2	4,5 ±0,4	d+1	d+6
VR-S10-7	6,5-8	6	2	3,9	5,2	4,5 ±0,4	d+1	d+6
VR-S10-8	8-9,5	7	2	3,9	5,2	4,5 ±0,4	d+1	d+6
VR-S10-10	9,5-11,5	9	3	5,6	7,7	6,7 ±0,6	d+2	d+9
VR-S10-12	11,5-12,5	10,5	3	5,6	7,7	6,7 ±0,6	d+2	d+9
VR-S10-14	13,5-15,5	12,5	3	5,6	7,7	6,7 ±0,6	d+2	d+9
VR-S10-16	15,5-17,5	14	3	5,6	7,7	6,7 ±0,6	d+2	d+9
VR-S10-18	17,5-19	16	3	5,6	7,7	6,7 ±0,6	d+2	d+9
VR-S10-20	19-21	18	4	7,9	10,5	9,0 ±0,8	d+2	d+12
VR-S10-22	21-24	20	4	7,9	10,5	9,0 ±0,8	d+2	d+12
VR-S10-25	24-27	22	4	7,9	10,5	9,0 ±0,8	d+2	d+12
VR-S10-28	27-29	25	4	7,9	10,5	9,0 ±0,8	d+3	d+12
VR-S10-30	29-31	27	4	7,9	10,5	9,0 ±0,8	d+3	d+12
VR-S10-32	31-33	29	4	7,9	10,5	9,0 ±0,8	d+3	d+12
VR-S10-35	33-36	31	4	7,9	10,5	9,0 ±0,8	d+3	d+12
VR-S10-38	36-38	34	4	7,9	10,5	9,0 ±0,8	d+3	d+12
VR-S10-40	38-43	36	5	9,5	13	11,0 ±1,0	d+3	d+15
VR-S10-45	43-48	40	5	9,5	13	11,0 ±1,0	d+3	d+15
VR-S10-50	48-53	45	5	9,5	13	11,0 ±1,0	d+3	d+15
VR-S10-55	53-58	49	5	9,5	13	11,0 ±1,0	d+3	d+15
VR-S10-60	58-63	54	5	9,5	13	11,0 ±1,0	d+3	d+15
VR-S10-65	63-68	58	5	9,5	13	11,0 ±1,0	d+3	d+15
VR-S10-70	68-73	63	6	11,3	15,5	13,5 ±1,2	d+4	d+18
VR-S10-75	73-78	67	6	11,3	15,5	13,5 ±1,2	d+4	d+18
VR-S10-80	78-83	72	6	11,3	15,5	13,5 ±1,2	d+4	d+18
VR-S10-85	83-88	76	6	11,3	15,5	13,5 ±1,2	d+4	d+18
VR-S10-90	88-93	81	6	11,3	15,5	13,5 ±1,2	d+4	d+18
VR-S10-95	93-98	85	6	11,3	15,5	13,5 ±1,2	d+4	d+18
VR-S10-100	98-105	90	6	11,3	15,5	13,5 ±1,2	d+4	d+18

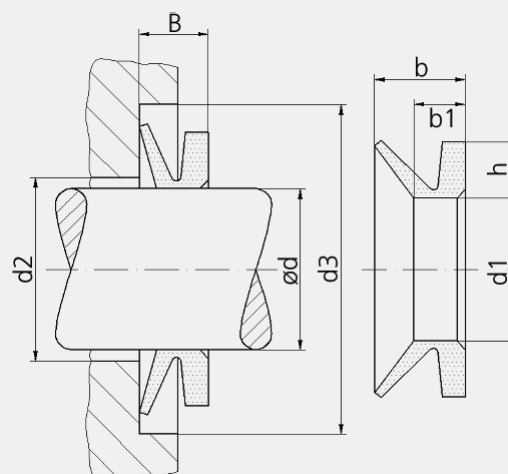
# V-rings



Type	Suitable for as - ø d	Dimensions in untensioned size				Target size after instal B	d2 max	d3 max
		d1	h	b1	b			
VR-S10-110	105-115	99	7	13,1	18	15,5 ±1,5	d+4	d+21
VR-S10-120	115-125	108	7	13,1	18	15,5 ±1,5	d+4	d+21
VR-S10-130	125-135	117	7	13,1	18	15,5 ±1,5	d+4	d+21
VR-S10-140	135-145	126	7	13,1	18	15,5 ±1,5	d+4	d+21
VR-S10-150	145-155	135	7	13,1	18	15,5 ±1,5	d+4	d+21
VR-S10-160	155-165	144	8	15	20,5	18,0 ±1,8	d+5	d+24
VR-S10-170	165-175	153	8	15	20,5	18,0 ±1,8	d+5	d+24
VR-S10-180	175-185	162	8	15	20,5	18,0 ±1,8	d+5	d+24
VR-S10-190	185-195	171	8	15	20,5	18,0 ±1,8	d+5	d+24
VR-S10-199	195-210	180	8	15	20,5	18,0 ±1,8	d+5	d+24



## Installation dimensions VR-L10

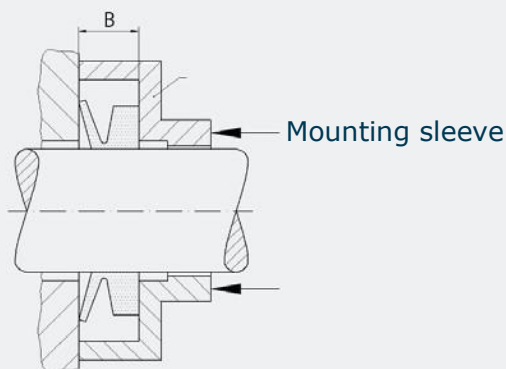


Type	Suitable for as - ø d	Dimensions in untensioned size				Target size after instal B	d2 max	d3 max
		d1	h	b1	b			
VR-L10-110	105-115	99	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-120	115-125	108	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-130	125-135	117	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-140	135-145	126	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-150	145-155	135	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-160	155-165	144	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-170	165-175	153	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-180	175-185	162	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-190	185-195	171	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-200	195-210	182	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-220	210-233	198	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-250	233-260	225	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-275	260-285	247	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-300	285-310	270	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-325	310-335	292	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-350	335-365	315	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-375	365-385	337	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-400	385-410	360	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-425	410-440	382	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-450	440-475	405	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-500	475-510	450	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-525	510-540	472	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-550	540-575	495	6,5	6	10,5	8 ±1,5	d+5	d+20
VR-L10-600	575-625	540	6,5	6	10,5	8 ±1,5	d+5	d+20

## Installation

The installation of V-rings is relatively simple compared to other rotary seals. However, the following rules must be followed:

- Clean all affected components
- There must be no lubricant between V-ring and shaft, especially in applications without axial locking.
- The V-ring can be manually extended on the shaft and slid into the correct position.
- The expansion of the V-ring must be uniform on the circumference. For this it can be useful, especially with large dimensions, a round and blunt auxiliary tool (for example made of POM or wood) between V-ring and shaft, and let it circulate several times around the shaft. ■  
Belangrijk is dat na de montage de afstand B gelijkmatig aangehouden wordt.
- A mounting sleeve can be used for mounting larger numbers.



V-Ring installation wit

## Storage of elastomers

The optimum storage conditions for elastomer products are described in DIN 7716 and ISO 2230. If these conditions are observed, elastomers can be stored for several years without any loss of quality.

The most damaging factors for accelerated aging of elastomers are:  
mechanical stresses (pressure, draft, bending...),  
action of oxygen, ozone, light, heat, humidity and solvents. Therefore, the following principles must be adhered to:

## Storage area

The storage area must be cool, dry, dust-free and moderately ventilated. The relative humidity must not exceed 65%. No ozone-generating electrical equipment may be installed in the storage area. The storage area may also not be used simultaneously for the storage of solvents, fuels, lubricants, chemicals or other gas-generating substances.

## Storage temperature

The temperature should be approx. 15°C, with variations from +20°C to -10°C being allowed. Heat sources such as heating elements must have a distance of at least 1 m from the product and must not radiate directly onto the product.

## Exposure

Elastomers must be protected against direct sunlight and artificial lighting with a high UV content. We recommend lighting the storage area with conventional light bulbs.

## Packaging

A closed packaging, for example in airtight containers or in polyethylene bags, protects the goods against air exchange and thus against oxygen and ozone. Packaging materials may not contain plasticizers or other elastomer-damaging substances.

## Mechanical stresses

Elastomer products must be stored stress-free. This means that they must not be loaded by draft, pressure, bending or other forces.

## Component Storage

When storing components with already installed seals, extreme care must be taken. The tensile stresses in an expanded seal accelerate aging to an extreme extent. The expansions must therefore be designed to be as low as possible constructively.

Despite optimum storage conditions, the components must no longer be stored and must always be further processed immediately according to the "first-in, first-out" principle.