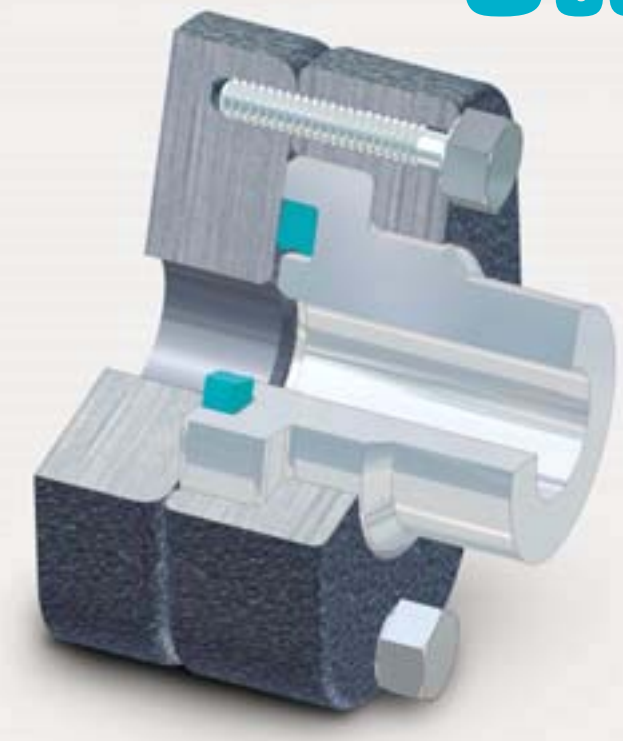
TRELLEBORG
SEALING SOLUTIONS

Static Seals



Your Partner for Sealing Technology

Your Partner for Sealing Technology

Trelleborg Sealing Solutions is a major international sealing force, uniquely placed to offer dedicated design and development from our market leading product and material portfolio; a one-stop shop providing the best in elastomer, thermoplastic, PTFE and composite technologies for applications in aerospace, industrial, and automotive industries.

With 50-years experience, Trelleborg Sealing Solutions engineers support customers with design, prototyping, production, test and installation using state-of-the-art design tools. An international network of over 70 facilities worldwide includes 30 manufacturing sites, 8 strategically positioned research and development centers, including materials and development laboratories and locations specializing in design and applications.

Developing and formulating materials in-house, we utilize the resource of our material database, including over 2,000 proprietary compounds and a range of unique products.

Trelleborg Sealing Solutions fulfills challenging service requirements, supplying standard parts in volume or a single custom-manufactured component, through our integrated logistical support, which effectively delivers over 40,000 sealing products to customers worldwide.

Facilities are certified to ISO 9001:2000 and ISO/TS 16949:2002, with many manufacturing sites also working to QS9000 and VDA 6.1. Trelleborg Sealing Solutions is backed by the experiences and resources of one of the world's foremost experts in polymer technology, Trelleborg AB.

ISO 9001:2000

ISO/TS 16949:2002

The information in this brochure is intended to be for general reference purposes only and is not intended to be a specific recommendation for any individual application. The application limits for pressure, temperature, speed and media given are maximum values determined in laboratory conditions. In application, due to the interaction of operating parameters, maximum values may not be achieved. It is vital therefore, that customers satisfy themselves as to the suitability of product and material for each of their individual applications. Any reliance on information is therefore at the user's own risk. In no event will Trelleborg Sealing Solutions be liable for any loss, damage, claim or expense directly or indirectly arising or resulting from the use of any information provided in this brochure. While every effort is made to ensure the accuracy of information contained herewith, Trelleborg Sealing Solutions cannot warrant the accuracy or completeness of information.

To obtain the best recommendation for a specific application, please contact your local Trelleborg Sealing Solutions marketing company.

This edition supersedes all previous brochures.
This brochure or any part of it may not be reproduced without permission.

® All trademarks are the property of Trelleborg AB.

The turquoise colour is a registered trademark of Trelleborg AB.

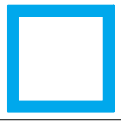
© Trelleborg AB, 2007. All rights reserved.

TRELLEBORG
SEALING SOLUTIONS

Content

Selection criteria for static seals

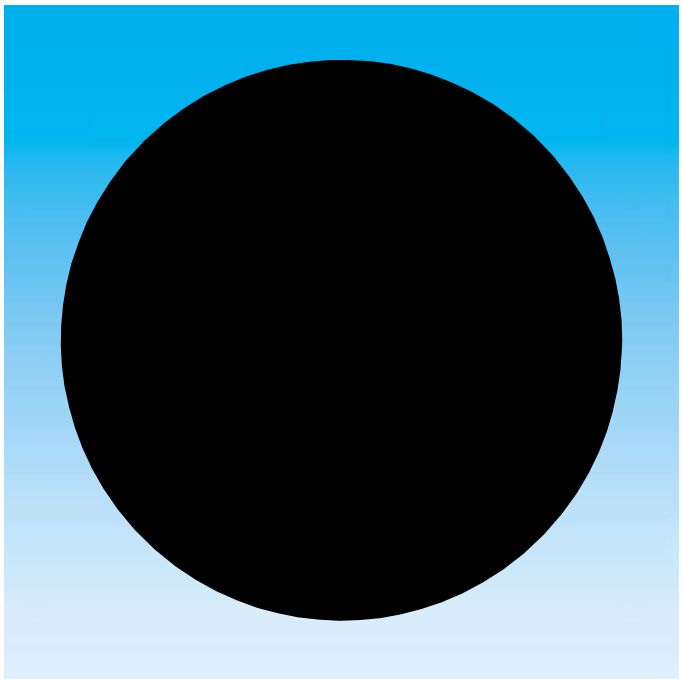
Table I Selection criteria for static seals

Seal		Application							Standard	Size range	Operating Temp. range	Pressure	Material
Type	Page		radial	axial	static	dynamic	internal	external		mm	°C	MPa max.	
O-Ring 	5		●	●	●	●	●	●	See further information catalogue O-Ring				
Back-up Ring, uncut BV/BU 	18 33	Injection moulding machines Machine tools, presses, Excavators, agricultural machines Valves for hydraulic circuits	●		●	●	●	●		6-500	-200/ +260	250	PTFE
Back-up Ring, cut BH/BG 	18 33												
Back-up Ring, spiral BP 	28 43												
Back-up Ring, uncut concave BA/BB 	23 38												
	48									2-660	-20/ +100	40	NBR
	48										-15/ +200		FKM
Back-up Ring, cut concave BD/BC 	23 38									6-500	-200/ +260	250	PTFE
Kantseal 	61	Flanges, valves, plates locks		●	●					7-470	-30/ +100	50	NBR
											-18/ +200		FKM
Dualseal 	75	Fork lifts, mobile hydraulic, industrial hydraulic, tooling machines, injection moulding machines, Hydraulic presses	●		●		●	●		6-280	-30/ +80	50	Poly-urethane

Selection criteria for static seals

Seal		Application							Standard	Size range	Operating Temp. range	Pressure	Material
Type	**Page**		**radial**	**axial**	**static**	**dynamic**	**internal**	**external**		**mm**	**°C**	**MPa max.**	
Bonded Seals 	83	Flanges, Bolts, Plates, Valves, Engines, Hydraulics, Pneumatics, Cylinder heads		●	●				extensive range	2.5-125	-30/ +100	100	NBR
											-18/ +200		FKM
											-50/ +120		EPDM
O-Ring 	105	Flange		●	●				SAE J 518	$^1/_2$" to 2"	-20/ +100	21	NBR
SAE-Seal Type DRV2 	106	Flange		●	●				SAE J 518	$^1/_2$" to 2"	-20/ +100	42	NBR
SAE-Seal Type DRV3 	107	Flange		●	●				SAE J 518	$^1/_2$" to 2"	-20/ +80	42	Poly-urethane
Fluid Connector Seal DRV1 	109	Threaded parts, stud ends		●	●				DIN 3869 ISO 9974 ISO 11926 ISO 1179	12-51	-25/ +100	63	NBR
											-18/ +200		FKM
Wills Rings® 	113	See further Information catalogue Wills Rings®		●	●					8-3000	-260/ +850	1000	Metal
Turcon® Variseal® HF 	119	See further Information catalogue Turcon® Variseal® HF		●	●		●	●		10-2500	-200/ +260	80	Turcon®

O-RING



- Elastomers and other materials -

■ Description

O-Rings offer the designer an efficient and economical sealing element for a wide range of static or dynamic applications.

Inexpensive production methods and its ease of use have made the O-Ring the most widely used seal.

A wide choice of elastomer materials for both standard and special applications allow the O-Ring to be used to seal practically all liquid and gaseous media.

O-Rings are vulcanised in moulds and are characterised by their circular form with circular cross section. The dimensions of the O-Ring are defined by the inside diameter d1 and the cross section diameter d2.

Cross section diameters of approx. 0.35 to 40 mm and inside diameters up to 5,000 mm and more are available.

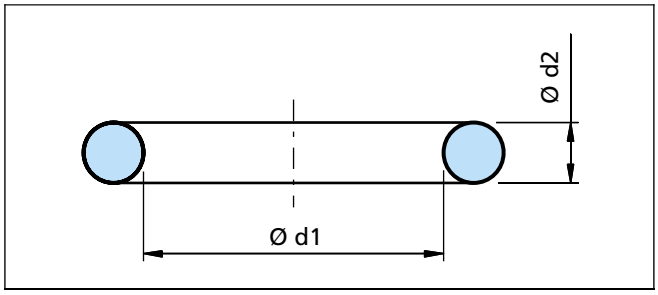


Figure 1 O-Ring dimensioning

■ Advantages

Compared with other sealing elements, the O-Ring has a wide range of advantages:

- Inexpensive, allows low cost solutions
- Simple, one-piece groove design reduces hardware and design costs
- Compact design allows smaller hardware
- Easy, foolproof installation reduces risk
- Applicable to a wide range of sealing problems, static, dynamic, single or double acting
- Wide compound choice for compatibility with most fluids
- Ex stock availability worldwide for easy maintenance and repair.

Standard size range for O-Rings

Standard/Dimension range	O-Ring cross section d_2 (mm)
Preferred metric dimensions	1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 7.0 8.0 10.0 12.0
International standard ISO 3601/1 German standard DIN 3771/1	1.80 2.65 3.55 5.30 7.0
Swedish standard SMS 1586	1.6 2.4 3.0 5.7 8.4
French standard	1.9 2.7 3.6 5.33 6.99
Japanese standard JIS B 2401	1.9 2.4 3.1 3.5 5.7 8.4
American standard AS 568 B British standard BS 1806	1.78 2.62 3.53 5.33 7.0
American standard AS 568 B (Series 900)	1.02 1.42 1.63 1.83 1.98 2.08 2.20 2.46 2.95 3.00
Special versions for large diameters from approx. 1,000 mm to 5,000 mm	5.0 5.4 7.0 7.7 9.2 10.0 12.0

Method of operation

O-Rings are double-acting sealing elements. The initial squeeze acting in a radial or axial direction due to the installation gives the O-Ring its initial sealing capability. These forces are superimposed by the system pressure to create the total sealing force which increases with increasing system pressure.

Under pressure, the O-Ring behaves in a similar way to a fluid with high surface tension. The pressure is transmitted uniformly to all directions.

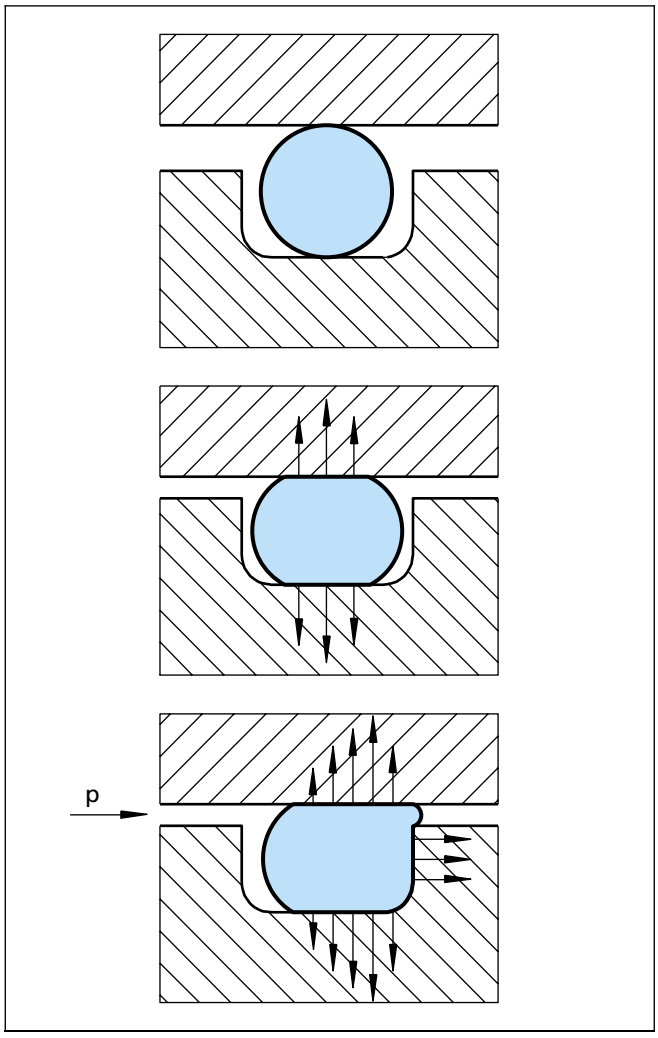


Figure 2 O-Ring sealing forces with and without system pressure

Applications

O-Rings are used as sealing elements, as energising elements for hydraulic slipper seals and wipers and thus cover a large number of fields of application. There are no fields of industry where the O-Ring is not used. From an individual seal for repairs or maintenance to a quality assured application in aerospace, automotive or general engineering.

The O-Ring is used predominantly for static sealing applications:

- As a radial static seal, e.g. for bushings, covers, pipes, cylinders
- As an axial static seal, e.g. for flanges, plates, caps.
- O-Rings in dynamic applications are recommended only for moderate service conditions. They are limited by the speed and the pressure against which they are to seal:
- For low duty sealing of reciprocating pistons, rods, plungers, etc.
- For sealing of slowly pivoting, rotating or spiral movements on shafts, spindles, rotary transmission leadthroughs, etc.

■ Technical information

The following Table provides a summary of the various elastomer material groups. Trelleborg Sealing Solutions can offer a large number of compounds within each group.

Table II Elastomer materials

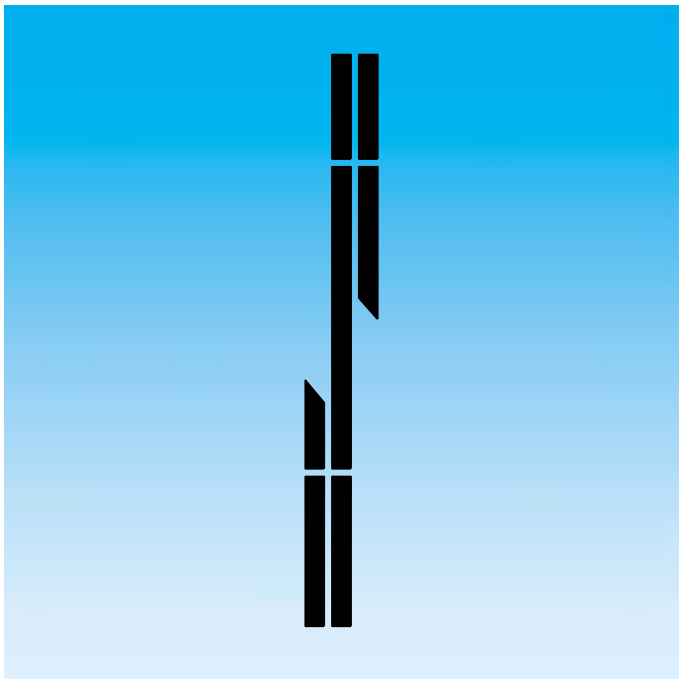
Designation	Trade Name*	Abbreviation		
		ISO 1629	ASTM 1418	TSS
Acrylonitrile-Butadiene Rubber Nitrile Rubber	Europrene® Krynac® Nipol N® Perbunan NT Breon®	NBR	NBR	N
Hydrogenated Acrylonitrile-Butadiene Rubber	Therban® Zetpol®	HNBR	HNBR	H
Polyacrylate Rubber	Noxtite® Hytemp® Nipol AR®	ACM	ACM	A
Chloroprene Rubber	Baypren® Neoprene®	CR	CR	WC
Ethylene-Propylene-Diene Rubber	Dutral® Keltan® Vistalon® Buna EP®	EPDM	EPDM	E
Silicone Rubber	Elastoseal® Rhodorsil® Silastic® Silopren®	VMQ	VMQ	S
Fluorosilicone Rubber	Silastic®	FVMQ	FVMQ	F
Tetrafluorethylene-Propylene Copolymer Elastomer	Aflas®	FEPM	TFE / P**	WT
Butyl Rubber	Esso Butyl®	IIR	IIR	WI
Styrene-Butadiene Rubber	Buna S® Europrene® Polysar S®	SBR	SBR	WB
Natural Rubber		NR	WR	WR
Fluorocarbon Rubber	Dai-El® Fluorel® Tecnoflon® Viton®	FKM	FKM	V
Perfluoro Rubber	Isolast® Kalrez®	FFKM	FFKM	J
Polyester Urethane Polyether Urethane	Adiprene® Pellethan® Vulcollan® Desmopan®	AU EU	AU EU	WU WU
Chlorosulphonated Polyethylene Rubber	Hypalon®	CSM	CSM	WM
Polysulphide Elastomer	Thiocol®	-	TWT	WY
Epichlorohydrin Elastomer	Hydrin®	-	-	WO

* Selection of registered trade names
** Abbreviation not yet standardised

ASTM = American Society for Testing and Materials
ISO = International Organization for Standardization

For further details on O-Rings please refer to our catalogue "O-Ring".

BACK-UP RING



- Protective and supporting element -

- PTFE compounds, elastomers and other materials -

■ Description

Back-up Rings have no intended sealing function. Instead, as their name indicates, they are protective and supporting elements made from extrusion-resistant materials which generally have a rectangular cross section. They are installed in a groove together with an elastomeric sealing element preferably with a corresponding O-Ring in static applications.

Due to the tight fit of the Back-up Ring in the housing, they prevent extrusion of the pressurised elastomeric sealing element into the sealing gap.

Advantages

- Use of O-Rings in high pressure applications
- Use of O-Ring materials with a low hardness
- Compensation of radial sealing gaps
- Use for internal and external sealing applications
- Reciprocating and rotating movements possible
- Compensation for large temperature fluctuations
- Static and dynamic applications

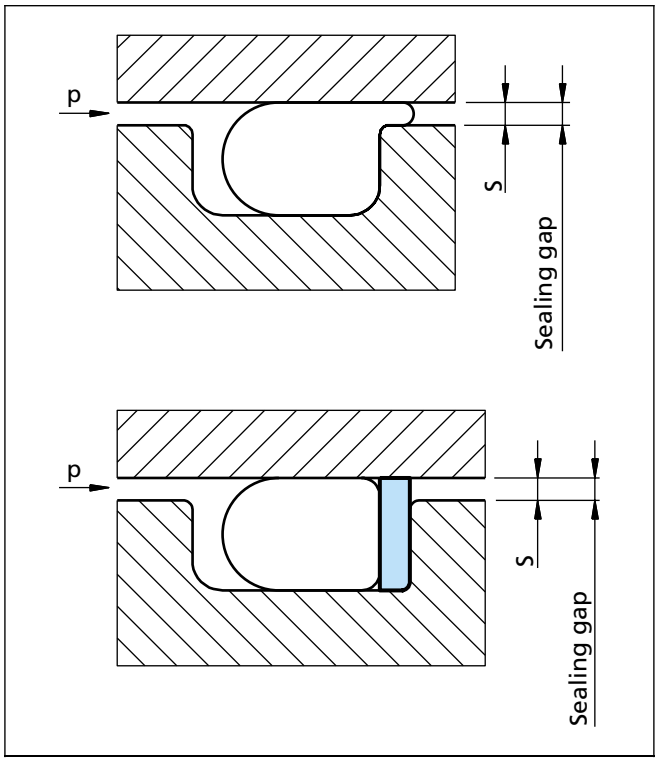


Figure 3 O-Ring installation with and without Back-up Ring

■ External sealing (Bore)

Back-up Ring types, uncut

■ Type BV

- Rectangular cross section
- Material PTFE
- Static and dynamic use
- Reciprocating and rotating movements possible

■ Type BB

- Concave cross section
- Materials: NBR, FKM
- The large contact surface protects the O-Ring against deformation in case of high pulsating pressure
- Dimensional stability of the O-Ring improves the sealing force and increases the service life
- Preferably for static use
- Reciprocating movements possible

■ Type BA

- Concave cross section
- Material: PTFE
- The large contact surface protects the O-Ring against deformation in case of high pulsating pressure
- Dimensional stability of the O-Ring improves the sealing force and increases the service life
- Static and dynamic use
- Reciprocating and rotating movements possible

■ Snap-back Back-up Ring, special Type

- Easy installation in closed grooves due to the snap-back effect of the material
- The dimensions are different compared to the standard Back-up Rings. Production only on request according to drawing

Back-up Ring types, cut

■ Type BH

- Rectangular cross section
- Material PTFE
- Cut angle of 30° or 45°
- Static and dynamic use
- Reciprocating and rotating movements possible
- Preferred for installations in a closed groove where uncut Back-up Rings are not suitable

■ Type BD

- Concave cross-section
- Material: PTFE
- Cut angle of 30° or 45°
- The large contact surface protects the O-Ring against deformation in case of high pulsating pressure
- Dimensional stability of the O-Ring improves the sealing force and increases the service life
- Static and dynamic use
- Reciprocating movements possible
- Preferred for installations in a closed groove where uncut Back-up Rings are not suitable

Back-up Ring types, spiral

■ Type BP

- Rectangular cross section
- Material: PTFE
- Cut angle of 30° or 45°
- Consists as standard two spiral windings which are cut at the ends at an angle
- Static and dynamic use
- For reciprocating movements only
- Preferred for installations in a closed groove where uncut Back-up Ring are not suitable
- Compensation of large temperature changes and tolerances without difficulties by a screw-like elongation and contraction. Easy Installation in closed grooves for external sealing applications
- The dimensions are different compared to standard Back-up Rings

■ Internal sealing (Rod)

Back-up Ring types, uncut

■ Type BU

- Rectangular cross section
- Material: PTFE
- Static and dynamic use
- Reciprocating and rotating movements possible

■ Type BB

- Concave cross-section
- Materials: PTFE, NBR, FKM
- The large contact surface protects the O-Ring against deformation in case of high pulsating pressure
- Dimensional stability of the O-Ring improves the sealing force and increases the service life
- Static and dynamic use
- Reciprocating movements possible

Back-up Ring types, cut

■ Type BG

- Rectangular cross section
- Material: PTFE
- Cut angle of 30° or 45°
- Static and dynamic use
- Reciprocating and rotating movement possible
- Preferred for installations in closed grooves where uncut Back-up Rings are not suitable

■ Type BC

- Concave cross-section
- Material: PTFE
- Cut angle of 30° or 45°
- The large contact surface protects the O-Ring against deformation in case of high pulsating pressure
- Dimensional stability of the O-Ring improves the sealing force and increases the service life
- Static and dynamic use
- Reciprocating movements possible
- Preferred for installations in a closed groove where uncut Back-up Rings are not suitable

Back-up Ring type, spiral

■ **Type BP**

- Rectangular cross section
- Material: PTFE
- Cut angle of 30° or 45°
- Consists as standard two spiral windings which are cut at the ends at an angle
- Static and dynamic use
- For reciprocating movements only
- Preferred for installations in a closed groove where uncut Back-up Rings are not suitable
- Compensation of large temperature changes and tolerances without difficulties by a screw-like elongation and contraction

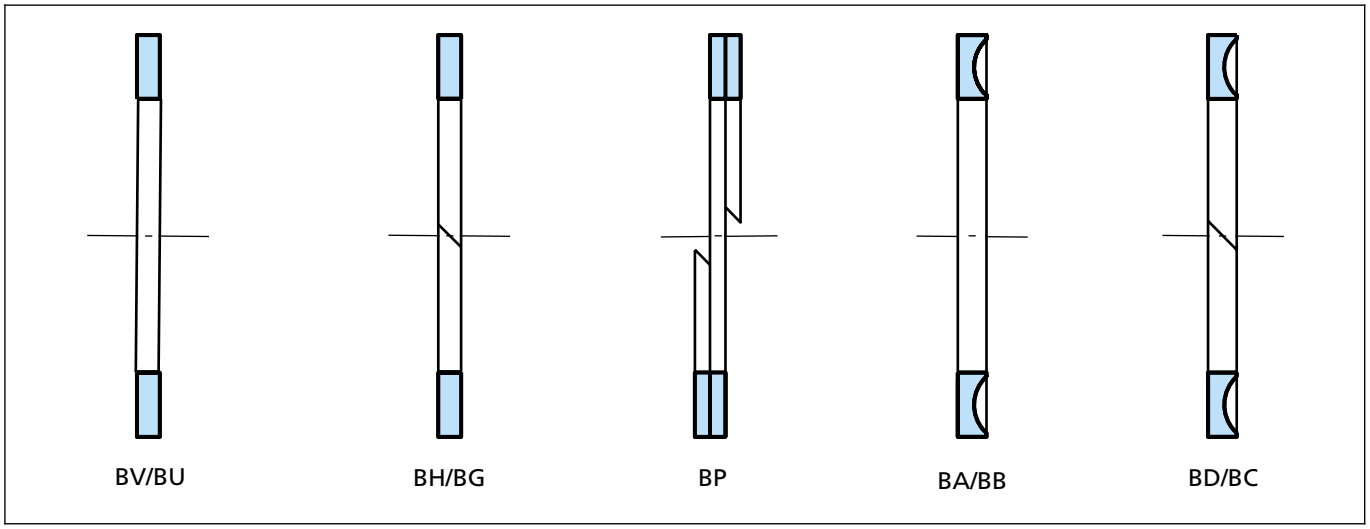


Figure 4 Back-up Ring types

External sealing (Bore)

■ **Type BV**

- Rectangular, uncut, PTFE

■ **Type BH**

- Rectangular, cut, PTFE

■ **Type BD**

- Concave, cut, PTFE

■ **Type BP**

- Spiral, PTFE

■ **Type BB**

- Concave, uncut, NBR + FKM

■ **Type BA**

- Concave, uncut, PTFE

Internal sealing (Rod)

■ **Type BU**

- Rectangular, uncut, PTFE

■ **Type BG**

- Rectangular, cut, PTFE

■ **Type BC**

- Concave, cut, PTFE

■ **Type BP**

- Spiral, PTFE

■ **Type BB**

- Concave, uncut, NBR + FKM + PTFE

■ Materials

Back-up Rings are as standard manufactured from virgin PTFE. In view of the unfavourable cold flow behaviour of virgin PTFE, these Back-up Rings are used only for low to medium loads. For higher load requirements, filled PTFE materials (with glassfibre, bronze, carbon, etc.) have to be used. For sealing against high pressures, Back-up Rings made from specially modified thermoplastic materials are used.

For the series production of larger quantities, injection moulded Back-up Rings can be manufactured, e.g. NBR 90 Shore A, FKM 90 Shore A, or thermoplastic elastomers (TPE) on request.

Base material	Material code	Type					Dynamic application
		BU/BV	BG/BH	BP	BB/BA	BC/BD	Pressure MPa
PTFE (virgin) - standard	PT00	●	●	●	●	●	25
PTFE - glassfibre-filled	PTGB	●	●	●	●	●	40
PTFE, carbon-filled	PTKC	●	●	●	●	●	40
PTFE, bronze-filled	PTB4	●	●	●	●	●	40
TPE-E	PR	●	●	-	●	●	30
NBR, 90 Shore A	N9	-	-	-	●	-	20
FKM, 90 Shore A	V9	-	-	-	●	-	20

■ Applications

Application examples

- Injection moulding machines
- Machine tools
- Presses
- Excavators
- Agricultural machines
- Valves for hydraulic circuits

Technical data

Operating pressure

Static applications:	Up to approx. 250 MPa depending on the Back-up Ring material and sealing gap
Dynamic applications:	Reciprocating up to approx. 40 MPa
	Oscillating/slowly rotating up to approx. 15 MPa
Speed:	Reciprocating or rotating up to approx. 2 m/s depending on the material
Operating temperature:	-200 °C to +260 °C depending on the material

Important Note:
The application limits for pressure and temperature given in this catalogue are maximum values. During practical applications it should be remembered that due to the interaction of operating parameters, the maximum values must be set correspondingly lower.

■ Design instructions

The recommendations for O-Rings (see catalogue "O-Rings") are generally valid for the use of Back-up Rings. This applies to the groove design, surface roughness, lead-in chamfers, etc.

When the pressure is applied from one side only, it is sufficient to install a Back-up Ring on the downstream side of the O-Ring. When the seal is exposed to pressure from both sides, two Back-up Rings - one on each side of the O-Ring - have to be used.

Permissible sealing gap

The use of Back-up Rings allows the service pressure and/or permissible sealing gap specified in our O-Ring catalogue to be increased.

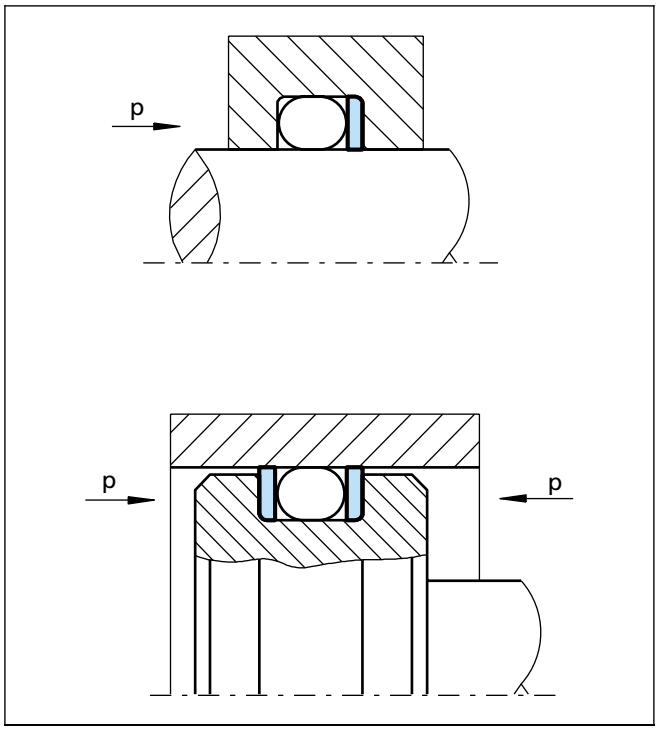


Figure 5 Back-up Ring installation, depending on the direction of the pressure

Installation recommendations static and dynamic applications

EXTERNAL SEALING (Bore), type BV (uncut) and type BH (cut), material PTFEhuhu

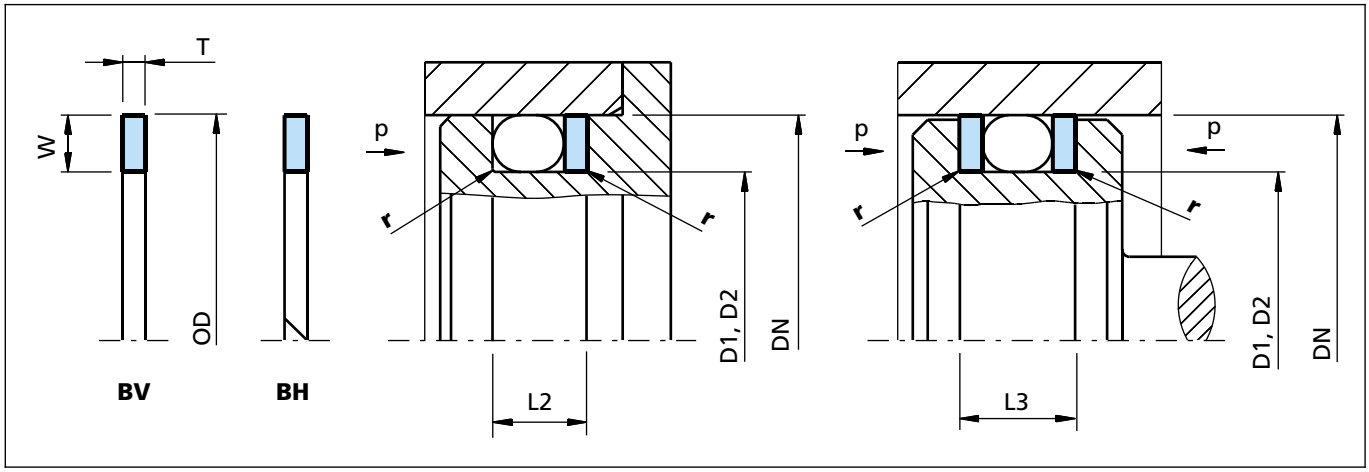


Figure 6 Installation drawing

Table III Installation dimensions

O-Ring cross section d2	Back-up Ring cross section			Groove dimensions				
	Radial height W		Thickness	Groove diameter		Groove width		Radius
	Dynamic	Static	T	Dynamic **D2** h9	Static **D1** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2
1.50	1.25	1.10	1.0	DN - 2.5	DN - 2.2	3.0	4.0	0.25
1.60	1.30	1.20	1.0	DN - 2.6	DN - 2.4	3.1	4.1	0.25
1.78	1.45	1.30	1.4	DN - 2.9	DN - 2.6	3.8	5.2	0.25
1.80	1.45	1.30	1.4	DN - 2.9	DN - 2.6	3.8	5.2	0.25
2.00	1.65	1.50	1.4	DN - 3.3	DN - 3.0	4.1	5.5	0.25
2.40	2.05	1.80	1.4	DN - 4.1	DN - 3.6	4.6	6.0	0.25
2.50	2.15	1.90	1.4	DN - 4.3	DN - 3.8	4.7	6.1	0.25
2.62	2.25	2.00	1.4	DN - 4.5	DN - 4.0	5.0	6.4	0.25
2.65	2.25	2.00	1.4	DN - 4.5	DN - 4.0	5.0	6.4	0.25
3.00	2.60	2.30	1.4	DN - 5.2	DN - 4.6	5.4	6.8	0.25
3.53	3.10	2.70	1.4	DN - 6.2	DN - 5.4	6.2	7.6	0.25
3.55	3.10	2.70	1.4	DN - 6.2	DN - 5.4	6.2	7.6	0.25
4.00	3.50	3.10	1.7	DN - 7.0	DN - 6.2	6.9	8.6	0.25
5.00	4.40	4.00	1.7	DN - 8.8	DN - 8.0	8.3	10.0	0.25
5.30	4.70	4.30	1.7	DN - 9.4	DN - 8.6	9.0	10.9	0.25
5.33	4.70	4.30	1.7	DN - 9.4	DN - 8.6	9.0	10.9	0.25
5.70	5.00	4.60	1.7	DN - 10.0	DN - 9.2	9.0	11.0	0.25
6.00	5.30	4.90	1.7	DN - 10.6	DN - 9.8	9.3	11.2	0.25
7.00	6.10	5.80	2.5	DN - 12.2	DN - 11.6	12.3	15.1	0.25
8.00	7.10	6.70	2.5	DN - 14.2	DN - 13.4	12.6	15.4	0.25
8.40	7.50	7.10	2.5	DN - 15.0	DN - 14.2	12.8	15.6	0.25

Ordering example

Back-up Ring:	Type BH (cut) For O-Ring seal
Application:	Static, external sealing
Bore diameter:	D_N = 40.00 mm
O-Ring cross section:	d_2 = 2.62 mm
Back-up Ring material:	PTFE, glassfibre filled
Material code see page 16	

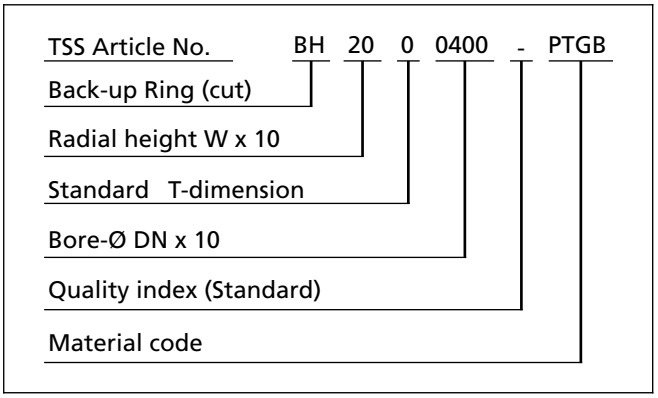


Table IV Preferred series static application

EXTERNAL SEALING (Bore), type BV (uncut) and type BH (cut), material PTFE

Bore Ø	Groove Ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.		O-Ring TSS Part No.	O-Ring dimension
DN H8	**D1** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**	**Cut**	**Uncut**		**d1 x d2**
6.0	3.4	3.8	5.2	0.25	6.0 x 1.3 x 1.4	BH1300060	BV1300060	ORAR00006	2.90 x 1.78
6.0	3.8	3.0	4.0	0.25	6.0 x 1.1 x 1.0	BH1100060	BV1100060	OR1500350	3.50 x 1.50
8.0	5.8	3.0	4.0	0.25	8.0 x 1.1 x 1.0	BH1100080	BV1100080	OR1500550	5.50 x 1.50
10.0	7.8	3.0	4.0	0.25	10.0 x 1.1 x 1.0	BH1100100	BV1100100	OR1500750	7.50 x 1.50
12.0	9.0	4.1	5.5	0.25	12.0 x 1.5 x 1.4	BH1500120	BV1500120	OR2000850	8.50 x 2.00
12.0	9.4	3.8	5.2	0.25	12.0 x 1.3 x 1.4	BH1300120	BV1300120	ORAR00012	9.25 x 1.78
14.0	11.0	4.1	5.5	0.25	14.0 x 1.5 x 1.4	BH1500140	BV1500140	OR2001000	10.00 x 2.00
14.0	11.4	3.8	5.2	0.25	14.0 x 1.3 x 1.4	BH1300140	BV1300140	ORAR00013	10.82 x 1.78
15.0	12.0	4.1	5.5	0.25	15.0 x 1.5 x 1.4	BH1500150	BV1500150	OR2001100	11.00 x 2.00
15.0	12.4	3.8	5.2	0.25	15.0 x 1.3 x 1.4	BH1300150	BV1300150	ORAR00014	12.42 x 1.78
16.0	13.0	4.1	5.5	0.25	16.0 x 1.5 x 1.4	BH1500160	BV1500160	OR2001200	12.00 x 2.00
16.0	13.4	3.8	5.2	0.25	16.0 x 1.3 x 1.4	BH1300160	BV1300160	ORAR00015	14.00 x 1.78
18.0	15.0	4.1	5.5	0.25	18.0 x 1.5 x 1.4	BH1500180	BV1500180	OR2001400	14.00 x 2.00
18.0	15.4	3.8	5.2	0.25	18.0 x 1.3 x 1.4	BH1300180	BV1300180	ORAR00016	15.60 x 1.78
20.0	17.0	4.1	5.5	0.25	20.0 x 1.5 x 1.4	BH1500200	BV1500200	OR2001600	16.00 x 2.00
20.0	17.4	3.8	5.2	0.25	20.0 x 1.3 x 1.4	BH1300200	BV1300200	ORAR00017	17.17 x 1.78
22.0	19.0	4.1	5.5	0.25	22.0 x 1.5 x 1.4	BH1500220	BV1500220	OR2001600	16.00 x 2.00
22.0	19.4	3.8	5.2	0.25	22.0 x 1.3 x 1.4	BH1300220	BV1300220	ORAR00018	18.77 x 1.78
25.0	22.0	4.1	5.5	0.25	25.0 x 1.5 x 1.4	BH1500250	BV1500250	OR2002100	21.00 x 2.00
25.0	22.4	3.8	5.2	0.25	25.0 x 1.3 x 1.4	BH1300250	BV1300250	ORAR00020	21.95 x 1.78
28.0	23.4	5.4	6.8	0.25	28.0 x 2.3 x 1.4	BH2300280	BV2300280	OR3002200	22.00 x 3.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Bore Ø	Groove Ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.		O-Ring TSS Part No.	O-Ring dimension
DN H8	D1 h9	L2 +0.2	L3 +0.2	r ±0.2	OD x W x T	Cut	Uncut		d1 x d2
28.0	24.0	5.0	6.4	0.25	28.0 x 2.0 x 1.4	BH2000280	BV2000280	ORAR00119	23.47 x 2.62
30.0	25.4	5.4	6.8	0.25	30.0 x 2.3 x 1.4	BH2300300	BV2300300	OR3002400	24.00 x 2.00
30.0	26.0	5.0	6.4	0.25	30.0 x 2.0 x 1.4	BH2000300	BV2000300	ORAR00120	25.07x 2.62
32.0	27.4	5.4	6.8	0.25	32.0 x 2.3 x 1.4	BH2300320	BV2300320	OR3002600	26.00 x 3.00
32.0	28.0	5.0	6.4	0.25	32.0 x 2.0 x 1.4	BH2000320	BV2000320	ORAR00121	26.64 x 2.62
35.0	30.4	5.4	6.8	0.25	35.0 x 2.3 x 1.4	BH2300350	BV2300350	OR3002900	29.30 x 3.00
35.0	31.0	5.0	6.4	0.25	35.0 x 2.0 x 1.4	BH2000350	BV2000350	ORAR00123	29.82 x 2.62
40.0	35.4	5.4	6.8	0.25	40.0 x 2.3 x 1.4	BH2300400	BV2300400	OR3003400	34.00 x 3.00
40.0	36.0	5.0	6.4	0.25	40.0 x 2.0 x 1.4	BH2000400	BV2000400	ORAR00126	34.59 x 2.62
42.0	37.4	5.4	6.8	0.25	42.0 x 2.3 x 1.4	BH2300420	BV2300420	OR3003600	36.00 x 3.00
42.0	38.0	5.0	6.4	0.25	42.0 x 2.0 x 1.4	BH2000420	BV2000420	ORAR00127	36.17 x 2.62
45.0	40.0	5.4	6.8	0.25	45.0 x 2.3 x 1.4	BH2300450	BV2300450	OR3003900	39.00 x 3.00
45.0	41.0	5.0	6.4	0.25	45.0 x 2.0 x 1.4	BH2000450	BV2000450	ORAR00129	39.34 x 2.62
48.0	41.8	6.9	8.6	0.25	48.0 x 3.1 x 1.7	BH3100480	BV3100480	OR4004000	40.00 x 4.00
48.0	42.6	6.2	7.6	0.25	48.0 x 2.7 x 1.4	BH2700480	BV2700480	ORAR00223	40.87 x 3.53
50.0	43.8	6.9	8.6	0.25	50.0 x 3.1 x 1.7	BH3100500	BV3100500	OR4004200	42.00 x 4.00
50.0	44.6	6.2	7.6	0.25	50.0 x 2.7 x 1.4	BH2700500	BV2700500	ORAR00224	44.04 x 3.53
52.0	45.8	6.9	8.6	0.25	52.0 x 3.1 x 1.7	BH3100520	BV3100520	OR4004400	44.00 x 4.00
52.0	46.6	6.2	7.6	0.25	52.0 x 2.7 x 1.4	BH2700520	BV2700520	ORAR00224	44.04 x 3.53
55.0	48.8	6.9	8.6	0.25	55.0 x 3.1 x 1.7	BH3100550	BV3100550	OR4004700	47.00 x 4.00
55.0	49.6	6.2	7.6	0.25	55.0 x 2.7 x 1.4	BH2700550	BV2700550	ORAR00225	47.22 x 3.53
60.0	53.8	6.9	8.6	0.25	60.0 x 3.1 x 1.7	BH3100600	BV3100600	OR4005200	52.00 x 4.00
60.0	54.6	6.2	7.6	0.25	60.0 x 2.7 x 1.4	BH2700600	BV2700600	ORAR00227	53.57 x 3.53
63.0	56.8	6.9	8.6	0.25	63.0 x 3.1 x 1.7	BH3100630	BV3100630	OR4005500	55.00 x 4.00
63.0	57.6	6.2	7.6	0.25	63.0 x 2.7 x 1.4	BH2700630	BV2700630	ORAR00228	56.74 x 3.53
65.0	58.8	6.9	8.6	0.25	65.0 x 3.1 x 1.7	BH3100650	BV3100650	OR4005700	57.00 x 4.00
65.0	59.6	6.2	7.6	0.25	65.0 x 2.7 x 1.4	BH2700650	BV2700650	ORAR00228	56.74 x 3.53
70.0	63.8	6.9	8.6	0.25	70.0 x 3.1 x 1.7	BH3100700	BV3100700	OR4006200	62.00 x 4.00
70.0	64.6	6.2	7.6	0.25	70.0 x 2.7 x 1.4	BH2700700	BV2700700	ORAR00230	63.09 x 3.53
75.0	68.8	6.9	8.6	0.25	75.0 x 3.1 x 1.7	BH3100750	BV3100750	OR4006700	67.00 x 4.00
75.0	69.6	6.2	7.6	0.25	75.0 x 2.7 x 1.4	BH2700750	BV2700750	ORAR00231	66.27 x 3.53
80.0	73.8	6.9	8.6	0.25	80.0 x 3.1 x 1.7	BH3100800	BV3100800	OR4007200	72.00 x 4.00
80.0	74.6	6.2	7.6	0.25	80.0 x 2.7 x 1.4	BH2700800	BV2700800	ORAR00233	72.62 x 3.53
85.0	78.8	6.9	8.6	0.25	85.0 x 3.1 x 1.7	BH3100850	BV3100850	OR4007700	77.00 x 4.00
85.0	79.6	6.2	7.6	0.25	85.0 x 2.7 x 1.4	BH2700850	BV2700850	ORAR00235	78.97 x 3.53
90.0	81.4	9.0	10.9	0.25	90.0 x 4.3 x 1.7	BH4300900	BV4300900	ORAR00338	78.74 x 5.33

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Bore Ø	Groove Ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.		O-Ring TSS Part No.	O-Ring dimension
DN H8	**D1** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**	**Cut**	**Uncut**		**d1 x d2**
90.0	82.0	8.3	10.0	0.25	90.0 x 4.0 x 1.7	BH4000900	BV4000900	OR5008000	80.00 x 5.00
95.0	86.4	9.0	10.9	0.25	95.0 x 4.3 x 1.7	BH4300950	BV4300950	ORAR00340	85.09 x 5.33
95.0	87.0	8.3	10.0	0.25	95.0 x 4.0 x 1.7	BH4000950	BV4000950	OR5008000	80.00 x 5.00
100.0	91.4	9.0	10.9	0.25	100.0 x 4.3 x 1.7	BH4301000	BV4301000	ORAR00342	91.44 x 5.33
100.0	92.0	8.3	10.0	0.25	100.0 x 4.0 x 1.7	BH4001000	BV4001000	OR5009000	90.00 x 5.00
105.0	96.4	9.0	10.9	0.25	105.0 x 4.3 x 1.7	BH4301050	BV4301050	ORAR00343	94.62 x 5.33
105.0	97.0	8.3	10.0	0.25	105.0 x 4.0 x 1.7	BH4001050	BV4001050	OR5009500	95.00 x 5.00
110.0	101.4	9.0	10.9	0.25	110.0 x 4.3 x 1.7	BH4301100	BV4301100	ORAR00345	100.97 x 5.33
110.0	102.0	8.3	10.0	0.25	110.0 x 4.0 x 1.7	BH4001100	BV4001100	OR5010000	100.00 x 5.00
115.0	106.4	9.0	10.9	0.25	115.0 x 4.3 x 1.7	BH4301150	BV4301150	ORAR00346	104.14 x 5.33
115.0	107.0	8.3	10.0	0.25	115.0 x 4.0 x 1.7	BH4001150	BV4001150	OR5010500	105.00 x 5.00
120.0	111.4	9.0	10.9	0.25	120.0 x 4.3 x 1.7	BH4301200	BV4301200	ORAR00348	110.49 x 5.33
120.0	112.0	8.3	10.0	0.25	120.0 x 4.0 x 1.7	BH4001200	BV4001200	OR5011000	110.00 x 5.00
125.0	116.4	9.0	10.9	0.25	125.0 x 4.3 x 1.7	BH4301250	BV4301250	ORAR00349	113.67 x 5.33
125.0	117.0	8.3	10.0	0.25	125.0 x 4.0 x 1.7	BH4001250	BV4001250	OR5011500	115.00 x 5.00
130.0	121.4	9.0	10.9	0.25	130.0 x 4.3 x 1.7	BH4301300	BV4301300	ORAR00351	120.02 x 5.33
130.0	122.0	8.3	10.0	0.25	130.0 x 4.0 x 1.7	BH4001300	BV4001300	OR5012000	120.00 x 5.00
135.0	123.4	12.3	15.1	0.25	135.0 x 5.8 x 2.5	BH5801350	BV5801350	ORAR00427	120.02 x 7.00
140.0	128.4	12.3	15.1	0.25	140.0 x 5.8 x 2.5	BH5801400	BV5801400	ORAR00429	126.37 x 7.00
150.0	138.4	12.3	15.1	0.25	150.0 x 5.8 x 2.5	BH5801500	BV5801500	ORAR00432	135.89 x 7.00
160.0	148.4	12.3	15.1	0.25	160.0 x 5.8 x 2.5	BH5801600	BV5801600	ORAR00435	145.42 x 7.00
170.0	158.4	12.3	15.1	0.25	170.0 x 5.8 x 2.5	BH5801700	BV5801700	ORAR00438	158.12 x 7.00
180.0	168.4	12.3	15.1	0.25	180.0 x 5.8 x 2.5	BH5801800	BV5801800	ORAR00439	164.47 x 7.00
190.0	178.4	12.3	15.1	0.25	190.0 x 5.8 x 2.5	BH5801900	BV5801900	ORAR00441	177.17 x 7.00
200.0	188.4	12.3	15.1	0.25	200.0 x 5.8 x 2.5	BH5802000	BV5802000	ORAR00442	183.52 x 7.00
210.0	198.4	12.3	15.1	0.25	210.0 x 5.8 x 2.5	BH5802100	BV5802100	ORAR00444	196.22 x 7.00
220.0	208.4	12.3	15.1	0.25	220.0 x 5.8 x 2.5	BH5802200	BV5802200	ORAR00445	202.57 x 7.00
230.0	218.4	12.3	15.1	0.25	230.0 x 5.8 x 2.5	BH5802300	BV5802300	ORAR00446	215.27 x 7.00
240.0	228.4	12.3	15.1	0.25	240.0 x 5.8 x 2.5	BH5802400	BV5802400	ORAR00447	227.97 x 7.00
250.0	238.4	12.3	15.1	0.25	250.0 x 5.8 x 2.5	BH5802500	BV5802500	ORAR00448	240.67 x 7.00
280.0	268.4	12.3	15.1	0.25	280.0 x 5.8 x 2.5	BH5802800	BV5802800	ORAR00450	266.07 x 7.00
300.0	288.4	12.3	15.1	0.25	300.0 x 5.8 x 2.5	BH5803000	BV5803000	ORAR00451	278.77 x 7.00
320.0	308.4	12.3	15.1	0.25	320.0 x 5.8 x 2.5	BH5803200	BV5803200	ORAR00453	304.17 x 7.00
350.0	338.4	12.3	15.1	0.25	350.0 x 5.8 x 2.5	-	BV5803500	ORAR00455	329.57 x 7.00
400.0	388.4	12.3	15.1	0.25	400.0 x 5.8 x 2.5	-	BV5804000	ORAR00459	380.37 x 7.00
420.0	408.4	12.3	15.1	0.25	420.0 x 5.8 x 2.5	-	BV5804200	ORAR00461	405.26 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Back-up Ring

Bore Ø	Groove Ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.		O-Ring TSS Part No.	O-Ring dimension
DN H8	**D1** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**	**Cut**	**Uncut**		**d1 x d2**
450.0	438.4	12.3	15.1	0.25	450.0 x 5.8 x 2.5	-	BV5804500	ORAR00463	430.66 x 7.00
480.0	468.4	12.3	15.1	0.25	480.0 x 5.8 x 2.5	-	BV5804800	ORAR00465	456.06 x 7.00
500.0	488.4	12.3	15.1	0.25	500.0 x 5.8 x 2.5	-	BV5805000	ORAR00467	481.46 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Installation recommendations static and dynamic applications

EXTERNAL SEALING (Bore), type BA (uncut) and type BD (cut), material PTFE

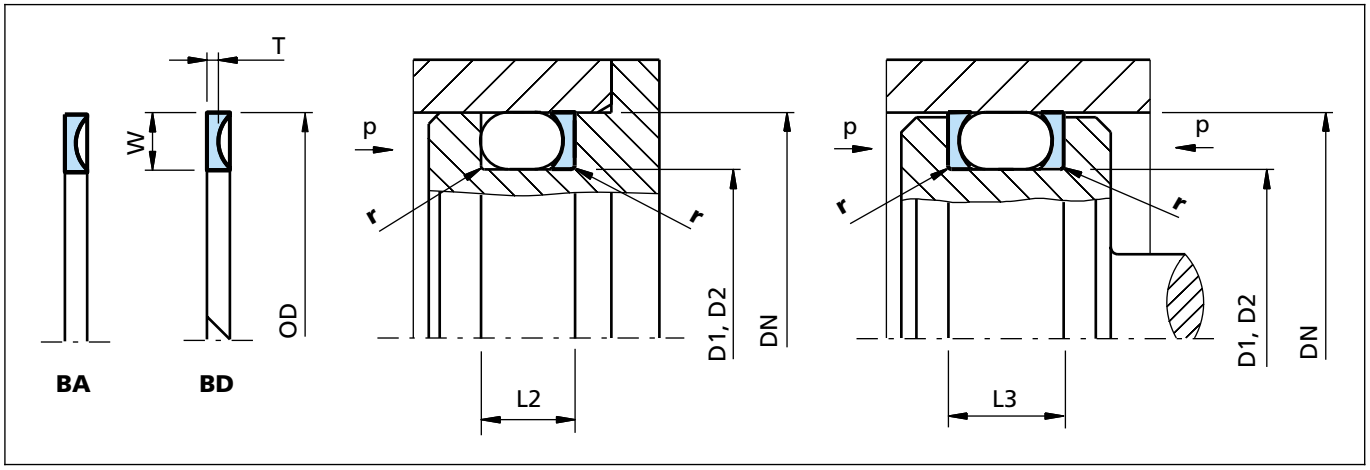


Figure 7 Installation drawing

Table V Installation dimensions

O-Ring cross section d2	Back-up Ring cross section			Groove dimensions				
	Radial height W		Thickness	Groove diameter		Groove width		Radius
	Dynamic	Static	T	Dynamic D2 h9	Static D1 h9	L2 +0.2	L3 +0.2	r ±0.2
1.50	1.25	1.10	1.0	DN - 2.5	DN - 2.2	3.0	4.0	0.25
1.60	1.30	1.20	1.0	DN - 2.6	DN - 2.4	3.1	4.1	0.25
1.78	1.45	1.30	1.4	DN - 2.9	DN - 2.6	3.8	5.2	0.25
1.80	1.45	1.30	1.4	DN - 2.9	DN - 2.6	3.8	5.2	0.25
2.00	1.65	1.50	1.4	DN - 3.3	DN - 3.0	4.1	5.5	0.25
2.40	2.05	1.80	1.4	DN - 4.1	DN - 3.6	4.6	6.0	0.25
2.50	2.15	1.90	1.4	DN - 4.3	DN - 3.8	4.7	6.1	0.25
2.62	2.25	2.00	1.4	DN - 4.5	DN - 4.0	5.0	6.4	0.25
2.65	2.25	2.00	1.4	DN - 4.5	DN - 4.0	5.0	6.4	0.25
3.00	2.60	2.30	1.4	DN - 5.2	DN - 4.6	5.4	6.8	0.25
3.53	3.10	2.70	1.4	DN - 6.2	DN - 5.4	6.2	7.6	0.25
3.55	3.10	2.70	1.4	DN - 6.2	DN - 5.4	6.2	7.6	0.25
4.00	3.50	3.10	1.7	DN - 7.0	DN - 6.2	6.9	8.6	0.25
5.00	4.40	4.00	1.7	DN - 8.8	DN - 8.0	8.3	10.0	0.25
5.30	4.70	4.30	1.7	DN - 9.4	DN - 8.6	9.0	10.9	0.25
5.33	4.70	4.30	1.7	DN - 9.4	DN - 8.6	9.0	10.9	0.25
5.70	5.00	4.60	1.7	DN - 10.0	DN - 9.2	9.0	11.0	0.25
6.00	5.30	4.90	1.7	DN - 10.6	DN - 9.8	9.3	11.2	0.25
7.00	6.10	5.80	2.5	DN - 12.2	DN - 11.6	12.3	15.1	0.25
8.00	7.10	6.70	2.5	DN - 14.2	DN - 13.4	12.6	15.4	0.25
8.40	7.50	7.10	2.5	DN - 15.0	DN - 14.2	12.8	15.6	0.25

Ordering example

Back-up Ring:	Concave, type BD (cut) For O-Ring seal
Application:	Static, external sealing
Bore diameter:	D_N = 40.00 mm
O-Ring cross section:	d_2 = 2.62 mm
Back-up Ring material:	PTFE, carbon filled
Material code see page 16	

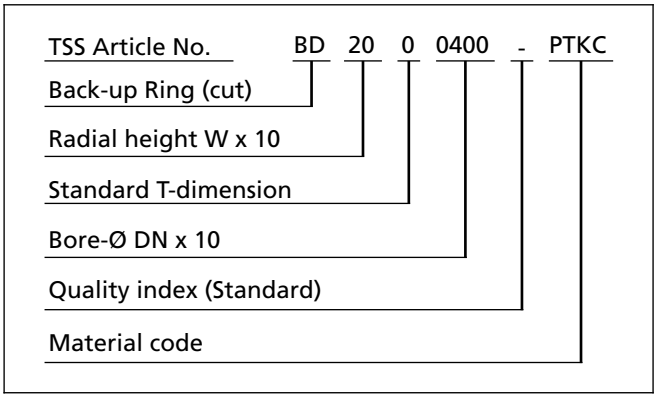


Table VI Preferred series static application

EXTERNAL SEALING (Bore), type BD (concave, cut), material PTFE

Bore ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
DN H8	**D1** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**			**d1 x d2**
6.0	3.4	3.8	5.2	0.25	6.0 x 1.3 x 1.4	BD1300060	ORAR00006	2.90 x 1.78
6.0	3.8	3.0	4.0	0.25	6.0 x 1.1 x 1.0	BD1100060	OR1500350	3.50 x 1.50
8.0	5.8	3.0	4.0	0.25	8.0 x 1.1 x 1.0	BD1100080	OR1500550	5.50 x 1.50
10.0	7.8	3.0	4.0	0.25	10.0 x 1.1 x 1.0	BD1100100	OR1500750	7.50 x 1.50
12.0	9.0	4.1	5.5	0.25	12.0 x 1.5 x 1.4	BD1500120	OR2000850	8.50 x 2.00
12.0	9.4	3.8	5.2	0.25	12.0 x 1.3 x 1.4	BD1300120	ORAR00012	9.25 x 1.78
14.0	11.0	4.1	5.5	0.25	14.0 x 1.5 x 1.4	BD1500140	OR2001000	10.00 x 2.00
14.0	11.4	3.8	5.2	0.25	14.0 x 1.3 x 1.4	BD1300140	ORAR00013	10.82 x 1.78
15.0	12.0	4.1	5.5	0.25	15.0 x 1.5 x 1.4	BD1500150	OR2001100	11.00 x 2.00
15.0	12.4	3.8	5.2	0.25	15.0 x 1.3 x 1.4	BD1300150	ORAR00014	12.42 x 1.78
16.0	13.0	4.1	5.5	0.25	16.0 x 1.5 x 1.4	BD1500160	OR2001200	12.00 x 2.00
16.0	13.4	3.8	5.2	0.25	16.0 x 1.3 x 1.4	BD1300160	ORAR00015	14.00 x 1.78
18.0	15.0	4.1	5.5	0.25	18.0 x 1.5 x 1.4	BD1500180	OR2001400	14.00 x 2.00
18.0	15.4	3.8	5.2	0.25	18.0 x 1.3 x 1.4	BD1300180	ORAR00016	15.60 x 1.78
20.0	17.0	4.1	5.5	0.25	20.0 x 1.5 x 1.4	BD1500200	OR2001600	16.00 x 2.00
20.0	17.4	3.8	5.2	0.25	20.0 x 1.3 x 1.4	BD1300200	ORAR00017	17.17 x 1.78
22.0	19.0	4.1	5.5	0.25	22.0 x 1.5 x 1.4	BD1500220	OR2001600	16.00 x 2.00
22.0	19.4	3.8	5.2	0.25	22.0 x 1.3 x 1.4	BD1300220	ORAR00018	18.77 x 1.78
25.0	22.0	4.1	5.5	0.25	25.0 x 1.5 x 1.4	BD1500250	OR2002100	21.00 x 2.00
25.0	22.4	3.8	5.2	0.25	25.0 x 1.3 x 1.4	BD1300250	ORAR00020	21.95 x 1.78
28.0	23.4	5.4	6.8	0.25	28.0 x 2.3 x 1.4	BD2300280	OR3002200	22.00 x 3.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Back-up Ring

Bore ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
DN H8	**D1** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**			**d1 x d2**
28.0	24.0	5.0	6.4	0.25	28.0 x 2.0 x 1.4	BD2000280	ORAR00119	23.47 x 2.62
30.0	25.4	5.4	6.8	0.25	30.0 x 2.3 x 1.4	BD2300300	OR3002400	24.00 x 2.00
30.0	26.0	5.0	6.4	0.25	30.0 x 2.0 x 1.4	BD2000300	ORAR00120	25.07x 2.62
32.0	27.4	5.4	6.8	0.25	32.0 x 2.3 x 1.4	BD2300320	OR3002600	26.00 x 3.00
32.0	28.0	5.0	6.4	0.25	32.0 x 2.0 x 1.4	BD2000320	ORAR00121	26.64 x 2.62
35.0	30.4	5.4	6.8	0.25	35.0 x 2.3 x 1.4	BD2300350	OR3002900	29.30 x 3.00
35.0	31.0	5.0	6.4	0.25	35.0 x 2.0 x 1.4	BD2000350	ORAR00123	29.82 x 2.62
40.0	35.4	5.4	6.8	0.25	40.0 x 2.3 x 1.4	BD2300400	OR3003400	34.00 x 3.00
40.0	36.0	5.0	6.4	0.25	40.0 x 2.0 x 1.4	BD2000400	ORAR00126	34.59 x 2.62
42.0	37.4	5.4	6.8	0.25	42.0 x 2.3 x 1.4	BD2300420	OR3003600	36.00 x 3.00
42.0	38.0	5.0	6.4	0.25	42.0 x 2.0 x 1.4	BD2000420	ORAR00127	36.17 x 2.62
45.0	40.0	5.4	6.8	0.25	45.0 x 2.3 x 1.4	BD2300450	OR3003900	39.00 x 3.00
45.0	41.0	5.0	6.4	0.25	45.0 x 2.0 x 1.4	BD2000450	ORAR00129	39.34 x 2.62
48.0	41.8	6.9	8.6	0.25	48.0 x 3.1 x 1.7	BD3100480	OR4004000	40.00 x 4.00
48.0	42.6	6.2	7.6	0.25	48.0 x 2.7 x 1.4	BD2700480	ORAR00223	40.87 x 3.53
50.0	43.8	6.9	8.6	0.25	50.0 x 3.1 x 1.7	BD3100500	OR4004200	42.00 x 4.00
50.0	44.6	6.2	7.6	0.25	50.0 x 2.7 x 1.4	BD2700500	ORAR00224	44.04 x 3.53
52.0	45.8	6.9	8.6	0.25	52.0 x 3.1 x 1.7	BD3100520	OR4004400	44.00 x 4.00
52.0	46.6	6.2	7.6	0.25	52.0 x 2.7 x 1.4	BD2700520	ORAR00224	44.04 x 3.53
55.0	48.8	6.9	8.6	0.25	55.0 x 3.1 x 1.7	BD3100550	OR4004700	47.00 x 4.00
55.0	49.6	6.2	7.6	0.25	55.0 x 2.7 x 1.4	BD2700550	ORAR00225	47.22 x 3.53
60.0	53.8	6.9	8.6	0.25	60.0 x 3.1 x 1.7	BD3100600	OR4005200	52.00 x 4.00
60.0	54.6	6.2	7.6	0.25	60.0 x 2.7 x 1.4	BD2700600	ORAR00227	53.57 x 3.53
63.0	56.8	6.9	8.6	0.25	63.0 x 3.1 x 1.7	BD3100630	OR4005500	55.00 x 4.00
63.0	57.6	6.2	7.6	0.25	63.0 x 2.7 x 1.4	BD2700630	ORAR00228	56.74 x 3.53
65.0	58.8	6.9	8.6	0.25	65.0 x 3.1 x 1.7	BD3100650	OR4005700	57.00 x 4.00
65.0	59.6	6.2	7.6	0.25	65.0 x 2.7 x 1.4	BD2700650	ORAR00228	56.74 x 3.53
70.0	63.8	6.9	8.6	0.25	70.0 x 3.1 x 1.7	BD3100700	OR4006200	62.00 x 4.00
70.0	64.6	6.2	7.6	0.25	70.0 x 2.7 x 1.4	BD2700700	ORAR00230	63.09 x 3.53
75.0	68.8	6.9	8.6	0.25	75.0 x 3.1 x 1.7	BD3100750	OR4006700	67.00 x 4.00
75.0	69.6	6.2	7.6	0.25	75.0 x 2.7 x 1.4	BD2700750	ORAR00231	66.27 x 3.53
80.0	73.8	6.9	8.6	0.25	80.0 x 3.1 x 1.7	BD3100800	OR4007200	72.00 x 4.00
80.0	74.6	6.2	7.6	0.25	80.0 x 2.7 x 1.4	BD2700800	ORAR00233	72.62 x 3.53
85.0	78.8	6.9	8.6	0.25	85.0 x 3.1 x 1.7	BD3100850	OR4007700	77.00 x 4.00
85.0	79.6	5.2	7.6	0.25	85.0 x 2.7 x 1.4	BD2700850	ORAR00235	78.97 x 3.53
90.0	81.4	9.0	10.9	0.25	90.0 x 4.3 x 1.7	BD4300900	ORAR00338	78.74 x 5.33

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Back-up Ring

Bore ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
DN H8	**D1** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**			**d1 x d2**
90.0	82.0	8.3	10.0	0.25	90.0 x 4.0 x 1.7	BD4000900	OR5008000	80.00 x 5.00
95.0	86.4	9.0	10.9	0.25	95.0 x 4.3 x 1.7	BD4300950	ORAR00340	85.09 x 5.33
95.0	87.0	8.3	10.0	0.25	95.0 x 4.0 x 1.7	BD4000950	OR5008000	80.00 x 5.00
100.0	91.4	9.0	10.9	0.25	100.0 x 4.3 x 1.7	BD4301000	ORAR00342	91.44 x 5.33
100.0	92.0	8.3	10.0	0.25	100.0 x 4.0 x 1.7	BD4001000	OR5009000	90.00 x 5.00
105.0	96.4	9.0	10.9	0.25	105.0 x 4.3 x 1.7	BD4301050	ORAR00343	94.62 x 5.33
105.0	97.0	8.3	10.0	0.25	105.0 x 4.0 x 1.7	BD4001050	OR5009500	95.00 x 5.00
110.0	101.4	9.0	10.9	0.25	110.0 x 4.3 x 1.7	BD4301100	ORAR00345	100.97 x 5.33
110.0	102.0	8.3	10.0	0.25	110.0 x 4.0 x 1.7	BD4001100	OR5010000	100.00 x 5.00
115.0	106.4	9.0	10.9	0.25	115.0 x 4.3 x 1.7	BD4301150	ORAR00346	104.14 x 5.33
115.0	107.0	8.3	10.0	0.25	115.0 x 4.0 x 1.7	BD4001150	OR5010500	105.00 x 5.00
120.0	111.4	9.0	10.9	0.25	120.0 x 4.3 x 1.7	BD4301200	ORAR00348	110.49 x 5.33
120.0	112.0	8.3	10.0	0.25	120.0 x 4.0 x 1.7	BD4001200	OR5011000	110.00 x 5.00
125.0	116.4	9.0	10.9	0.25	125.0 x 4.3 x 1.7	BD4301250	ORAR00349	113.67 x 5.33
125.0	117.0	8.3	10.0	0.25	125.0 x 4.0 x 1.7	BD4001250	OR5011500	115.00 x 5.00
130.0	121.4	9.0	10.9	0.25	130.0 x 4.3 x 1.7	BD4301300	ORAR00351	120.02 x 5.33
130.0	122.0	8.3	10.0	0.25	130.0 x 4.0 x 1.7	BD4001300	OR5012000	120.00 x 5.00
135.0	123.4	12.3	15.1	0.25	135.0 x 5.8 x 2.5	BD5801350	ORAR00427	120.02 x 7.00
140.0	128.4	12.3	15.1	0.25	140.0 x 5.8 x 2.5	BD5801400	ORAR00429	126.37 x 7.00
150.0	138.4	12.3	15.1	0.25	150.0 x 5.8 x 2.5	BD5801500	ORAR00432	135.89 x 7.00
160.0	148.4	12.3	15.1	0.25	160.0 x 5.8 x 2.5	BD5801600	ORAR00435	145.42 x 7.00
170.0	158.4	12.3	15.1	0.25	170.0 x 5.8 x 2.5	BD5801700	ORAR00438	158.12 x 7.00
180.0	168.4	12.3	15.1	0.25	180.0 x 5.8 x 2.5	BD5801800	ORAR00439	164.47 x 7.00
190.0	178.4	12.3	15.1	0.25	190.0 x 5.8 x 2.5	BD5801900	ORAR00441	177.17 x 7.00
200.0	188.4	12.3	15.1	0.25	200.0 x 5.8 x 2.5	BD5802000	ORAR00442	183.52 x 7.00
210.0	198.4	12.3	15.1	0.25	210.0 x 5.8 x 2.5	BD5802100	ORAR00444	196.22 x 7.00
220.0	208.4	12.3	15.1	0.25	220.0 x 5.8 x 2.5	BD5802200	ORAR00445	202.57 x 7.00
230.0	218.4	12.3	15.1	0.25	230.0 x 5.8 x 2.5	BD5802300	ORAR00446	215.27 x 7.00
240.0	228.4	12.3	15.1	0.25	240.0 x 5.8 x 2.5	BD5802400	ORAR00447	227.97 x 7.00
250.0	238.4	12.3	15.1	0.25	250.0 x 5.8 x 2.5	BD5802500.	ORAR00448	240.67 x 7.00
280.0	268.4	12.3	15.1	0.25	280.0 x 5.8 x 2.5	BD5802800	ORAR00450	266.07 x 7.00
300.0	288.4	12.3	15.1	0.25	300.0 x 5.8 x 2.5	BD5803000	ORAR00451	278.77 x 7.00
320.0	308.4	12.3	15.1	0.25	320.0 x 5.8 x 2.5	BD5803200	ORAR00453	304.17 x 7.00
350.0	338.4	12.3	15.1	0.25	350.0 x 5.8 x 2.5	BD5803500	ORAR00455	329.57 x 7.00
400.0	388.4	12.3	15.1	0.25	400.0 x 5.8 x 2.5	BD5804000	ORAR00459	380.37 x 7.00
420.0	408.4	12.3	15.1	0.25	420.0 x 5.8 x 2.5	BD5804200	ORAR00461	405.26 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Back-up Ring

Bore ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
DN H8	**D1** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**			**d1 x d2**
450.0	438.4	12.3	15.1	0.25	450.0 x 5.8 x 2.5	BD5804500	ORAR00463	430.66 x 7.00
480.0	468.4	12.3	15.1	0.25	480.0 x 5.8 x 2.5	BD5804800	ORAR00465	456.06 x 7.00
500.0	488.4	12.3	15.1	0.25	500.0 x 5.8 x 2.5	BD5805000	ORAR00467	481.46 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Installation recommendations static and dynamic applications

EXTERNAL SEALING (Bore), type BP (spiral), material PTFE

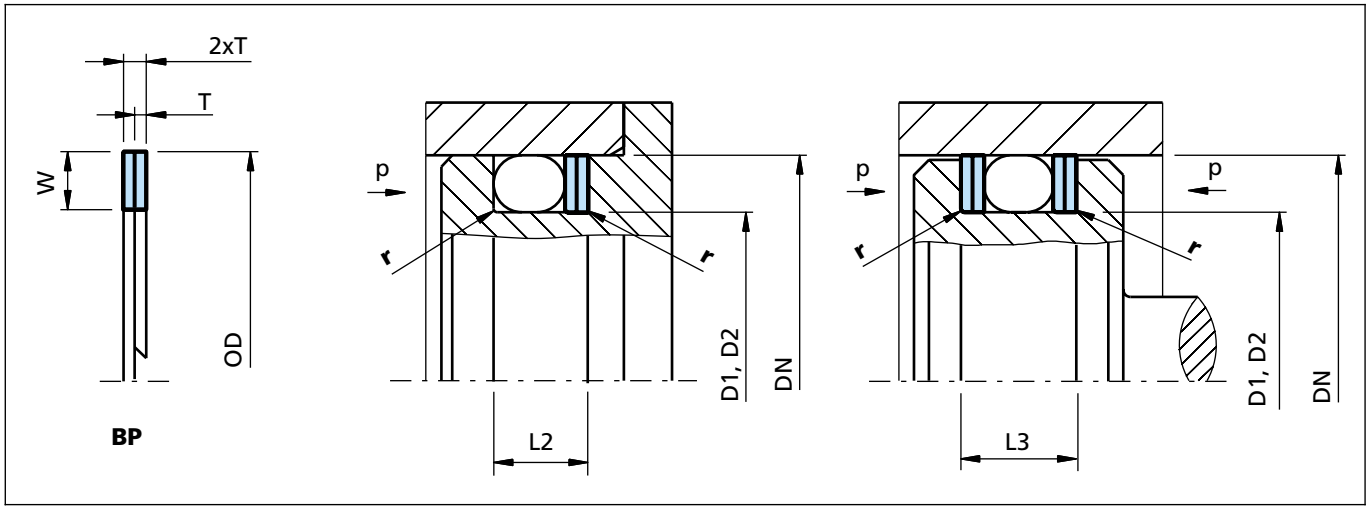


Figure 8 Installation drawing

Table VII Installation dimensions

O-Ring cross section d2	Back-up Ring cross section			Groove dimensions				
	Radial height W		Thickness	Groove diameter		Groove width		Radius
	Dynamic	Static	T	Dynamic **D2** h9	Static **D1** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2
1.50	1.25	1.10	0.50	DN - 2.5	DN - 2.2	3.0	4.0	0.25
1.60	1.30	1.20	0.50	DN - 2.6	DN - 2.4	3.1	4.1	0.25
1.78	1.45	1.30	0.70	DN - 2.9	DN - 2.6	3.8	5.2	0.25
1.80	1.45	1.30	0.70	DN - 2.9	DN - 2.6	3.8	5.2	0.25
2.00	1.65	1.50	0.70	DN - 3.3	DN - 3.0	4.1	5.5	0.25
2.40	2.05	1.80	0.70	DN - 4.1	DN - 3.6	4.6	6.0	0.25
2.50	2.15	1.90	0.70	DN - 4.3	DN - 3.8	4.7	6.1	0.25
2.62	2.25	2.00	0.70	DN - 4.5	DN - 4.0	5.0	6.4	0.25
2.65	2.25	2.00	0.70	DN - 4.5	DN - 4.0	5.0	6.4	0.25
3.00	2.60	2.30	0.70	DN - 5.2	DN - 4.6	5.4	6.8	0.25
3.53	3.10	2.70	0.70	DN - 6.2	DN - 5.4	6.2	7.6	0.25
3.55	3.10	2.70	0.70	DN - 6.2	DN - 5.4	6.2	7.6	0.25
4.00	3.50	3.10	0.85	DN - 7.0	DN - 6.2	6.9	8.6	0.25
5.00	4.40	4.00	0.85	DN - 8.8	DN - 8.0	8.3	10.0	0.25
5.30	4.70	4.30	0.85	DN - 9.4	DN - 8.6	9.0	10.9	0.25
5.33	4.70	4.30	0.85	DN - 9.4	DN - 8.6	9.0	10.9	0.25
5.70	5.00	4.60	0.85	DN - 10.0	DN - 9.2	9.0	11.0	0.25
6.00	5.30	4.90	0.85	DN - 10.6	DN - 9.8	9.3	11.2	0.25
7.00	6.10	5.80	1.25	DN - 12.2	DN - 11.6	12.3	15.1	0.25
8.00	7.10	6.70	1.25	DN - 14.2	DN - 13.4	12.6	15.4	0.25
8.40	7.50	7.10	1.25	DN - 15.0	DN - 14.2	12.8	15.6	0.25

Ordering example

Back-up Ring:	Type BP (spiral) For O-Ring seal
Application:	Dynamic, external sealing
Bore diameter:	D_N = 120.00 mm
Groove diameter:	D2 = 111.20 mm
O-Ring cross section:	d_2 = 5.00 mm
Back-up Ring material:	PTFE, virgin

Material code see page 16

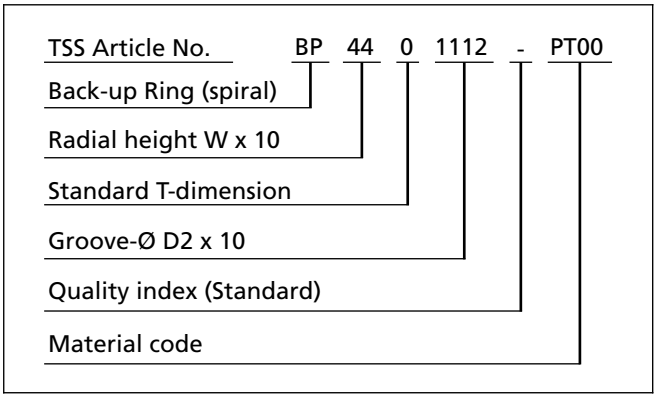


Table VIII Preferred series dynamic application **EXTERNAL SEALING (Bore), type BP (spiral), material PTFE**

Bore ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
DN H8	**D2** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**			**d1 x d2**
6.0	3.1	3.8	5.2	0.25	6.0 x 1.45 x 0.70	BP14H00031	ORAR00006	2.90 x 1.78
6.0	3.5	3.0	4.0	0.25	6.0 x 1.25 x 0.50	BP12H00035	OR1500300	3.00 x 1.50
8.0	5.1	3.8	5.2	0.25	8.0 x 1.45 x 0.70	BP14H00051	ORAR00008	4.47 x 1.78
8.0	5.5	3.0	4.0	0.25	8.0 x 1.25 x 0.50	BP12H00055	OR1500500	5.00 x 1.50
10.0	7.1	3.8	5.2	0.25	10.0 x 1.45 x 0.70	BP14H00071	ORAR00011	7.65 x 1.78
10.0	7.5	3.0	4.0	0.25	10.0 x 1.45 x 0.50	BP12H00075	OR1500700	7.00 x 1.50
12.0	8.7	4.1	5.5	0.25	12.0 x 1.65 x 0.70	BP16H00087	OR2000800	8.00 x 2.00
12.0	9.1	3.8	5.2	0.25	12.0 x 1.45 x 0.70	BP14H00091	ORAR00012	9.25 x 1.78
14.0	10.7	4.1	5.5	0.25	14.0 x 1.65 x 0.70	BP16H00107	OR2001000	10.00 x 2.00
14.0	11.1	3.8	5.2	0.25	14.0 x 1.45 x 0.70	BP14H00111	ORAR00013	10.82 x 1.78
15.0	11.7	4.1	5.5	0.25	15.0 x 1.65 x 0.70	BP16H00117	OR2001100	11.00 x 2.00
15.0	12.1	3.8	5.2	0.25	15.0 x 1.45 x 0.70	BP14H00121	ORAR00014	12.42 x 1.78
16.0	12.7	4.1	5.5	0.25	16.0 x 1.65 x 0.70	BP16H00127	OR2001200	12.00 x 2.00
16.0	13.1	3.8	5.2	0.25	16.0 x 1.45 x 0.70	BP14H00131	ORAR00015	14.00 x 1.78
18.0	14.7	4.1	5.5	0.25	18.0 x 1.65 x 0.70	BP16H00147	OR2001400	14.00 x 2.00
18.0	15.1	3.8	5.2	0.25	18.0 x 1.45 x 0.70	BP14H00151	ORAR00016	15.60 x 1.78
20.0	16.7	4.1	5.5	0.25	20.0 x 1.65 x 0.70	BP16H00167	OR2001600	16.00 x 2.00
20.0	17.1	3.8	5.2	0.25	20.0 x 1.45 x 0.70	BP14H00171	ORAR00017	17.17 x 1.78
22.0	18.7	4.1	5.5	0.25	22.0 x 1.65 x 0.70	BP16H00187	OR2001800	18.00 x 2.00
22.0	19.1	3.8	5.2	0.25	22.0 x 1.45 x 0.70	BP14H00191	ORAR00018	18.77 x 1.78
25.0	21.7	4.1	5.5	0.25	25.0 x 1.65 x 0.70	BP16H00217	OR2002100	21.00 x 2.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Bore ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
DN H8	**D2** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**			**d1 x d2**
25.0	22.1	3.8	5.2	0.25	25.0 x 1.45 x 0.70	BP14H00221	ORAR00020	21.95 x 1.78
28.0	22.8	5.4	6.8	0.25	28.0 x 2.60 x 0.70	BP2600228	OR3002200	22.00 x 3.00
28.0	23.5	5.0	6.4	0.25	28.0 x 2.25 x 0.70	BP22H00235	ORAR00119	23.47 x 2.62
30.0	24.8	5.4	6.8	0.25	30.0 x 2.60 x 0.70	BP2600248	OR3002400	24.00 x 3.00
30.0	25.5	5.0	6.4	0.25	30.0 x 2.25 x 0.70	BP22H00255	ORAR00120	25.07 x 2.62
32.0	26.8	5.4	6.8	0.25	26.8 x 2.60 x 0.70	BP2600268	OR3002600	26.00 x 3.00
32.0	27.5	5.0	6.4	0.25	32.0 x 2.65 x 0.70	BP26H00275	ORAR00121	26.64 x 2.62
35.0	29.8	5.4	6.8	0.25	35.0 x 2.60 x 0.70	BP2600298	OR3002900	29.00 x 3.00
35.0	30.5	5.0	6.4	0.25	35.0 x 2.25 x 0.70	BP22H00305	ORAR00123	29.82 x 2.62
40.0	34.8	5.4	6.8	0.25	40.0 x 2.60 x 0.70	BP2600348	OR3003400	34.00 x 3.00
40.0	35.5	5.0	6.4	0.25	40.0 x 2.25 x 0.70	BP22H00355	ORAR00126	34.59 x 2.62
42.0	36.8	5.4	6.8	0.25	42.0 x 2.60 x 0.70	BP2600368	OR3003600	36.00 x 3.00
42.0	37.5	5.0	6.4	0.25	42.0 x 2.25 x 0.70	BP22H00375	ORAR00127	36.17 x 2.62
45.0	39.8	5.4	6.8	0.25	45.0 x 2.60 x 0.70	BP2600398	OR3003900	39.00 x 3.00
45.0	40.5	5.0	6.4	0.25	45.0 x 2.25 x 0.70	BP22H00405	ORAR00129	39.34 x 2.62
48.0	41.0	6.9	8.6	0.25	48.0 x 3.50 x 0.85	BP3500410	OR4004000	40.00 x 4.00
48.0	41.8	6.2	7.6	0.25	48.0 x 3.10 x 0.70	BP31D0418	ORAR00223	40.87 x 3.53
50.0	43.0	6.9	8.6	0.25	50.0 x 3.50 x 0.85	BP3500430	OR4004200	42.00 x 4.00
50.0	43.8	6.2	7.6	0.25	50.0 x 3.10 x 0.70	BP31D0438	ORAR00224	44.04 x 3.53
52.0	45.0	6.9	8.6	0.25	52.0 x 3.50 x 0.85	BP3500450	OR4004400	44.00 x 4.00
52.0	45.8	6.2	7.6	0.25	52.0 x 3.10 x 0.70	BP31D0458	ORAR00224	44.04 x 3.53
55.0	48.0	6.9	8.6	0.25	55.0 x 3.50 x 0.85	BP3500480	OR4004700	47.00 x 4.00
55.0	48.8	6.2	7.6	0.25	55.0 x 3.10 x 0.70	BP31D0488	ORAR00225	47.22 x 3.53
60.0	53.0	6.9	8.6	0.25	60.0 x 3.50 x 0.85	BP3500530	OR4005200	52.00 x 4.00
60.0	53.8	6.2	7.6	0.25	60.0 x 3.10 x 0.70	BP31D0538	ORAR00227	53.57 x 3.53
63.0	56.0	6.9	8.6	0.25	63.0 x 3.50 x 0.85	BP3500560	OR4005500	55.00 x 4.00
63.0	56.8	6.2	7.6	0.25	63.0 x 3.10 x 0.70	BP31D0568	ORAR00228	56.74 x 3.53
65.0	58.0	6.9	8.6	0.25	65.0 x 3.50 x 0.85	BP3500580	OR4005700	57.00 x 4.00
65.0	58.8	6.2	7.6	0.25	65.0 x 3.10 x 0.70	BP31D0588	ORAR00228	56.74 x 3.53
70.0	63.0	6.9	8.6	0.25	70.0 x 3.50 x 0.85	BP3500630	OR4006200	62.00 x 4.00
70.0	63.8	6.2	7.6	0.25	70.0 x 3.10 x 0.70	BP31D0638	ORAR00230	63.09 x 3.53
75.0	68.0	6.9	8.6	0.25	75.0 x 3.50 x 0.85	BP3500680	OR4006700	67.00 x 4.00
75.0	68.8	6.2	7.6	0.25	75.0 x 3.10 x 0.70	BP31D0688	ORAR00231	66.27 x 3.53
80.0	73.0	6.9	8.6	0.25	80.0 x 3.50 x 0.85	BP3500730	OR4007200	72.00 x 4.00
80.0	73.8	6.2	7.6	0.25	80.0 x 3.10 x 0.70	BP31D0738	ORAR00233	72.62 x 3.53
85.0	78.0	6.9	8.6	0.25	85.0 x 3.50 x 0.85	BP3500780	OR4007700	77.00 x 4.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Back-up Ring

Bore ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
DN H8	**D2** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**			**d1 x d2**
85.0	78.8	6.2	7.6	0.25	85.0 x 3.10 x 0.70	BP31D0788	ORAR00235	78.97 x 3.53
90.0	80.6	9.0	10.9	0.25	90.0 x 4.70 x 0.85	BP4700806	ORAR00338	78.74 x 5.33
90.0	81.2	8.3	10.0	0.25	90.0 x 4.40 x 0.85	BP4400812	OR5008000	80.00 x 5.00
95.0	85.6	9.0	10.9	0.25	95.0 x 4.70 x 0.85	BP4700856	ORAR00340	85.09 x 5.33
95.0	86.2	8.3	10.0	0.25	95.0 x 4.40 x 0.85	BP4400862	OR5008500	85.00 x 5.00
100.0	90.6	9.0	10.9	0.25	100.0 x 4.70 x 0.85	BP4700906	ORAR00342	91.44 x 5.33
100.0	91.2	8.3	10.0	0.25	100.0 x 4.40 x 0.85	BP4400912	OR5009000	90.00 x 5.00
105.0	95.6	9.0	10.9	0.25	105.0 x 4.70 x 0.85	BP4700956	ORAR00343	94.62 x 5.33
105.0	96.2	8.3	10.0	0.25	105.0 x 4.40 x 0.85	BP4400962	OR5009500	95.00 x 5.00
110.0	100.6	9.0	10.9	0.25	110.0 x 4.70 x 0.85	BP4701006	ORAR00345	100.97 x 5.33
110.0	101.2	8.3	10.0	0.25	110.0 x 4.40 x 0.85	BP4401012	OR5010000	100.00 x 5.00
115.0	105.6	9.0	10.9	0.25	115.0 x 4.70 x 0.85	BP4701056	ORAR00346	104.14 x 5.33
115.0	106.2	8.3	10.0	0.25	115.0 x 4.40 x 0.85	BP4401062	OR5010500	105.00 x 5.00
120.0	110.6	9.0	10.9	0.25	120.0 x 4.70 x 0.85	BP4701106	ORAR00348	110.49 x 5.33
120.0	111.2	8.3	10.0	0.25	120.0 x 4.40 x 0.85	BP4401112	OR5011000	110.00 x 5.00
125.0	115.6	9.0	10.9	0.25	125.0 x 4.70 x 0.85	BP4701156	ORAR00349	113.67 x 5.33
125.0	116.2	8.3	10.0	0.25	125.0 x 4.40 x 0.85	BP4401162	OR5011500	115.00 x 5.00
130.0	120.6	9.0	10.9	0.25	130.0 x 4.70 x 0.85	BP4701206	ORAR00351	120.02 x 5.33
130.0	121.2	8.3	10.0	0.25	130.0 x 4.40 x 0.85	BP4401212	OR5012000	120.00 x 5.00
135.0	122.8	12.3	15.1	0.25	135.0 x 6.10 x 1.25	BP6101228	ORAR00427	120.02 x 7.00
140.0	127.8	12.3	15.1	0.25	140.0 x 6.10 x 1.25	BP6101278	ORAR00429	126.37 x 7.00
150.0	137.8	12.3	15.1	0.25	150.0 x 6.10 x 1.25	BP6101378	ORAR00432	135.89 x 7.00
160.0	147.8	12.3	15.1	0.25	160.0 x 6.10 x 1.25	BP6101478	ORAR00435	145.42 x 7.00
170.0	157.8	12.3	15.1	0.25	170.0 x 6.10 x 1.25	BP6101578	ORAR00438	158.12 x 7.00
180.0	167.8	12.3	15.1	0.25	180.0 x 6.10 x 1.25	BP6101678	ORAR00439	164.47 x 7.00
190.0	177.8	12.3	15.1	0.25	190.0 x 6.10 x 1.25	BP6101778	ORAR00441	177.17 x 7.00
200.0	187.8	12.3	15.1	0.25	200.0 x 6.10 x 1.25	BP6101878	ORAR00442	183.52 x 7.00
210.0	197.8	12.3	15.1	0.25	210.0 x 6.10 x 1.25	BP6101978	ORAR00444	196.22 x 7.00
220.0	207.8	12.3	15.1	0.25	220.0 x 6.10 x 1.25	BP6102078	ORAR00445	202.57 x 7.00
230.0	217.8	12.3	15.1	0.25	230.0 x 6.10 x 1.25	BP6102178	ORAR00446	215.27 x 7.00
240.0	227.8	12.3	15.1	0.25	240.0 x 6.10 x 1.25	BP6102278	ORAR00447	227.97 x 7.00
250.0	237.8	12.3	15.1	0.25	250.0 x 6.10 x 1.25	BP6102378	ORAR00448	240.67 x 7.00
280.0	267.8	12.3	15.1	0.25	280.0 x 6.10 x 1.25	BP6102678	ORAR00450	266.07 x 7.00
300.0	287.8	12.3	15.1	0.25	300.0 x 6.10 x 1.25	BP6102878	ORAR00451	278.77 x 7.00
320.0	307.8	12.3	15.1	0.25	320.0 x 6.10 x 1.25	BP6103078	ORAR00453	304.17 x 7.00
350.0	337.8	12.3	15.1	0.25	350.0 x 6.10 x 1.25	BP6103378	ORAR00455	329.57 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Back-up Ring

Bore ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
DN H8	**D2** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**OD x W x T**			**d1 x d2**
400.0	387.8	12.3	15.1	0.25	400.0 x 6.10 x 1.25	BP6103878	ORAR00459	380.37 x 7.00
420.0	407.8	12.3	15.1	0.25	420.0 x 6.10 x 1.25	BP6104078	ORAR00461	405.26 x 7.00
450.0	437.8	12.3	15.1	0.25	450.0 x 6.10 x 1.25	BP6104378	ORAR00463	430.66 x 7.00
480.0	467.8	12.3	15.1	0.25	480.0 x 6.10 x 1.25	BP6104678	ORAR00465	456.06 x 7.00
500.0	487.8	12.3	15.1	0.25	500.0 x 6.10 x 1.25	BP6104878	ORAR00467	481.46 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Installation recommendations static and dynamic applications

INTERNAL SEALING (Rod), type BU (uncut) and BG (cut), material PTFE

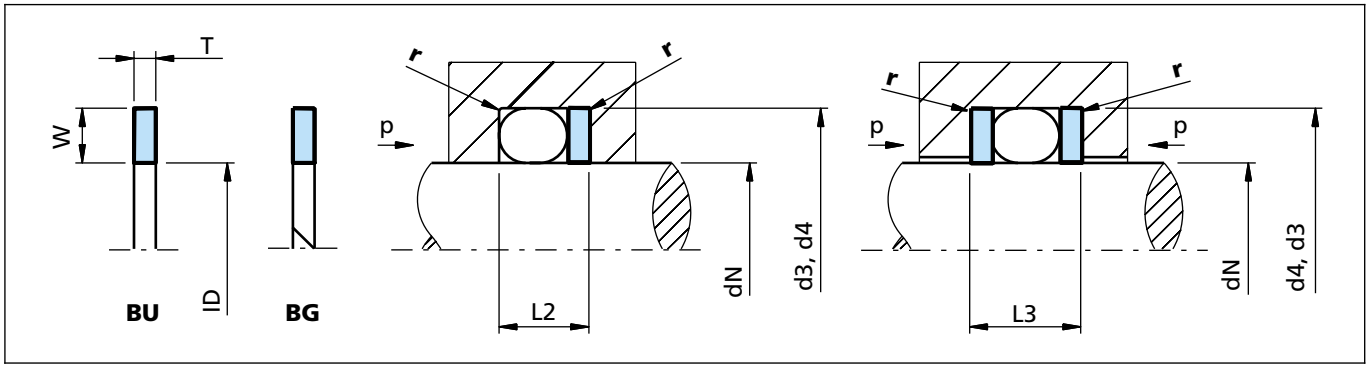


Figure 9 Installation drawing

Table IX Installation dimensions

O-Ring cross section d2	Back-up Ring cross section			Groove dimensions				
	Radial height W		Thickness	Groove diameter		Groove width		Radius
	Dynamic	Static	T	Dynamic d4 h9	Static d3 h9	L2 +0.2	L3 +0.2	r ±0.2
1.50	1.25	1.10	1.0	dN + 2.5	dN + 2.2	3.0	4.0	0.25
1.60	1.30	1.20	1.0	dN + 2.6	dN + 2.4	3.1	4.1	0.25
1.78	1.45	1.30	1.4	dN + 2.9	dN + 2.6	3.8	5.2	0.25
1.80	1.45	1.30	1.4	dN + 2.9	dN + 2.6	3.8	5.2	0.25
2.00	1.65	1.50	1.4	dN + 3.3	dN + 3.0	4.1	5.5	0.25
2.40	2.05	1.80	1.4	dN + 4.1	dN + 3.6	4.6	6.0	0.25
2.50	2.15	1.90	1.4	dN + 4.3	dN + 3.8	4.7	6.1	0.25
2.62	2.25	2.00	1.4	dN + 4.5	dN + 4.0	5.0	6.4	0.25
2.65	2.25	2.00	1.4	dN + 4.5	dN + 4.0	5.0	6.4	0.25
3.00	2.60	2.30	1.4	dN + 5.2	dN + 4.6	5.4	6.8	0.25
3.53	3.10	2.70	1.4	dN + 6.2	dN + 5.4	6.2	7.6	0.25
3.55	3.10	2.70	1.4	dN + 6.2	dN + 5.4	6.2	7.6	0.25
4.00	3.50	3.10	1.7	dN + 7.0	dN + 6.2	6.9	8.6	0.25
5.00	4.40	4.00	1.7	dN + 8.8	dN + 8.0	8.3	10.0	0.25
5.30	4.70	4.30	1.7	dN + 9.4	dN + 8.6	9.0	10.9	0.25
5.33	4.70	4.30	1.7	dN + 9.4	dN + 8.6	9.0	10.9	0.25
5.70	5.00	4.60	1.7	dN + 10.0	dN + 9.2	9.0	11.0	0.25
6.00	5.30	4.90	1.7	dN + 10.6	dN + 9.8	9.3	11.2	0.25
7.00	6.10	5.80	2.5	dN + 12.2	dN + 11.6	12.3	15.1	0.25
8.00	7.10	6.70	2.5	dN + 14.2	dN + 13.4	12.6	15.4	0.25
8.40	7.50	7.10	2.5	dN + 15.0	dN + 14.2	12.8	15.6	0.25

Ordering example

Back-up Ring:	Type BU (uncut) For O-Ring seal
Application:	Static, internal sealing
Rod diameter:	d_N = 25.00 mm
O-Ring cross section:	d_2 = 2.62 mm
Back-up Ring material:	PTFE, virgin
Material code see page 16	

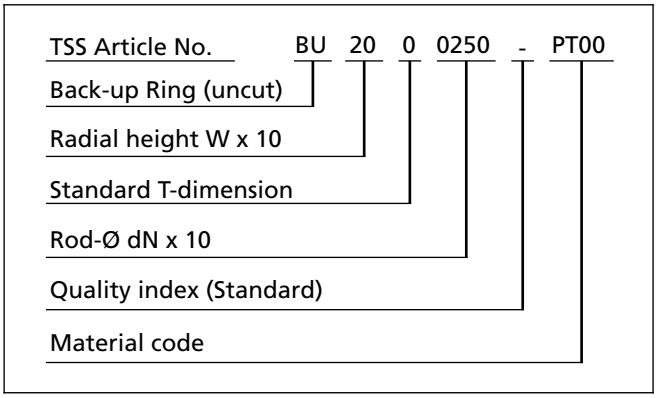


Table X Preferred series static application

INTERNAL SEALING (Rod), type BU (uncut), material PTFE

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d3** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
4.0	6.2	3.0	4.0	0.25	4.0 x 1.1 x 1.4	BU11L0040	OR1500400	4.00 x 1.50
4.0	6.6	3.8	5.2	0.25	4.0 x 1.3 x 1.4	BU1300040	ORAR00007	3.68 x 1.78
5.0	7.2	3.0	4.0	0.25	5.0 x 1.1 x 1.4	BU1100050	OR1500500	5.00 x 1.50
5.0	7.6	3.8	5.2	0.25	5.0 x 1.3 x 1.4	BU1300050	ORAR00008	4.47 x 1.78
6.0	8.2	3.0	4.0	0.25	6.0 x 1.1 x 1.4	BU1100060	OR1500600	6.00 x 1.50
6.0	8.6	3.8	5.2	0.25	6.0 x 1.3 x 1.4	BU1300060	ORAR00010	6.07 x 1.78
8.0	10.6	3.8	5.2	0.25	8.0 x 1.3 x 1.4	BU1300080	ORAR00011	7.65 x 1.78
8.0	11.0	4.1	5.5	0.25	8.0 x 1.5 x 1.4	BU1500080	OR2000800	8.00 x 2.00
10.0	12.6	3.8	5.2	0.25	10.0 x 1.3 x 1.4	BU1300100	ORAR00013	10.82 x 1.78
10.0	13.0	4.1	5.5	0.25	10.0 x 1.5 x 1.4	BU1500100	OR2001000	10.00 x 2.00
12.0	14.6	3.8	5.2	0.25	12.0 x 1.3 x 1.4	BU1300120	ORAR00014	12.42 x 1.78
12.0	15.0	4.1	5.5	0.25	12.0 x 1.5 x 1.4	BU1500120	OR2001200	12.00 x 2.00
14.0	16.6	3.8	5.2	0.25	14.0 x 1.3 x 1.4	BU1300140	ORAR00015	14.00 x 1.78
14.0	17.0	4.1	5.5	0.25	14.0 x 1.5 x 1.4	BU1500140	OR2001400	14.00 x 2.00
15.0	17.6	3.8	5.2	0.25	15.0 x 1.3 x 1.4	BU1300150	ORAR00016	15.60 x 1.78
15.0	18.0	4.1	5.5	0.25	15.0 x 1.5 x 1.4	BU1500150	OR2001500	15.00 x 2.00
16.0	18.6	3.8	5.2	0.25	16.0 x 1.3 x 1.4	BU1300160	ORAR00016	15.60 x 1.78
16.0	19.0	4.1	5.5	0.25	16.0 x 1.5 x 1.4	BU1500160	OR2001600	16.00 x 2.00
18.0	20.6	3.8	5.2	0.25	18.0 x 1.3 x 1.4	BU1300180	ORAR00018	18.77 x 1.78
18.0	21.0	4.1	5.5	0.25	18.0 x 1.5 x 1.4	BU1500180	OR2001800	18.00 x 2.00
20.0	22.6	3.8	5.2	0.25	20.0 x 1.3 x 1.4	BU1300200	ORAR00019	20.35 x 1.78
20.0	23.0	4.1	5.5	0.25	20.0 x 1.5 x 1.4	BU1500200	OR2002000	20.00 x 2.00
22.0	26.0	5.0	6.4	0.25	22.0 x 2.0 x 1.4	BU2000220	ORAR00118	21.89 x 2.62
22.0	26.6	5.4	6.8	0.25	22.0 x 2.3 x 1.4	BU2300220	OR3002200	22.00 x 3.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d3** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
25.0	29.0	5.0	6.4	0.25	25.0 x 2.0 x 1.4	BU2000250	ORAR00120	25.07 x 2.62
25.0	29.6	5.4	6.8	0.25	25.0 x 2.3 x 1.4	BU2300250	OR3002500	25.00 x 3.00
28.0	32.0	5.0	6.4	0.25	28.0 x 2.0 x 1.4	BU2000280	ORAR00122	28.24 x 2.62
28.0	32.6	5.4	6.8	0.25	28.0 x 2.3 x 1.4	BU2300280	OR3002800	28.00 x 2.00
30.0	34.0	5.0	6.4	0.25	30.0 x 2.0 x 1.4	BU2000300	ORAR00123	29.83 x 2.62
30.0	34.6	5.4	6.8	0.25	30.0 x 2.3 x 1.4	BU2300300	OR3003000	30.00 x 3.00
32.0	36.0	5.0	6.4	0.25	32.0 x 2.0 x 1.4	BU2000320	ORAR00125	31.42 x 2.62
32.0	36.6	5.4	6.8	0.25	32.0 x 2.3 x 1.4	BU2300320	OR3003200	32.00 x 3.00
35.0	39.0	5.0	6.4	0.25	35.0 x 2.0 x 1.4	BU2000350	ORAR00126	34.59 x 2.62
35.0	39.6	5.4	6.8	0.25	35.0 x 2.3 x 1.4	BU2300350	OR3003500	35.00 x 3.00
36.0	40.0	5.0	6.4	0.25	36.0 x 2.0 x 1.4	BU2000360	ORAR00127	36.17 x 2.62
36.0	40.6	5.4	6.8	0.25	36.0 x 2.3 x 1.4	BU2300360	OR3003600	36.00 x 3.00
40.0	45.4	6.2	7.6	0.25	40.0 x 2.7 x 1.4	BU2700400	ORAR00223	40.87 x 3.53
40.0	46.1	6.9	8.6	0.25	40.0 x 3.1 x 1.7	BU3100400	OR4004000	40.00 x 4.00
42.0	47.4	6.2	7.6	0.25	42.0 x 2.7 x 1.4	BU2700420	ORAR00223	40.87 x 3.53
42.0	48.2	6.9	8.6	0.25	42.0 x 3.1 x 1.7	BU3100420	OR4004200	42.00 x 4.00
45.0	50.4	6.2	7.6	0.25	45.0 x 2.7 x 1.4	BU2700450	ORAR00224	44.04 x 3.53
45.0	51.2	6.9	8.6	0.25	45.0 x 3.1 x 1.7	BU3100450	OR4004500	45.00 x 4.00
48.0	53.4	6.2	7.6	0.25	48.0 x 2.7 x 1.4	BU2700480	ORAR00225	47.22 x 3.53
48.0	54.2	6.9	8.6	0.25	48.0 x 3.1 x 1.7	BU3100480	OR4004800	48.00 x 4.00
50.0	55.4	6.2	7.6	0.25	50.0 x 2.7 x 1.4	BU2700500	ORAR00226	50.39 x 3.53
50.0	56.2	6.9	8.6	0.25	50.0 x 3.1 x 1.7	BU3100500	OR4005000	50.00 x 4.00
52.0	57.4	6.2	7.6	0.25	52.0 x 2.7 x 1.4	BU2700520	ORAR00226	50.39 x 3.53
52.0	58.2	6.9	8.6	0.25	52.0 x 3.1 x 1.7	BU3100520	OR4005200	52.00 x 4.00
55.0	60.4	6.2	7.6	0.25	55.0 x 2.7 x 1.4	BU2700550	ORAR00227	53.57 x 3.53
55.0	61.2	6.9	8.6	0.25	55.0 x 3.1 x 1.7	BU3100550	OR4005500	55.00 x 4.00
56.0	61.4	6.2	7.6	0.25	56.0 x 2.7 x 1.4	BU2700560	ORAR00228	56.74 x 3.53
56.0	62.2	6.9	8.6	0.25	56.0 x 3.1 x 1.7	BU3100560	OR4005600	56.00 x 4.00
60.0	65.4	6.2	7.6	0.25	60.0 x 2.7 x 1.4	BU2700600	ORAR00229	59.92 x 3.53
60.0	66.2	6.9	8.6	0.25	60.0 x 3.1 x 1.7	BU3100600	OR4006000	60.00 x 4.00
63.0	68.4	6.2	7.6	0.25	63.0 x 2.7 x 1.4	BU2700630	ORAR00230	63.09 x 3.53
63.0	69.2	6.9	8.6	0.25	63.0 x 3.1 x 1.7	BU3100630	OR4006300	60.00 x 4.00
65.0	70.4	6.2	7.6	0.25	65.0 x 2.7 x 1.4	BU2700650	ORAR00231	66.27 x 3.53
65.0	71.2	6.9	8.6	0.25	65.0 x 3.1 x 1.7	BU3100650	OR4006500	65.40 x 4.00
70.0	75.4	6.2	7.6	0.25	70.0 x 2.7 x 1.4	BU2700700	ORAR00232	69.44 x 3.53
70.0	76.2	6.9	8.6	0.25	70.0 x 3.1 x 1.7	BU3100700	OR4007000	70.00 x 4.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d3** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
75.0	80.4	6.2	7.6	0.25	75.0 x 2.7 x 1.4	BU2700750	ORAR00234	75.79 x 3.53
75.0	81.2	6.9	8.6	0.25	75.0 x 3.1 x 1.7	BU3100750	OR4007500	75.00 x 4.00
80.0	88.0	8.3	10.0	0.25	80.0 x 4.0 x 1.7	BU4000800	OR5008000	80.00 x 5.00
80.0	88.6	9.0	10.9	0.25	80.0 x 4.3 x 1.7	BU4300800	ORAR00339	81.92 x 5.33
85.0	93.0	8.3	10.0	0.25	85.0 x 4.0 x 1.7	BU4000850	OR5008500	85.00 x 5.00
85.0	93.6	9.0	10.9	0.25	85.0 x 4.3 x 1.7	BU4300850	ORAR00340	85.09 x 5.33
90.0	98.0	8.3	10.0	0.25	90.0 x 4.0 x 1.7	BU4000900	OR5009000	90.00 x 5.00
90.0	98.6	9.0	10.9	0.25	90.0 x 4.3 x 1.7	BU4300900	ORAR00342	91.44 x 5.33
95.0	103.0	8.3	10.0	0.25	95.0 x 4.0 x 1.7	BU4000950	OR5009500	95.00 x 5.00
95.0	103.6	9.0	10.9	0.25	95.0 x 4.3 x 1.7	BU4300950	ORAR00343	94.62 x 5.33
100.0	108.0	8.3	10.0	0.25	100.0 x 4.0 x 1.7	BU4001000	OR5010000	100.00 x 5.00
100.0	108.6	9.0	10.9	0.25	100.0 x 4.3 x 1.7	BU4301000	ORAR00345	100.97 x 5.33
105.0	113.0	8.3	10.0	0.25	105.0 x 4.0 x 1.7	BU4001050	OR5010500	105.00 x 5.00
105.0	113.6	9.0	10.9	0.25	105.0 x 4.3 x 1.7	BU4301050	ORAR00346	104.14 x 5.33
110.0	118.0	8.3	10.0	0.25	110.0 x 4.0 x 1.7	BU4001100	OR5011000	110.00 x 5.00
110.0	118.6	9.0	10.9	0.25	110.0 x 4.3 x 1.7	BU4301100	ORAR00348	110.49 x 5.33
115.0	123.0	8.3	10.0	0.25	115.0 x 4.0 x 1.7	BU4001150	OR5011500	115.00 x 5.00
115.0	123.6	9.0	10.9	0.25	115.0 x 4.3 x 1.7	BU4301150	ORAR00349	113.67 x 5.33
120.0	128.0	8.3	10.0	0.25	120.0 x 4.0 x 1.7	BU4001200	OR5012000	120.00 x 5.00
120.0	128.6	9.0	10.9	0.25	120.0 x 4.3 x 1.7	BU4301200	ORAR00351	120.02 x 5.33
125.0	133.0	8.3	10.0	0.25	125.0 x 4.0 x 1.7	BU4001250	OR5012500	125.00 x 5.00
125.0	133.6	9.0	10.9	0.25	125.0 x 4.3 x 1.7	BU4301250	ORAR00353	126.37 x 5.33
130.0	138.0	8.3	10.0	0.25	130.0 x4.0 x 1.7	BU4001300	OR5013000	130.00 x 5.00
130.0	138.6	9.0	10.9	0.25	130.0 x 4.3 x 1.7	BU4301300	ORAR00354	129.54 x 5.33
135.0	146.6	12.3	15.1	0.25	135.0 x 5.8 x 2.5	BU5801350	ORAR00432	135.89 x 7.00
140.0	151.6	12.3	15.1	0.25	140.0 x 5.8 x 2.5	BU5801400	ORAR00433	139.07 x 7.00
150.0	161.6	12.3	15.1	0.25	150.0 x 5.8 x 2.5	BU5801500	ORAR00437	151.77 x 7.00
160.0	171.6	12.3	15.1	0.25	160.0 x 5.8 x 2.5	BU5801600	ORAR00438	158.12 x 7.00
170.0	181.6	12.3	15.1	0.25	170.0 x 5.8 x 2.5	BU5801700	ORAR00440	170.82 x 7.00
180.0	191.6	12.3	15.1	0.25	180.0 x 5.8 x 2.5	BU5801800	ORAR00442	183.52 x 7.00
190.0	201.6	12.3	15.1	0.25	190.0 x 5.8 x 2.5	BU5801900	ORAR00443	189.87 x 7.00
200.0	211.6	12.3	15.1	0.25	200.0 x 5.8 x 2.5	BU5802000	ORAR00445	202.57 x 7.00
210.0	221.6	12.3	15.1	0.25	210.0 x 5.8 x 2.5	BU5802100	ORAR00446	215.27 x 7.00
220.0	231.6	12.3	15.1	0.25	220.0 x 5.8 x 2.5	BU5802200	ORAR00446	215.27 x 7.00
230.0	241.6	12.3	15.1	0.25	230.0 x 5.8 x 2.5	BU5802300	ORAR00447	227.97 x 7.00
240.0	251.6	12.3	15.1	0.25	240.0 x 5.8 x 2.5	BU5802400	ORAR00448	240.67 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d3** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
250.0	261.6	12.3	15.1	0.25	250.0 x 5.8 x 2.5	BU5802500	ORAR00449	253.37 x 7.00
280.0	291.6	12.3	15.1	0.25	280.0 x 5.8 x 2.5	BU5802800	ORAR00451	278.77 x 7.00
300.0	311.6	12.3	15.1	0.25	300.0 x 5.8 x 2.5	BU5803000	ORAR00453	304.17 x 7.00
320.0	331.6	12.3	15.1	0.25	320.0 x 5.8 x 2.5	BU5803200	ORAR00454	316.87 x 7.00
350.0	361.6	12.3	15.1	0.25	350.0 x 5.8 x 2.5	BU5803500	ORAR00457	354.97 x 7.00
360.0	371.6	12.3	15.1	0.25	360.0 x 5.8 x 2.5	BU5803600	ORAR00457	354.97 x 7.00
400.0	411.6	12.3	15.1	0.25	400.0 x 5.8 x 2.5	BU5804000	ORAR00461	405.26 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Installation recommendations static and Type dynamic applications

INTERNAL SEALING (Rod), type BB (uncut) and BC (cut), material PTFE

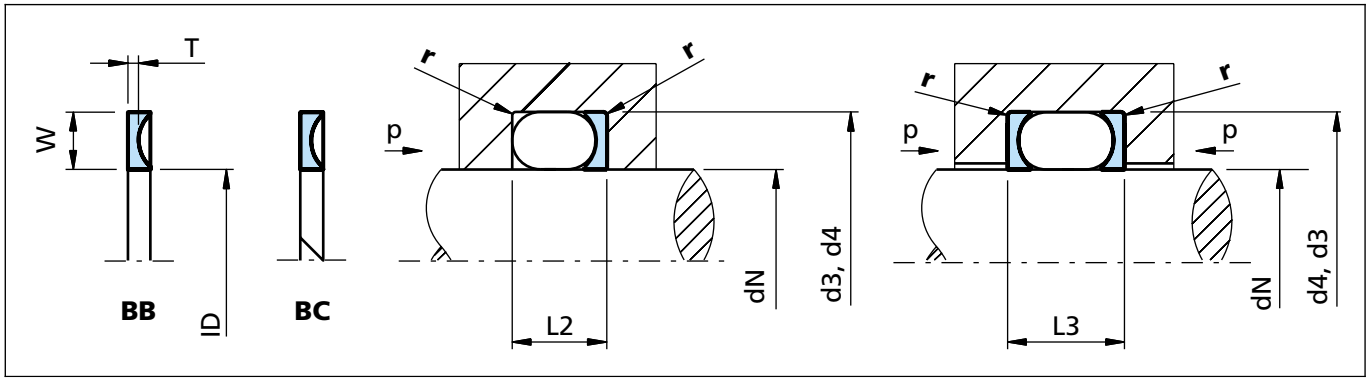


Figure 10 Installation drawing

Table XI Installation dimensions

O-Ring cross section d2	Back-up Ring cross section			Groove dimensions				
	Radial height W		Thickness	Groove diameter		Groove width		Radius
	Dynamic	Static	T	Dynamic d4 H9	Static d3 H9	L2 +0.2	L3 +0.2	r ±0.2
1.50	1.25	1.10	1.0	dN + 2.5	dN + 2.2	3.0	4.0	0.25
1.60	1.30	1.20	1.0	dN + 2.6	dN + 2.4	3.1	4.1	0.25
1.78	1.45	1.30	1.4	dN + 2.9	dN + 2.6	3.8	5.2	0.25
1.80	1.45	1.30	1.4	dN + 2.9	dN + 2.6	3.8	5.2	0.25
2.00	1.65	1.50	1.4	dN + 3.3	dN + 3.0	4.1	5.5	0.25
2.40	2.05	1.80	1.4	dN + 4.1	dN + 3.6	4.6	6.0	0.25
2.50	2.15	1.90	1.4	dN + 4.3	dN + 3.8	4.7	6.1	0.25
2.62	2.25	2.00	1.4	dN + 4.5	dN + 4.0	5.0	6.4	0.25
2.65	2.25	2.00	1.4	dN + 4.5	dN + 4.0	5.0	6.4	0.25
3.00	2.60	2.30	1.4	dN + 5.2	dN + 4.6	5.4	6.8	0.25
3.53	3.10	2.70	1.4	dN + 6.2	dN + 5.4	6.2	7.6	0.25
3.55	3.10	2.70	1.4	dN + 6.2	dN + 5.4	6.2	7.6	0.25
4.00	3.50	3.10	1.7	dN + 7.0	dN + 6.2	6.9	8.6	0.25
5.00	4.40	4.00	1.7	dN + 8.8	dN + 8.0	8.3	10.0	0.25
5.30	4.70	4.30	1.7	dN + 9.4	dN + 8.6	9.0	10.9	0.25
5.33	4.70	4.30	1.7	dN + 9.4	dN + 8.6	9.0	10.9	0.25
5.70	5.00	4.60	1.7	dN + 10.0	dN + 9.2	9.0	11.0	0.25
6.00	5.30	4.90	1.7	dN + 10.6	dN + 9.8	9.3	11.2	0.25
7.00	6.10	5.80	2.5	dN + 12.2	dN + 11.6	12.3	15.1	0.25
8.00	7.10	6.70	2.5	dN + 14.2	dN + 13.4	12.6	15.4	0.25
8.40	7.50	7.10	2.5	dN + 15.0	dN + 14.2	12.8	15.6	0.25

Ordering example

Back-up Ring: Concave, type BB (uncut)
For O-Ring seal
Application: Static, internal sealing
Rod diameter: d_N = 50.00 mm
O-Ring cross section: d_2 = 3.53 mm
Back-up Ring material: PTFE, glassfibre-filled
Material code see page 16

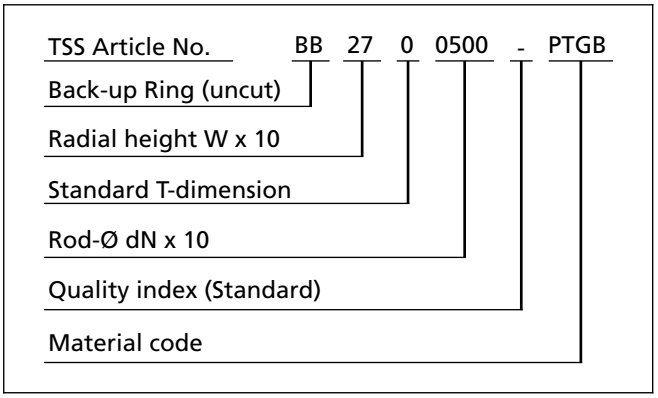


Table XII Preferred series static application

INTERNAL SEALING (Rod), type BB (uncut), material PTFE

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d3** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
4.0	6.2	3.0	4.0	0.25	4.0 x 1.1 x 1.4	BB1100040	OR1500400	4.00 x 1.50
4.0	6.6	3.8	5.2	0.25	4.0 x 1.3 x 1.4	BB1300040	ORAR00007	3.68 x 1.78
5.0	7.2	3.0	4.0	0.25	5.0 x 1.1 x 1.4	BB1100050	OR1500500	5.00 x 1.50
5.0	7.6	3.8	5.2	0.25	5.0 x 1.3 x 1.4	BB1300050	ORAR00008	4.47 x 1.78
6.0	8.2	3.0	4.0	0.25	6.0 x 1.1 x 1.4	BB1100060	OR1500600	6.00 x 1.50
6.0	8.6	3.8	5.2	0.25	6.0 x 2.3 x 1.4	BB1300060	ORAR00010	6.07 x 1.78
8.0	10.6	3.8	5.2	0.25	8.0 x 1.3 x 1.4	BB1300080	ORAR00011	7.65 x 1.78
8.0	11.0	4.1	5.5	0.25	8.0 x 1.5 x 1.4	BB1500080	OR2000800	8.00 x 2.00
10.0	12.6	3.8	5.2	0.25	10.0 x 1.3 x 1.4	BB1300100	ORAR00013	10.82 x 1.78
10.0	13.0	4.1	5.5	0.25	10.0 x 1.5 x 1.4	BB1500100	OR2001000	10.00 x 2.00
12.0	14.6	3.8	5.2	0.25	12.0 x 1.3 x 1.4	BB1300120	ORAR00014	12.42 x 1.78
12.0	15.0	4.1	5.5	0.25	12.0 x 1.5 x 1.4	BB1500120	OR2001200	12.00 x 2.00
14.0	16.6	3.8	5.2	0.25	14.0 x 1.3 x 1.4	BB1300140	ORAR00015	14.00 x 1.78
14.0	17.0	4.1	5.5	0.25	14.0 x 1.5 x 1.4	BB1500140	OR2001400	14.00 x 2.00
15.0	17.6	3.8	5.2	0.25	15.0 x 1.3 x 1.4	BB1300150	ORAR00016	15.60 x 1.78
15.0	18.0	4.1	5.5	0.25	15.0 x 1.5 x 1.4	BB1500150	OR2001500	15.00 x 2.00
16.0	18.6	3.8	5.2	0.25	16.0 x 1.3 x 1.4	BB1300160	ORAR00016	15.60 x 1.78
16.0	19.0	4.1	5.5	0.25	16.0 x 1.5 x 1.4	BB1500160	OR2001600	16.00 x 2.00
18.0	20.6	3.8	5.2	0.25	18.0 x 1.3 x 1.4	BB1300180	ORAR00018	18.77 x 1.78
18.0	21.0	4.1	5.5	0.25	18.0 x 1.5 x 1.4	BB1500180	OR2001800	18.00 x 2.00
20.0	22.6	3.8	5.2	0.25	20.0 x 1.3 x 1.4	BB1300200	ORAR00019	20.35 x 1.78
20.0	23.0	4.1	5.5	0.25	20.0 x 1.5 x 1.4	BB1500200	OR2002000	20.00 x 2.00
22.0	26.0	5.0	6.4	0.25	22.0 x 2.0 x 1.4	BB2000220	ORAR00118	21.89 x 2.62
22.0	26.6	5.4	6.8	0.25	22.0 x 2.3 x 1.4	BB2300220	OR3002200	22.00 x 3.00

Further sizes on request
This table shows possible range of available dimensions (Back-up ring). However, these dimensions are not always stock items.

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d3** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
25.0	29.0	5.0	6.4	0.25	25.0 x 2.0 x 1.4	BB2000250	ORAR00120	25.07 x 2.62
25.0	29.6	5.4	6.8	0.25	25.0 x 2.3 x 1.4	BB2300250	OR3002500	25.00 x 3.00
28.0	32.0	5.0	6.4	0.25	28.0 x 2.0 x 1.4	BB2000280	ORAR00122	28.24 x 2.62
28.0	32.6	5.4	6.8	0.25	28.0 x 2.3 x 1.4	BB2300280	OR3002800	28.00 x 2.00
30.0	34.0	5.0	6.4	0.25	30.0 x 2.0 x 1.4	BB2000300	ORAR00123	29.83 x 2.62
30.0	34.6	5.4	6.8	0.25	30.0 x 2.3 x 1.4	BB2300300	OR3003000	30.00 x 3.00
32.0	36.0	5.0	6.4	0.25	32.0 x 2.0 x 1.4	BB2000320	ORAR00125	31.42 x 2.62
32.0	36.6	5.4	6.8	0.25	32.0 x 2.3 x 1.4	BB2300320	OR3003200	32.00 x 3.00
35.0	39.0	5.0	6.4	0.25	35.0 x 2.0 x 1.4	BB2000350	ORAR00126	34.59 x 2.62
35.0	39.6	5.4	6.8	0.25	35.0 x 2.3 x 1.4	BB2300350	OR3003500	35.00 x 3.00
36.0	40.0	5.0	6.4	0.25	36.0 x 2.0 x 1.4	BB2000360	ORAR00127	36.17 x 2.62
36.0	40.6	5.4	6.8	0.25	36.0 x 2.3 x 1.4	BB2300360	OR3003600	36.00 x 3.00
40.0	45.4	6.2	7.6	0.25	40.0 x 2.7 x 1.4	BB2700400	ORAR00223	40.87 x 3.53
40.0	46.2	6.9	8.6	0.25	40.0 x 3.1 x 1.7	BB3100400	OR4004000	40.00 x 4.00
42.0	47.4	6.2	7.6	0.25	42.0 x 2.7 x 1.4	BB2700420	ORAR00223	40.87 x 3.53
42.0	48.2	6.9	8.6	0.25	42.0 x 3.1 x 1.7	BB3100420	OR4004200	42.00 x 4.00
45.0	50.4	6.2	7.6	0.25	45.0 x 2.7 x 1.4	BB2700450	ORAR00224	44.04 x 3.53
45.0	51.2	6.9	8.6	0.25	45.0 x 3.1 x 1.7	BB3100450	OR4004500	45.00 x 4.00
48.0	53.4	6.2	7.6	0.25	48.0 x 2.7 x 1.4	BB2700480	ORAR00225	47.22 x 3.53
48.0	54.2	6.9	8.6	0.25	48.0 x 3.1 x 1.7	BB3100480	OR4004800	48.00 x 4.00
50.0	55.4	6.2	7.6	0.25	50.0 x 2.7 x 1.4	BB2700500	ORAR00226	50.39 x 3.53
50.0	56.2	6.9	8.6	0.25	50.0 x 3.1 x 1.7	BB3100500	OR4005000	50.00 x 4.00
52.0	57.4	6.2	7.6	0.25	52.0 x 2.7 x 1.4	BB2700520	ORAR00226	50.39 x 3.53
52.0	58.2	6.9	8.6	0.25	52.0 x 3.1 x 1.7	BB3100520	OR4005200	52.00 x 4.00
55.0	60.4	6.2	7.6	0.25	55.0 x 2.7 x 1.4	BB2700550	ORAR00227	53.57 x 3.53
55.0	61.2	6.9	8.6	0.25	55.0 x 3.1 x 1.7	BB3100550	OR4005500	55.00 x 4.00
56.0	61.4	6.2	7.6	0.25	56.0 x 2.7 x 1.4	BB2700560	ORAR00228	56.74 x 3.53
56.0	62.2	6.9	8.6	0.25	56.0 x 3.1 x 1.7	BB3100560	OR4005600	56.00 x 4.00
60.0	65.4	6.2	7.6	0.25	60.0 x 2.7 x 1.4	BB2700600	ORAR00229	59.92 x 3.53
60.0	66.2	6.9	8.6	0.25	60.0 x 3.1 x 1.7	BB3100600	OR4006000	60.00 x 4.00
63.0	68.4	6.2	7.6	0.25	63.0 x 2.7 x 1.4	BB2700630	ORAR00230	63.09 x 3.53
63.0	69.2	6.9	8.6	0.25	63.0 x 3.1 x 1.7	BB3100630	OR4006300	60.00 x 4.00
65.0	70.4	6.2	7.6	0.25	65.0 x 2.7 x 1.4	BB2700650	ORAR00231	66.27 x 3.53
65.0	71.2	6.9	8.6	0.25	65.0 x 3.1 x 1.7	BB3100650	OR4006500	65.40 x 4.00
70.0	75.4	6.2	7.6	0.25	70.0 x 2.7 x 1.4	BB2700700	ORAR00232	69.44 x 3.53
70.0	76.2	6.9	8.6	0.25	70.0 x 3.1 x 1.7	BB3100700	OR4007000	70.00 x 4.00

Further sizes on request
This table shows possible range of available dimensions (Back-up ring). However, these dimensions are not always stock items.

Back-up Ring

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d3** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
75.0	80.4	6.2	7.6	0.25	75.0 x 2.7 x 1.4	BB2700750	ORAR00234	75.79 x 3.53
75.0	81.2	6.9	8.6	0.25	75.0 x 3.1 x 1.7	BB3100750	OR4007500	75.00 x 4.00
80.0	88.0	8.3	10.0	0.25	80.0 x 4.0 x 1.7	BB4000800	OR5008000	80.00 x 5.00
80.0	88.6	9.0	10.9	0.25	80.0 x 4.3 x 1.7	BB4300800	ORAR00339	81.92 x 5.33
85.0	93.0	8.3	10.0	0.25	85.0 x 4.0 x 1.7	BB4000850	OR5008500	85.00 x 5.00
85.0	93.6	9.0	10.9	0.25	85.0 x 4.3 x 1.7	BB4300850	ORAR00340	85.09 x 5.33
90.0	98.0	8.3	10.0	0.25	90.0 x 4.0 x 1.7	BB4000900	OR5009000	90.00 x 5.00
90.0	98.6	9.0	10.9	0.25	90.0 x 4.3 x 1.7	BB4300900	ORAR00342	91.44 x 5.33
95.0	103.0	8.3	10.0	0.25	95.0 x 4.0 x 1.7	BB4000950	OR5009500	95.00 x 5.00
95.0	103.6	9.0	10.9	0.25	95.0 x 4.3 x 1.7	BB4300950	ORAR00343	94.62 x 5.33
100.0	108.0	8.3	10.0	0.25	100.0 x 4.0 x 1.7	BB4001000	OR5010000	100.00 x 5.00
100.0	108.6	9.0	10.9	0.25	100.0 x 4.3 x 1.7	BB4301000	ORAR00345	100.97 x 5.33
105.0	113.0	8.3	10.0	0.25	105.0 x 4.0 x 1.7	BB4001050	OR5010500	105.00 x 5.00
105.0	113.6	9.0	10.9	0.25	105.0 x 4.3 x 1.7	BB4301050	ORAR00346	104.14 x 5.33
110.0	118.0	8.3	10.0	0.25	110.0 x 4.0 x 1.7	BB4001100	OR5011000	110.00 x 5.00
110.0	118.6	9.0	10.9	0.25	110.0 x 4.3 x 1.7	BB4301100	ORAR00348	110.49 x 5.33
115.0	123.0	8.3	10.0	0.25	115.0 x 4.0 x 1.7	BB4001150	OR5011500	115.00 x 5.00
115.0	123.6	9.0	10.9	0.25	115.0 x 4.3 x 1.7	BB4301150	ORAR00349	113.67 x 5.33
120.0	128.0	8.3	10.0	0.25	120.0 x 4.0 x 1.7	BB4001200	OR5012000	120.00 x 5.00
120.0	128.6	9.0	10.9	0.25	120.0 x 4.3 x 1.7	BB4301200	ORAR00351	120.02 x 5.33
125.0	133.0	8.3	10.0	0.25	125.0 x 4.0 x 1.7	BB4001250	OR5012500	125.00 x 5.00
125.0	133.6	9.0	10.9	0.25	125.0 x 4.3 x 1.7	BB4301250	ORAR00353	126.37 x 5.33
130.0	138.0	8.3	10.0	0.25	130.0 x4.0 x 1.7	BB4001300	OR5013000	130.00 x 5.00
130.0	138.6	9.0	10.9	0.25	130.0 x 4.3 x 1.7	BB4301300	ORAR00354	129.54 x 5.33
135.0	146.6	12.3	15.1	0.25	135.0 x 5.8 x 2.5	BB5801350	ORAR00432	135.89 x 7.00
140.0	151.6	12.3	15.1	0.25	140.0 x 5.8 x 2.5	BB5801400	ORAR00433	139.07 x 7.00
150.0	161.6	12.3	15.1	0.25	150.0 x 5.8 x 2.5	BB5801500	ORAR00437	151.77 x 7.00
160.0	171.6	12.3	15.1	0.25	160.0 x 5.8 x 2.5	BB5801600	ORAR00438	158.12 x 7.00
170.0	181.6	12.3	15.1	0.25	170.0 x 5.8 x 2.5	BB5801700	ORAR00440	170.82 x 7.00
180.0	191.6	12.3	15.1	0.25	180.0 x 5.8 x 2.5	BB5801800	ORAR00442	183.52 x 7.00
190.0	201.6	12.3	15.1	0.25	190.0 x 5.8 x 2.5	BB5801900	ORAR00443	189.87 x 7.00
200.0	211.6	12.3	15.1	0.25	200.0 x 5.8 x 2.5	BB5802000	ORAR00445	202.57 x 7.00
210.0	221.6	12.3	15.1	0.25	210.0 x 5.8 x 2.5	BB5802100	ORAR00446	215.27 x 7.00
220.0	231.6	12.3	15.1	0.25	220.0 x 5.8 x 2.5	BB5802200	ORAR00446	215.27 x 7.00
230.0	241.6	12.3	15.1	0.25	230.0 x 5.8 x 2.5	BB5802300	ORAR00447	227.97 x 7.00
240.0	251.6	12.3	15.1	0.25	240.0 x 5.8 x 2.5	BB5802400	ORAR00448	240.67 x 7.00

Further sizes on request
This table shows possible range of available dimensions (Back-up ring). However, these dimensions are not always stock items.

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d3** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
250.0	261.6	12.3	15.1	0.25	250.0 x 5.8 x 2.5	BB5802500	ORAR00449	253.37 x 7.00
280.0	291.6	12.3	15.1	0.25	280.0 x 5.8 x 2.5	BB5802800	ORAR00451	278.77 x 7.00
300.0	311.6	12.3	15.1	0.25	300.0 x 5.8 x 2.5	BB5803000	ORAR00453	304.17 x 7.00
320.0	331.6	12.3	15.1	0.25	320.0 x 5.8 x 2.5	BB5803200	ORAR00454	316.87 x 7.00
350.0	361.6	12.3	15.1	0.25	350.0 x 5.8 x 2.5	BB5803500	ORAR00457	354.97 x 7.00
360.0	371.6	12.3	15.1	0.25	360.0 x 5.8 x 2.5	BB5803600	ORAR00457	354.97 x 7.00
400.0	411.6	12.3	15.1	0.25	400.0 x 5.8 x 2.5	BB5804000	ORAR00461	405.26 x 7.00

Further sizes on request
This table shows possible range of available dimensions (Back-up ring). However, these dimensions are not always stock items.

Installation recommendations static and dynamic applications

INTERNAL SEALING (Rod), type BP (spiral) material PTFE

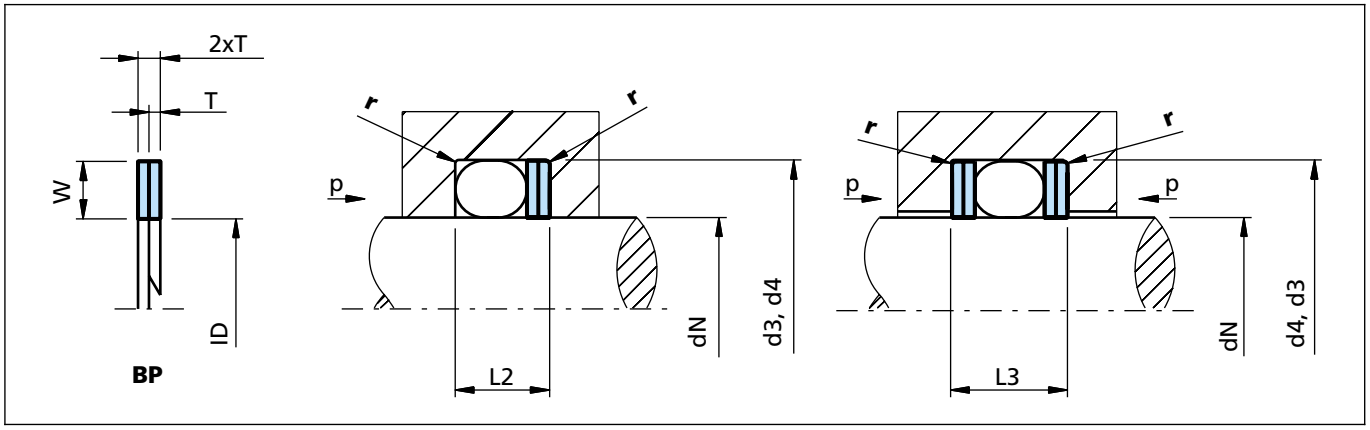


Figure 11 Installation drawing

Table XIII Installation dimensions

O-Ring cross section d2	Back-up Ring cross section			Groove dimensions				
	Radial height W		Thickness	Groove diameter		Groove width		Radius
	Dynamic	Static	T	Dynamic **d4** h9	Static **d3** h9	**L2** +0.2	**L3** +0.2	**r** ±0.2
1.50	1.25	1.10	0.50	dN + 2.5	dN + 2.2	3.0	4.0	0.25
1.60	1.30	1.20	0.50	dN + 2.6	dN + 2.4	3.1	4.1	0.25
1.78	1.45	1.30	0.70	dN + 2.9	dN + 2.6	3.8	5.2	0.25
1.80	1.45	1.30	0.70	dN + 2.9	dN + 2.6	3.8	5.2	0.25
2.00	1.65	1.50	0.70	dN + 3.3	dN + 3.0	4.1	5.5	0.25
2.40	2.05	1.80	0.70	dN + 4.1	dN + 3.6	4.6	6.0	0.25
2.50	2.15	1.90	0.70	dN + 4.3	dN + 3.8	4.7	6.1	0.25
2.62	2.25	2.00	0.70	dN + 4.5	dN + 4.0	5.0	6.4	0.25
2.65	2.25	2.00	0.70	dN + 4.5	dN + 4.0	5.0	6.4	0.25
3.00	2.60	2.30	0.70	dN + 5.2	dN + 4.6	5.4	6.8	0.25
3.53	3.10	2.70	0.70	dN + 6.2	dN + 5.4	6.2	7.6	0.25
3.55	3.10	2.70	0.70	dN + 6.2	dN + 5.4	6.2	7.6	0.25
4.00	3.50	3.10	0.85	dN + 7.0	dN + 6.2	6.9	8.6	0.25
5.00	4.40	4.00	0.85	dN + 8.8	dN + 8.0	8.3	10.0	0.25
5.30	4.70	4.30	0.85	dN + 9.4	dN + 8.6	9.0	10.9	0.25
5.33	4.70	4.30	0.85	dN + 9.4	dN + 8.6	9.0	10.9	0.25
5.70	5.00	4.60	0.85	dN + 10.0	dN + 9.2	9.0	11.0	0.25
6.00	5.30	4.90	0.85	dN + 10.6	dN + 9.8	9.3	11.2	0.25
7.00	6.10	5.80	1.25	dN + 12.2	dN + 11.6	12.3	15.1	0.25
8.00	7.10	6.70	1.25	dN + 14.2	dN + 13.4	12.6	15.4	0.25
8.40	7.50	7.10	1.25	dN + 15.0	dN + 14.2	12.8	15.6	0.25

Ordering example

Back-up Ring:	Type BP (spiral) For O-Ring seal
Application:	Dynamic, internal sealing
Rod diameter:	d_N = 56.00 mm
O-Ring cross section:	d_2 = 3.53 mm
Back-up Ring material:	PTFE, bronze-filled

Material code see page 16

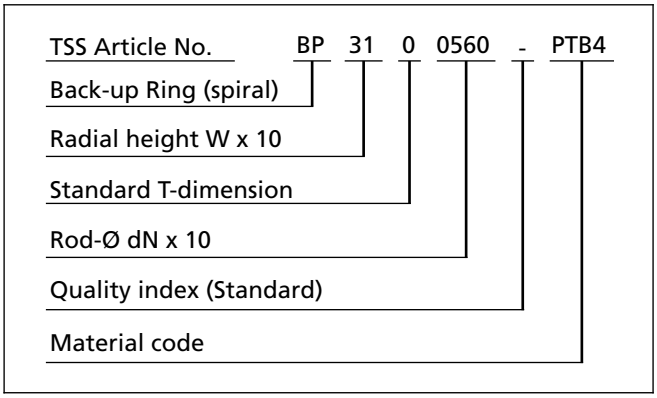


Table XIV Preferred series dynamic application

INTERNAL SEALING (Rod), type BP (spiral), material PTFE

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d4** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
4.0	6.5	3.0	4.0	0.25	4.0 x 1.25 x 0.50	BP12H00040	OR1500400	4.00 x 1.50
4.0	6.9	3.8	5.2	0.25	4.0 x 1.45 x 0.70	BP14H00040	ORAR00007	3.68 x 1.78
5.0	7.5	3.0	4.0	0.25	5.0 x 1.25 x 0.50	BP12H00050	OR1500500	5.00 x 1.50
5.0	7.9	3.8	5.2	0.25	5.0 x 1.45 x 0.70	BP14H00050	ORAR00008	4.47x 1.78
6.0	8.5	3.0	4.0	0.25	6.0 x 1.25 x 0.50	BP12H00060	OR1500600	6.00 x 1.50
6.0	8.9	3.8	5.2	0.25	6.0 x 1.45 x 0.70	BP14H00060	ORAR00010	6.07 x 1.78
8.0	10.9	3.8	5.2	0.25	8.0 x 1.45 x 0.70	BP14H00080	ORAR00011	7.65 x 1.78
8.0	11.3	4.1	5.5	0.25	8.0 x 1.65 x 0.70	BP16H00080	OR2000800	8.00 x 2.00
10.0	12.9	3.8	5.2	0.25	10.0 x 1.45 x 0.70	BP14H00100	ORAR00013	10.82 x 1.78
10.0	13.3	4.1	5.5	0.25	10.0 x 1.65 x 0.70	BP16H00100	OR2001000	10.00 x 2.00
12.0	14.9	3.8	5.2	0.25	12.0 x 1.45 x 0.70	BP14H00120	ORAR00014	12.42 x 1.78
12.0	15.3	4.1	5.5	0.25	12.0 x 1.65 x 0.70	BP16H00120	OR2001200	12.00 x 2.00
14.0	16.9	3.8	5.2	0.25	14.0 x 1.45 x 0.70	BP14H00140	ORAR00015	14.00 x 1.78
14.0	17.3	4.1	5.5	0.25	14.0 x 1.65 x 0.70	BP16H00140	OR2001400	14.00 x 2.00
15.0	17.9	3.8	5.2	0.25	15.0 x 1.45 x 0.70	BP14H00150	ORAR00016	15.60 x 1.78
15.0	18.3	4.1	5.5	0.25	15.0 x 1.65 x 0.70	BP16H00150	OR2001500	15.00 x 2.00
16.0	18.9	3.8	5.2	0.25	16.0 x 1.45 x 0.70	BP14H00160	ORAR00016	15.60 x 1.78
16.0	19.3	4.1	5.5	0.25	16.0 x 1.65 x 0.70	BP16H00160	OR2001600	16.00 x 2.00
18.0	20.9	3.8	5.2	0.25	18.0 x 1.45 x 0.70	BP14H00180	ORAR00018	18.77 x 1.78
18.0	21.3	4.1	5.5	0.25	18.0 x 1.65 x 0.70	BP16H00180	OR2001800	18.00 x 2.00
20.0	22.9	3.8	5.2	0.25	20.0 x 1.45 x 0.70	BP14H00200	ORAR00019	20.35 x 1.78
20.0	23.3	4.1	5.5	0.25	20.0 x 1.65 x 0.70	BP16H00200	OR2002000	20.00 x 2.00
22.0	26.5	5.0	6.4	0.25	22.0 x 2.25 x 0.70	BP22H00220	ORAR00118	21.89 x 2.62
22.0	27.2	5.4	6.8	0.25	22.0 x 2.60 x 0.70	BP2600220	OR3002200	22.00 x 3.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Back-up Ring

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d4** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
25.0	29.5	5.0	6.4	0.25	25.0 x 2.25 x 0.70	BP22H00250	ORAR00120	25.07 x 2.62
25.0	30.2	5.4	6.8	0.25	25.0 x 2.60 x 0.70	BP2600250	OR3002500	25.00 x 3.00
28.0	32.5	5.0	6.4	0.25	28.0 x 2.25 x 0.70	BP22H00280	ORAR00122	28.24 x 2.62
28.0	33.2	5.4	6.8	0.25	28.0 x 2.60 x 0.70	BP2600280	OR3002800	28.00 x 3.00
30.0	34.5	5.0	6.4	0.25	30.0 x 2.25 x 0.70	BP22H00300	ORAR00123	29.83 x 2.62
30.0	35.2	5.4	6.8	0.25	30.0 x 2.60 x 0.70	BP2600300	OR3003000	30.00 x 3.00
32.0	36.5	5.0	6.4	0.25	32.0 x 2.25 x 0.70	BP22H00320	ORAR00125	31.42 x 2.62
32.0	37.2	5.4	6.8	0.25	32.0 x 2.60 x 0.70	BP2600320	OR3003200	32.00 x 3.00
35.0	39.5	5.0	6.4	0.25	35.0 x 2.25 x 0.70	BP22H00350	ORAR00126	24.59 x 2.62
35.0	40.2	5.4	6.8	0.25	35.0 x 2.60 x 0.70	BP2600350	OR3003500	35.00 x 3.00
36.0	40.5	5.0	6.4	0.25	36.0 x 2.25 x 0.70	BP22H00360	ORAR00127	36.17 x 2.62
36.0	41.2	5.4	6.8	0.25	36.0 x 2.60 x 0.70	BP2600360	OR3003600	36.00 x 3.00
40.0	46.2	6.2	7.6	0.25	40.0 x 3.10 x 0.70	BP31D0400	ORAR00223	40.87 x 3.53
40.0	47.0	6.9	8.6	0.25	40.0 x 3.50 x 0.85	BP3500400	OR4004000	40.00 x 4.00
42.0	48.2	6.2	7.6	0.25	42.0 x 3.10 x 0.70	BP31D0420	ORAR00223	40.87 x 3.53
42.0	49.0	6.9	8.6	0.25	42.0 x 3.50 x 0.70	BP35D0420	OR4004200	42.00 x 2.00
45.0	51.2	6.2	7.6	0.25	45.0 x 3.10 x 0.70	BP31D0450	ORAR00224	44.04 x 3.53
45.0	52.0	6.9	8.6	0.25	45.0 x 3.50 x 0.85	BP3500450	OR4004500	45.00 x 4.00
48.0	54.2	6.2	7.6	0.25	48.0 x 3.10 x 0.70	BP31D0480	ORAR00225	47.22 x 3.53
48.0	55.0	6.9	8.6	0.25	48.0 x 3.50 x 0.85	BP3500480	OR4004800	48.00 x 4.00
50.0	56.2	6.2	7.6	0.25	50.0 x 3.10 x 0.70	BP31D0500	ORAR00226	50.39 x 3.53
50.0	57.0	6.9	8.6	0.25	50.0 x 3.50 x 0.85	BP3500500	OR4005000	50.00 x 4.00
52.0	58.2	6.2	7.6	0.25	52.0 x 3.10 x 0.70	BP31D0520	ORAR00226	50.39 x 3.53
52.0	59.0	6.9	8.6	0.25	52.0 x 3.50 x 0.85	BP3500520	OR4005200	52.00 x 4.00
55.0	61.2	6.2	7.6	0.25	55.0 x 3.10 x 0.70	BP31D0550	ORAR00227	53.57 x 3.53
55.0	62.0	6.9	8.6	0.25	55.0 x 3.50 x 0.85	BP3500550	OR4005500	55.00 x 4.00
56.0	62.2	6.2	7.6	0.25	56.0 x 3.10 x 0.70	BP31D0560	ORAR00228	56.74 x 3.53
56.0	63.0	6.9	8.6	0.25	56.0 x 3.50 x 0.85	BP3500560	OR4005600	56.00 x 4.00
60.0	66.2	6.2	7.6	0.25	60.0 x 3.10 x 0.70	BP31D0600	ORAR00229	59.92 x 3.53
60.0	97.0	6.9	8.6	0.25	60.0 x 3.50 x 0.85	BP3500600	OR4006000	60.00 x 4.00
63.0	69.2	6.2	7.6	0.25	63.0 x 3.10 x 0.70	BP31D0630	ORAR00230	63.09 x 3.53
63.0	70.0	6.9	8.6	0.25	63.0 x 3.50 x 0.85	BP3500630	OR4006300	63.00 x 4.00
65.0	71.2	6.2	7.6	0.25	65.0 x 3.10 x 0.70	BP31D0650	ORAR00231	66.27 x 3.53
65.0	72.0	6.9	8.6	0.25	65.0 x 3.50 x 0.85	BP3500650	OR4006500	65.00 x 4.00
70.0	76.2	6.2	7.6	0.25	70.0 x 3.10 x 0.70	BP31D0700	ORAR00232	69.44 x 3.53
70.0	77.0	6.9	8.6	0.25	70.0 x 3.50 x 0.85	BP3500700	OR4007000	70.00 x 4.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d4** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
75.0	81.2	6.2	7.6	0.25	75.0 x 3.10 x 0.70	BP31D0750	ORAR00234	75.79 x 3.53
75.0	82.0	6.9	8.6	0.25	75.0 x 3.50 x 0.85	BP3500750	OR4007500	75.00 x 4.00
80.0	88.8	8.3	10.0	0.25	80.0 x 4.40 x 0.85	BP4400800	OR5008000	80.00 x 5.00
80.0	89.4	9.0	10.9	0.25	80.0 x 4.70 x 0.85	BP4700800	ORAR00339	81.92 x 5.33
85.0	93.8	8.3	10.0	0.25	85.0 x 4.40 x 0.85	BP4400850	OR5008500	85.00 x 5.00
85.0	94.4	9.0	10.9	0.25	85.0 x 4.70 x 0.85	BP4700850	ORAR00340	85.09 x 5.33
90.0	98.8	8.3	10.0	0.25	90.0 x 4.40 x 0.85	BP4400900	OR5009000	90.00 x 5.00
90.0	99.4	9.0	10.9	0.25	90.0 x 4.70 x 0.85	BP4700900	ORAR00342	91.44 x 5.33
95.0	103.8	8.3	10.0	0.25	95.0 x 4.40 x 0.85	BP4400950	OR5009500	95.00 x 5.00
95.0	104.4	9.0	10.9	0.25	95.0 x 4.70 x 0.85	BP4700950	ORAR00343	94.62 x 5.33
100.0	108.8	8.3	10.0	0.25	100.0 x 4.40 x 0.85	BP4401000	OR5010000	100.00 x 5.00
100.0	109.4	9.0	10.9	0.25	100.0 x 4.70 x 0.85	BP4701000	ORAR00345	100.97 x 5.33
105.0	113.8	8.3	10.0	0.25	105.0 x 4.40 x 0.85	BP4401050	OR5010500	105.00 x 5.00
105.0	114.4	9.0	10.9	0.25	105.0 x 4.70 x 0.85	BP4701050	ORAR00346	104.14 x 5.33
110.0	118.8	8.3	10.0	0.25	110.0 x 4.40 x 0.85	BP4401100	OR5011000	110.00 x 5.00
110.0	119.4	9.0	10.9	0.25	110.0 x 4.70 x 0.85	BP4701100	ORAR00348	110.49 x 5.33
115.0	123.8	8.3	10.0	0.25	115.0 x 4.40 x 0.85	BP4401150	OR5011500	115.00 x 5.00
115.0	124.4	9.0	10.9	0.25	115.0 x 4.70 x 0.85	BP4701150	ORAR00349	113.67 x 5.33
120.0	128.8	8.3	10.0	0.25	120.0 x 4.40 x 0.85	BP4401200	OR5012000	120.00 x 5.00
120.0	129.4	9.0	10.9	0.25	120.0 x 4.70 x 0.85	BP4701200	ORAR00351	120.02 x 5.33
125.0	133.8	8.3	10.0	0.25	125.0 x 4.40 x 0.85	BP4401250	OR5012500	125.00 x 5.00
125.0	134.4	9.0	10.9	0.25	125.0 x 4.70 x 0.85	BP4701250	ORAR00353	126.37 x 5.33
130.0	138.8	8.3	10.0	0.25	130.0 x 4.40 x 0.85	BP4401300	OR5013000	130.00 x 5.00
130.0	139.4	9.0	10.9	0.25	130.0 x 4.70 x 0.85	BP4701300	ORAR00354	129.54 x 5.33
135.0	147.2	12.3	15.1	0.25	135.0 x 6.10 x 1.25	BP6101350	ORAR00432	135.89 x 7.00
140.0	152.2	12.3	15.1	0.25	140.0 x 6.10 x 1.25	BP6101400	ORAR00433	139.07 x 7.00
150.0	162.2	12.3	15.1	0.25	150.0 x 6.10 x 1.25	BP6101500	ORAR00437	151.77 x 7.00
160.0	172.2	12.3	15.1	0.25	160.0 x 6.10 x 1.25	BP6101600	ORAR00438	158.12 x 7.00
170.0	182.2	12.3	15.1	0.25	170.0 x 6.10 x 1.25	BP6101700	ORAR00440	170.82 x 7.00
180.0	192.2	12.3	15.1	0.25	180.0 x 6.10 x 1.25	BP6101800	ORAR00442	183.52 x 7.00
190.0	202.2	12.3	15.1	0.25	190.0 x 6.10 x 1.25	BP6101900	ORAR00443	189.87 x 7.00
200.0	212.2	12.3	15.1	0.25	200.0 x 6.10 x 1.25	BP6102000	ORAR00445	202.57 x 7.00
210.0	222.2	12.3	15.1	0.25	210.0 x 6.10 x 1.25	BP6102100	ORAR00446	215.27 x 7.00
220.0	232.2	12.3	15.1	0.25	220.0 x 6.10 x 1.25	BP6102200	ORAR00446	215.27 x 7.00
230.0	242.2	12.3	15.1	0.25	230.0 x 6.10 x 1.25	BP6102300	ORAR00447	227.97 x 7.00
240.0	252.2	12.3	15.1	0.25	240.0 x 6.10 x 1.25	BP6102400	ORAR00448	240.67 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Rod ø	Groove ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**d4** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x W x T**			**d1 x d2**
250.0	262.2	12.3	15.1	0.25	250.0 x 6.10 x 1.25	BP6102500	ORAR00449	253.37 x 7.00
280.0	292.2	12.3	15.1	0.25	280.0 x 6.10 x 1.25	BP6102800	ORAR00451	278.77 x 7.00
300.0	312.2	12.3	15.1	0.25	300.0 x 6.10 x 1.25	BP6103000	ORAR00453	304.17 x 7.00
320.0	332.2	12.3	15.1	0.25	320.0 x 6.10 x 1.25	BP6103200	ORAR00454	316.87 x 7.00
350.0	362.2	12.3	15.1	0.25	350.0 x 6.10 x 1.25	BP6103500	ORAR00457	354.97 x 7.00
360.0	372.2	12.3	15.1	0.25	360.0 x 6.10 x 1.25	BP6103600	ORAR00457	354.97 x 7.00
400.0	412.2	12.3	15.1	0.25	400.0 x 6.10 x 1.25	BP6104000	ORAR00461	405.26 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (Back-up rings). However, these dimensions are not always stock items.

Installation recommendations static applications

INTERNAL (Rod) and EXTERNAL (Bore) sealing, type BB (uncut) based on AS 568 B, material NBR und FKM

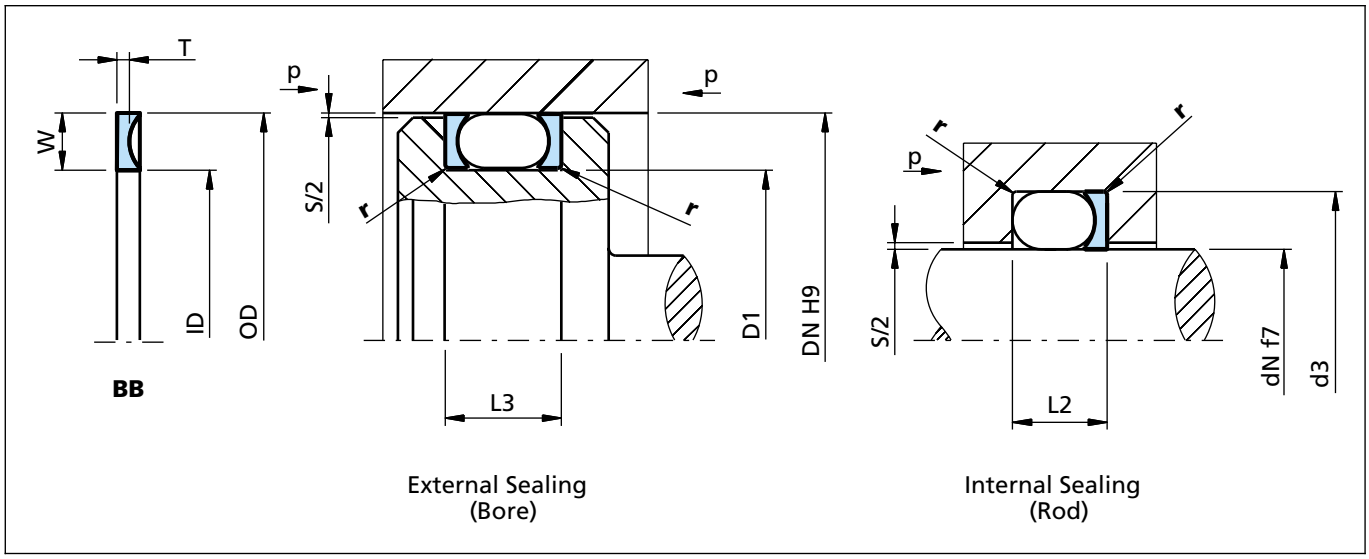


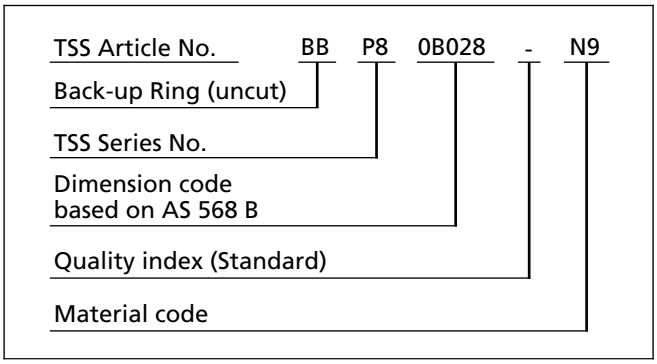
Figure 12 Installation drawing

Table XV Installation dimensions

O-Ring cross section d2		Back-up Ring cross section		Groove dimensions					
AS 568 B	**Series**	**Radial height**	**Thickness**	**Groove diameter**		**Groove width**		**Radius**	**dia-metrical clearence**
		W	**T**	**D1** -0.1	**d3** +0.1	**L2** +0.2	**L3** +0.2	**r** ±0.2	**S max.**
1.78	004 to 050	1.35	1.14	DN - 2.9	dN + 2.9	3.6	5.0	0.25	0.12
2.62	102 to 178	2.18	1.14	DN - 4.5	dN + 4.5	4.5	5.9	0.25	0.12
3.53	201 to 284	3.00	1.02	DN - 6.2	dN + 6.2	5.6	7.0	0.25	0.15
5.33	309 to 395	4.65	1.52	DN - 9.4	dN + 9.4	7.9	9.6	0.25	0.15
7.00	425 to 475	5.99	2.44	DN - 12.2	dN + 12.2	10.7	13.2	0.25	0.20

Ordering example

Back-up Ring:	Concave, type BB (uncut) For O-Ring seal
Application:	Static, external sealing
Bore diameter:	D_N = 38.00 mm
O-Ring cross section:	d_2 = 1.78 mm
Back Up Ring material:	NBR 90 Shore A
Material code see page 16	



TRELLEBORG SEALING SOLUTIONS

Table XVI Static applications preferred series INTERNAL (Rod) and EXTERNAL (Bore) sealing, type BB (uncut) based on AS 568 B, material NBR and FKM

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**DN** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x OD x T**			**d1 x d2**
2.0	5.2	3.6	5.0	0.25	2.44 x 5.14 x 1.14	BBP80B004	ORAR00004	1.78 x 1.78
2.5	6.0	3.6	5.0	0.25	3.24 x 5.94 x 1.14	BBP80B005	ORAR00005	2.57 x 1.78
3.0	6.5	3.6	5.0	0.25	3.56 x 6.26 x 1.14	BBP80B006	ORAR00006	2.90 x 1.78
4.0	7.0	3.6	5.0	0.25	4.74 x 7.04 x 1.14	BBP80B007	ORAR00007	3.68 x 1.78
5.0	8.0	3.6	5.0	0.25	5.13 x 7.83 x 1.14	BBP80B008	ORAR00008	4.47 x 1.78
5.5	9.0	3.6	5.0	0.25	5.94 x 8.64 x 1.14	BBP80B009	ORAR00009	5.28 x 1.78
6.5	10.0	3.6	5.0	0.25	6.73 x 9.43 x 1.14	BBP80B010	ORAR00010	6.07 x 1.78
8.0	11.0	3.6	5.0	0.25	8.31 x 11.01 x 1.14	BBP80B011	ORAR00011	7.65 x 1.78
9.5	13.0	3.6	5.0	0.25	9.91 x 12.61 x 1.14	BBP80B012	ORAR00012	9.25 x 1.78
11.0	14.0	3.6	5.0	0.25	11.56 x 14.26 x 1.14	BBP80B013	ORAR00013	10.82 x 1.78
13.0	16.0	3.6	5.0	0.25	13.16 x 15.86 x 1.14	BBP80B014	ORAR00014	12.42 x 1.78
14.0	17.0	3.6	5.0	0.25	14.73 x 17.43 x 1.14	BBP80B015	ORAR00015	14.00 x 1.78
16.0	19.0	3.6	5.0	0.25	16.33 x 19.03 x 1.14	BBP80B016	ORAR00016	15.60 x 1.78
17.0	21.0	3.6	5.0	0.25	17.91 x 20.61 x 1.14	BBP80B017	ORAR00017	17.17 x 1.78
19.0	22.0	3.6	5.0	0.25	19.51 x 22.21 x 1.14	BBP80B018	ORAR00018	18.77 x 1.78
20.0	24.0	3.6	5.0	0.25	21.08 x 23.78 x 1.14	BBP80B019	ORAR00019	20.35 x 1.78
22.0	25.0	3.6	5.0	0.25	22.68 x 25.38 x 1.14	BBP80B020	ORAR00020	21.95 x 1.78
24.0	27.0	3.6	5.0	0.25	24.26 x 26.96 x 1.14	BBP80B021	ORAR00021	23.52 x 1.78
25.0	29.0	3.6	5.0	0.25	25.86 x 28.56 x 1.14	BBP80B022	ORAR00022	25.12 x 1.78
27.0	30.0	3.6	5.0	0.25	27.43 x 30.13 x 1.14	BBP80B023	ORAR00023	26.70 x 1.78
29.0	32.0	3.6	5.0	0.25	29.03 x 31.73 x 1.14	BBP80B024	ORAR00024	28.30 x 1.78
30.0	33.0	3.6	5.0	0.25	30.61 x 33.31 x 1.14	BBP80B025	ORAR00025	29.87 x 1.78
32.0	35.0	3.6	5.0	0.25	32.21 x 34.91 x 1.14	BBP80B026	ORAR00026	31.47 x 1.78
33.0	36.5	3.6	5.0	0.25	33.78 x 36.48 x 1.14	BBP80B027	ORAR00027	33.05 x 1.78
35.0	38.0	3.6	5.0	0.25	35.38 x 38.08 x 1.14	BBP80B028	ORAR00028	34.65 x 1.78
38.0	41.0	3.6	5.0	0.25	38.56 x 41.26 x 1.14	BBP80B029	ORAR00029	37.82 x 1.78
41.0	44.5	3.6	5.0	0.25	41.73 x 44.43 x 1.14	BBP80B030	ORAR00030	41.00 x 1.78
44.5	48.0	3.6	5.0	0.25	44.91 x 47.61 x 1.14	BBP80B031	ORAR00031	44.17 x 1.78
48.0	51.0	3.6	5.0	0.25	48.08 x 50.78 x 1.14	BBP80B032	ORAR00032	47.35 x 1.78
51.0	54.0	3.6	5.0	0.25	51.26 x 53.96 x 1.14	BBP80B033	ORAR00033	50.52 x 1.78
54.0	57.0	3.6	5.0	0.25	54.53 x 57.13 x 1.14	BBP80B034	ORAR00034	53.70 x 1.78
57.0	60.0	3.6	5.0	0.25	57.61 x 60.31 x 1.14	BBP80B035	ORAR00035	56.87 x 1.78
60.0	63.5	3.6	5.0	0.25	60.78 x 63.48 x 1.14	BBP80B036	ORAR00036	60.05 x 1.78
63.0	67.0	3.6	5.0	0.25	63.96 x 66.66 x 1.14	BBP80B037	ORAR00037	63.22 x 1.78

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	DN H9	L2 +0.2	L3 +0.2	r ±0.2	ID x OD x T			d1 x d2
67.0	70.0	3.6	5.0	0.25	67.13 x 69.83 x 1.14	BBP80B038	ORAR00038	66.40 x 1.78
70.0	73.0	3.6	5.0	0.25	70.31 x 73.01 x 1.14	BBP80B039	ORAR00039	69.57 x 1.78
73.0	76.0	3.6	5.0	0.25	73.48 x 76.18 x 1.14	BBP80B040	ORAR00040	72.75 x 1.78
76.0	80.0	3.6	5.0	0.25	76.66 x 79.36 x 1.14	BBP80B041	ORAR00041	75.92 x 1.78
83.0	86.0	3.6	5.0	0.25	83.01 x 85.71 x 1.14	BBP80B042	ORAR00042	82.27 x 1.78
89.0	92.0	3.6	5.0	0.25	89.36 x 92.06 x 1.14	BBP80B043	ORAR00043	88.62 x 1.78
95.0	99.0	3.6	5.0	0.25	95.71 x 98.41 x 1.14	BBP80B044	ORAR00044	94.97 x 1.78
102.0	105.0	3.6	5.0	0.25	102.06 x 104.76 x 1.14	BBP80B045	ORAR00045	101.32 x 1.78
108.0	111.0	3.6	5.0	0.25	108.41 x 111.11 x 11.4	BBP80B046	ORAR00046	107.67 x 1.78
114.0	118.0	3.6	5.0	0.25	114.76 x 117.46 x 1.14	BBP80B047	ORAR00047	114.02 x 1.78
121.0	124.0	3.6	5.0	0.25	121.11 x 123.81 x 1.14	BBP80B048	ORAR00048	120.37 x 1.78
127.0	130.0	3.6	5.0	0.25	127.46 x 130.16 x 1.14	BBP80B049	ORAR00049	126.72 x 1.78
133.0	137.0	3.6	5.0	0.25	133.81 x 136.50 x 1.14	BBP80B050	ORAR00050	133.07 x 1.78
1.6	6.3	4.5	5.9	0.25	1.96 x 6.32 x 1.14	BBP80B102	ORAR00102	1.24 x 2.62
2.5	7.0	4.5	5.9	0.25	2.77 x 7.13 x 1.14	BBP80B103	ORAR00103	2.06 x 2.62
3.0	8.0	4.5	5.9	0.25	3.56 x 7.92 x 1.14	BBP80B104	ORAR00104	2.84 x 2.62
4.0	9.0	4.5	5.9	0.25	4.34 x 8.70 x 1.14	BBP80B105	ORAR00105	3.63 x 2.62
5.0	9.5	4.5	5.9	0.25	5.13 x 9.49 x 1.14	BBP80B106	ORAR00106	4.42 x 2.62
5.5	10.0	4.5	5.9	0.25	5.94 x 10.30 x 1.14	BBP80B107	ORAR00107	5.23 x 2.62
6.5	11.0	4.5	5.9	0.25	6.73 x 11.09 x 1.14	BBP80B108	ORAR00108	6.02 x 2.62
8.0	13.0	4.5	5.9	0.25	8.31 x 12.67 x 1.14	BBP80B109	ORAR00109	7.59 x 2.62
9.5	14.0	4.5	5.9	0.25	9.91 x 14.27 x 1.14	BBP80B110	ORAR00110	9.19 x 2.62
11.0	16.0	4.5	5.9	0.25	11.48 x 15.84 x 1.14	BBP80B111	ORAR00111	10.77 x 2.62
13.0	17.0	4.5	5.9	0.25	13.08 x 17.44 x 1.14	BBP80B112	ORAR00112	12.37 x 2.62
14.0	19.0	4.5	5.9	0.25	14.66 x 19.02 x 1.14	BBP80B113	ORAR00113	13.94 x 2.62
16.0	21.0	4.5	5.9	0.25	16.26 x 20.62 x 1.14	BBP80B114	ORAR00114	15.54 x 2.62
17.0	22.0	4.5	5.9	0.25	17.83 x 22.19 x 1.14	BBP80B115	ORAR00115	17.12 x 2.62
19.0	24.0	4.5	5.9	0.25	19.43 x 23.79 x 1.14	BBP80B116	ORAR00116	18.72 x 2.62
20.0	25.0	4.5	5.9	0.25	21.11 x 25.47 x 1.14	BBP80B117	ORAR00117	20.29 x 2.62
22.0	27.0	4.5	5.9	0.25	22.68 x 27.04 x 1.14	BBP80B118	ORAR00118	21.89 x 2.62
24.0	29.0	4.5	5.9	0.25	24.28 x 28.64 x 1.14	BBP80B119	ORAR00119	23.47 x 2.62
25.0	30.0	4.5	5.9	0.25	25.86 x 30.22 x 1.14	BBP80B120	ORAR00120	25.07 x 2.62
27.0	32.0	4.5	5.9	0.25	27.46 x 31.82 x 1.14	BBP80B121	ORAR00121	26.64 x 2.62
29.0	33.0	4.5	5.9	0.25	29.03 x 33.39 x 1.14	BBP80B122	ORAR00122	28.24 x 2.62

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**DN** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x OD x T**			**d1 x d2**
30.0	35.0	4.5	5.9	0.25	30.63 x 34.99 x 1.14	BBP80B123	ORAR00123	29.82 x 2.62
32.0	36.5	4.5	5.9	0.25	32.21 x 36.57 x 1.14	BBP80B124	ORAR00124	31.42 x 2.62
33.0	38.0	4.5	5.9	0.25	33.81 x 38.17 x 1.14	BBP80B125	ORAR00125	32.99 x 2.62
35.0	40.0	4.5	5.9	0.25	35.38 x 39.74 x 1.14	BBP80B126	ORAR00126	34.59 x 2.62
36.5	41.0	4.5	5.9	0.25	36.98 x 41.34 x 1.14	BBP80B127	ORAR00127	36.17 x 2.62
38.0	43.0	4.5	5.9	0.25	38.56 x 42.92 x 1.14	BBP80B128	ORAR00128	37.77 x 2.62
40.0	44.5	4.5	5.9	0.25	40.16 x 44.52 x 1.14	BBP80B129	ORAR00129	39.34 x 2.62
41.0	46.0	4.5	5.9	0.25	41.73 x 46.09 x 1.14	BBP80B130	ORAR00130	40.94 x 2.62
43.0	48.0	4.5	5.9	0.25	43.33 x 47.69 x 1.14	BBP80B131	ORAR00131	42.52 x 2.62
44.5	50.0	4.5	5.9	0.25	44.91 x 49.27 x 1.14	BBP80B132	ORAR00132	44.12 x 2.62
46.0	51.0	4.5	5.9	0.25	46.51 x 50.87 x 1.14	BBP80B133	ORAR00133	45.69 x 2.62
48.0	52.0	4.5	5.9	0.25	48.08 x 52.44 x 1.14	BBP80B134	ORAR00134	47.29 x 2.62
49.0	54.0	4.5	5.9	0.25	49.86 x 54.04 x 1.14	BBP80B135	ORAR00135	48.90 x 2.62
51.0	55.5	4.5	5.9	0.25	51.26 x 55.62 x 1.14	BBP80B136	ORAR00136	50.47 x 2.62
52.0	57.0	4.5	5.9	0.25	52.86 x 57.22 x 1.14	BBP80B137	ORAR00137	52.07 x 2.62
54.0	58.0	4.5	5.9	0.25	54.43 x 58.79 x 1.14	BBP80B138	ORAR00138	53.64 x 2.62
55.0	60.0	4.5	5.9	0.25	56.03 x 60.39 x 1.14	BBP80B139	ORAR00139	55.25 x 2.62
57.0	62.0	4.5	5.9	0.25	57.61 x 61.97 x 1.14	BBP80B140	ORAR00140	56.82 x 2.62
59.0	63.5	4.5	5.9	0.25	59.21 x 63.57 x 1.14	BBP80B141	ORAR00141	58.42 x 2.62
60.0	65.0	4.5	5.9	0.25	60.78 x 65.14 x 1.14	BBP80B142	ORAR00142	59.99 x 2.62
62.0	67.0	4.5	5.9	0.25	62.38 x 66.74 x 1.14	BBP80B143	ORAR00143	61.60 x 2.62
63.0	68.0	4.5	5.9	0.25	63.96 x 68.32 x 1.14	BBP80B144	ORAR00144	63.17 x 2.62
65.0	70.0	4.5	5.9	0.25	65.56 x 69.92 x 1.14	BBP80B145	ORAR00145	64.77 x 2.62
67.0	71.0	4.5	5.9	0.25	67.13 x 71.49 x 1.14	BBP80B146	ORAR00146	66.34 x 2.62
68.0	73.0	4.5	5.9	0.25	68.73 x 73.09 x 1.14	BBP80B147	ORAR00147	67.95 x 2.62
70.0	75.0	4.5	5.9	0.25	70.31 x 74.67 x 1.14	BBP80B148	ORAR00148	69.52 x 2.62
71.0	76.0	4.5	5.9	0.25	71.91 x 76.27 x 1.14	BBP80B149	ORAR00149	71.12 x 2.62
73.0	78.0	4.5	5.9	0.25	73.48 x 77.84 x 1.14	BBP80B150	ORAR00150	72.69 x 2.62
76.0	81.0	4.5	5.9	0.25	76.66 x 81.02 x 1.14	BBP80B151	ORAR00151	75.87 x 2.62
83.0	87.0	4.5	5.9	0.25	83.01 x 87.37 x 1.14	BBP80B152	ORAR00152	82.22 x 2.62
89.0	94.0	4.5	5.9	0.25	89.36 x 93.72 x 1.14	BBP80B153	ORAR00153	88.57 x 2.62
95.0	100.0	4.5	5.9	0.25	95.71 x 100.07 x 1.14	BBP80B154	ORAR00154	94.92 x 2.62
102.0	106.0	4.5	5.9	0.25	102.06 x 106.42 x 1.14	BBP80B155	ORAR00155	101.27 x 2.62
108.0	113.0	4.5	5.9	0.25	108.41 x 112.77 x 1.14	BBP80B156	ORAR00156	107.62 x 2.62
114.0	119.0	4.5	5.9	0.25	114.76 x 119.12 x 1.14	BBP80B157	ORAR00157	113.97 x 2.62

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	DN H9	L2 +0.2	L3 +0.2	r ±0.2	ID x OD x T			d1 x d2
121.0	125.0	4.5	5.9	0.25	121.11 x 125.47 x 1.14	BBP80B158	ORAR00158	120.32 x 2.62
127.0	132.0	4.5	5.9	0.25	127.46 x 131.82 x 1.14	BBP80B159	ORAR00159	126.67 x 2.62
133.0	138.0	4.5	5.9	0.25	133.81 x 138.17 x 1.14	BBP80B160	ORAR00160	133.02 x 2.62
140.0	144.0	4.5	5.9	0.25	140.16 x 144.52 x 1.14	BBP80B161	ORAR00161	139.37 x 2.62
146.0	151.0	4.5	5.9	0.25	146.51 x 150.87 x 1.14	BBP80B162	ORAR00162	145.72 x 2.62
152.0	157.0	4.5	5.9	0.25	152.86 x 157.22 x 1.14	BBP80B163	ORAR00163	152.07 x 2.62
159.0	164.0	4.5	5.9	0.25	159.21 x 163.57 x 1.14	BBP80B164	ORAR00164	158.42 x 2.62
165.0	170.0	4.5	5.9	0.25	165.56 x 169.92 x 1.14	BBP80B165	ORAR00165	164.77 x 2.62
172.0	176.0	4.5	5.9	0.25	171.91 x 176.27 x 1.14	BBP80B166	ORAR00166	171.12 x 2.62
178.0	183.0	4.5	5.9	0.25	178.25 x 182.61 x 1.14	BBP80B167	ORAR00167	177.47 x 2.62
184.0	189.0	4.5	5.9	0.25	184.61 x 188.97 x 1.14	BBP80B168	ORAR00168	183.82 x 2.62
190.0	195.0	4.5	5.9	0.25	190.96 x 195.32 x 1.14	BBP80B169	ORAR00169	190.17 x 2.62
197.0	202.0	4.5	5.9	0.25	197.31 x 201.67 x 1.14	BBP80B170	ORAR00170	196.52 x 2.62
203.0	208.0	4.5	5.9	0.25	203.66 x 208.02 x 1.14	BBP80B171	ORAR00171	202.87 x 2.62
210.0	214.0	4.5	5.9	0.25	210.01 x 214.37 x 1.14	BBP80B172	ORAR00172	209.22 x 2.62
216.0	221.0	4.5	5.9	0.25	216.36 x 220.72 x 1.14	BBP80B173	ORAR00173	215.57 x 2.62
222.0	227.0	4.5	5.9	0.25	222.71 x 227.07 x 1.14	BBP80B174	ORAR00174	221.92 x 2.62
229.0	233.0	4.5	5.9	0.25	229.06 x 233.42 x 1.14	BBP80B175	ORAR00175	228.27 x 2.62
235.0	240.0	4.5	5.9	0.25	235.41 x 239.77 x 1.14	BBP80B176	ORAR00176	234.62 x 2.62
241.0	246.0	4.5	5.9	0.25	241.76 x 246.12 x 1.14	BBP80B177	ORAR00177	240.97 x 2.62
248.0	252.0	4.5	5.9	0.25	248.11 x 252.47 x 1.14	BBP80B178	ORAR00178	247.32 x 2.62
5.0	11.0	5.6	7.0	0.25	5.13 x 11.13 x 1.02	BBP80B201	ORAR00201	4.34 x 3.53
6.5	13.0	5.6	7.0	0.25	6.73 x 12.73 x 1.02	BBP80B202	ORAR00202	5.94 x 3.53
8.0	14.0	5.6	7.0	0.25	8.30 x 14.30 x 1.02	BBP80B203	ORAR00203	7.52 x 3.53
9.5	16.0	5.6	7.0	0.25	9.90 x 15.90 x 1.02	BBP80B204	ORAR00204	9.12 x 3.53
11.0	17.0	5.6	7.0	0.25	11.56 x 17.56 x 1.02	BBP80B205	ORAR00205	10.69 x 3.53
13.0	19.0	5.6	7.0	0.25	13.16 x 19.16 x 1.02	BBP80B206	ORAR00206	12.29 x 3.53
14.0	21.0	5.6	7.0	0.25	14.73 x 20.73 x 1.02	BBP80B207	ORAR00207	13.87 x 3.53
16.0	22.0	5.6	7.0	0.25	16.33 x 22.33 x 1.02	BBP80B208	ORAR00208	15.47 x 3.53
17.0	24.0	5.6	7.0	0.25	17.90 x 23.90 x 1.02	BBP80B209	ORAR00209	17.04 x 3.53
19.0	25.0	5.6	7.0	0.25	19.46 x 25.46 x 1.02	BBP80B210	ORAR00210	18.64 x 3.53
20.0	27.0	5.6	7.0	0.25	21.03 x 27.03 x 1.02	BBP80B211	ORAR00211	20.22 x 3.53
22.0	29.0	5.6	7.0	0.25	22.63 x 28.63 x 1.02	BBP80B212	ORAR00212	21.82 x 3.53
24.0	30.0	5.6	7.0	0.25	24.21 x 30.21 x 1.02	BBP80B213	ORAR00213	23.39 x 3.53

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**DN** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x OD x T**			**d1 x d2**
25.0	32.0	5.6	7.0	0.25	25.81 x 31.81 x 1.02	BBP80B214	ORAR00214	25.00 x 3.53
27.0	33.0	5.6	7.0	0.25	27.38 x 33.38 x 1.02	BBP80B215	ORAR00215	26.57 x 3.53
29.0	35.0	5.6	7.0	0.25	28.98 x 34.98 x 1.02	BBP80B216	ORAR00216	28.17 x 3.53
30.0	36.5	5.6	7.0	0.25	30.56 x 36.56 x 1.02	BBP80B217	ORAR00217	29.74 x 3.53
32.0	38.0	5.6	7.0	0.25	32.16 x 38.16 x 1.02	BBP80B218	ORAR00218	31.34 x 3.53
33.0	40.0	5.6	7.0	0.25	33.88 x 39.88 x 1.02	BBP80B219	ORAR00219	32.92 x 3.53
35.0	41.0	5.6	7.0	0.25	35.50 x 41.50 x 1.02	BBP80B220	ORAR00220	34.52 x 3.53
36.0	43.0	5.6	7.0	0.25	37.06 x 43.06 x 1.02	BBP80B221	ORAR00221	36.09 x 3.53
38.0	44.5	5.6	7.0	0.25	38.66 x 44.66 x 1.02	BBP80B222	ORAR00222	37.69 x 3.53
41.0	48.0	5.6	7.0	0.25	41.83 x 47.83 x 1.02	BBP80B223	ORAR00223	40.87 x 3.53
44.5	51.0	5.6	7.0	0.25	45.01 x 51.01 x 1.02	BBP80B224	ORAR00224	44.04 x 3.53
48.0	54.0	5.6	7.0	0.25	48.18 x 54.18 x 1.02	BBP80B225	ORAR00225	47.22 x 3.53
51.0	57.0	5.6	7.0	0.25	51.36 x 57.36 x 1.02	BBP80B226	ORAR00226	50.39 x 3.53
54.0	60.0	5.6	7.0	0.25	54.53 x 60.53 x 1.02	BBP80B227	ORAR00227	53.57 x 3.53
57.0	63.5	5.6	7.0	0.25	57.71 x 63.71 x 1.02	BBP80B228	ORAR00228	56.74 x 3.53
60.0	67.0	5.6	7.0	0.25	60.88 x 68.88 x 1.02	BBP80B229	ORAR00229	59.92 x 3.53
63.5	70.0	5.6	7.0	0.25	64.06 x 70.06 x 1.02	BBP80B230	ORAR00230	63.09 x 3.53
67.0	73.0	5.6	7.0	0.25	66.83 x 72.83 x 1.02	BBP80B231	ORAR00231	66.27 x 3.53
70.0	76.0	5.6	7.0	0.25	70.00 x 76.00 x 1.02	BBP80B232	ORAR00232	69.44 x 3.53
73.0	79.0	5.6	7.0	0.25	73.18 x 79.18 x 1.02	BBP80B233	ORAR00233	72.62 x 3.53
76.0	83.0	5.6	7.0	0.25	76.35 x 82.35 x 1.02	BBP80B234	ORAR00234	75.79 x 3.53
79.5	86.0	5.6	7.0	0.25	79.53 x 85.53 x 1.02	BBP80B235	ORAR00235	78.97 x 3.53
83.0	89.0	5.6	7.0	0.25	82.70 x 88.70 x 1.02	BBP80B236	ORAR00236	82.14 x 3.53
86.0	92.0	5.6	7.0	0.25	85.88 x 91.88 x 1.02	BBP80B237	ORAR00237	85.32 x 3.53
90.0	95.0	5.6	7.0	0.25	89.05 x 95.05 x 1.02	BBP80B238	ORAR00238	88.49 x 3.53
92.0	98.0	5.6	7.0	0.25	92.23 x 98.23 x 1.02	BBP80B239	ORAR00239	91.67 x 3.53
95.0	102.0	5.6	7.0	0.25	95.40 x 101.40 x 1.02	BBP80B240	ORAR00240	94.84 x 3.53
98.0	105.0	5.6	7.0	0.25	98.58 x 104.58 x 1.02	BBP80B241	ORAR00241	98.02 x 3.53
102.0	108.0	5.6	7.0	0.25	101.75 x 107.75 x 1.02	BBP80B242	ORAR00242	101.19 x 3.53
105.0	111.0	5.6	7.0	0.25	104.93 x 110.93 x 1.02	BBP80B243	ORAR00243	104.37 x 3.53
108.0	114.0	5.6	7.0	0.25	108.10 x 114.10 x 1.02	BBP80B244	ORAR00244	107.54 x 3.53
111.0	118.0	5.6	7.0	0.25	111.28 x 117.28 x 1.02	BBP80B245	ORAR00245	110.72 x 3.53
114.0	121.0	5.6	7.0	0.25	114.45 x 120.45 x 1.02	BBP80B246	ORAR00246	113.89 x 3.53
118.0	124.0	5.6	7.0	0.25	117.63 x 123.63 x 1.02	BBP80B247	ORAR00247	117.07 x 3.53
121.0	127.0	5.6	7.0	0.25	121.11 x 127.11 x 1.02	BBP80B248	ORAR00248	120.24 x 3.53

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	DN H9	L2 +0.2	L3 +0.2	r ±0.2	ID x OD x T			d1 x d2
124.0	130.0	5.6	7.0	0.25	124.28 x 130.28 x 1.02	BBP80B249	ORAR00249	123.42 x 3.53
127.0	133.0	5.6	7.0	0.25	127.46 x 133.46 x 1.02	BBP80B250	ORAR00250	126.59 x 3.53
130.0	136.5	5.6	7.0	0.25	130.63 x 136.63 x 1.02	BBP80B251	ORAR00251	129.77 x 3.53
133.0	140.0	5.6	7.0	0.25	133.81 x 139.81 x 1.02	BBP80B252	ORAR00252	132.94 x 3.53
136.5	143.0	5.6	7.0	0.25	136.98 x 142.98 x 1.02	BBP80B253	ORAR00253	136.12 x 3.53
140.0	146.0	5.6	7.0	0.25	140.16 x 146.16 x 1.02	BBP80B254	ORAR00254	139.29 x 3.53
143.0	150.0	5.6	7.0	0.25	143.33 x 149.33 x 1.02	BBP80B255	ORAR00255	142.47 x 3.53
146.0	152.0	5.6	7.0	0.25	146.51 x 152.51 x 1.02	BBP80B256	ORAR00256	145.64 x 3.53
149.0	156.0	5.6	7.0	0.25	149.68 x 155.68 x 1.02	BBP80B257	ORAR00257	148.82 x 3.53
152.0	159.0	5.6	7.0	0.25	152.86 x 158.86 x 1.02	BBP80B258	ORAR00258	151.99 x 3.53
159.0	165.0	5.6	7.0	0.25	159.21 x 165.21 x 1.02	BBP80B259	ORAR00259	158.34 x 3.53
165.0	172.0	5.6	7.0	0.25	165.56 x 171.56 x 1.02	BBP80B260	ORAR00260	164.69 x 3.53
172.0	178.0	5.6	7.0	0.25	171.91 x 177.91 x 1.02	BBP80B261	ORAR00261	171.04 x 3.53
178.0	184.0	5.6	7.0	0.25	178.26 x 184.26 x 1.02	BBP80B262	ORAR00262	177.39 x 3.53
184.0	190.5	5.6	7.0	0.25	184.61 x 190.61 x 1.02	BBP80B263	ORAR00263	183.74 x 3.53
190.5	197.0	5.6	7.0	0.25	190.96 x 196.96 x 1.02	BBP80B264	ORAR00264	190.09 x 3.53
197.0	203.0	5.6	7.0	0.25	197.31 x 203.31 x 1.02	BBP80B265	ORAR00265	196.44 x 3.53
203.0	210.0	5.6	7.0	0.25	203.66 x 209.66 x 1.02	BBP80B266	ORAR00266	202.79 x 3.53
210.0	215.9	5.6	7.0	0.25	210.01 x 216.01 x 1.02	BBP80B267	ORAR00267	209.14 x 3.53
215.9	222.3	5.6	7.0	0.25	216.36 x 222.36 x 1.02	BBP80B268	ORAR00268	215.49 x 3.53
222.3	229.0	5.6	7.0	0.25	222.71 x 228.71 x 1.02	BBP80B269	ORAR00269	221.84 x 3.53
228.6	235.0	5.6	7.0	0.25	229.06 x 235.06 x 1.02	BBP80B270	ORAR00270	228.19 x 3.53
235.0	241.0	5.6	7.0	0.25	235.41 x 241.41 x 1.02	BBP80B271	ORAR00271	234.54 x 3.53
241.0	248.0	5.6	7.0	0.25	241.76 x 247.76 x 1.02	BBP80B272	ORAR00272	240.89 x 3.53
248.0	254.0	5.6	7.0	0.25	248.11 x 254.11 x 1.02	BBP80B273	ORAR00273	247.24 x 3.53
254.0	260.0	5.6	7.0	0.25	254.46 x 260.46 x 1.02	BBP80B274	ORAR00274	253.59 x 3.53
267.0	273.0	5.6	7.0	0.25	267.16 x 273.16 x 1.02	BBP80B275	ORAR00275	266.29 x 3.53
280.0	286.0	5.6	7.0	0.25	279.86 x 285.86 x 1.02	BBP80B276	ORAR00276	278.99 x 3.53
292.0	299.0	5.6	7.0	0.25	292.56 x 298.56 x 1.02	BBP80B277	ORAR00277	291.69 x 3.53
305.0	311.0	5.6	7.0	0.25	305.26 x 311.26 x 1.02	BBP80B278	ORAR00278	304.39 x 3.53
330.0	336.0	5.6	7.0	0.25	330.66 x 336.66 x 1.02	BBP80B279	ORAR00279	329.79 x 3.53
356.0	362.0	5.6	7.0	0.25	356.05 x 362.05 x 1.02	BBP80B280	ORAR00280	355.19 x 3.53
381.0	387.0	5.6	7.0	0.25	381.46 x 387.46 x 1.02	BBP80B281	ORAR00281	380.59 x 3.53
406.0	413.0	5.6	7.0	0.25	406.12 x 412.12 x 1.02	BBP80B282	ORAR00282	405.26 x 3.53
432.0	438.0	5.6	7.0	0.25	431.52 x 437.52 x 1.02	BBP80B283	ORAR00283	430.66 x 3.53

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**DN** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x OD x T**			**d1 x d2**
457.0	464.0	5.6	7.0	0.25	456.92 x 462.92 x 1.02	BBP80B284	ORAR00284	456.06 x 3.53
11.0	21.0	7.9	9.6	0.25	11.43 x 20.73 x 1.52	BBP80B309	ORAR00309	10.46 x 5.33
13.0	22.0	7.9	9.6	0.25	13.03 x 22.33 x 1.52	BBP80B310	ORAR00310	12.07 x 5.33
14.0	24.0	7.9	9.6	0.25	14.60 x 23.90 x 1.52	BBP80B311	ORAR00311	13.64 x 5.33
16.0	25.0	7.9	9.6	0.25	16.20 x 25.50 x 1.52	BBP80B312	ORAR00312	15.24 x 5.33
17.0	27.0	7.9	9.6	0.25	17.78 x 27.08 x 1.52	BBP80B313	ORAR00313	16.81 x 5.33
19.0	29.0	7.9	9.6	0.25	19.38 x 28.68 x 1.52	BBP80B314	ORAR00314	18.42 x 5.33
20.0	30.0	7.9	9.6	0.25	20.96 x 30.26 x 1.52	BBP80B315	ORAR00315	19.99 x 5.33
22.0	32.0	7.9	9.6	0.25	22.56 x 31.86 x 1.52	BBP80B316	ORAR00316	21.59 x 5.33
24.0	33.0	7.9	9.6	0.25	24.13 x 33.43 x 1.52	BBP80B317	ORAR00317	23.16 x 5.33
25.0	35.0	7.9	9.6	0.25	25.73 x 35.03 x 1.52	BBP80B318	ORAR00318	24.77 x 5.33
27.0	36.5	7.9	9.6	0.25	27.31 x 36.61 x 1.52	BBP80B319	ORAR00319	26.34 x 5.33
29.0	38.0	7.9	9.6	0.25	28.91 x 38.21 x 1.52	BBP80B320	ORAR00320	27.94 x 5.33
30.0	40.0	7.9	9.6	0.25	30.42 x 39.72 x 1.52	BBP80B321	ORAR00321	29.51 x 5.33
32.0	41.0	7.9	9.6	0.25	32.08 x 41.38 x 1.52	BBP80B322	ORAR00322	31.12 x 5.33
33.0	43.0	7.9	9.6	0.25	33.43 x 42.73 x 1.52	BBP80B323	ORAR00323	32.69 x 5.33
35.0	44.5	7.9	9.6	0.25	35.26 x 44.56 x 1.52	BBP80B324	ORAR00324	34.29 x 5.33
38.0	48.0	7.9	9.6	0.25	38.43 x 47.73 x 1.52	BBP80B325	ORAR00325	37.47 x 5.33
41.0	51.0	7.9	9.6	0.25	41.61 x 50.91 x 1.52	BBP80B326	ORAR00326	40.64 x 5.33
44.5	54.0	7.9	9.6	0.25	44.78 x 54.08 x 1.52	BBP80B327	ORAR00327	43.82 x 5.33
48.0	57.0	7.9	9.6	0.25	47.96 x 57.26 x 1.52	BBP80B328	ORAR00328	46.99 x 5.33
51.0	60.0	7.9	9.6	0.25	51.13 x 60.43 x 1.52	BBP80B329	ORAR00329	50.17 x 5.33
54.0	63.5	7.9	9.6	0.25	54.31 x 63.61 x 1.52	BBP80B330	ORAR00330	53.34 x 5.33
57.0	67.0	7.9	9.6	0.25	57.61 x 66.91 x 1.52	BBP80B331	ORAR00331	56.52 x 5.33
60.0	70.0	7.9	9.6	0.25	60.78 x 70.08 x 1.52	BBP80B332	ORAR00332	59.69 x 5.33
64.0	73.0	7.9	9.6	0.25	63.96 x 73.26 x 1.52	BBP80B333	ORAR00333	62.87 x 5.33
67.0	76.0	7.9	9.6	0.25	67.13 x 76.43 x 1.52	BBP80B334	ORAR00334	66.04 x 5.33
70.0	80.0	7.9	9.6	0.25	70.31 x 79.61 x 1.52	BBP80B335	ORAR00335	69.22 x 5.33
73.0	83.0	7.9	9.6	0.25	73.48 x 82.78 x 1.52	BBP80B336	ORAR00336	72.39 x 5.33
76.0	86.0	7.9	9.6	0.25	76.66 x 85.96 x 1.52	BBP80B337	ORAR00337	75.57 x 5.33
80.0	89.0	7.9	9.6	0.25	79.83 x 89.13 x 1.52	BBP80B338	ORAR00338	78.74 x 5.33
83.0	92.0	7.9	9.6	0.25	83.13 x 92.43 x 1.52	BBP80B339	ORAR00339	81.92 x 5.33
86.0	95.0	7.9	9.6	0.25	86.31 x 95.61 x 1.52	BBP80B340	ORAR00340	85.09 x 5.33
90.0	98.0	7.9	9.6	0.25	89.48 x 98.78 x 1.52	BBP80B341	ORAR00341	88.27 x 5.33

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	DN H9	L2 +0.2	L3 +0.2	r ±0.2	ID x OD x T			d1 x d2
92.0	102.0	7.9	9.6	0.25	92.66 x 101.96 x 1.52	BBP80B342	ORAR00342	91.44 x 5.33
95.0	105.0	7.9	9.6	0.25	95.83 x 105.13 x 1.52	BBP80B343	ORAR00343	94.62 x 5.33
98.0	108.0	7.9	9.6	0.25	99.01 x 108.31 x 1.52	BBP80B344	ORAR00344	97.79 x 5.33
102.0	111.0	7.9	9.6	0.25	102.31 x 111.61 x 1.52	BBP80B345	ORAR00345	100.97 x 5.33
105.0	114.0	7.9	9.6	0.25	105.49 x 114.79 x 1.52	BBP80B346	ORAR00346	104.14 x 5.33
108.0	118.0	7.9	9.6	0.25	108.66 x 117.96 x 1.52	BBP80B347	ORAR00347	107.32 x 5.33
111.0	121.0	7.9	9.6	0.25	111.84 x 121.14 x 1.52	BBP80B348	ORAR00348	110.49 x 5.33
114.0	124.0	7.9	9.6	0.25	115.01 x 124.31 x 1.52	BBP80B349	ORAR00349	113.67 x 5.33
115.0	130.0	7.9	9.6	0.25	121.36 x 130.66 x 1.52	BBP80B351	ORAR00351	120.02 x 5.33
118.0	127.0	7.9	9.6	0.25	118.19 x 127.49 x 1.52	BBP80B350	ORAR00350	116.84 x 5.33
124.0	133.0	7.9	9.6	0.25	124.54 x 133.84 x 1.52	BBP80B352	ORAR00352	123.19 x 5.33
127.0	137.0	7.9	9.6	0.25	127.71 x 137.01 x 1.52	BBP80B353	ORAR00353	126.37 x 5.33
130.0	140.0	7.9	9.6	0.25	130.89 x 140.19 x 1.52	BBP80B354	ORAR00354	129.54 x 5.33
134.0	143.0	7.9	9.6	0.25	134.09 x 143.39 x 1.52	BBP80B355	ORAR00355	132.72 x 5.33
137.0	146.0	7.9	9.6	0.25	137.24 x 146.54 x 1.52	BBP80B356	ORAR00356	135.89 x 5.33
140.0	150.0	7.9	9.6	0.25	140.41 x 149.71 x 1.52	BBP80B357	ORAR00357	139.07 x 5.33
143.0	152.0	7.9	9.6	0.25	143.59 x 152.89 x 1.52	BBP80B358	ORAR00358	142.24 x 5.33
146.0	156.0	7.9	9.6	0.25	146.76 x 156.06 x 1.52	BBP80B359	ORAR00359	145.42 x 5.33
150.0	159.0	7.9	9.6	0.25	149.94 x 159.24 x 1.52	BBP80B360	ORAR00360	148.49 x 5.33
152.0	162.0	7.9	9.6	0.25	153.11 x 162.41 x 1.52	BBP80B361	ORAR00361	151.77 x 5.33
159.0	168.0	7.9	9.6	0.25	159.46 x 168.76 x 1.52	BBP80B362	ORAR00362	158.12 x 5.33
165.0	175.0	7.9	9.6	0.25	165.81 x 175.11 x 1.52	BBP80B363	ORAR00363	164.47 x 5.33
172.0	181.0	7.9	9.6	0.25	172.16 x 181.46 x 1.52	BBP80B364	ORAR00364	170.82 x 5.33
178.0	187.0	7.9	9.6	0.25	178.51 x 187.81 x 1.52	BBP80B365	ORAR00365	177.17 x 5.33
184.0	194.0	7.9	9.6	0.25	184.86 x 194.16 x 1.52	BBP80B366	ORAR00366	183.52 x 5.33
191.0	200.0	7.9	9.6	0.25	191.21 x 200.51 x 1.52	BBP80B367	ORAR00367	189.87 x 5.33
197.0	206.0	7.9	9.6	0.25	197.56 x 206.86 x 1.52	BBP80B368	ORAR00368	196.22 x 5.33
203.0	213.0	7.9	9.6	0.25	203.91 x 213.21 x 1.52	BBP80B369	ORAR00369	202.57 x 5.33
210.0	220.0	7.9	9.6	0.25	210.26 x 219.56 x 1.52	BBP80B370	ORAR00370	208.92 x 5.33
216.0	225.0	7.9	9.6	0.25	216.61 x 225.91 x 1.52	BBP80B371	ORAR00371	215.27 x 5.33
222.0	232.0	7.9	9.6	0.25	222.96 x 232.26 x 1.52	BBP80B372	ORAR00372	221.62 x 5.33
229.0	238.0	7.9	9.6	0.25	229.31 x 238.61 x 1.52	BBP80B373	ORAR00373	227.97 x 5.33
235.0	244.5	7.9	9.6	0.25	235.66 x 244.96 x 1.52	BBP80B374	ORAR00374	234.32 x 5.33
241.0	251.0	7.9	9.6	0.25	242.01 x 251.31 x 1.52	BBP80B375	ORAR00375	240.67 x 5.33
248.0	257.0	7.9	9.6	0.25	248.36 x 257.66 x 1.52	BBP80B376	ORAR00376	247.02 x 5.33

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**DN** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x OD x T**			**d1 x d2**
254.0	264.0	7.9	9.6	0.25	254.71 x 264.01 x 1.52	BBP80B377	ORAR00377	253.37 x 5.33
267.0	276.0	7.9	9.6	0.25	267.41 x 276.71 x 1.52	BBP80B378	ORAR00378	266.07 x 5.33
280.0	290.0	7.9	9.6	0.25	280.11 x 289.41 x 1.52	BBP80B379	ORAR00379	278.77 x 5.33
292.0	302.0	7.9	9.6	0.25	292.81 x 302.11 x 1.52	BBP80B380	ORAR00380	291.47 x 5.33
305.0	315.0	7.9	9.6	0.25	305.51 x 314.81 x 1.52	BBP80B381	ORAR00381	304.17 x 5.33
330.0	340.0	7.9	9.6	0.25	330.91 x 340.21 x 1.52	BBP80B382	ORAR00382	329.57 x 5.33
356.0	366.0	7.9	9.6	0.25	356.31 x 365.61 x 1.52	BBP80B383	ORAR00383	354.97 x 5.33
381.0	390.5	7.9	9.6	0.25	381.71 x 391.01 x 1.52	BBP80B384	ORAR00384	380.37 x 5.33
407.0	416.0	7.9	9.6	0.25	406.60 x 415.90 x 1.52	BBP80B385	ORAR00385	405.26 x 5.33
432.0	441.0	7.9	9.6	0.25	432.00 x 441.30 x 1.52	BBP80B386	ORAR00386	430.66 x 5.33
457.0	467.0	7.9	9.6	0.25	457.40 x 466.70 x 1.52	BBP80B387	ORAR00387	456.06 x 5.33
483.0	492.0	7.9	9.6	0.25	482.75 x 492.05 x 1.52	BBP80B388	ORAR00388	481.38 x 5.33
508.0	518.0	7.9	9.6	0.25	508.15 x 517.45 x 1.52	BBP80B389	ORAR00389	506.78 x 5.33
533.0	543.0	7.9	9.6	0.25	533.55 x 542.85 x 1.52	BBP80B390	ORAR00390	532.18 x 5.33
559.0	568.0	7.9	9.6	0.25	558.95 x 568.25 x 1.52	BBP80B391	ORAR00391	557.58 x 5.33
584.0	593.0	7.9	9.6	0.25	584.02 x 593.32 x 1.52	BBP80B392	ORAR00392	582.68 x 5.33
610.0	619.0	7.9	9.6	0.25	609.42 x 618.72 x 1.52	BBP80B393	ORAR00393	608.08 x 5.33
635.0	644.0	7.9	9.6	0.25	634.82 x 644.12 x 1.52	BBP80B394	ORAR00394	633.48 x 5.33
660.0	670.0	7.9	9.6	0.25	660.22 x 669.52 x 1.52	BBP80B395	ORAR00395	658.88 x 5.33
114.0	128.0	10.7	13.2	0.25	115.60 x 127.58 x 2.44	BBP80B425	ORAR00425	113.67 x 7.00
118.0	131.0	10.7	13.2	0.25	118.77 x 130.75 x 2.44	BBP80B426	ORAR00426	116.84 x 7.00
121.0	134.0	10.7	13.2	0.25	121.95 x 133.93 x 2.44	BBP80B427	ORAR00427	120.02 x 7.00
124.0	137.0	10.7	13.2	0.25	125.20 x 137.18 x 2.44	BBP80B428	ORAR00428	123.19 x 7.00
127.0	140.0	10.7	13.2	0.25	128.30 x 140.28 x 2.44	BBP80B429	ORAR00429	126.37 x 7.00
130.0	143.0	10.7	13.2	0.25	131.47 x 143.45 x 2.44	BBP80B430	ORAR00430	129.54 x 7.00
134.0	147.0	10.7	13.2	0.25	134.65 x 146.63 x 2.44	BBP80B431	ORAR00431	132.72 x 7.00
137.0	150.0	10.7	13.2	0.25	137.82 x 149.80 x 2.44	BBP80B432	ORAR00432	135.89 x 7.00
140.0	152.0	10.7	13.2	0.25	141.00 x 152.98 x 2.44	BBP80B433	ORAR00433	139.07 x 7.00
143.0	156.0	10.7	13.2	0.25	144.17 x 156.15 x 2.44	BBP80B434	ORAR00434	142.24 x 7.00
146.0	159.0	10.7	13.2	0.25	147.35 x 159.33 x 2.44	BBP80B435	ORAR00435	145.42 x 7.00
150.0	162.0	10.7	13.2	0.25	150.52 x 162.50 x 2.44	BBP80B436	ORAR00436	148.59 x 7.00
153.0	165.0	10.7	13.2	0.25	153.70 x 165.68 x 2.44	BBP80B437	ORAR00437	151.77 x 7.00
159.0	172.0	10.7	13.2	0.25	159.36 x 171.34 x 2.44	BBP80B438	ORAR00438	158.12 x 7.00
165.0	178.0	10.7	13.2	0.25	165.71 x 177.69 x 2.44	BBP80B439	ORAR00439	164.47 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	DN H9	L2 +0.2	L3 +0.2	r ±0.2	ID x OD x T			d1 x d2
172.0	184.0	10.7	13.2	0.25	172.06 x 184.04 x 2.44	BBP80B440	ORAR00440	170.82 x 7.00
178.0	190.5	10.7	13.2	0.25	178.41 x 190.39 x 2.44	BBP80B441	ORAR00441	177.17 x 7.00
185.0	197.0	10.7	13.2	0.25	184.76 x 196.74 x 2.44	BBP80B442	ORAR00442	183.52 x 7.00
190.0	203.0	10.7	13.2	0.25	191.11 x 203.09 x 2.44	BBP80B443	ORAR00443	189.87 x 7.00
197.0	210.0	10.7	13.2	0.25	197.46 x 209.44 x 2.44	BBP80B444	ORAR00444	196.22 x 7.00
203.0	216.0	10.7	13.2	0.25	203.81 x 215.79 x 2.44	BBP80B445	ORAR00445	202.57 x 7.00
216.0	229.0	10.7	13.2	0.25	216.51 x 228.49 x 2.44	BBP80B446	ORAR00446	215.27 x 7.00
229.0	241.0	10.7	13.2	0.25	229.21 x 241.19 x 2.44	BBP80B447	ORAR00447	227.97 x 7.00
241.0	254.0	10.7	13.2	0.25	241.91 x 253.89 x 2.44	BBP80B448	ORAR00448	240.67 x 7.00
254.0	267.0	10.7	13.2	0.25	254.61 x 266.59 x 2.44	BBP80B449	ORAR00449	253.37 x 7.00
267.0	280.0	10.7	13.2	0.25	267.31 x 279.29 x 2.44	BBP80B450	ORAR00450	266.07 x 7.00
280.0	292.0	10.7	13.2	0.25	280.01 x 291.99 x 2.44	BBP80B451	ORAR00451	278.77 x 7.00
292.0	305.0	10.7	13.2	0.25	292.71 x 304.69 x 2.44	BBP80B452	ORAR00452	291.47 x 7.00
305.0	218.0	10.7	13.2	0.25	305.41 x 317.39 x 2.44	BBP80B453	ORAR00453	304.17 x 7.00
318.0	330.0	10.7	13.2	0.25	318.11 x 330.09 x 2.44	BBP80B454	ORAR00454	316.87 x 7.00
330.0	343.0	10.7	13.2	0.25	330.81 x 342.79 x 2.44	BBP80B455	ORAR00455	329.57 x 7.00
343.0	356.0	10.7	13.2	0.25	343.51 x 355.49 x 2.44	BBP80B456	ORAR00456	342.47 x 7.00
356.0	368.0	10.7	13.2	0.25	356.21 x 361.09 x 2.44	BBP80B457	ORAR00457	354.97 x 7.00
368.0	381.0	10.7	13.2	0.25	368.91 x 380.89 x 2.44	BBP80B458	ORAR00458	367.67 x 7.00
381.0	394.0	10.7	13.2	0.25	381.61 x 393.51 x 2.44	BBP80B459	ORAR00459	380.37 x 7.00
394.0	406.0	10.7	13.2	0.25	394.31 x 406.29 x 2.44	BBP80B460	ORAR00460	393.07 x 7.00
407.0	419.0	10.7	13.2	0.25	406.50 x 418.48 x 2.44	BBP80B461	ORAR00461	405.26 x 7.00
420.0	432.0	10.7	13.2	0.25	419.20 x 431.18 x 2.44	BBP80B462	ORAR00462	417.96 x 7.00
432.0	444.5	10.7	13.2	0.25	431.90 x 443.88 x 2.44	BBP80B463	ORAR00463	430.66 x 7.00
445.0	457.0	10.7	13.2	0.25	444.60 x 456.58 x 2.44	BBP80B464	ORAR00464	443.36 x 7.00
458.0	470.0	10.7	13.2	0.25	457.30 x 469.28 x 2.44	BBP80B465	ORAR00465	456.06 x 7.00
470.0	483.0	10.7	13.2	0.25	470.00 x 481.98 x 2.44	BBP80B466	ORAR00466	468.76 x 7.00
483.0	495.0	10.7	13.2	0.25	482.70 x 494.68 x 2.44	BBP80B467	ORAR00467	481.38 x 7.00
495.0	508.0	10.7	13.2	0.25	495.40 x 507.38 x 2.44	BBP80B468	ORAR00468	494.16 x 7.00
508.0	521.0	10.7	13.2	0.25	508.10 x 520.08 x 2.44	BBP80B469	ORAR00469	506.86 x 7.00
533.0	546.0	10.7	13.2	0.25	533.50 x 545.80 x 2.44	BBP80B470	ORAR00470	532.26 x 7.00
559.0	572.0	10.7	13.2	0.25	558.90 x 570.88 x 2.44	BBP80B471	ORAR00471	557.66 x 7.00
584.0	597.0	10.7	13.2	0.25	584.30 x 596.28 x 2.44	BBP80B472	ORAR00472	582.68 x 7.00
610.0	622.0	10.7	13.2	0.25	609.70 x 621.68 x 2.44	BBP80B473	ORAR00473	608.08 x 7.00
635.0	648.0	10.7	13.2	0.25	635.10 x 647.08 x 2.44	BBP80B474	ORAR00474	633.48 x 7.00

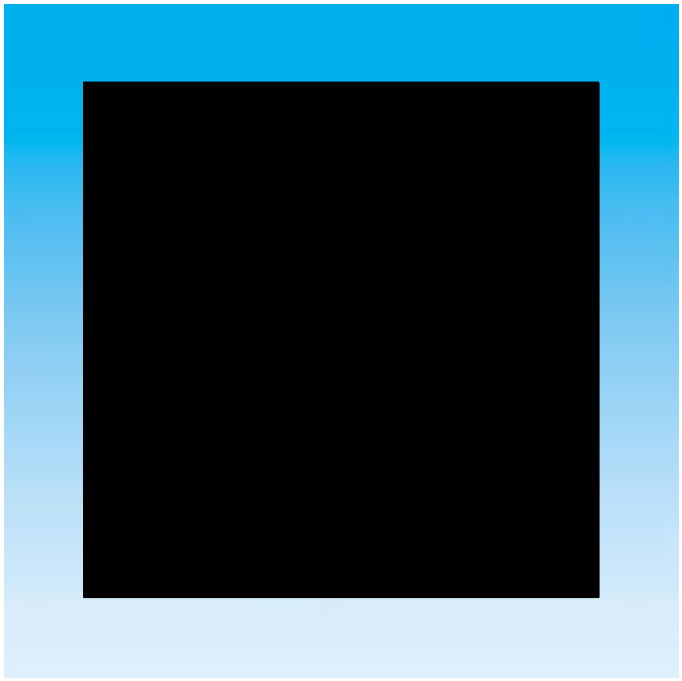
Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

Back-up Ring

Rod ø	Bore ø	Groove width		Radius	Back-up Ring dimension	TSS Part No.	O-Ring TSS Part No.	O-Ring dimension
dN f7	**DN** H9	**L2** +0.2	**L3** +0.2	**r** ±0.2	**ID x OD x T**			**d1 x d2**
660.0	673.0	10.7	13.2	0.25	660.50 x 672.48 x 2.44	BBP80B475	ORAR00475	658.88 x 7.00

Further sizes on request
This table shows the possible range of available dimensions (NBR or FKM Back-up Rings). However, these dimensions are not always stock items.

KANTSEAL



- Axial sealing -

- Elastomers -

■ Description

The Kantseal is a good alternative to the O-Ring as an axial static seal in cases where particular demands are made. The application and handling of Kantseals is comparable with those of O-Rings. The Kantseal is used as a static seal so that the square form remains practically constant even under high pressures.

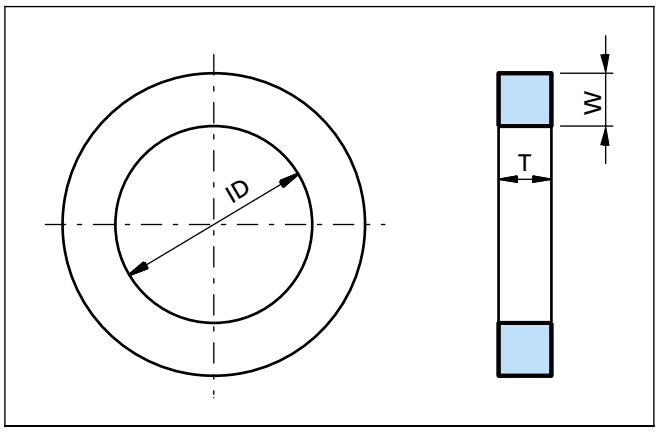


Figure 13 Kantseal dimensioning

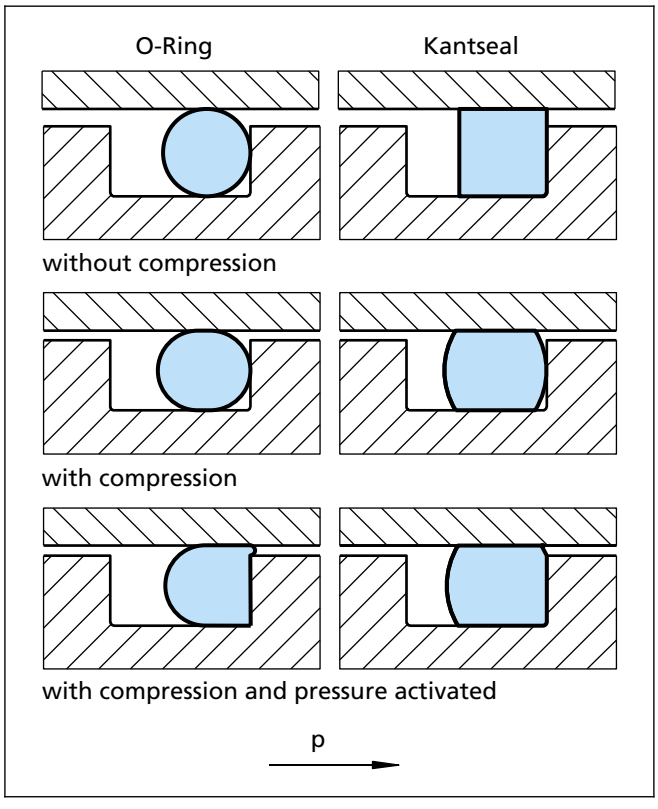


Figure 14 Installation comparison - O-Ring/Kantseal

■ Advantages

- High resistance to extrusion, not sensitive to gap extrusion
- Minimum mechanical deformation of the cross-section
- Outstanding sealing behaviour over long periods
- Good compression set
- No twisting in the groove
- No relative movements during pressure cycles
- Dimensionally stable under pressure
- No additional Back-up Ring required
- No parting line or flash on the seal
- Long service life
- High leak tightness

■ Application examples

- Flanges
- Valves
- Plates
- Locks

Technical data

Pressure:

up to 50 MPa and higher (depending on sealing gap)

Operating temperature:

-30 °C to +100 °C	NBR 70 Shore A
-20 °C to +100 °C	NBR 90 Shore A
-18 °C to +200 °C	FKM 70 Shore A
-15 °C to +200 °C	FKM 90 Shore A

Media:

Depending on the used material oil-based hydraulic fluids, lubricating oils, water, air and further media.

Important Note:
The application limits for pressure and temperature given in this catalogue are maximum values.
During practical applications it should be remembered that due to the interaction of operating parameters the maximum values must be set correspondingly lower.

■ Design instructions

Groove design

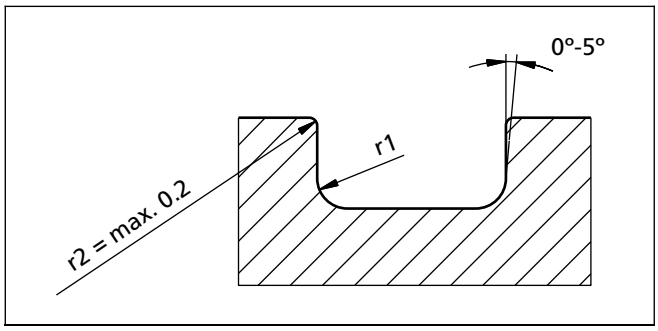


Figure 15 Groove specifications

Table XVII Surface roughness

Type of load	Surface	Rt µm	Rz µm	Ra µm
Axial-static	Mating surface	≤ 10.0	≤ 6.3	≤ 1.6
	Groove surface (groove bottom, groove flanks)	≤ 16.0	≤ 6.3	≤ 1.6
Under pulsating pressures	Mating surface	≤ 6.3	≤ 6.3	≤ 0.8
	Groove surface (groove bottom, groove flanks)	≤ 10.0	≤ 6.3	≤ 1.6

■ Tolerances

Table XVIII Tolerances for Kantseal inside diameter ID

Inside diameter ID	Tolerance ±
4.00 - 14.00	0.13
14.01 - 15.60	0.18
15.61 - 25.12	0.23
25.13 - 29.78	0.25
29.79 - 34.65	0.28
34.66 - 44.17	0.33
44.18 - 50.52	0.38
50.53 - 66.40	0.46
66.41 - 75.92	0.51
75.93 - 94.97	0.61
94.98 - 107.67	0.69
107.68 - 126.72	0.76
126.73 - 133.07	0.94
133.08 - 158.42	0.89
158.43 - 183.82	1.02
183.83 - 209.22	1.14
209.23 - 234.62	1.27
234.63 - 278.99	1.40
279.00 - 405.26	1.65
405.27 - 430.66	1.91
430.67 - 456.07	2.03

Table XIX Tolerances cross section W + T dimension

Cross section W	Tolerance ±	Cross section T	Tolerance ±
1.68	0.15	1.68	0.08
2.51	0.15	2.51	0.10
3.40	0.15	3.40	0.10
5.16	0.15	5.16	0.10
6.73	0.15	6.73	0.10

■ Axial-static installation with internal pressure

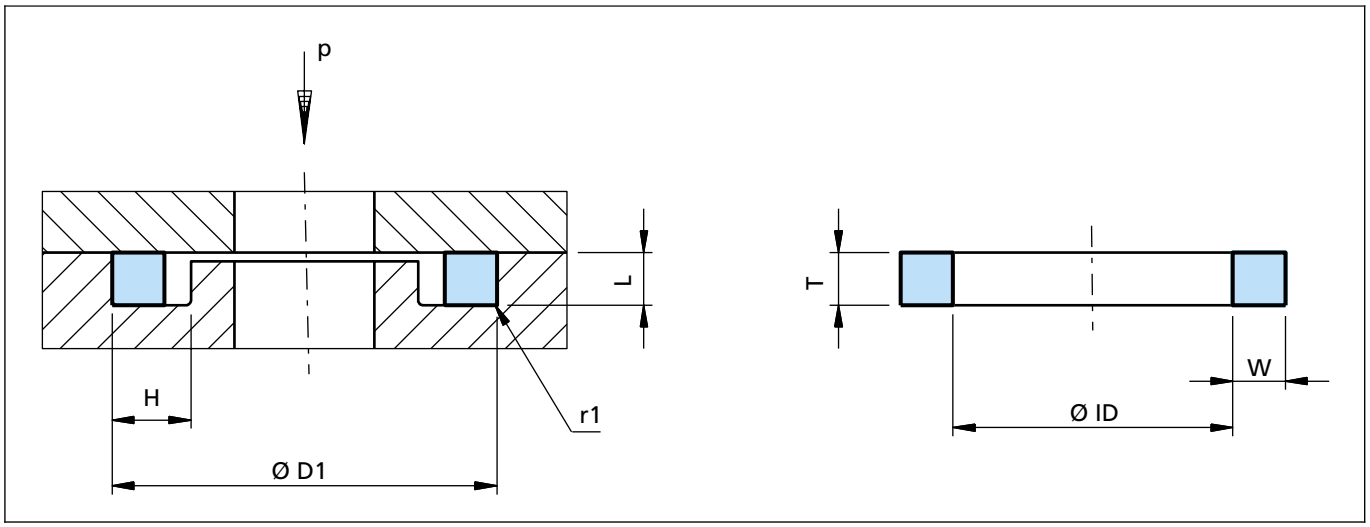


Figure 16 Installation drawing

Ordering example

Dimensions:	Inside diameter	ID = 28.17 mm
	Cross-section	W = 3.40 mm
Material:	NBR 90 Shore A	

TSS Article No.: DKAR00216-N90

Table XX Preferred series

Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
7.92	2.4	1.45	0.4	4.47	1.68	1.68	DKAR00008
8.71	2.4	1.45	0.4	5.28	1.68	1.68	DKAR00009
9.53	2.4	1.45	0.4	6.07	1.68	1.68	DKAR00010
11.10	2.4	1.45	0.4	7.65	1.68	1.68	DKAR00011
12.70	2.4	1.45	0.4	9.25	1.68	1.68	DKAR00012
14.27	2.4	1.45	0.4	10.82	1.68	1.68	DKAR00013
15.88	2.4	1.45	0.4	12.42	1.68	1.68	DKAR00014
17.45	2.4	1.45	0.4	14.00	1.68	1.68	DKAR00015
19.05	2.4	1.45	0.4	15.60	1.68	1.68	DKAR00016
20.62	2.4	1.45	0.4	17.17	1.68	1.68	DKAR00017
22.23	2.4	1.45	0.4	18.77	1.68	1.68	DKAR00018
23.80	2.4	1.45	0.4	20.35	1.68	1.68	DKAR00019
25.40	2.4	1.45	0.4	21.95	1.68	1.68	DKAR00020
26.97	2.4	1.45	0.4	23.52	1.68	1.68	DKAR00021
28.58	2.4	1.45	0.4	25.12	1.68	1.68	DKAR00022

Other dimensions and metric sizes on request!

Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
30.15	2.4	1.45	0.4	26.70	1.68	1.68	DKAR00023
31.75	2.4	1.45	0.4	28.30	1.68	1.68	DKAR00024
33.32	2.4	1.45	0.4	29.87	1.68	1.68	DKAR00025
34.93	2.4	1.45	0.4	31.47	1.68	1.68	DKAR00026
36.50	2.4	1.45	0.4	33.05	1.68	1.68	DKAR00027
38.10	2.4	1.45	0.4	34.65	1.68	1.68	DKAR00028
41.28	2.4	1.45	0.4	37.82	1.68	1.68	DKAR00029
44.45	2.4	1.45	0.4	41.00	1.68	1.68	DKAR00030
47.63	2.4	1.45	0.4	44.17	1.68	1.68	DKAR00031
50.80	2.4	1.45	0.4	47.35	1.68	1.68	DKAR00032
53.98	2.4	1.45	0.4	50.52	1.68	1.68	DKAR00033
57.15	2.4	1.45	0.4	53.70	1.68	1.68	DKAR00034
60.33	2.4	1.45	0.4	56.87	1.68	1.68	DKAR00035
63.50	2.4	1.45	0.4	60.05	1.68	1.68	DKAR00036
66.68	2.4	1.45	0.4	63.22	1.68	1.68	DKAR00037
69.85	2.4	1.45	0.4	66.40	1.68	1.68	DKAR00038
73.03	2.4	1.45	0.4	69.57	1.68	1.68	DKAR00039
76.20	2.4	1.45	0.4	72.75	1.68	1.68	DKAR00040
79.38	2.4	1.45	0.4	75.92	1.68	1.68	DKAR00041
85.73	2.4	1.45	0.4	82.27	1.68	1.68	DKAR00042
92.08	2.4	1.45	0.4	88.62	1.68	1.68	DKAR00043
98.43	2.4	1.45	0.4	94.97	1.68	1.68	DKAR00044
107.95	2.4	1.45	0.4	101.32	1.68	1.68	DKAR00045
111.13	2.4	1.45	0.4	107.67	1.68	1.68	DKAR00046
117.48	2.4	1.45	0.4	114.02	1.68	1.68	DKAR00047
123.83	2.4	1.45	0.4	120.37	1.68	1.68	DKAR00048
130.18	2.4	1.45	0.4	126.72	1.68	1.68	DKAR00049
136.53	2.4	1.45	0.4	133.07	1.68	1.68	DKAR00050
9.53	3.6	2.30	0.4	4.42	2.51	2.51	DKAR00106
10.31	3.6	2.30	0.4	5.23	2.51	2.51	DKAR00107
11.10	3.6	2.30	0.4	6.02	2.51	2.51	DKAR00108
12.70	3.6	2.30	0.4	7.59	2.51	2.51	DKAR00109
14.27	3.6	2.30	0.4	9.19	2.51	2.51	DKAR00110
15.88	3.6	2.30	0.4	10.77	2.51	2.51	DKAR00111
17.45	3.6	2.30	0.4	12.37	2.51	2.51	DKAR00112
19.05	3.6	2.30	0.4	13.94	2.51	2.51	DKAR00113

Other dimensions and metric sizes on request!

Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
20.62	3.6	2.30	0.4	15.54	2.51	2.51	DKAR00114
22.23	3.6	2.30	0.4	17.12	2.51	2.51	DKAR00115
23.80	3.6	2.30	0.4	18.72	2.51	2.51	DKAR00116
25.40	3.6	2.30	0.4	20.29	2.51	2.51	DKAR00117
26.97	3.6	2.30	0.4	21.89	2.51	2.51	DKAR00118
28.58	3.6	2.30	0.4	23.47	2.51	2.51	DKAR00119
30.15	3.6	2.30	0.4	25.07	2.51	2.51	DKAR00120
31.75	3.6	2.30	0.4	26.64	2.51	2.51	DKAR00121
33.32	3.6	2.30	0.4	28.24	2.51	2.51	DKAR00122
34.93	3.6	2.30	0.4	29.82	2.51	2.51	DKAR00123
36.50	3.6	2.30	0.4	31.42	2.51	2.51	DKAR00124
38.10	3.6	2.30	0.4	32.99	2.51	2.51	DKAR00125
39.67	3.6	2.30	0.4	34.59	2.51	2.51	DKAR00126
41.28	3.6	2.30	0.4	36.17	2.51	2.51	DKAR00127
42.85	3.6	2.30	0.4	37.77	2.51	2.51	DKAR00128
44.45	3.6	2.30	0.4	39.34	2.51	2.51	DKAR00129
46.02	3.6	2.30	0.4	40.94	2.51	2.51	DKAR00130
47.63	3.6	2.30	0.4	42.52	2.51	2.51	DKAR00131
49.20	3.6	2.30	0.4	44.12	2.51	2.51	DKAR00132
50.80	3.6	2.30	0.4	45.69	2.51	2.51	DKAR00133
52.37	3.6	2.30	0.4	47.29	2.51	2.51	DKAR00134
53.98	3.6	2.30	0.4	48.90	2.51	2.51	DKAR00135
55.55	3.6	2.30	0.4	50.47	2.51	2.51	DKAR00136
57.15	3.6	2.30	0.4	52.07	2.51	2.51	DKAR00137
58.72	3.6	2.30	0.4	53.64	2.51	2.51	DKAR00138
60.33	3.6	2.30	0.4	55.25	2.51	2.51	DKAR00139
61.90	3.6	2.30	0.4	56.82	2.51	2.51	DKAR00140
63.50	3.6	2.30	0.4	58.42	2.51	2.51	DKAR00141
65.07	3.6	2.30	0.4	60.00	2.51	2.51	DKAR00142
66.68	3.6	2.30	0.4	61.60	2.51	2.51	DKAR00143
68.25	3.6	2.30	0.4	63.17	2.51	2.51	DKAR00144
69.85	3.6	2.30	0.4	64.77	2.51	2.51	DKAR00145
71.42	3.6	2.30	0.4	66.34	2.51	2.51	DKAR00146
73.03	3.6	2.30	0.4	67.95	2.51	2.51	DKAR00147
74.60	3.6	2.30	0.4	69.52	2.51	2.51	DKAR00148
76.20	3.6	2.30	0.4	71.12	2.51	2.51	DKAR00149
77.77	3.6	2.30	0.4	72.69	2.51	2.51	DKAR00150

Other dimensions and metric sizes on request!

Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
80.95	3.6	2.30	0.4	75.87	2.51	2.51	DKAR00151
87.30	3.6	2.30	0.4	82.22	2.51	2.51	DKAR00152
93.65	3.6	2.30	0.4	88.57	2.51	2.51	DKAR00153
100.00	3.6	2.30	0.4	94.92	2.51	2.51	DKAR00154
106.35	3.6	2.30	0.4	101.27	2.51	2.51	DKAR00155
112.70	3.6	2.30	0.4	107.62	2.51	2.51	DKAR00156
119.05	3.6	2.30	0.4	113.97	2.51	2.51	DKAR00157
125.40	3.6	2.30	0.4	120.32	2.51	2.51	DKAR00158
131.75	3.6	2.30	0.4	126.67	2.51	2.51	DKAR00159
138.10	3.6	2.30	0.4	133.02	2.51	2.51	DKAR00160
144.45	3.6	2.30	0.4	139.37	2.51	2.51	DKAR00161
150.80	3.6	2.30	0.4	145.72	2.51	2.51	DKAR00162
157.15	3.6	2.30	0.4	152.07	2.51	2.51	DKAR00163
163.50	3.6	2.30	0.4	158.42	2.51	2.51	DKAR00164
169.85	3.6	2.30	0.4	164.77	2.51	2.51	DKAR00165
176.20	3.6	2.30	0.4	171.12	2.51	2.51	DKAR00166
182.55	3.6	2.30	0.4	177.47	2.51	2.51	DKAR00167
188.90	3.6	2.30	0.4	183.82	2.51	2.51	DKAR00168
195.25	3.6	2.30	0.4	190.17	2.51	2.51	DKAR00169
201.60	3.6	2.30	0.4	196.52	2.51	2.51	DKAR00170
207.95	3.6	2.30	0.4	202.87	2.51	2.51	DKAR00171
214.30	3.6	2.30	0.4	209.22	2.51	2.51	DKAR00172
220.65	3.6	2.30	0.4	215.57	2.51	2.51	DKAR00173
227.00	3.6	2.30	0.4	221.92	2.51	2.51	DKAR00174
233.35	3.6	2.30	0.4	228.27	2.51	2.51	DKAR00175
239.70	3.6	2.00	0.4	234.62	2.51	2.51	DKAR00176
246.05	3.6	2.30	0.4	240.97	2.51	2.51	DKAR00177
252.40	3.6	2.30	0.4	247.32	2.51	2.51	DKAR00178
11.10	4.8	3.10	0.6	4.34	3.40	3.40	DKAR00201
12.70	4.8	3.10	0.6	5.94	3.40	3.40	DKAR00202
14.27	4.8	3.10	0.6	7.52	3.40	3.40	DKAR00203
15.88	4.8	3.10	0.6	9.12	3.40	3.40	DKAR00204
17.45	4.8	3.10	0.6	10.69	3.40	3.40	DKAR00205
19.05	4.8	3.10	0.6	12.29	3.40	3.40	DKAR00206
20.62	4.8	3.10	0.6	13.87	3.40	3.40	DKAR00207
22.23	4.8	3.10	0.6	15.47	3.40	3.40	DKAR00208

Other dimensions and metric sizes on request!

Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
23.80	4.8	3.10	0.6	17.04	3.40	3.40	DKAR00209
25.40	4.8	3.10	0.6	18.64	3.40	3.40	DKAR00210
26.97	4.8	3.10	0.6	20.22	3.40	3.40	DKAR00211
28.58	4.8	3.10	0.6	21.82	3.40	3.40	DKAR00212
30.15	4.8	3.10	0.6	23.39	3.40	3.40	DKAR00213
31.75	4.8	3.10	0.6	24.99	3.40	3.40	DKAR00214
33.32	4.8	3.10	0.6	26.57	3.40	3.40	DKAR00215
34.93	4.8	3.10	0.6	28.17	3.40	3.40	DKAR00216
36.50	4.8	3.10	0.6	29.74	3.40	3.40	DKAR00217
38.10	4.8	3.10	0.6	31.34	3.40	3.40	DKAR00218
39.67	4.8	3.10	0.6	32.92	3.40	3.40	DKAR00219
41.28	4.8	3.10	0.6	34.52	3.40	3.40	DKAR00220
42.85	4.8	3.10	0.6	36.09	3.40	3.40	DKAR00221
44.45	4.8	3.10	0.6	37.69	3.40	3.40	DKAR00222
47.63	4.8	3.10	0.6	40.87	3.40	3.40	DKAR00223
50.80	4.8	3.10	0.6	44.04	3.40	3.40	DKAR00224
53.98	4.8	3.10	0.6	47.22	3.40	3.40	DKAR00225
57.15	4.8	3.10	0.6	50.39	3.40	3.40	DKAR00226
60.33	4.8	3.10	0.6	53.57	3.40	3.40	DKAR00227
63.50	4.8	3.10	0.6	56.74	3.40	3.40	DKAR00228
66.68	4.8	3.10	0.6	59.92	3.40	3.40	DKAR00229
69.85	4.8	3.10	0.6	63.09	3.40	3.40	DKAR00230
73.03	4.8	3.10	0.6	66.27	3.40	3.40	DKAR00231
76.20	4.8	3.10	0.6	69.44	3.40	3.40	DKAR00232
79.38	4.8	3.10	0.6	72.62	3.40	3.40	DKAR00233
82.55	4.8	3.10	0.6	75.79	3.40	3.40	DKAR00234
85.73	4.8	3.10	0.6	78.97	3.40	3.40	DKAR00235
88.90	4.8	3.10	0.6	82.14	3.40	3.40	DKAR00236
92.08	4.8	3.10	0.6	85.32	3.40	3.40	DKAR00237
95.25	4.8	3.10	0.6	88.49	3.40	3.40	DKAR00238
98.43	4.8	3.10	0.6	91.67	3.40	3.40	DKAR00239
101.60	4.8	3.10	0.6	94.84	3.40	3.40	DKAR00240
104.78	4.8	3.10	0.6	98.02	3.40	3.40	DKAR00241
107.95	4.8	3.10	0.6	101.19	3.40	3.40	DKAR00242
111.13	4.8	3.10	0.6	104.37	3.40	3.40	DKAR00243
114.30	4.8	3.10	0.6	107.54	3.40	3.40	DKAR00244
117.48	4.8	3.10	0.6	110.72	3.40	3.40	DKAR00245

Other dimensions and metric sizes on request!

Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
120.65	4.8	3.10	0.6	113.89	3.40	3.40	DKAR00246
123.83	4.8	3.10	0.6	117.07	3.40	3.40	DKAR00247
127.00	4.8	3.10	0.6	120.24	3.40	3.40	DKAR00248
130.18	4.8	3.10	0.6	123.42	3.40	3.40	DKAR00249
133.35	4.8	3.10	0.6	126.59	3.40	3.40	DKAR00250
136.53	4.8	3.10	0.6	129.77	3.40	3.40	DKAR00251
139.70	4.8	3.10	0.6	132.94	3.40	3.40	DKAR00252
142.88	4.8	3.10	0.6	136.12	3.40	3.40	DKAR00253
146.05	4.8	3.10	0.6	139.29	3.40	3.40	DKAR00254
149.23	4.8	3.10	0.6	142.47	3.40	3.40	DKAR00255
153.40	4.8	3.10	0.6	145.64	3.40	3.40	DKAR00256
155.58	4.8	3.10	0.6	148.82	3.40	3.40	DKAR00257
158.75	4.8	3.10	0.6	151.99	3.40	3.40	DKAR00258
165.10	4.8	3.10	0.6	158.34	3.40	3.40	DKAR00259
171.45	4.8	3.10	0.6	164.69	3.40	3.40	DKAR00260
177.80	4.8	3.10	0.6	171.04	3.40	3.40	DKAR00261
184.15	4.8	3.10	0.6	177.39	3.40	3.40	DKAR00262
190.50	4.8	3.10	0.6	183.74	3.40	3.40	DKAR00263
196.85	4.8	3.10	0.6	190.09	3.40	3.40	DKAR00264
203.20	4.8	3.10	0.6	196.44	3.40	3.40	DKAR00265
209.55	4.8	3.10	0.6	202.79	3.40	3.40	DKAR00266
215.90	4.8	3.10	0.6	209.14	3.40	3.40	DKAR00267
222.25	4.8	3.10	0.6	215.49	3.40	3.40	DKAR00268
228.60	4.8	3.10	0.6	221.84	3.40	3.40	DKAR00269
234.95	4.8	3.10	0.6	228.19	3.40	3.40	DKAR00270
241.30	4.8	3.10	0.6	234.54	3.40	3.40	DKAR00271
247.65	4.8	3.10	0.6	240.89	3.40	3.40	DKAR00272
254.00	4.8	3.10	0.6	247.24	3.40	3.40	DKAR00273
260.35	4.8	3.10	0.6	253.59	3.40	3.40	DKAR00274
273.05	4.8	3.10	0.6	266.29	3.40	3.40	DKAR00275
285.75	4.8	3.10	0.6	278.99	3.40	3.40	DKAR00276
298.45	4.8	3.10	0.6	291.69	3.40	3.40	DKAR00277
311.15	4.8	3.10	0.6	304.39	3.40	3.40	DKAR00278
336.55	4.8	3.10	0.6	329.79	3.40	3.40	DKAR00279
361.95	4.8	3.10	0.6	355.19	3.40	3.40	DKAR00280
387.35	4.8	3.10	0.6	380.59	3.40	3.40	DKAR00281
412.75	4.8	3.10	0.6	405.26	3.40	3.40	DKAR00282

Other dimensions and metric sizes on request!

Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
438.15	4.8	3.10	0.6	430.66	3.40	3.40	DKAR00283
463.55	4.8	3.00	0.6	456.06	3.40	3.40	DKAR00284
20.62	7.1	4.75	0.8	10.46	5.16	5.16	DKAR00309
22.23	7.1	4.75	0.8	12.07	5.16	5.16	DKAR00310
23.80	7.1	4.75	0.8	13.64	5.16	5.16	DKAR00311
25.40	7.1	4.75	0.8	15.24	5.16	5.16	DKAR00312
26.97	7.1	4.75	0.8	16.81	5.16	5.16	DKAR00313
28.58	7.1	4.75	0.8	18.42	5.16	5.16	DKAR00314
30.15	7.1	4.75	0.8	19.99	5.16	5.16	DKAR00315
31.75	7.1	4.75	0.8	21.59	5.16	5.16	DKAR00316
33.32	7.1	4.70	0.8	23.16	5.16	5.16	DKAR00317
34.93	7.1	4.75	0.8	24.77	5.16	5.16	DKAR00318
36.50	7.1	4.75	0.8	26.34	5.16	5.16	DKAR00319
38.10	7.1	4.75	0.8	27.94	5.16	5.16	DKAR00320
39.67	7.1	4.75	0.8	29.51	5.16	5.16	DKAR00321
41.28	7.1	4.75	0.8	31.12	5.16	5.16	DKAR00322
42.85	7.1	4.75	0.8	32.69	5.16	5.16	DKAR00323
44.45	7.1	4.75	0.8	34.29	5.16	5.16	DKAR00324
47.63	7.1	4.75	0.8	37.47	5.16	5.16	DKAR00325
50.80	7.1	4.75	0.8	40.64	5.16	5.16	DKAR00326
53.98	7.1	4.75	0.8	43.82	5.16	5.16	DKAR00327
57.15	7.1	4.75	0.8	46.99	5.16	5.16	DKAR00328
60.33	7.1	4.75	0.8	50.17	5.16	5.16	DKAR00329
63.50	7.1	4.75	0.8	53.34	5.16	5.16	DKAR00330
66.68	7.1	4.75	0.8	56.52	5.16	5.16	DKAR00331
69.85	7.1	4.75	0.8	59.69	5.16	5.16	DKAR00332
73.03	7.1	4.75	0.8	62.87	5.16	5.16	DKAR00333
76.20	7.1	4.75	0.8	66.04	5.16	5.16	DKAR00334
79.38	7.1	4.75	0.8	69.22	5.16	5.16	DKAR00335
82.55	7.1	4.75	0.8	72.39	5.16	5.16	DKAR00336
85.73	7.1	4.75	0.8	75.57	5.16	5.16	DKAR00337
88.90	7.1	4.75	0.8	78.74	5.16	5.16	DKAR00338
92.08	7.1	4.75	0.8	81.92	5.16	5.16	DKAR00339
95.25	7.1	4.75	0.8	85.09	5.16	5.16	DKAR00340
98.43	7.1	4.75	0.8	88.27	5.16	5.16	DKAR00341
101.60	7.1	4.75	0.8	91.44	5.16	5.16	DKAR00342

Other dimensions and metric sizes on request!

Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
104.78	7.1	4.75	0.8	94.62	5.16	5.16	DKAR00343
107.95	7.1	4.75	0.8	97.79	5.16	5.16	DKAR00344
111.13	7.1	4.75	0.8	100.97	5.16	5.16	DKAR00345
114.30	7.1	4.75	0.8	104.14	5.16	5.16	DKAR00346
117.48	7.1	4.75	0.8	107.32	5.16	5.16	DKAR00347
120.65	7.1	4.75	0.8	110.49	5.16	5.16	DKAR00348
123.83	7.1	4.75	0.8	113.67	5.16	5.16	DKAR00349
127.00	7.1	4.75	0.8	116.84	5.16	5.16	DKAR00350
130.18	7.1	4.75	0.8	120.02	5.16	5.16	DKAR00351
133.35	7.1	4.75	0.8	123.19	5.16	5.16	DKAR00352
136.53	7.1	4.75	0.8	126.37	5.16	5.16	DKAR00353
139.70	7.1	4.75	0.8	129.54	5.16	5.16	DKAR00354
142.88	7.1	4.75	0.8	132.72	5.16	5.16	DKAR00355
146.05	7.1	4.75	0.8	135.89	5.16	5.16	DKAR00356
149.23	7.1	4.75	0.8	139.07	5.16	5.16	DKAR00357
152.40	7.1	4.75	0.8	142.24	5.16	5.16	DKAR00358
155.58	7.1	4.75	0.8	145.42	5.16	5.16	DKAR00359
158.75	7.1	4.75	0.8	148.59	5.16	5.16	DKAR00360
161.93	7.1	4.75	0.8	151.77	5.16	5.16	DKAR00361
168.28	7.1	4.75	0.8	158.12	5.16	5.16	DKAR00362
174.63	7.1	4.75	0.8	164.47	5.16	5.16	DKAR00363
180.98	7.1	4.75	0.8	170.82	5.16	5.16	DKAR00364
187.33	7.1	4.75	0.8	177.17	5.16	5.16	DKAR00365
193.68	7.1	4.75	0.8	183.52	5.16	5.16	DKAR00366
200.03	7.1	4.75	0.8	189.87	5.16	5.16	DKAR00367
206.38	7.1	4.75	0.8	196.22	5.16	5.16	DKAR00368
212.73	7.1	4.75	0.8	202.57	5.16	5.16	DKAR00369
219.08	7.1	4.75	0.8	208.92	5.16	5.16	DKAR00370
225.43	7.1	4.75	0.8	215.27	5.16	5.16	DKAR00371
231.78	7.1	4.75	0.8	221.62	5.16	5.16	DKAR00372
238.13	7.1	4.75	0.8	227.97	5.16	5.16	DKAR00373
244.48	7.1	4.75	0.8	234.32	5.16	5.16	DKAR00374
250.83	7.1	4.75	0.8	240.67	5.16	5.16	DKAR00375
257.18	7.1	4.75	0.8	247.02	5.16	5.16	DKAR00376
263.53	7.1	4.75	0.8	253.37	5.16	5.16	DKAR00377
276.23	7.1	4.75	0.8	266.07	5.16	5.16	DKAR00378
288.93	7.1	4.75	0.8	278.77	5.16	5.16	DKAR00379

Other dimensions and metric sizes on request!

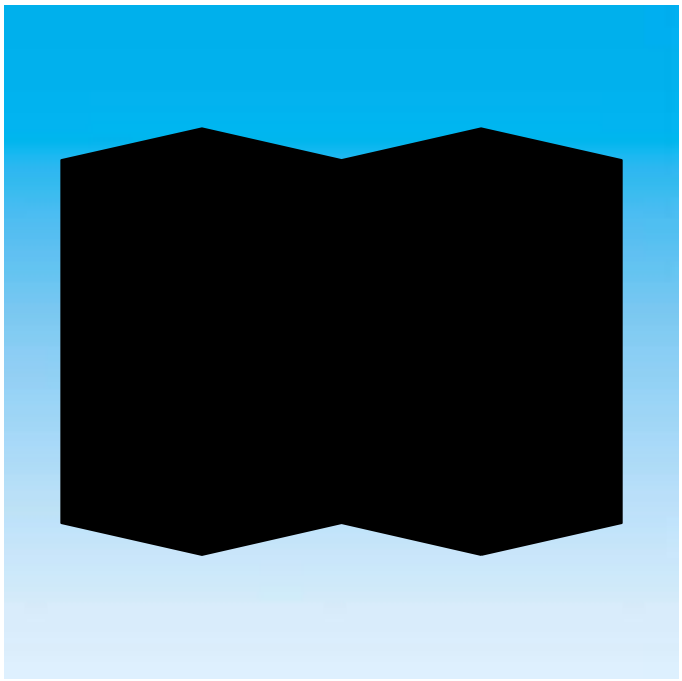
Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
301.63	7.1	4.75	0.8	291.47	5.16	5.16	DKAR00380
314.33	7.1	4.75	0.8	304.17	5.16	5.16	DKAR00381
339.73	7.1	4.75	0.8	329.57	5.16	5.16	DKAR00382
365.13	7.1	4.75	0.8	354.97	5.16	5.16	DKAR00383
390.53	7.1	4.75	0.8	380.37	5.16	5.16	DKAR00384
415.93	7.1	4.75	0.8	405.27	5.16	5.16	DKAR00385
441.33	7.1	4.75	0.0	430.67	5.16	5.16	DKAR00386
466.73	7.1	4.75	0.8	456.07	5.16	5.16	DKAR00387
127.00	9.5	6.10	0.8	113.67	6.73	6.73	DKAR00425
130.18	9.5	6.10	0.8	116.84	6.73	6.73	DKAR00426
133.35	9.5	6.10	0.8	120.02	6.73	6.73	DKAR00427
136.53	9.5	6.10	0.8	123.19	6.73	6.73	DKAR00428
139.70	9.5	6.10	0.8	126.37	6.73	6.73	DKAR00429
142.88	9.5	6.10	0.8	129.54	6.73	6.73	DKAR00430
146.05	9.5	6.10	0.8	132.72	6.73	6.73	DKAR00431
149.23	9.5	6.10	0.8	135.89	6.73	6.73	DKAR00432
152.40	9.5	6.10	0.8	139.07	6.73	6.73	DKAR00433
155.58	9.5	6.10	0.8	142.24	6.73	6.73	DKAR00434
158.75	9.5	6.10	0.8	145.42	6.73	6.73	DKAR00435
161.93	9.5	6.10	0.8	148.59	6.73	6.73	DKAR00436
165.10	9.5	6.10	0.8	151.77	6.73	6.73	DKAR00437
171.45	9.5	6.10	0.8	158.12	6.73	6.73	DKAR00438
177.80	9.5	6.10	0.8	164.47	6.73	6.73	DKAR00439
184.15	9.5	6.10	0.8	170.82	6.73	6.73	DKAR00440
190.50	9.5	6.10	0.8	177.17	6.73	6.73	DKAR00441
196.85	9.5	6.10	0.8	183.52	6.73	6.73	DKAR00442
203.20	9.5	6.10	0.8	189.87	6.73	6.73	DKAR00443
209.55	9.5	6.10	0.8	196.22	6.73	6.73	DKAR00444
215.90	9.5	6.10	0.8	202.57	6.73	6.73	DKAR00445
228.60	9.5	6.10	0.8	215.27	6.73	6.73	DKAR00446
241.30	9.5	6.10	0.8	227.97	6.73	6.73	DKAR00447
254.00	9.5	6.10	0.8	240.67	6.73	6.73	DKAR00448
266.70	9.5	6.10	0.8	253.37	6.73	6.73	DKAR00449
279.40	9.5	6.10	0.8	266.07	6.73	6.73	DKAR00450
292.10	9.5	6.10	0.8	278.77	6.73	6.73	DKAR00451
304.80	9.5	6.10	0.8	291.47	6.73	6.73	DKAR00452

Other dimensions and metric sizes on request!

Groove dimensions			Radius	Ring dimensions			TSS Part No.
D1 H11	**H** +0.2	**L** -0.05	**r1 max.**	**ID**	**W**	**T**	
317.50	9.5	6.10	0.8	304.17	6.73	6.73	DKAR00453
330.20	9.5	6.10	0.8	316.87	6.73	6.73	DKAR00454
342.90	9.5	6.10	0.8	329.57	6.73	6.73	DKAR00455
355.60	9.5	6.10	0.8	342.27	6.73	6.73	DKAR00456
368.30	9.5	6.10	0.8	354.97	6.73	6.73	DKAR00457
381.00	9.5	6.10	0.8	367.67	6.73	6.73	DKAR00458
393.70	9.5	6.10	0.8	380.37	6.73	6.73	DKAR00459
406.40	9.5	6.10	0.8	393.07	6.73	6.73	DKAR00460
419.10	9.5	6.10	0.8	405.27	6.73	6.73	DKAR00461
431.80	9.5	6.10	0.8	417.97	6.73	6.73	DKAR00462
444.50	9.5	6.10	0.8	430.67	6.73	6.73	DKAR00463
457.20	9.5	6.10	0.8	443.37	6.73	6.73	DKAR00464
469.90	9.5	6.10	0.8	456.07	6.73	6.73	DKAR00465

Other dimensions and metric sizes on request!

DUALSEAL



- Radial sealing -

- For O-Ring grooves -

- Material Polyurethane -

■ Description

In current hydraulic cylinder design, O-Ring or O-Ring/Back-up Ring combinations are mainly used as static seals. However, this sealing solution hides the risk that during assembly the O-Ring may become twisted and that the position of the Back-up Ring is not optimal. This solution also exhibits weaknesses with regard to pressure pulsation and the ingress of dirt.

The Dualseal as a-single component static hydraulic seal offers a good alternative in such cases.

Advantages

Compared with the O-Ring / Back-up Ring combination, the Dualseal offers the following advantages:

- High resistance to twisting
- Easy assembly
- Long service life
- High extrusion resistance of the material

Table XXI Surface finish

Type of load	Surface	Rt µm	Rz µm	Ra µm
Radial-static	Mating surface Groove surface (groove diameter, groove flanks)	$\leq$ 10.0 $\leq$ 16.0	$\leq$ 6.3	$\leq$ 1.6 $\leq$ 3.2

Lead-in chamfers

Groove depth < 3 mm $\Rightarrow$ 3x15°

Groove depth > 3 mm $\Rightarrow$ 5x15°

Preferred sealing gap

Bore H8

Gland g6

Due to the high extrusion resistance of the seal a radial sealing gap (S) of 0.2 mm can be realised.

In case of low temperature applications deviations of the gland to the bore and rod shall be avoided.

Technical data

Operating pressure: Max. 50 MPa
Operating temperature: -35 °C to +110 °C

Important Note:
The application limits for pressure and temperature given in this catalogue are maximum values.
During practical applications it should be remembered that due to the interaction of operating parameters the maximum values must be set correspondingly lower.

Material

Standard material: Zurcon® Z20 polyurethane 93 shore A, turquoise. Suitable for all HL and HLP hydraulic fluids.

Applications

The Dualseal allows general use in hydraulic cylinders e.g.

- Fork lifts
- Mobile hydraulics
- Industrial hydraulics
- Machine tools
- Injection moulding machines
- Hydraulic presses
- Cartridge valves

Dualseal performs leak-free and is highly extrusion resistant under the following test conditions:

	High pressure test	Pressure pulsation test
Pressure p	40/52 MPa	30 MPa
Temperature T	100 °C / 80 °C	60 °C (max. tank temperature)
Medium	Hydraulic oil HLP 46	Hydraulic oil HLP 46
Test duration	72 h	500.000 Pressure pulsations

■ Installation recommendations Dualseal

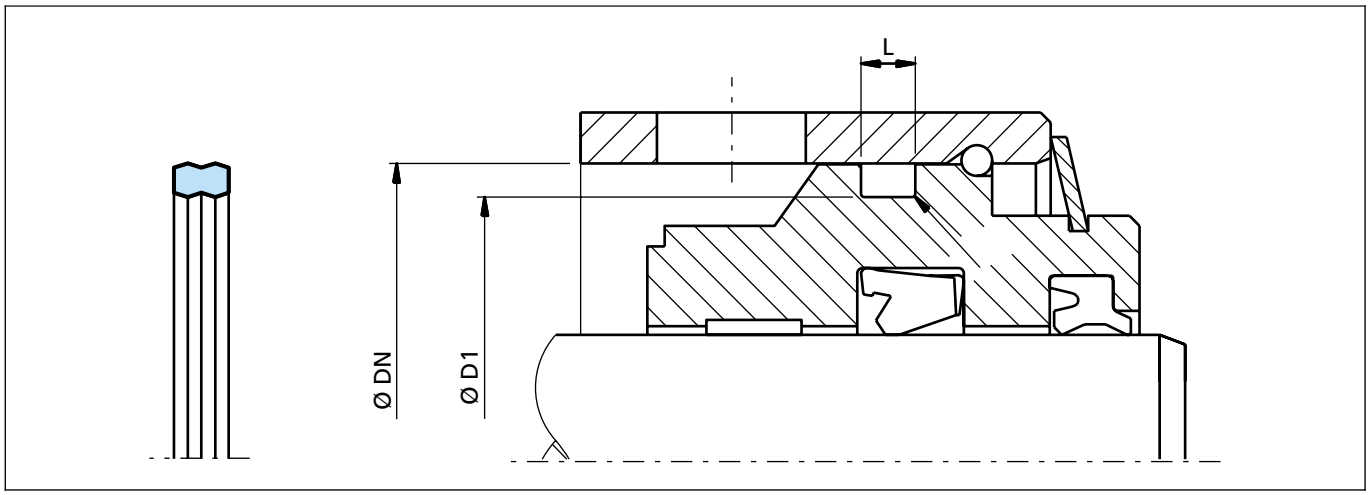


Figure 17 Installation drawing

Ordering example

TSS Article No.: DU0202500-Z20

Table XXII Installation dimensions / TSS Part No.

Bore ø	**Groove** ø	**Groove width**	**Radius**	**TSS Part No.**
DN H8	**D1** h9	**L** +0.2	**r** ± 0.2	
6.0	4.6	2.4	0.3	DU0000060
10.0	7.6	3.6	0.3	DU0000100
11.0	8.6	2.6	0.3	DU0000110
12.0	9.6	3.6	0.3	DU0000120
13.8	9.2	3.1	0.3	DU0000138
15.0	12.6	3.6	0.3	DU0000150
15.5	13.1	3.6	0.3	DU0000155
16.0	13.6	3.6	0.3	DU0000160
16.6	12.0	3.1	0.3	DU0000166
17.0	14.6	2.6	0.3	DU0000170
17.0	14.6	3.6	0.3	DU0100170
17.5	15.1	2.6	0.3	DU0000175
17.5	15.1	3.6	0.3	DU0100175
18.0	14.0	5.8	0.3	DU0100180
18.0	15.6	3.6	0.3	DU0000180

Further sizes on request
This table shows the possible range of available dimensions (Dual Seal). However, these dimensions are not always stock item.

Bore ø	Groove ø	Groove width	Radius	TSS Part No.
DN H8	**D1** h9	**L** +0.2	**r** ± 0.2	
19.0	15.6	4.4	0.3	DU0100190
19.0	15.6	3.6	0.3	DU0000190
19.0	16.6	2.6	0.3	DU0200190
19.0	16.6	3.6	0.3	DU0300190
20.0	16.0	5.8	0.3	DU0000200
20.0	16.6	4.4	0.3	DU0100200
20.0	16.6	3.6	0.3	DU0300200
20.0	17.6	3.6	0.3	DU0400200
20.5	17.2	5.0	0.3	DU0000205
21.0	17.6	4.4	0.3	DU0000210
21.0	18.6	3.6	0.3	DU0100210
21.5	18.1	4.4	0.3	DU0000215
21.5	19.1	2.6	0.3	DU0100215
22.0	19.6	3.6	0.3	DU0000220
23.0	19.6	4.4	0.3	DU0100230
23.0	20.6	3.6	0.3	DU0000230
24.0	20.0	4.8	0.3	DU0000240
24.0	21.6	3.6	0.3	DU0100240
26.0	22.0	4.4	0.3	DU0000260
26.8	22.0	5.4	0.3	DU0000268
28.0	23.8	5.3	0.3	DU0000280
28.6	25.6	3.6	0.3	DU0000286
30.0	25.1	4.4	0.3	DU0000300
30.0	25.4	5.4	0.3	DU0100300
31.0	26.4	5.0	0.3	DU0000310
32.0	27.4	5.4	0.3	DU0000320
33.0	20.0	15.6	0.6	DU0200200
34.0	28.4	5.3	0.3	DU0000340
34.0	31.1	3.6	0.3	DU0100340
35.0	30.4	5.0	0.3	DU0000350
35.5	30.9	5.0	0.3	DU0000355
36.0	32.0	6.2	0.3	DU0000360
38.0	32.4	5.3	0.3	DU0000380
40.0	35.2	5.4	0.3	DU0000400
40.0	35.4	5.4	0.3	DU0100400
42.8	38.0	6.8	0.3	DU0000428

Further sizes on request
This table shows the possible range of available dimensions (Dual Seal). However, these dimensions are not always stock item.

Bore ø	Groove ø	Groove width	Radius	TSS Part No.
DN H8	**D1** h9	**L** +0.2	**r** ± 0.2	
43.4	37.8	6.2	0.3	DU0000434
45.0	35.8	9.7	0.3	DU0100450
45.0	40.0	5.4	0.3	DU0000450
50.0	40.8	9.7	0.6	DU0000500
50.0	43.8	5.6	0.3	DU0300500
50.0	44.6	6.2	0.3	DU0100500
50.0	45.4	5.4	0.3	DU0200500
50.0	45.4	3.9	0.3	DU0400500
55.0	45.8	9.8	0.3	DU0300550
55.0	49.6	6.2	0.3	DU0000550
55.0	49.9	5.3	0.3	DU0100550
55.0	50.0	6.7	0.3	DU0400550
55.0	51.0	3.6	0.3	DU0200550
57.0	52.2	4.1	0.3	DU0000570
58.0	50.0	9.0	0.3	DU0000580
60.0	50.8	9.7	0.6	DU0000600
60.0	54.4	5.8	0.3	DU0100600
60.0	54.6	6.2	0.3	DU0200600
63.0	53.8	9.7	0.3	DU0000630
63.0	56.6	6.4	0.3	DU0100630
63.0	57.4	4.8	0.3	DU0200630
63.0	57.6	6.2	0.3	DU0300630
63.0	58.4	5.4	0.3	DU0400630
65.0	59.4	5.0	0.3	DU0000650
65.0	59.6	6.2	0.3	DU0100650
65.0	60.0	5.0	0.3	DU0200650
68.0	62.7	5.0	0.3	DU0000680
69.6	65.0	3.9	0.3	DU0000696
70.0	65.0	5.0	0.3	DU0100700
70.0	66.4	6.2	0.3	DU0000700
72.0	66.4	5.0	0.3	DU0000720
73.5	70.0	5.0	0.3	DU0000735
74.6	70.0	3.8	0.3	DU0000746
75.0	65.8	9.7	0.6	DU0200750
75.0	69.4	5.3	0.3	DU0000750
75.0	69.6	6.2	0.4	DU0100750

Further sizes on request
This table shows the possible range of available dimensions (Dual Seal). However, these dimensions are not always stock item.

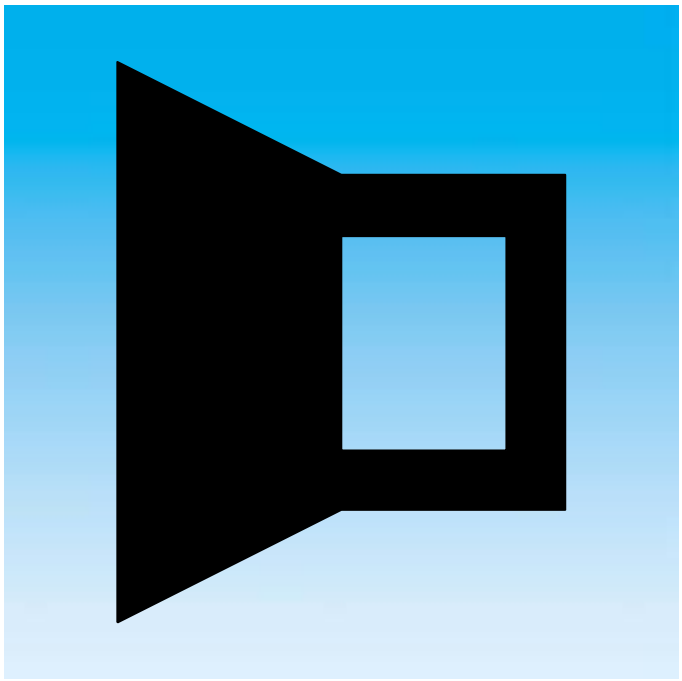
Bore ø	Groove ø	Groove width	Radius	TSS Part No.
DN H8	**D1** h9	**L** +0.2	**r** ± 0.2	
76.6	72.0	4.8	0.3	DU0000766
77.0	70.8	6.2	0.3	DU0000770
78.0	73.0	5.0	0.3	DU0000780
80.0	70.8	9.0	0.6	DU0400800
80.0	70.8	9.7	0.6	DU0000800
80.0	73.6	6.4	0.3	DU0100800
80.0	73.8	6.9	0.3	DU0200800
80.0	74.4	5.3	0.3	DU0300800
80.0	75.4	5.4	0.3	DU0500800
80.0	76.0	3.6	0.3	DU0600800
85.0	79.4	5.3	0.3	DU0000850
85.1	80.5	3.9	0.3	DU0000851
90.0	81.4	9.0	0.3	DU0000900
90.0	83.0	6.5	0.3	DU0100900
90.0	84.4	4.8	0.3	DU0200900
93.0	87.4	5.3	0.3	DU0000930
95.0	89.4	6.2	0.3	DU0000950
97.0	91.4	4.8	0.3	DU0000970
100.0	90.8	9.7	0.3	DU0001000
100.0	91.4	9.0	0.3	DU0101000
100.0	91.6	8.6	0.3	DU0201000
100.0	93.8	6.9	0.3	DU0301000
102.0	95.8	6.2	0.3	DU0001020
105.0	96.4	9.0	0.3	DU0001050
110.0	100.8	9.7	0.6	DU0101100
110.0	101.4	9.0	0.3	DU0001100
114.0	107.8	6.2	0.3	DU0001140
115.0	106.6	8.6	0.6	DU0001150
125.0	115.8	9.7	0.6	DU0001250
125.0	116.4	9.0	0.3	DU0101250
125.0	116.6	8.6	0.3	DU0201250
140.0	128.4	12.3	0.6	DU0001400
140.0	130.8	9.7	0.6	DU0201400
140.0	131.6	8.6	0.3	DU0101400
150.0	138.4	12.3	0.6	DU0001500
150.0	140.8	9.7	0.6	DU0201500

Further sizes on request
This table shows the possible range of available dimensions (Dual Seal). However, these dimensions are not always stock item.

Bore ø	Groove ø	Groove width	Radius	TSS Part No.
DN H8	**D1** h9	**L** +0.2	**r** ± 0.2	
150.0	141.6	8.6	0.3	DU0101500
160.0	148.4	12.3	0.6	DU0001600
160.0	150.8	9.7	0.6	DU0101600
165.0	153.4	12.3	0.6	DU0001650
165.0	155.8	9.7	0.6	DU0201650
165.0	156.6	8.6	0.3	DU0101650
170.0	158.4	12.3	0.6	DU0001700
170.0	160.8	9.7	0.6	DU0101700
180.0	168.4	12.3	0.6	DU0001800
180.0	170.8	9.7	0.6	DU0201800
180.0	171.6	8.6	0.3	DU0101800
190.0	178.4	12.3	0.6	DU0001900
200.0	188.4	12.3	0.6	DU0002000
200.0	190.8	9.7	0.6	DU0202000
200.0	191.6	8.6	0.3	DU0102000
225.0	213.0	10.9	0.6	DU0002250
250.0	238.0	10.9	0.6	DU0002500
250.0	238.4	12.3	0.6	DU0102500
250.0	240.8	9.7	0.6	DU0202500
270.0	258.4	12.3	0.6	DU0002700
280.0	268.0	10.9	0.6	DU0002800

Further sizes on request
This table shows the possible range of available dimensions (Dual Seal). However, these dimensions are not always stock item.

BONDED SEALS
U-SEALS



- Axial sealing -
- Rubber-metal Bonded Seals for bolted connections and mounting elements -

■ Description

Bonded Seals represent a combination of metal washer and elastomer sealing lip vulcanised to the edge of the metal part to seal bolted connections and mounting elements in all industrial applications e.g. pipe connections and couplings. When the bolted connection is tightened, the sealing lip is pressed against the flat surfaces.

The metal washer ensures that the components to be connected are reliably and securely held. The thickness of the washer limits the compression of the elastomer seal, eliminates any over torque of the joint, thereby ensuring a reliable sealing system. The internal pressure increases the sealing force by energising the sealing lip.

Advantages

- Cost effective solution for bolt/thread sealing
- Versatile, applicable to all threaded bolts, studs and clearance holes
- Sealing washers are available for metric, Whitworth and BSP threads
- Large range of elastomers and metals available
- Wide temperature range
- Reliable high and low pressure sealing
- Metall washer prevents over -compression and extrusion
- Usable for overhead installation
- Can be automatically installed
- Seals to plane surfaces with no housing for the sealing lip
- Visible from the outside
- No sweating
- Reusable
- Metal washer with vulcanised sealing body of rubber for sealing of bolt heads and flanges
- All European thread sizes available

■ GM500 / U-Seal

- Can be used to seal clearance or tapped holes in general engineering using a wide range of different bolts
- Can be used on flat flanges or with recessed bolt holes
- **Article group DD**

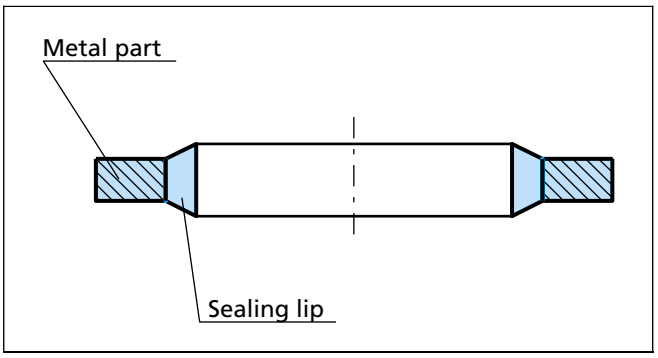


Figure 18 GM500 / U-Seal

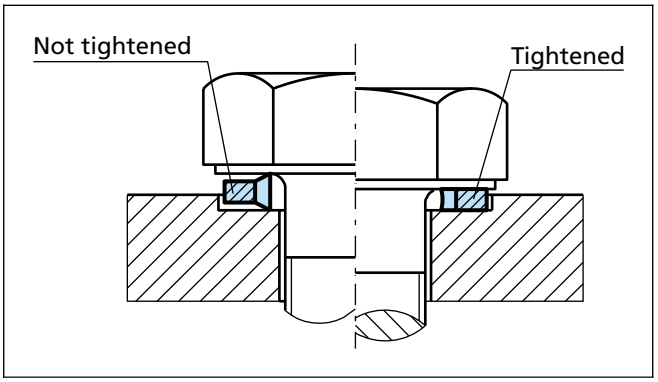


Figure 19 Installation GM500 / U-Seal

■ GM500 self-centering

- Concentrically located
- Positively retained
- Ability to pre-assemble
- Ease of assembly
- All European thread sizes available
- **Article group DD**

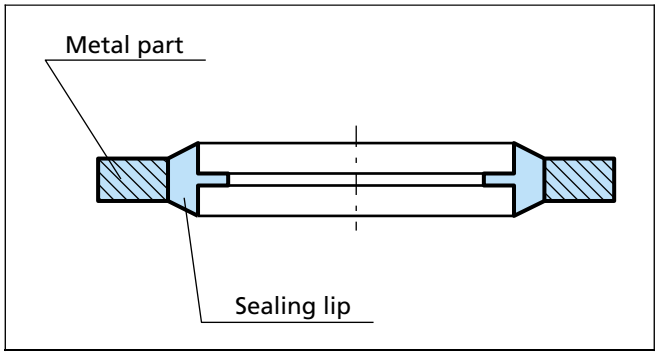


Figure 20 GM500 self-centering

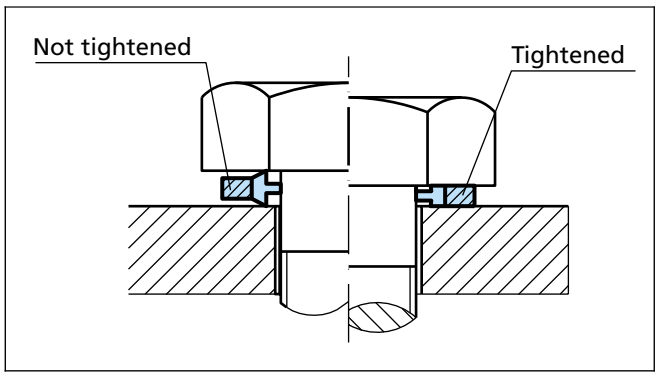


Figure 21 Installation GM500 self-centering

■ GM1000

- Good sealing function with a low tightening moment
- No need of a countersink to center the seal, this is achieved thanks to the design of the sealing lip
- Mostly used together with metric bolts with hexagonal heads as per DIN specifications
- On request GM 1000 can also be made for inch threads as well as for special bolts
- **Article group DDG1**

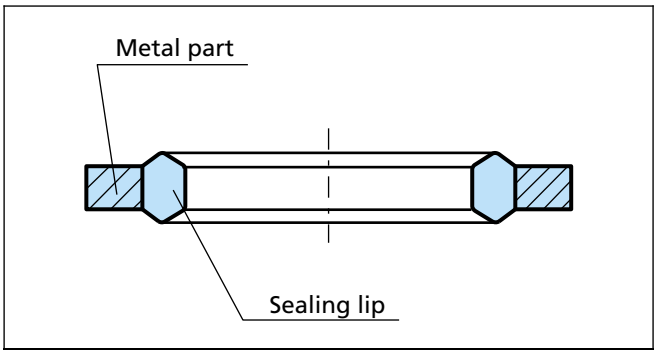


Figure 22 GM1000

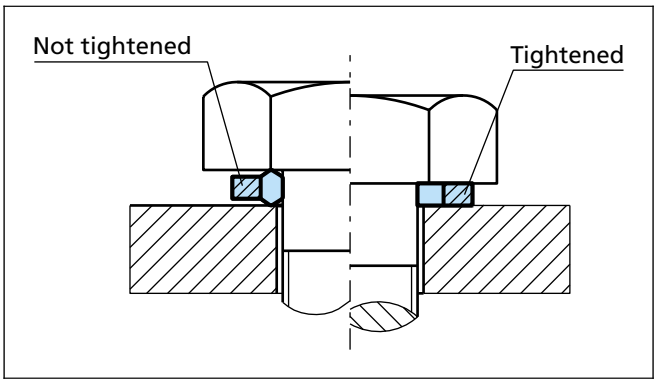


Figure 23 Installation GM1000

■ GM2000

- Rubber to metal bonded seal with specially designed sealing lip for threads and nuts
- No need of a countersink to center the seal, this is achieved thanks to the design of the sealing lip
- The seal prevents leakage by sealing in the thread
- The three contact lips of the rubber body seal the thread to nut and machine component
- Positively retained
- Mostly used together with hexagonal nuts as per DIN specification as well as for threaded connectors and adjusting screws
- **Article group DDG2**

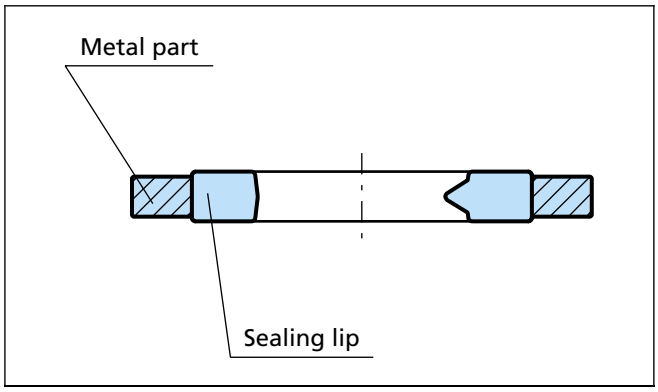


Figure 24 GM2000

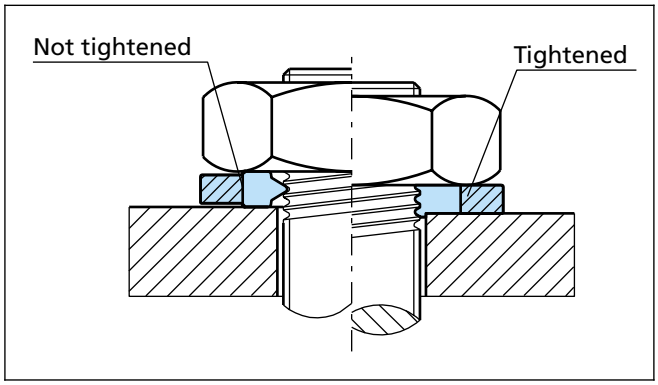


Figure 25 Installation GM2000

Figure 26 GM2000

■ GM3000 Sealing plate

Sealing plate GM3000 as per customer drawing and specification. The sealing lip is designed according to need and function. These sealing plates can in many applications very well replace O-Rings, square rings and moulded parts of rubber.

- One seal can seal multiple holes, flanges and such

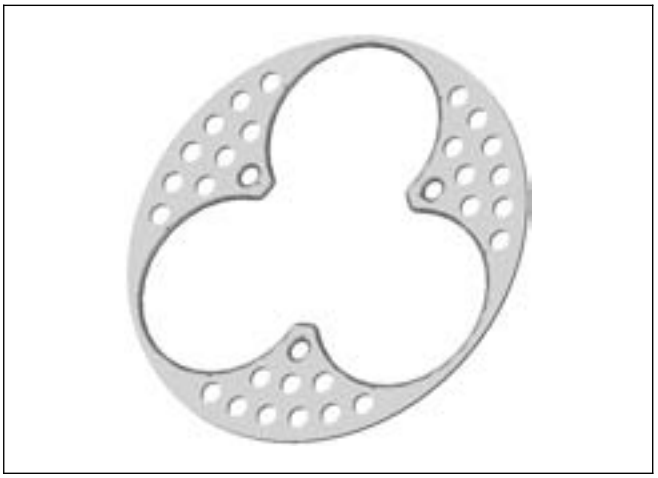


Figure 27 GM3000

Design guidlines GM3000

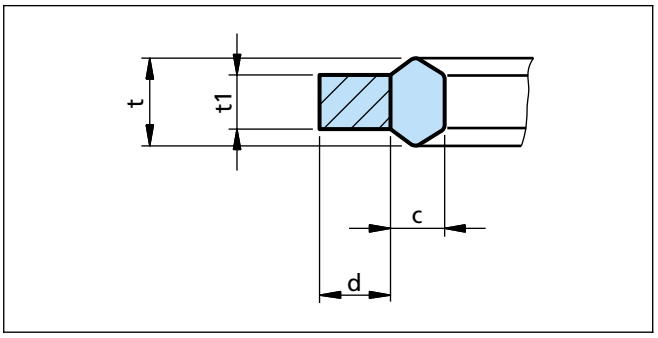


Figure 28 Sealing lip GM3000

Table XXIII Dimensions GM3000 (detail)

t1 ±0.15	**t** ±0.2	**c** ±0.2	**d min.**
1	1.5	1.4	1.25
1.25	1.85	1.6	1.5
1.5	2.25	1.8	1.75
2	2.6	2.5	2.25
2.5	3.15	3	2.75

Applications

- Flanges
- Plates
- Engines
- Bolts
- Valves
- Hydraulics
- Cylinder / valve connection

■ Seloc

- The shakeproof washer is well known for it's ability to resist vibration, the effect of tightening the bolt or nut causing the metal serrations to pierce the rubber, bite into the relative metal surface and thus provide the necessary locking action. The cover or rubber reduces the risk of corrosion that would occur with normal lockwasher by enveloping the scores in the protective treatment on the metal face to give effective protection against moisture and oxidation.
- Resists vibrations
- Suitable for pre-build assemblies
- Options for water, mineral oils and alkalis
- Used on painted, plated and stove enamelled surfaces
- **Article group DDSL**

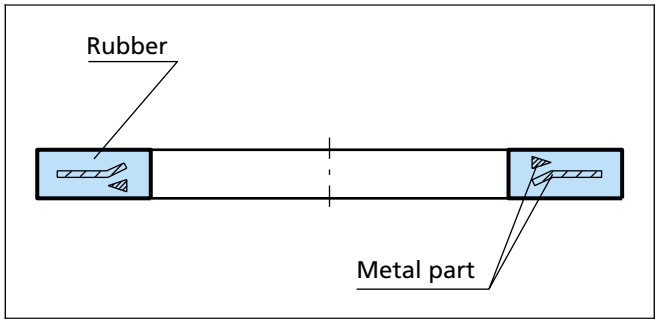


Figure 29 Seloc

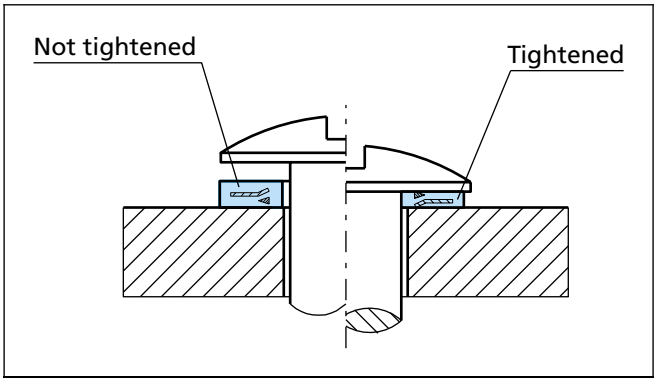


Figure 30 Installation Seloc

■ Technical data

Operating pressure

Max pressure is dependent of design, material choice and dimensions. Bonded Seals can be designed to withstand from 25 to 200 MPa max. pressure.

Please contact us for further information.

Operating temperature:

-30 °C to + 100 °C NBR 70 Shore A

-20 °C to + 100 °C NBR 90 Shore A

-18 °C to + 200 °C FKM 70 Shore A / FKM 75 Shore

-50 °C to + 120 °C EPDM 70 Shore A / EPDM 75 Shore

-10 °C to + 80 °C NBR/PVC blend 60 Shore A

Media:

Mineral oils, water, water-oil emulsion, gases

Important Note:
Bonded Seals are not effective as a bolt locking device except Seloc. This must be taken into consideration particulary with bolted connections subject to dynamic loads.

■ Materials

GM500

Standard steel

- BS EN 10139: 1998 DC01 + C490
  surface treatment zinc plate yellow chromate 8-12 µm

Stainless steel

- BS1449 (part2) type 316 (1.4436) (316S33)

Seal lip

- NBR 70 Shore A
- NBR 90 Shore A
- FKM 70 Shore A
- FKM 75 Shore A
- EPDM 75 Shore A

Other materials on request!

U-Seal

Standard steel

- 1.0330 (AISI 1008) surface treatment zinc plate yellow chromate

Stainless steel

- 1.4301 (AISI 304)

Seal lip

- NBR 70 Shore A
- FKM 70 Shore A

Other materials on request!

GM500 self centering

Standard steel

- BS1449 (part1) CS4 BR H5
  surface treatment zinc plate yellow chromate 8-12 µm

Stainless steel

- BS1449 (part2) type 316 (1.4436 (316S33))

Seal lip

- NBR 70 Shore A
- NBR 90 Shore A
- FKM 70 Shore A
- FKM 75 Shore A
- EPDM 75 Shore A

Other materials on request!

GM1000 / GM2000

Standard steel

- SS1265-16 HB min 200 (St2K60)

  surface treatment Fe/Zn 6c2 yellow chromate

Stainless steel

- SS2343 (AISI 316) (1.4436)

Seal lip

- NBR 70 Shore A
- FKM 70 Shore A
- EPDM 70 Shore A

Other materials on request!

GM3000 Sealing plate

Standard steel

- SS1265-16 HB min 200 (St2K60)

  surface treatment Fe/Zn 6c4 black chromate
  surface treatment Fe/Zn 6c2 yellow chromate
  surface treatment Fe/Zn 6c1 blue chromate

Stainless steel

- SS2333 (AISI 304) (1.4301)

Aluminium

- SS4212 (EN AW-6082)

Brass

- SS5150 (ISO CuZn37)

Copper

- SS5015 (ISO Cu-DHP)

Seal lip

- NBR 70 Shore A
- FKM 70 Shore A

Other materials on request!

Seloc

Spring steel

Seal lip

- NBR/PVC blend 60 Shore A

Mating surfaces

The plane surfaces to be sealed should be free from scores and should be machined smooth. The permissible surface roughness is:

R_{max} < 15 µm, R_a < 3.2 µm

Table XXIV Materials for Bonded Seals

		Type					
Base material	**Material code**	**GM500 (DD)**	**U-Seal (DD)**	**GM500 self-centering (DD)**	**GM1000 (DDG1) GM2000 (DDG2)**	**GM3000**	**Seloc (DDSL)**
NBR 70 Shore A + BS EN 10139: 1998	4N49	●	-	●	-	-	-
NBR 90 Shore A + BS EN 10139: 1998	4N59	●	-	●	-	-	-
FKM 70 Shore A + BS EN 10139: 1998	4V89	●	-	●	-	-	-
FKM 75 Shore A + BS EN 10139: 1998	4V49	●	-	●	-	-	-
EPDM 75 Shore A + BS EN 10139: 1998	4E49	●	-	●	-	-	-
NBR 70 Shore A + BS1449 (part2)	4N4E	●	-	●	-	-	-
NBR 90 Shore A + BS1449 (part2)	4N5E	●	-	●	-	-	-
FKM 70 Shore A + BS1449 (part2)	4V8E	●	-	●	-	-	-
FKM 75 Shore A + BS1449 (part2)	4V4E	●	-	●	-	-	-
EPDM 75 Shore A + BS1449 (part2)	4E4E	●	-	●	-	-	-
NBR 70 Shore A + 1.0330	N7MC	-	●	-	-	-	-
FKM 75 Shore A + 1.0330	VCBC	-	●	-	-	-	-
NBR 70 Shore A + 1.4301	N7MA	-	●	-	-	-	-
FKM 75 Shore A + 1.4301	VCBA	-	●	-	-	-	-
NBR 70 Shore A + SS1265	4N17	-	-	-	●	-	-
FKM 70 Shore A + SS1265	4V17	-	-	-	●	-	-
EPDM 70 Shore A + SS1265	4E17	-	-	-	●	-	-
NBR 70 Shore A + SS2343	4N15	-	-	-	●	-	-
FKM 70 Shore A + SS2343	4V15	-	-	-	●	-	-
NBR 70 Shore A + SS1265 black chromate	4N17M	-	-	-	-	●	-
NBR 70 Shore A + SS1265 yellow chromate	4N17Y	-	-	-	-	●	-
NBR 70 Shore A + SS1265 blue chromate	4N17L	-	-	-	-	●	-
FKM 70 Shore A + SS1265 black chromate	4V17M	-	-	-	-	●	-
FKM 70 Shore A + SS1265 yellow chromate	4V17Y	-	-	-	-	●	-
FKM 70 Shore A + SS1265 blue chromate	4V17L	-	-	-	-	●	-
NBR 70 Shore A + SS2333	4N12	-	-	-	-	●	-
FKM 70 Shore A + SS2333	4V12	-	-	-	-	●	-
NBR 70 Shore A + SS4212	4N1A	-	-	-	-	●	-
FKM 70 Shore A + SS4212	4V1A	-	-	-	-	●	-
NBR 70 Shore A + SS5150	4N1M	-	-	-	-	●	-
FKM 70 Shore A + SS5150	4V1M	-	-	-	-	●	-
NBR 70 Shore A + SS5015	4N1K	-	-	-	-	●	-
FKM 70 Shore A + SS5015	4V1K	-	-	-	-	●	-
NBR/PVC + Spring Steel	4NPH	-	-	-	-	-	●

● available - not available

Installation recommendations article group DD

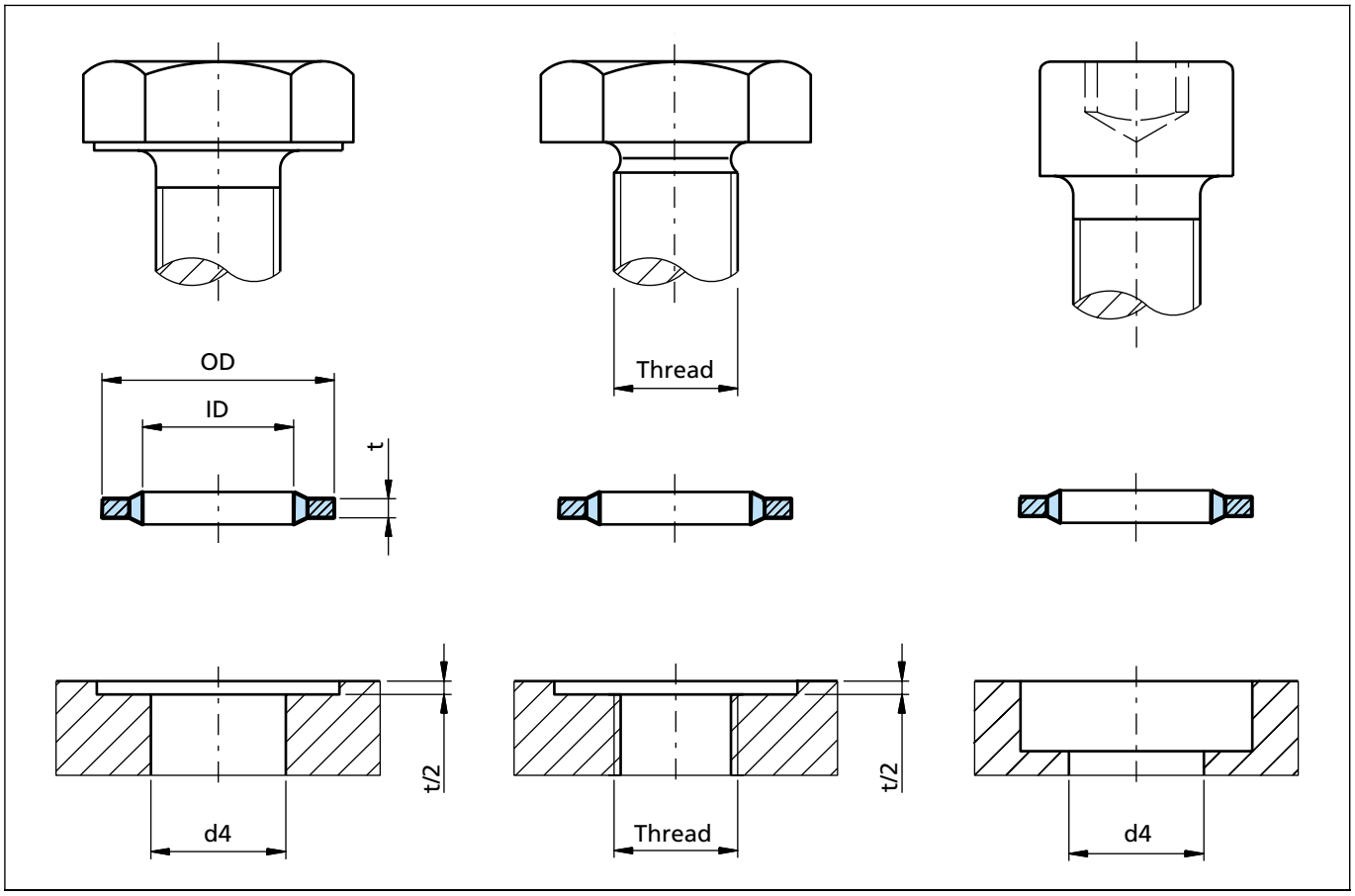


Figure 31 Installation drawing

Ordering example

Bonded Seal for hexagon head cap screw M4

Dimensions:	Inside diameter	ID =	4.5 mm
	Outside diameter	OD =	7.0 mm
	Thickness	t =	1.0 mm
Materials:	Flat ring of steel (1.0330)		
	Sealing lip of NBR 70 Shore A		

Material code see page 90

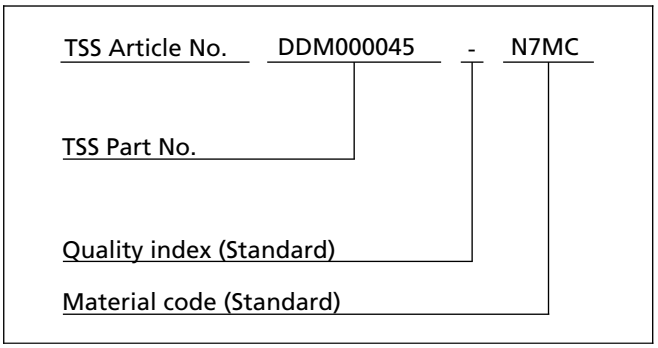


Table XXV GM500 / U-Seal Preferred metric dimensions

Metric thread	Dimensions			Bore	TSS Part No.	U-Seal	Ref. No. GM500
	ID	OD	t	d4			
M2.5	3.10	6.40	1.00	2.70	DDM000031	●	-
M2.5	3.10	6.40	1.30	2.70	DDM100031	●	-
M3	3.60	7.50	1.00	3.20	DDM000036	-	301
M3	4.10	7.00	1.00	3.20	DDM000041	●	-
M3 (M3.5)	4.10	7.20	1.00	3.20 (3.70)	DDM100041	●	201
M4	4.50	7.00	1.00	4.20	DDM000045	●	202
M4	4.60	9.00	1.00	4.30 (4.20)	DDM000046	●	302
M4	4.90	8.60	1.00	4.30	DDM000049	●	-
M5	5.60	10.00	1.00	5.20	DDM000056	-	303
M5	5.70	9.00	1.00	5.30 (5.20)	DDM000057	●	203
M5	5.70	9.20	1.00	5.30	DDM100057	●	-
M5	5.70	10.00	1.00	5.30 (5.20)	DDM200057	●	204
M5 (M5.5)	6.20	9.20	1.00	5.30 (5.70)	DDM000062	●	205
M6	6.60	11.00	1.00	6.20	DDM000066	-	304
M6	6.70	10.00	1.00	6.40 (6.20)	DDM000067	●	206
M6	6.70	11.00	1.00	6.40 (6.20)	DDM100067	●	207
M6	6.70	11.00	2.50	6.40 (6.20)	DDM200067	-	208
M6	6.85	13.27	1.30	6.20	DDM000068	-	305
M6	6.90	13.20	1.30	6.40	DDM000069	●	-
M6	7.00	11.40	1.00	6.20	DDM100070	-	306
M6	7.00	13.40	1.30	6.40	DDM000070	●	-
M6 (M6.5)	7.10	12.00	1.00	6.40 (6.70)	DDM000071	●	209
M6 (M6.7)	7.30	10.20	1.00	6.40 (6.90)	DDM000073	●	210
M6 (M8)	8.50	13.40	1.00	6.40 (8.20)	DDM000085	●	211
M8	8.60	13.00	1.00	8.20	DDM000086	-	307
M8	8.70	13.00	1.00	8.40 (8.20)	DDM000087	●	212
M8	8.70	14.00	1.00	8.40 (8.20)	DDM100087	●	213
M8	8.70	14.20	1.30	8.40	DDM200087	●	-
M8	8.70	16.00	1.00	8.40 (8.20)	DDM300087	●	214
M8 (M8.5)	9.30	13.30	1.00	8.40 (8.70)	DDM000093	●	215
M10	10.35	16.00	2.00	9.95	DDM000103	-	216
M8 (M10)	10.70	16.00	1.50	8.40 (10.20)	DDM000107	●	217
M10	10.70	17.00	1.50	10.20	DDM200107	-	310
M8 (M10)	10.70	18.00	1.50	8.40 (10.20)	DDM100107	●	218
M10 (M11)	11.40	16.30	1.50	10.50 (11.20)	DDM000114	●	219
M11	11.80	18.10	1.50	11.20	DDM200118	-	312

● Availabe sizes - Not available

Metric thread	Dimensions			Bore	TSS Part No.	U-Seal	Ref. No. GM500
	ID	OD	t	d4			
M10 (M11)	11.80	18.50	1.50	10.50 (11.20)	DDM000118	●	220
M10 (M11)	11.80	19.10	1.50	10.50 (11.20)	DDM100118	●	221
M10 (M12)	12.70	18.00	1.50	10.50 (12.20)	DDM000127	●	222
M12	12.70	19.00	1.50	12.20	DDM200127	-	313
M10 (M12)	12.70	20.00	1.50	10.50 (12.20)	DDM100127	●	223
M12 (M13)	13.70	20.00	1.50	13.00 (13.20)	DDM000137	●	224
M12	13.70	20.60	2.10	13.00	DDM100137	●	-
M12 (M13)	13.70	22.00	1.50	13.00 (13.20)	DDM200137	●	225
M12	13.70	22.20	1.59	13.00	DDM300137	●	-
M13	13.80	20.10	1.50	13.20	DDM000138	-	315
M12 (M13.5)	14.00	18.70	1.50	13.00 (13.70)	DDM000140	●	226
M14	14.70	21.00	1.50	14.20	DDM100147	-	316
M12 (M14)	14.70	22.00	1.50	13.00 (14.20)	DDM000147	●	227
M12	14.90	22.30	2.10	13.00	DDM000149	●	-
M14 (M15)	16.00	22.70	1.50	15.00 (15.20)	DDM000160	●	228
M14	16.50	25.50	2.10	15.00	DDM000165	●	-
M16	16.70	23.00	1.50	16.20	DDM100167	-	317
M14 (M16)	16.70	24.00	1.50	15.00 (16.20)	DDM000167	●	229
M16.5	17.20	23.90	2.10	16.70	DDM000172	-	319
M17	17.40	23.70	1.50	17.20	DDM200174	-	318
M14 (M17)	17.40	24.00	1.50	15.00 (17.20)	DDM000174	●	230
M14	17.40	24.00	2.00	15.00	DDM100174	●	-
M16 (M17.5)	18.00	24.70	1.50	17.00 (17.70)	DDM000180	●	231
M16	18.20	25.40	2.50	17.00	DDM000182	●	-
M16 (M18)	18.70	26.00	1.50	17.00 (18.20)	DDM000187	●	232
M18	18.70	27.00	2.00	18.20	DDM100187	-	320
M18 (M20)	20.70	28.00	1.50	19.00 (20.20)	DDM000207	●	233
M20	20.70	29.00	2.00	20.20	DDM100207	-	321
M18 (M21)	21.50	28.70	2.50	19.00 (21.20)	DDM000215	●	234
M21	21.70	30.00	2.00	21.20	DDM000217	-	323
M20 (M22)	22.50	28.00	1.50	21.00 (22.20)	DDM000225	●	235
M20 (M22)	22.70	30.00	2.00	21.00 (22.20)	DDM000227	●	236
M20 (M22)	22.70	30.00	3.00	21.00 (22.20)	DDM100227	●	237
M22	22.70	31.00	2.00	22.20	DDM200227	-	324
M23	23.70	32.00	2.00	23.20	DDM000237	-	325
M20 (M24)	24.70	32.00	2.00	21.00 (24.20)	DDM000247	●	238

● Availabe sizes - Not available

Metric thread	Dimensions			Bore	TSS Part No.	U-Seal	Ref. No. GM500
	ID	OD	t	d4			
M24	24.70	33.00	2.00	24.20	DDM100247	-	326
M22	26.70	35.00	2.00	23.00	DDM000267	●	-
M24	27.00	35.00	2.50	25.00	DDM000270	●	-
M26	27.00	35.30	2.00	26.20	DDM100270	-	327
M24 (M27)	27.20	36.00	2.00	25.00 (27.20)	DDM000272	●	240
M27	27.70	36.00	2.00	27.20	DDM000277	-	328
M28	28.60	36.00	2.00	28.20	DDM000286	-	329
M24	28.70	37.00	2.00	25.00	DDM000287	●	-
M28.5	29.20	37.50	2.00	28.70	DDM000292	-	330
M30	30.70	39.00	2.00	30.20	DDM000307	-	331
M27 (M30)	31.00	39.00	2.00	28.00 (30.20)	DDM000310	●	242
M27 (M33)	33.70	42.00	2.00	28.00 (33.20)	DDM000337	●	243
M27	33.90	42.80	3.25	28.00	DDM000339	●	-
M27	33.90	42.90	3.40	28.00	DDM100339	●	-
M30 (M33)	34.30	43.00	2.00	31.00 (33.20)	DDM000343	●	244
M30 (M36)	36.70	46.00	2.00	31.00 (36.20)	DDM000367	●	245
M36	37.00	48.00	2.50	36.20	DDM000370	-	333
M36 (M39)	40.00	51.00	2.50	37.00 (39.20)	DDM000400	●	246
M39	40.00	51.00	2.50	39.20	DDM100400	-	334
M36 (M42)	42.70	53.00	3.00	37.00 (42.20)	DDM000427	●	247
M42	43.00	54.00	2.50	42.20	DDM000430	-	335
M45	46.00	57.00	2.50	45.20	DDM000460	-	336
M36 (M48)	48.70	59.00	3.00	37.00 (48.20)	DDM000487	●	248
M48	49.00	60.00	2.50	48.20	DDM000490	-	337
M42	51.70	63.50	3.25	43.00	DDM000517	●	-
M42 (M51)	52.00	60.00	3.00	43.00 (51.20)	DDM000520	●	249
M48 (M52)	53.30	64.50	3.00	50.00 (52.20)	DDM000533	●	250
M48 (M60)	60.70	73.00	3.00	50.00 (60.20)	DDM000607	●	251
M68	68.60	79.50	3.50	68.20	DDM000686	-	252
M75	76.10	90.30	3.38	75.20	DDM100761	-	253
M64	76.10	90.30	3.40	66.00	DDM000761	●	-
M88	89.09	101.48	3.25	88.20	DDM000890	-	254
M125	127.00	143.67	5.00	125.20	DDM001270	-	255

● Availabe sizes - Not available

Table XXVI GM500 / U-Seal Preferred inch dimensions, BSP

Inch thread	BSP	Dimensions			Bore	TSS Part No.	U-Seal	Ref. No. GM500
		ID	OD	t	d4			
6BA		3.05	6.35	1.22	2.79	DDW400001	-	001
1/8		3.70	8.05	1.04	3.50	DDW200005	●	-
9/64		4.00	8.38	1.04	3.90	DDW200006	●	-
4BA		4.12	7.26	1.22	3.60	DDW400002	-	002
5/32		4.70	9.29	1.04	4.50	DDW200008	●	-
2BA		5.21	8.38	1.22	4.69	DDW400003	-	003
3/16		5.60	10.79	1.37	5.40	DDW200190	●	-
7/32		6.20	11.55	1.37	6.00	DDW200216	●	-
1/4		6.86	13.21	1.22	6.34	DDW400004	-	004
1/4		6.99	13.34	1.22	6.35	DDW400005	-	005
1/4		7.10	13.18	1.37	7.00	DDW200250	●	-
5/16		8.31	13.34	1.22	7.93	DDW400006	-	006
5/16		8.64	14.22	1.22	7.94	DDW400007	-	007
5/16		8.70	15.16	1.37	8.50	DDW200312	●	-
3/8		10.30	17.52	1.37	10.20	DDW200375	●	-
3/8	1/8	10.37	15.88	2.00	9.53	DDW400020	-	020
40		11.26	18.36	2.00	10.16	DDW400008	-	008
7/16		11.69	19.05	2.00	11.11	DDW400009	-	009
7/16		11.90	19.53	1.90	11.70	DDW200437	●	-
1/2		13.70	22.30	1.90	13.50	DDW200500	●	-
1/2	1/4	13.74	20.57	2.00	12.70	DDW400021	-	021
9/16		14.86	22.23	2.00	14.28	DDW400010	-	010
9/16		15.30	24.68	1.90	15.00	DDW200562	●	-
60		15.83	22.23	2.00	15.23	DDW400022	-	022
5/8		16.52	25.40	2.00	15.88	DDW400011	-	011
5/8		16.90	27.05	1.90	16.80	DDW200625	●	-
	3/8	17.28	23.80	2.00	16.64	DDW400023	-	023
11/16		18.16	25.40	2.34	17.46	DDW400012	-	012
11/16		18.50	29.43	2.28	18.20	DDW200687	●	-
3/4		19.69	26.92	2.34	19.05	DDW400024	-	024
3/4		20.30	32.23	2.28	20.00	DDW200750	●	-
13/16	1/2	21.54	28.58	2.34	20.64	DDW400025	-	025
13/16		21.90	34.59	2.28	21.50	DDW200812	●	-
7/8	5/8	23.49	31.75	2.34	22.23	DDW400026	-	026
7/8		23.50	36.98	2.28	23.20	DDW200875	●	-
15/16		24.26	33.27	2.34	23.80	DDW400013	-	013

● Availabe sizes - Not available

Inch thread	BSP	Dimensions			Bore	TSS Part No.	U-Seal	Ref. No. GM500
		ID	OD	t	d4			
15/16		25.10	38.96	2.28	24.80	DDW200937	●	-
1		26.70	42.13	2.28	26.50	DDW201000	●	-
1	3/4	27.05	34.93	2.34	25.41	DDW400027	-	027
1 1/16		27.82	38.61	2.34	27.00	DDW400028	-	028
1 1/8		29.33	36.58	2.34	28.57	DDW400014	-	014
1 1/8		29.80	46.91	2.28	29.50	DDW201125	●	-
1 3/16	7/8	30.81	38.10	2.34	30.15	DDW400029	-	029
1 1/4		32.64	41.40	3.25	31.74	DDW400015	-	015
1 1/4		33.00	51.28	3.40	32.80	DDW201250	●	-
1 5/16	1	33.89	42.80	2.34	33.33	DDW400031	-	031
1 5/16	1	33.89	42.80	3.25	33.33	DDW400030	-	030
1 3/8		35.94	44.45	3.25	34.92	DDW400016	-	016
1 1/2		38.96	47.75	3.25	38.10	DDW400017	-	017
1 1/2		39.50	58.93	3.40	39.00	DDW201500	●	-
1 5/8	1 1/4	42.93	52.38	3.25	41.29	DDW400032	-	032
1 3/4		45.34	57.15	3.25	44.44	DDW400018	-	018
1 7/8	1 1/2	48.44	58.60	3.25	47.64	DDW400033	-	033
2		51.69	63.50	3.25	50.79	DDW400019	-	019
2 1/8	1 3/4	54.89	69.85	3.25	53.99	DDW400034	-	034
2 1/4		58.04	70.36	3.25	57.14	DDW400035	-	035
	2	60.58	73.03	3.25	59.62	DDW400036	-	036
2 1/2		64.39	77.72	3.25	63.49	DDW400037	-	037
	2 1/4	66.68	79.50	3.25	65.50	DDW400038	-	038
	2 1/2	76.08	90.17	3.25	75.18	DDW400039	-	039

● Availabe sizes - Not available

Table XXVII GM500 Dimensions for pipe connections and couplings, ISO 1179

Thread dia. BSP	Dimensions			TSS Part No.
	ID +0.2	**OD** -0.2	**t** ± 0.15	
1/16	8.30	12.70	1.25	DDW400519
1/8	10.40	14.70	1.25	DDW400510
1/4	13.85	18.70	1.25	DDW400511
3/8	17.35	22.70	1.25	DDW400512
1/2	21.65	26.70	1.25	DDW400513
3/4	27.30	32.50	1.25	DDW400514
1	34.20	39.50	2.00	DDW400515
1 1/4	42.80	49.50	2.00	DDW400516
1 1/2	48.70	55.50	2.00	DDW400517
2	60.50	68.50	2.00	DDW400518

GM 500 Self-centering

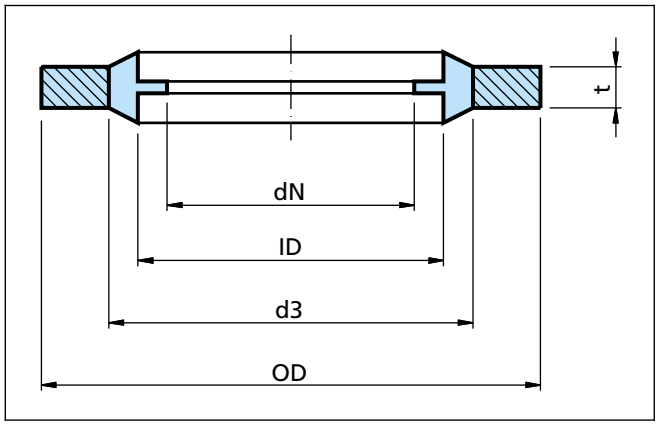


Figure 32 GM500 Self-centering

Ordering example

M8

TSS Article No.: DDM0C0087-4V4E

Material code see page 90

Table XXVIII GM500 Self-centering range metric dimensions

Metric thread	Dimensions					TSS Part No.
	OD	d3	ID	dN	t	
M4	7.00	5.40	4.50	3.30	1.00	DDM0C0045
M5	10.00	7.40	5.70	4.45	1.00	DDM0C0057
M6	10.00	8.00	6.70	5.60	1.00	DDM0C0067
M8	14.00	10.40	8.70	6.40	1.00	DDM0C0087
M10	16.00	12.40	10.70	8.05	1.50	DDM0C0107
M12	19.00	14.10	12.70	9.73	1.50	DDM0C0127
M14	22.00	16.40	14.70	11.38	1.50	DDM0C0147
M16	24.00	18.40	16.70	13.41	1.50	DDM0C0167
M18	26.00	20.40	18.70	14.76	1.50	DDM0C0187
M20	28.00	22.50	20.70	16.76	1.50	DDM0C0207
M22	30.00	24.40	22.70	18.74	2.00	DDM0C0227
M24	32.00	26.40	24.70	20.11	2.00	DDM0C0247

Ordering example

BSP 3/8

TSS Article No.: DDW4C0823-4N5E

Material code see page 90

Table XXIX GM500 Self-centering range inch dimensions, BSP

Inch thread	Dimensions					TSS Part No.
	OD	d3	ID	dN	t	
BSP 1/8	15.88	11.84	10.37	8.26	2.00	DDW4C0820
BSP 1/4	20.57	15.21	13.74	11.18	2.00	DDW4C0821
5/8	25.40	18.75	16.51	12.90	2.00	DDW4C0869
BSP 3/8	23.80	18.75	17.28	14.76	2.00	DDW4C0823
11/16	25.40	19.69	18.16	14.50	2.40	DDW4C0871
BSP 1/2	28.58	23.01	21.54	18.24	2.47	DDW4C0825
BSP 5/8	31.75	24.97	23.49	20.27	2.47	DDW4C0826
BSP 3/4	34.93	28.53	27.05	23.83	2.47	DDW4C0827
BSP 7/8	38.10	32.29	30.81	27.51	2.47	DDW4C0829
BSP 1	42.80	36.88	33.89	29.92	3.40	DDW4C0830
BSP 1 1/4	52.38	45.93	42.93	38.45	3.40	DDW4C0832
BSP 1 1/2	58.60	51.39	48.44	44.45	3.40	DDW4C0833
BSP 1 3/4	69.85	58.30	54.89	50.42	3.40	DDW4C0834
BSP 2	73.03	63.63	60.58	56.26	3.40	DDW4C0836
BSP 2 1/4	79.50	69.98	66.68	62.36	3.40	DDW4C0838
BSP 2 1/2	90.17	79.38	76.08	71.50	3.40	DDW4C0839

GM1000

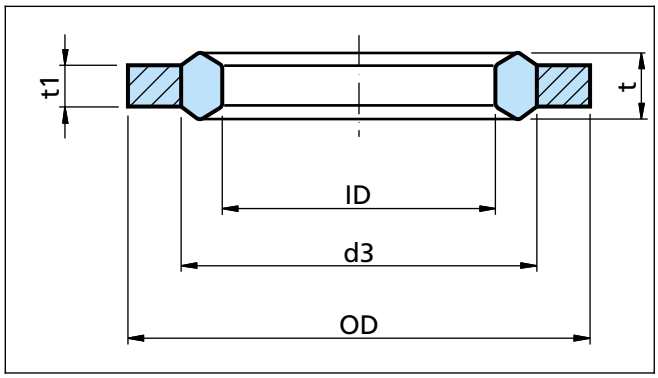


Figure 33 GM1000

Ordering example

M12

TSS Article No.: DDG100M12-4V17

Material code see page 90

Table XXX GM1000 metric dimensions

Metric thread	ø OD	Tol ±	ø d3	ø ID	Tol ±	t	Tol ±	t1	Tol ±	Clearance bore max ø	TSS Part No.
M 3	5.9	0.20	4.50	3.0	0.2	1.40	0.20	1.0	0.15	3.6	DDG1000M3
M 4	7.9	0.20	6.00	4.0	0.2	1.50	0.20	1.0	0.15	4.5	DDG1000M4
M 5	8.9	0.20	6.40	5.0	0.2	1.50	0.20	1.0	0.15	5.5	DDG1000M5
M 6	9.9	0.20	8.00	6.0	0.2	1.50	0.20	1.0	0.15	6.6	DDG1000M6
M 8	13.9	0.20	11.00	8.0	0.2	2.00	0.20	1.0	0.15	9.0	DDG1000M8
M 10	16.9	0.35	13.00	10.0	0.25	2.50	0.20	1.5	0.15	11.0	DDG100M10
M 12	18.9	0.35	16.00	12.0	0.25	2.50	0.20	1.5	0.15	14.0	DDG100M12
M 14	21.9	0.35	18.00	14.0	0.25	2.50	0.20	1.5	0.15	16.0	DDG100M14
M 16	23.9	0.35	20.00	16.0	0.25	2.50	0.20	1.5	0.15	18.0	DDG100M16
M 18	26.9	0.40	22.00	18.0	0.35	3.00	0.20	2.0	0.15	20.0	DDG100M18
M 20	29.9	0.40	25.00	20.0	0.35	3.00	0.20	2.0	0.15	22.0	DDG100M20
M 22	31.9	0.40	27.00	22.0	0.35	3.00	0.20	2.0	0.15	24.0	DDG100M22
M 24	35.9	0.40	29.00	24.0	0.35	3.00	0.20	2.0	0.15	26.0	DDG100M24

GM2000

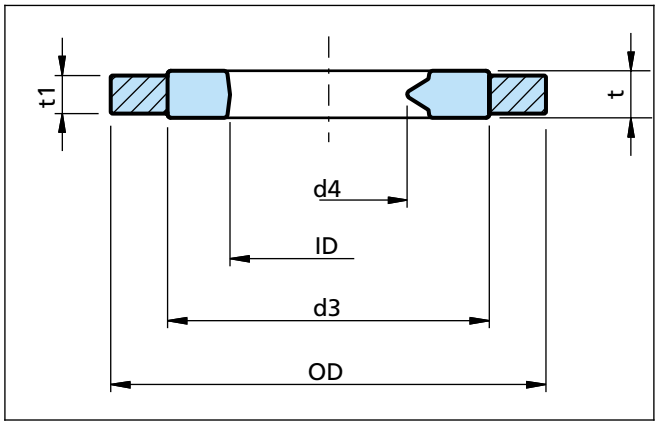


Figure 34 GM2000

Ordering example

M6

TSS Article No.: DDG2000M6-4N17

Material code see page 90

Table XXXI GM2000 metric dimensions

Metric thread	ø OD	Tol ±	ø d3	ø ID	Tol ±	t	Tol ±	t1	Tol ±	ø d4	Bore max ø	Pitch of thread	TSS Part No.
M 4	7.9	0.20	6.0	4.2	0.20	1.8	0.30	1.0	0.15	3.1	4.3	0.70	DDG2000M4
M 5	8.9	0.20	6.4	5.2	0.20	1.8	0.30	1.0	0.15	4.0	5.3	0.80	DDG2000M5
M 6	9.9	0.20	8.0	6.2	0.20	1.8	0.30	1.0	0.15	4.7	6.4	1.00	DDG2000M6
M 8	13.9	0.20	11.0	8.2	0.20	2.5	0.30	1.5	0.15	6.4	8.4	1.25	DDG2000M8
M 10	16.9	0.35	13.0	10.2	0.25	2.5	0.30	1.5	0.15	8.1	10.5	1.50	DDG200M10
M 12	18.9	0.35	15.0	12.2	0.25	2.5	0.30	1.5	0.15	9.8	13.0	1.75	DDG200M12
M 14	21.9	0.35	18.0	14.2	0.25	3.0	0.30	2.0	0.15	11.5	15.0	2.00	DDG200M14
M 16	23.9	0.35	20.0	16.2	0.25	3.5	0.30	2.5	0.15	13.5	17.0	2.00	DDG200M16
M 18	26.9	0.40	22.0	18.2	0.35	3.5	0.30	2.5	0.15	14.8	19.0	2.50	DDG200M18
M 20	29.9	0.40	25.0	20.2	0.35	3.7	0.30	2.5	0.15	16.8	21.0	2.50	DDG200M20
M 22	31.9	0.40	27.0	22.2	0.35	3.7	0.30	2.5	0.15	18.8	23.0	2.50	DDG200M22
M 24	35.9	0.40	29.0	24.2	0.35	4.2	0.30	3.0	0.15	20.2	25.0	3.00	DDG200M24

Seloc

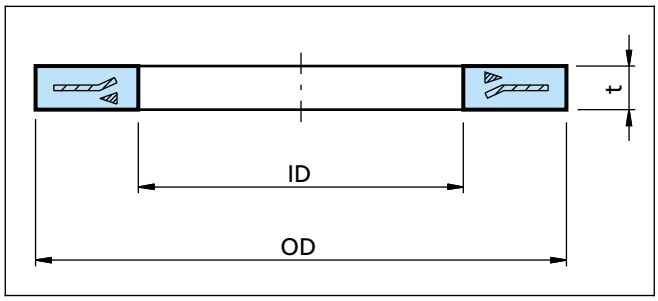


Figure 35 Seloc

Ordering example

M3, 4BA, 6UNC

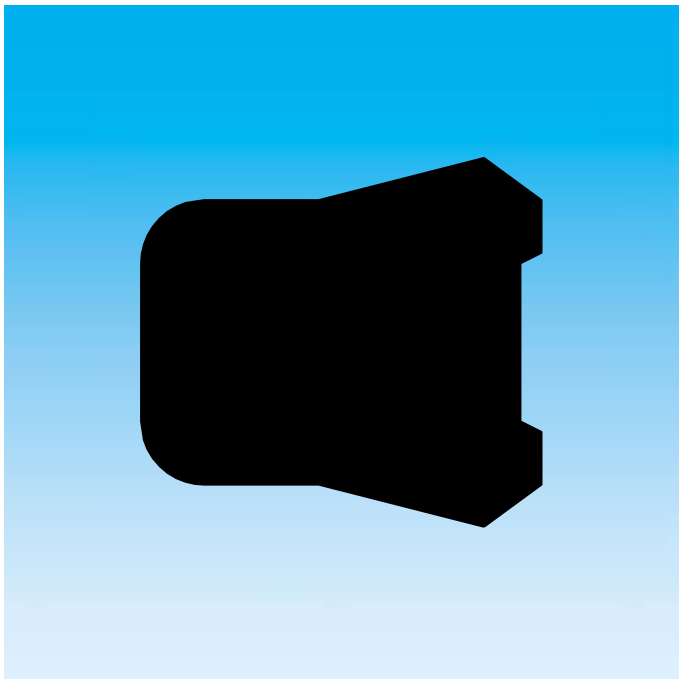
TSS Article No.: DDSL00002-4NPH

Material code see page 90

Table XXXII Seloc dimensions

Inch thread	Metric thread	Dimensions			TSS Part No.
		ID	OD	t	
6BA, 4UNC	M2.5; M2.6	3.05	7.62	1.27	DDSL00001
4BA, 6UNC	M3	3.81	8.64	1.27	DDSL00002
3BA, 8UNC	M3.5; M4	4.32	10.16	1.40	DDSL00003
2BA, 3/16in	M4	4.95	11.18	1.52	DDSL00004
1/4	M6	6.60	13.34	1.78	DDSL00005
5/16	M8	8.26	16.26	1.78	DDSL00006
3/8	M9	9.78	18.54	2.03	DDSL00007
7/16	M10	11.38	21.00	2.29	DDSL00008
1/2	M12	13.08	23.37	2.29	DDSL00009
9/16	M14	14.73	25.65	2.29	DDSL00010
5/8	M16	16.26	28.19	2.54	DDSL00011
3/4	M18	19.43	32.90	2.67	DDSL00012
7/8	M22	22.86	36.58	2.79	DDSL00013
1	M24	26.29	42.55	3.05	DDSL00014

SEALS FOR SAE J518 FLANGES



- Axial sealing -

- Hydraulic seal -

- Elastomers, Polyurethane -

■ Description

Flanges to the SAE J518 standard are among the most widely used static connections for high volume flows. They are functionally reliable and simple to assemble and dismantle. The individual elements for sealing these flanges can be Nitrile O-Rings, Nitrile rectangular rings (type DRV2), or polyurethane compact sealing rings (type DRV3), specially developed for mobile hydraulic systems.

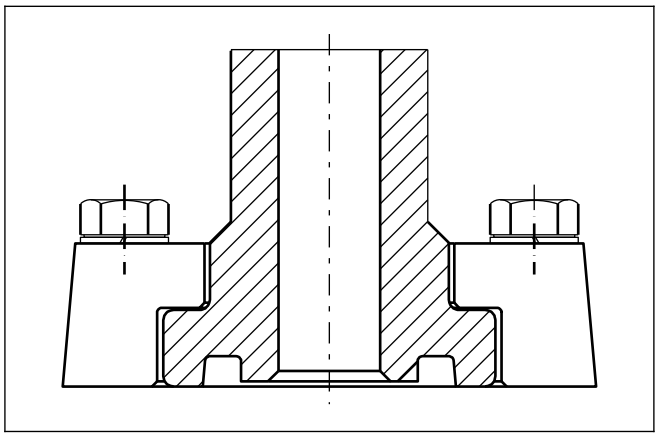


Figure 36 SAE-Flange acc. to J518

Application examples

- Mobile hydraulics
- Injection moulding machines
- Machine tools
- Presses
- Excavators
- Agricultural machines

■ O-Ring

Advantages

- Simple design
- Economical sealing
- Ex stock availability

Technical data

- Service pressure: max. 21 MPa
- Standard material: NBR 90 Shore A
- Operating temperature: NBR 90: -20 °C to +100 °C
- Media: HL, HLP, HETG, HEPG, HEES and HFC hydraulic fluids

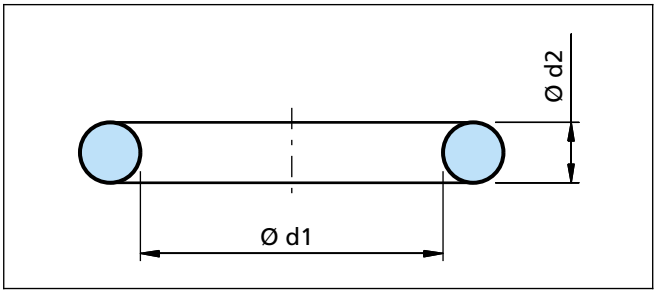


Figure 37 O-Ring acc. to AS 568 B

Ordering example

ORAR00214-N9

Table XXXIII Dimensions / TSS Part No.

Nominal flange size	d1	d2	TSS Part No.
1/2“	18.64	3.53	ORAR00210
3/4“	24.99	3.53	ORAR00214
1“	32.92	3.53	ORAR00219
1 1/4“	37.69	3.53	ORAR00222
1 1/2“	47.22	3.53	ORAR00225
2“	56.74	3.53	ORAR00228

Type DRV2

Advantages

- Minimal mechanical deformation of the cross-section
- Outstanding sealing behaviour over long periods
- No twisting in the groove due to its rectangular profile
- Less sensitive to gap extrusion
- No relative movements during pressure cycles
- Dimensionally stable under pressure
- High leak tightness
- Fits at the outer diameter due to its interference with the groove

Technical data

- Service pressure: max. 42 MPa
- Standard material: NBR 90 Shore A
- Operating temperature NBR 90: -20 °C to +100 °C
- Media: HL, HLP, HETG, HEPG, HEES and HFC hydraulic fluids

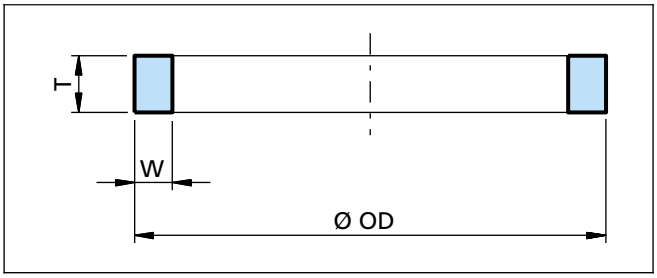


Figure 38 Type DRV2

Ordering example

DRV203230-N9

Table XXXIV Dimensions / TSS Part No.

Nominal flange size	OD	W	T	TSS Part No.
1/2“	25.85	2.8	3.4	DRV202585
3/4“	32.30	2.8	3.4	DRV203230
1“	40.15	2.8	3.4	DRV204015
1 1/4“	45.05	2.8	3.4	DRV204505
1 1/2“	54.40	2.8	3.4	DRV205440
2“	63.90	2.8	3.4	DRV206390

■ SAE-Seal type DRV3

Advantages

- Good abrasion resistance
- Usable for rough surface finish
- The sealing edge offers a very good sealing function
- Very high resistance to extrusion
- Low compression set

Technical data

- Service pressure: max. 42 MPa
- Standard material: Zurcon® Z20 polyurethane 93 Shore A
- Operating temperature: Z20: -35 °C to +110 °C
- Media: HL and HLP hydraulic fluids

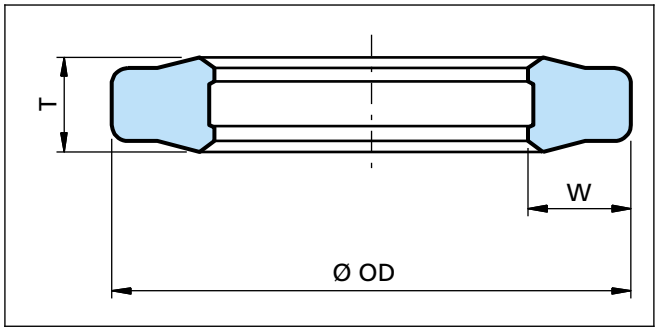


Figure 39 SAE-Seal type DRV3

Ordering example

DRV302560-Z20

Table XXXV Dimensions / TSS Part No.

Nominal flange size	OD	W	T	TSS Part No.
1/2"	25.6	3.8	3.4	DRV302560
3/4"	31.8	3.8	3.4	DRV303180
1"	39.8	3.8	3.4	DRV303980
1 1/4"	44.8	3.8	3.4	DRV304480
1 1/2"	54.3	3.8	3.4	DRV305430
2"	63.8	3.8	3.4	DRV306380

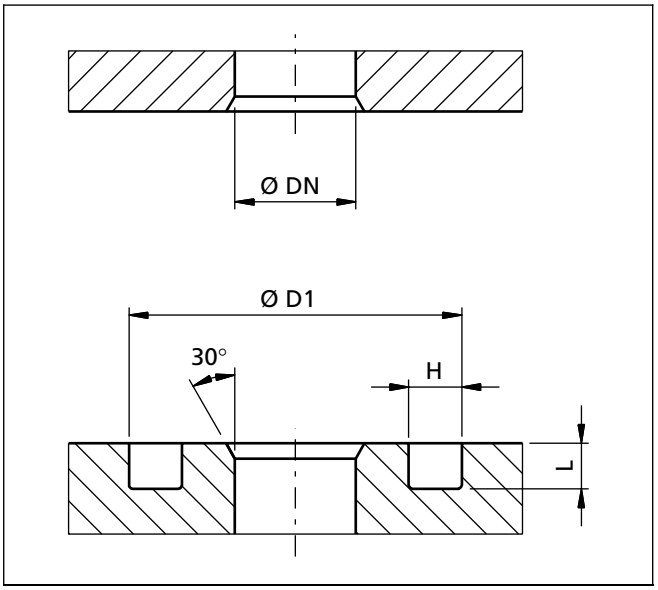


Figure 40 SAE installation dimensions

Table XXXVI Installation SAE recommendations

Nominal flange size	Ø DN	Ø D1 min. - max.	H min. - max.	L min. - max.
1/2"	13	25.40 - 25.83	3.94 - 4.45	2.79 - 2.92
3/4"	19	31.75 - 31.88	3.94 - 4.45	2.79 - 2.92
1"	25	39.62 - 39.75	3.94 - 4.45	2.79 - 2.92
1 1/4"	32	44.45 - 44.58	3.94 - 4.45	2.79 - 2.92
1 1/2"	38	53.72 - 53.98	3.94 - 4.45	2.79 - 2.92
2"	51	63.25 - 63.50	3.94 - 4.45	2.79 - 2.92

Important Note:
The performance and operational reliability of this seal is related to the assembly techniques used. The application limits for pressure and temperature given in this catalogue are maximum values. During practical applications it should be remembered that due to the interaction of operating action of operating parameters, the maximum values must be set correspondingly lower.

FLUID CONNECTOR SEAL

- Axial sealing -

- Elastomers -

■ Description

This elastomeric seal is used as an axial static seal for threaded ports and stud ends in hydraulic fluid power applications in accordance with DIN 3869, ISO 11926, ISO 9974 and ISO 1179. The cross-section remains practically constant even under high pressure.

The groove dimensions are in accordance with DIN 3852 part 11.

Advantages

- Minimal mechanical deformation of the cross-section
- Outstanding sealing behaviour over long periods
- No twisting in the groove
- No relative movements during pressure cycles
- Dimensionally stable under pressure
- High leak tightness compared to metal / metal sealing

Application examples

Significant testing over more than 15 years has confirmed the performance requirements of these seals with ports and stud ends (metric, UNF, Withworth) in hydraulic components such as:

- Injection molding machines
- Machine tools
- Presses
- Excavators
- Agricultural machines
- Valves for hydraulic circuits

Technical data

Operating pressure:

Up to 63 MPa

Operating temperature:

-25 °C to +100 °C	NBR 85 Shore A	black
-18 °C to +200 °C	FKM 80 Shore A	green

Important Note:
The performance and operational reliability of this seal is related to the assembly techniques used. The application limits for pressure and temperature given in this catalogue are maximum values. During practical applications it should be remembered that due to the interaction of operating action of operating parameters, the maximum values must be set correspondingly lower.

Fluid Connector Seal

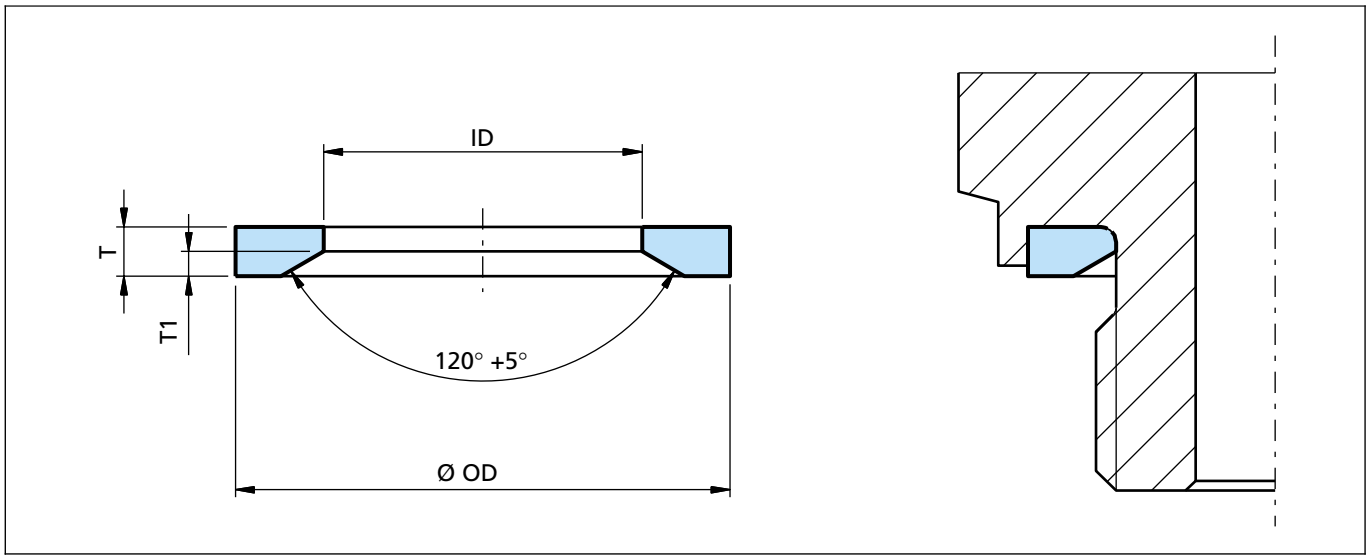


Figure 41 Installation drawing

Ordering example

DRV100157-N

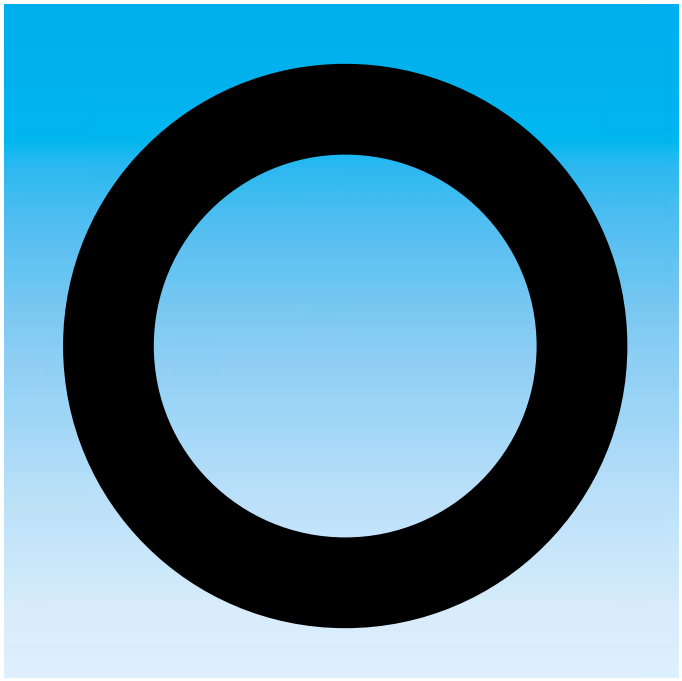
DRV100239-V

Table XXXVII Dimensions / TSS Part No.

Size	Thread (metric)	Thread (inch)	ø ID	ø OD	T	T1	TSS Part No.
10.0	M 10 x 1	G 1/8 A	8.4	11.9	1.0	0.5	DRV100084
12.0	M 12 x 1.5	-	9.8	14.4	1.5	0.8	DRV100098
14.0	M 14 x 1.5	G 1/4 A	11.6	16.5	1.5	0.8	DRV100116
16.0	M 16 x 1.5	-	13.8	18.9	1.5	0.8	DRV100138
17.0	-	G 3/8 A	14.7	18.9	1.5	0.8	DRV100147
18.0	M 18 x 1.5	-	15.7	20.9	1.5	0.8	DRV100157
20.0	M 20 x 1.5	-	17.8	22.9	1.5	0.8	DRV100178
21.0	-	G 1/2 A	18.5	23.9	1.5	0.8	DRV110185
22.0	M 22 x 1.5	-	19.6	24.3	1.5	0.8	DRV100196
27.0	M 27 x 2	G 3/4 A	23.9	29.2	1.5	0.8	DRV100239
33.0	M 33 x 2	G 1 A	29.7	35.7	2.0	1.0	DRV100297
42.0	M 42 x 2	G 1 1/4 A	38.8	45.8	2.0	1.0	DRV100388
48.0	M 48 x 2	G 1 1/2 A	44.7	50.7	2.0	1.0	DRV100447

This table shows the possible range of available dimensions (Fluid Connector Seal). However, these dimensions are not always stock items.

WILLS RINGS®



- Axial sealing -

- For high pressure- or high temperature applications -

- Metal -

■ Description

Wills Rings® are metal seals which can be of two fundamental designs:

a) Wills Rings®O

b) Wills Rings®C

Wills Rings® are superior controlled compression type seals and are for static applications only. Wills Rings® have a degree of elastic recovery after being compressed in a housing - but this is not sufficient to guarentee sealing again once the housing has been dismantled.

Wills Rings® are designed for extreme conditions which exceed the capabilities of elastomer and polymer seals.

Wills Rings®O are the original Metal O-Ring seals.

Wills Rings®O consist of a tube formed into a circular profile. Wills Rings®C are similar, but they have an open 'C' cross section. The open slot of the Wills Rings®C faces toward the system pressure and allows the seal to be pressure activated.

Wills Rings® are constructed from high quality metal tubing or strip in standard or thin wall thickness, they are often coated or plated with a softer material to increase their sealing performance. There are five types of Wills Rings® depending upon the application.

Advantages

- Temperature range from cryogenic to 850 °C
- Pressure range from ultra high vacuum to 1,000 MPa
- Compatible with a large range of media
- Corrosion resistant and radiation tolerant
- Simple and reliable sealing
- No "outgassing"
- Wide range of sizes

Applications

- Nuclear power plants
- Furnaces
- Offshore and marine
- Cryogenics
- Extreme vacuum systems
- Fire safe valves
- Plastic processing
- Exhaust and cylinder head seals

The design of Wills Rings® can be modified to suit the specific requirements of a system. These different designs offer a variety of sealing performances.

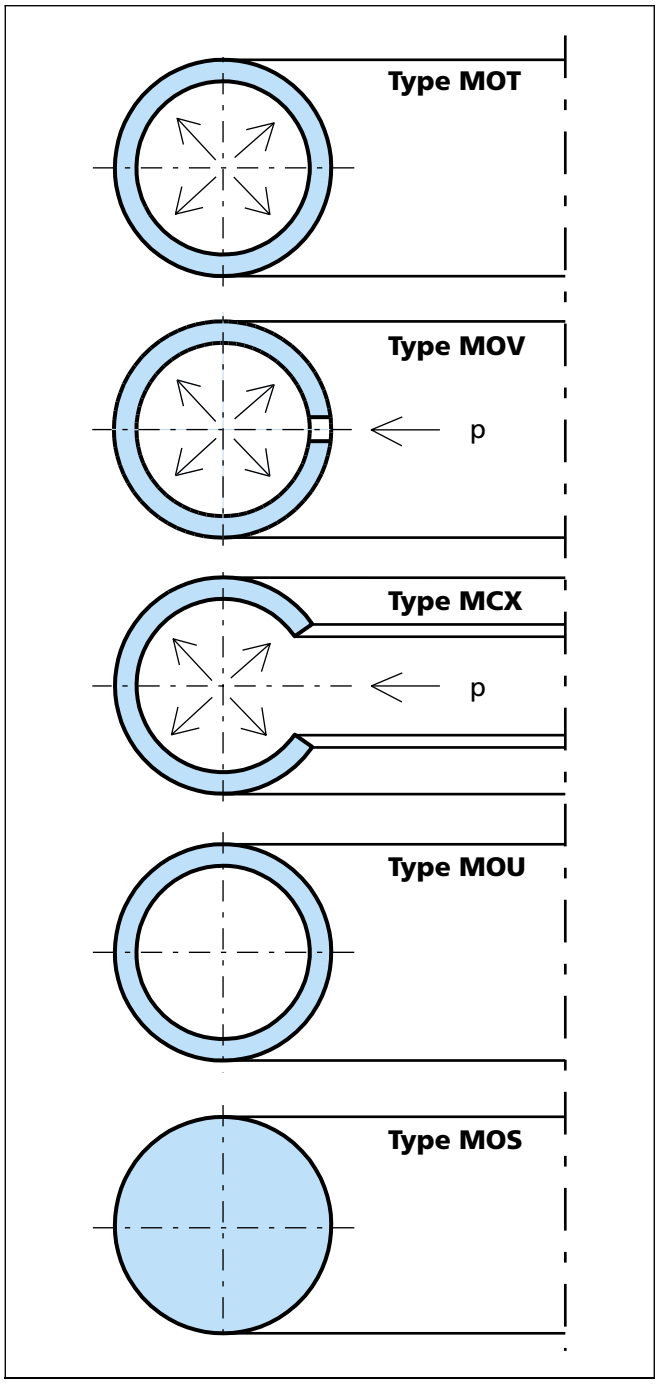


Figure 42 Wills Rings®

■ Method of operation

Wills Rings® consist of a metal ring, often coated, which is used as a deformable seal in a static sealing situation. The ring is located between two flanges and undergoes a controlled compression. Wills Rings® are defined by their free height which is the cross section in the axial direction of the seal. The free height d2 of the seal is compressed down to the groove depth h. The resistance of the ring to compression enables it to form an effective seal when compressed. The resilient effect of the seal is increased by pressurising the internal volume of the ring (see type MOT gas filled Wills Rings®O).

Alternatively, if the system to be sealed is of very high pressure - this can be used to provide additional sealing effect. This is termed 'system actuation'. This is achieved by allowing the high pressure to enter the seal through either vent holes (see Type MOV), or through the open C slot (see type MCX).

Wills Rings® seals have a certain degree of elasticity. This is known as "springback". The springback is the elastic part of the seal deflection when it is installed in a groove. This influences the seal's ability to absorb or compensate for hardware variations due to temperature loadings, and thus maintain the seal integrity (Figure 43).

A softer plating/coating material can be applied to Wills Rings® to maximise sealing performance in difficult applications. The soft coating material yields during the ring compression and fills any surface machining marks (Figure 44).

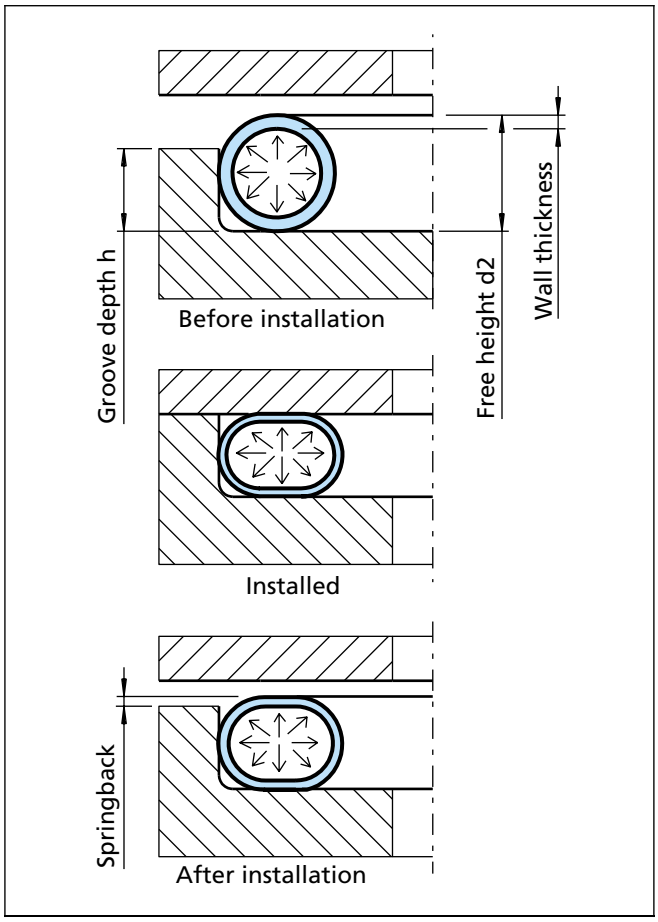


Figure 43 Method of seal operation

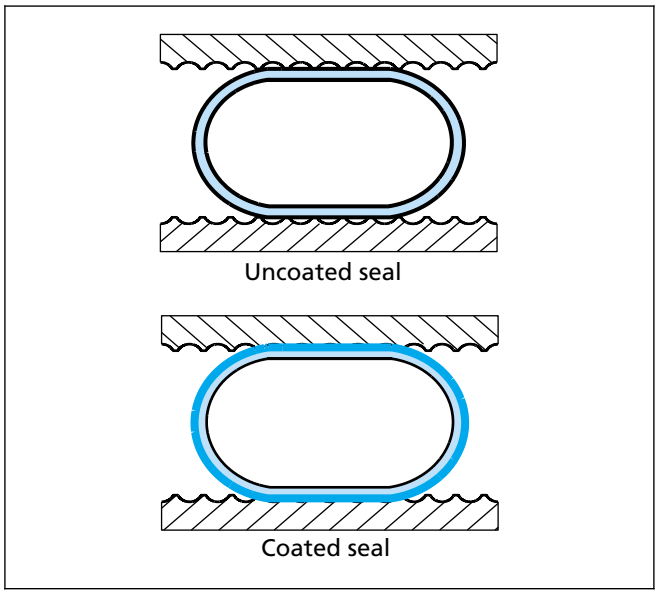
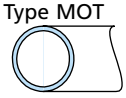
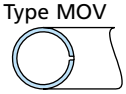
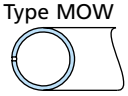
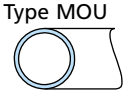
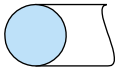
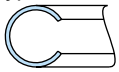
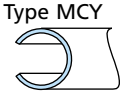


Figure 44 Contact surface for coated and uncoated Wills Rings ®

■ Selection table

Use this table to select the optimum seal for a given application. The scoring for each seal type indicates relative performance.

Table XXXVIII Selection criteria

Seal	Description	Extreme conditions	Seating loads	Spring-back	Vacuum sealing	Pressure MPa	Max. working Temp. °C	Standard material	
Code							**Cryogenic to**	**Seal**	**Coating**
Type MOT 	Pressurized	A	C	C	A	40 MPa	850 °C	Mild steel Stainless steel 316L 321 Inconel® 600 Copper	PTFE Silver Nickel Copper Gold Indium
Type MOV 	Vented internal	B	B	C	C	1,000 MPa	600 °C		
Type MOW 	Vented external								
Type MOU 	Non-pressurized	C	B	C	C	4 MPa	400 °C		
Type MOS 	Solid	C	D	D	B	4 MPa	500 °C		
Type MCX 	Internal pressure	B	A	A	C	200 MPa	750 °C	Inconel® 718 Inconel® X750	PTFE Silver Copper Gold Indium
Type MCY 	External pressure								

MOV/MOW (Vented type Wills Rings® O) seal not available in 0.89 mm (0.035") Free Height size J. Use MOT type or increase to a 1.59 mm (0.063") size instead.

Properties: A = Excellent B = Good C = Satisfactory D = Poor

For further information on seal selection see catalogue Wills Rings®

TURCON® VARISEAL® HF

- Axial sealing -

- For high pressure sealing and high temperature sealing -

- Turcon® -

■ Turcon® Variseal® HF

Description

Turcon® Variseal® **HF** is the standard seal for axial (face) applications. The seal has the same high sealing load as Variseal® H and is available for both internal and external pressure. The use of the heavy helical spring makes Variseal® HF the best choice for vacuum, gas, and low temperature flange and cover applications.

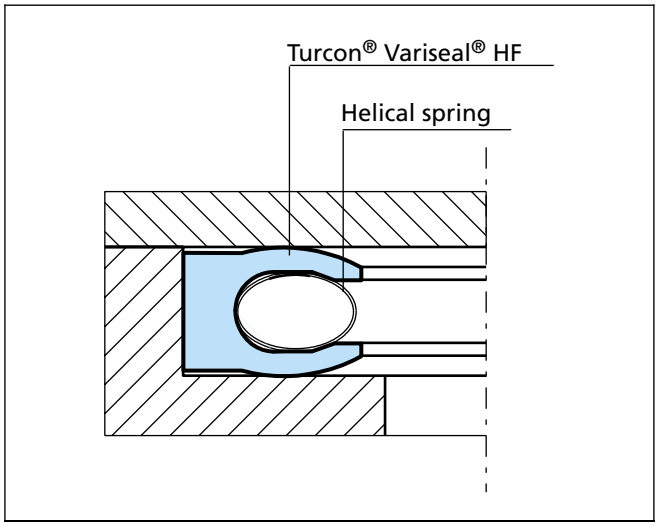


Figure 45 Turcon® Variseal® HF

Advantages

- High sealing pressure
- Excellent sealability in gas and fluid applications
- Can handle rapid changes in temperature
- Good sealability on non-ideal surfaces
- Easy installation
- Unlimited shelf life

Technical data

Operating pressure:	Max. static load: 80 MPa
Speed:	Static to slow rotating or pivoting movements
Temperature:	-200 °C to +260 °C
Medium:	Virtually all fluids, chemicals and gases
Note:	Please contact us for applications outside these permissible application parameters.

Table XXXIX Installation dimensions

Series No.	Groove outside diameter d7 H11		Groove width b4	Groove depth		Radius r1
	Recommended range	Extended range[1)]	min.	h	Tol.	max.
DVE0	10 - 13.9	10 - 40	2.4	1.45	+0.03	0.4
DVE1	14 - 24.9	13 - 200	3.6	2.25	+0.05	0.4
DVE2	25 - 45.9	18 - 400	4.8	3.10	+0.08	0.6
DVE3	46 - 124.9	28 - 700 *	7.1	4.70	+0.1	0.8
DVE4	125 - 999.9 **	45 - 1,000 **	9.5	6.10	+0.15	0.8
DVE5	1,000 - 2,500 ***	110 - 2,500 ***	15.0	9.50	+0.2	0.8
DVL0	3 - 9.9	3 - 40	2.4	1.45	+0.03	0.4
DVL1	10 - 19.9	8 - 200	3.6	2.25	+0.05	0.4
DVL2	20 - 39.9	12 - 400	4.8	3.10	+0.08	0.6
DVL3	40 - 119.9	20 - 700 *	7.1	4.70	+0.1	0.8
DVL4	120 - 999.9 **	35 - 1,000 **	9.5	6.10	+0.15	0.8
DVL5	1,000 - 2,500 ***	80 - 2,500 ***	15.0	9.50	+0.2	0.8

* For diameters above 600 mm b_4 min. = 8.0 mm
** For diameters above 600 mm b_4 min. = 11.0 mm
*** For diameters above 1000 mm b_4 min. = 18.0 mm

[1)] Available on request

Installation recommendations for Turcon® Variseal® HF flange seals for internal pressure

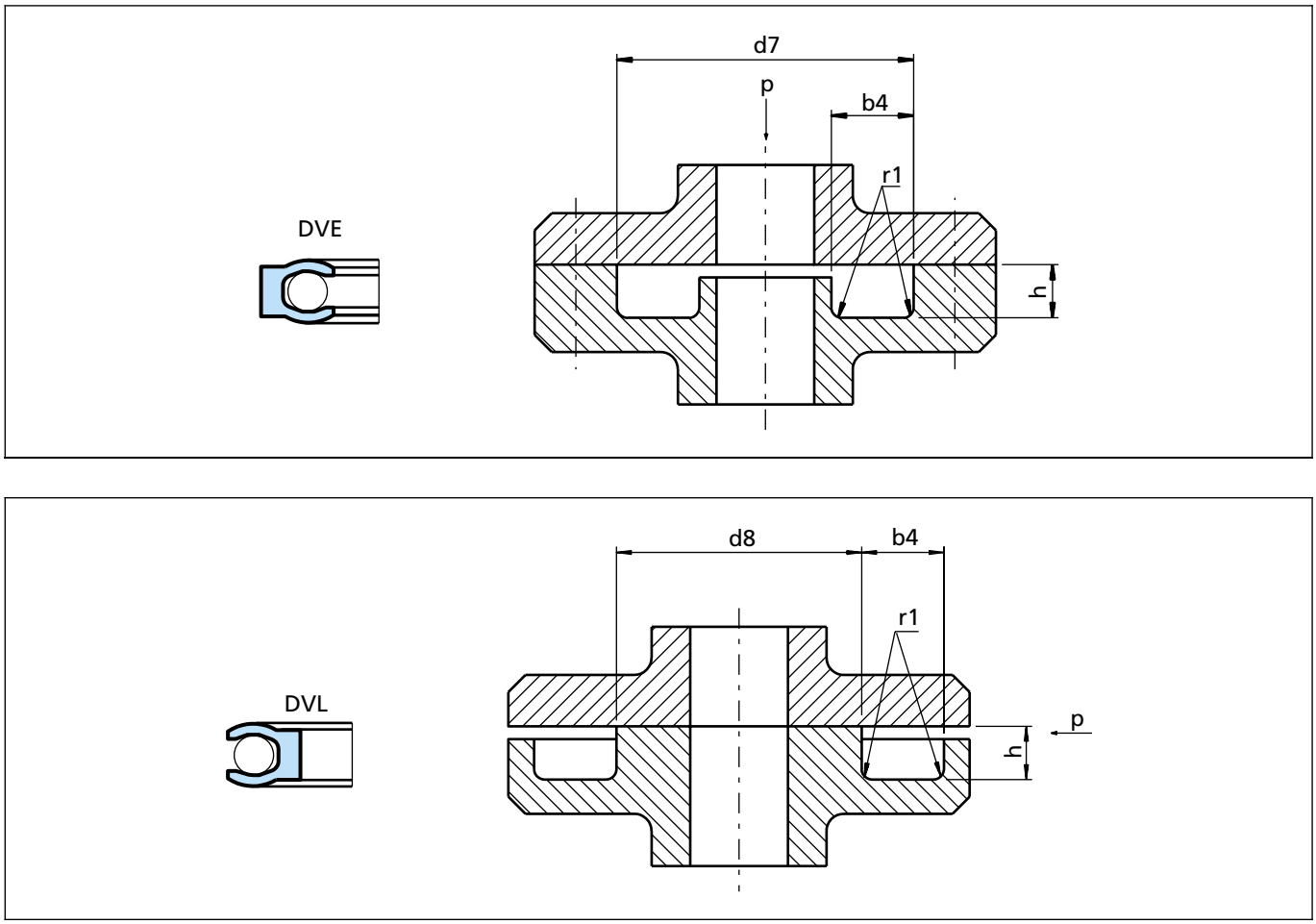


Figure 46 Installation drawing

Ordering example

Turcon Variseal® HF for internal pressure, Series DVE3
Groove outside diameter: d7 = 80.0 mm
TSS Part No.: DVE300800
* For diameters ≥ 1,000 mm multiply only by factor 1.
Example: DVE5 for diameter 1200 mm.
TSS Article No.: DVE5**X1200** - T05S.

Standard materials

Seal ring: Material code **T05**
Spring material: Spring code **S** (stainless steel), Material No. 1.4310 (AISI 301)

TSS Article No.	DVE3	0	0800	-	T05	S
TSS Series No.						
Type (Standard)						
Groove out. diam. x 10*						
Quality index (Standard)						
Material code - Seal ring						
Material code - Spring						

For further details in Turcon® Variseal® HF, please refer to our Variseal catalogue.

■ Quality Criteria

The cost-effective use of seals and bearings is highly influenced by the quality criteria applied in production. Seals and bearings from Trelleborg Sealing Solutions are continuously monitored according to strict quality standards from material acquisition through to delivery.

Certification of our production plants in accordance with international standards QS 9000 / ISO 9000 meets the specific requirements for quality control and management of purchasing, production and marketing functions.

Our quality policy is consistently controlled by strict procedures and guidelines which are implemented within all strategic areas of the company.

All testing of materials and products is performed in accordance with accepted test standards and specifications, e.g. random sample testing in accordance with DIN ISO 2859, part 1.
Inspection specifications correspond to standards applicable to individual product groups (e.g. for O-Rings: ISO 3601).

Our sealing materials are usually produced free of chlorofluorinated hydrocarbons and carcinogenic elements.

The tenth digit of our part number defines the quality characteristics of the part. A hyphen indicates compliance with standard quality criteria outlined in this catalogue. Customer-specific requirements are indicated by a different symbol in this position. Customers who require special quality criteria should contact their local Trelleborg Sealing Solutions sales office for assistance. We have experience in meeting all Customer quality requirements.

■ Storage and shelf life

Seals and bearings are often stored as spare parts for prolonged periods. Most rubbers change in physical properties during storage and ultimately become unserviceable due, e.g., to excessive hardening, softening, cracking, crazing or other surface degradation. These changes may be the result of particular factors or combination of factors, such as the action of deformation, oxygen, ozone, light, heat, humidity or oils and solvents.

With a few simple precautions, the shelf life of these products can be considerably lengthened.
Fundamental instructions on storage, cleaning and maintenance of
elastomeric seal elements are described in international standards, such as:

DIN 7716 / BS 3F68:1977,

ISO 2230, or DIN 9088

The standards give several recommendations for the storage and the shelf life of elastomers, depending on the material classes.

The following recommendations are based on the several standards and are intended to provide the most suitable conditions for storage of rubbers. They should be observed to maintain the optimum physical and chemical values of the parts:

Heat

The storage temperature should preferable be between +5 °C and +25 °C. Direct contact with sources of heat such as boilers, radiators and direct sunlight should be avoided.
If articles are taken from low temperature storage, care should be taken to avoid distorting them during handling at that temperature as they may have stiffened. In this case the temperature of the articles should be raised to approximately +20 °C before they are put into service.

Humidity

The relative humidity in the store room should be below 70 %. Very moist or very dry conditions should be avoided. Condensation should not occur.

Light

Elastomeric seals should be protected from light sources, in particular direct sunlight or strong artificial light with an ultraviolet content. The individual storage bags offer the best protection as long as they are UV resistant.
It is advisable to cover any windows of storage rooms with a red or orange coating or screen.

Radiation

Precaution should be taken to protect stored articles from all sources of ionising radiation likely to cause damage to stored articles.

Oxygen and ozone

Where possible, elastomeric materials should be protected from circulating air by wrapping, storage in airtight containers or by other suitable means.
As ozone is particular deleterious to some elastomeric seals, storage rooms should not contain any equipment that is capable of generating ozone, such as mercury vapour lamps, high voltage electrical equipment, electric motors or other equipment which may give rise to electric sparks or silent electrical discharges. Combustion gases and organic vapour should be excluded from storage rooms alas they may give rise to ozone via photochemical processes.

Deformation

Elastomeric materials should, wherever possible, be stored in a relaxed condition free from tension, compression or other deformation. Where articles are packed in a strain-free condition they should be stored in their original packaging.

Contact with liquid and semi-solid materials

Elastomeric seals should not be allowed to come into contact with solvents, oils, greases or any other semi-solid materials at any time during storage, unless so packed by the manufacturer.

Contact with metal and non-metals

Direct contact with certain metals, e.g. manganese, iron and particularly copper and its alloys, e.g. brass and compounds of these materials are known to have deleterious effects on some rubbers. Elastomeric seals should not be stored in contact with such metals.
Because of possible transfer of plasticisers or other ingredients, rubbers must not be stored in contact with PVC. Different rubbers should preferably be separated from each other.

Cleaning

Where necessary, cleaning should be carried out with the aid of soap and water or methylated spirits. Water should not, however, be permitted to come into contact with fabric reinforced components, bonded seals (because of corrosion) or polyurethane rubbers. Disinfectants or other organic solvents as well as sharp-edged objects must not be used. The articles should be dried at room temperature and not placed near a source of heat.

Shelf life and shelf life control

The useful life of a elastomeric seals will depend to a large extend on the type of rubber. When stored under the recommended conditions (above sections) the below given shelf life of several materials should be considered.

AU, thermoplastics	4 years
NBR, HNBR, CR	6 years
EPDM	8 years
FKM, VMQ, FVMQ	10 years
FFKM, Isolast®	18 years
PTFE	unlimited

Elastomeric seals should be inspected after the given period. After this giving an extension period is possible.

Rubber details and components less than 1.5 mm thick are liable to be more seriously affected by oxidation degradation even when stored in satisfactory conditions as recommended. Therefore they may be inspected and tested more frequently than it is mentioned above.

Rubber details / seals in assembled components

It is recommended that the units should be exercised at least every six months and that the maximum period a rubber detail be allowed to remain assembled within a stored unit, without inspection, be a total of the initial period stated above and the extension period. Naturally this will depend on the design of the unit concerned.

For further information:

Europe	Telephone
AUSTRIA - Vienna (ALBANIA, BOSNIA AND HERZEGOVINA, CROATIA, HUNGARY, MACEDONIA, SERBIA AND MONTENEGRO, SLOVENIA)	+43 (1) 406 47 33
BELGIUM - Dion-Valmont (LUXEMBOURG)	+32 (10) 22 57 50
BULGARIA - Sofia (ROMANIA, RUSSIA)	+359 2 96 99 510
CZECH REPUBLIC - Rakovnik (SLOVAKIA)	+420 313 529 111
DENMARK - Hillerød	+45 4822 8080
FINLAND - Vantaa (ESTONIA, LATVIA, LITHUANIA)	+358 (0)9 8256 110
FRANCE - Maisons-Laffitte	+33 (0)1 30 86 56 00
GERMANY - Stuttgart	+49 (711) 7 86 40
GREECE	+41 (21) 6314111
ITALY - Livorno	+39 (0586) 22 61 11
THE NETHERLANDS - Barendrecht	+31 (10) 29 22 111
NORWAY - Oslo	+47 22 64 60 80
POLAND - Warsaw	+48 (22) 8 63 30 11
SPAIN - Madrid (PORTUGAL)	+34 91 710 5730
SWEDEN - Jönköping	+46 (36) 34 15 00
SWITZERLAND - Crissier	+41 (21) 631 41 11
TURKEY	+41 (21) 6314111
UNITED KINGDOM - Solihull (EIRE)	+44 (0)121 744 1221
AFRICA REGIONAL	+41 (21) 6314111
MIDDLE EAST REGIONAL	+41 (21) 6314111

America	Telephone
AMERICAS - Fort Wayne, IN	+1 (260) 749 9631
BRAZIL - Sao Paulo	+55 (11) 3372 4500
CANADA - Ontario	+1 (416) 213 9444
MEXICO - Mexico D.F.	+52 55 57 19 50 05
USA, East - Philadelphia, PA	+1 (610) 828 3209
USA, Great Lakes - Fort Wayne, IN	+1 (260) 749 6781
USA, Midwest - Lombard, IL	+1 (630) 268 9915
USA, Mountain - Broomfield, CO	+1 (303) 469 1357
USA, Northwest - Portland, OR	+1 (503) 595 6565
USA, South - N. Charleston, SC	+1 (843) 747 7656
USA, Southwest - Houston, TX	+1 (713) 461 3495
USA, West - Torrance, CA	+1 (310) 371 1025

Asia	Telephone
ASIA PACIFIC REGIONAL	+65 (6)265 6883
CHINA - Hong Kong	+852 (2)366 9165
INDIA - Bangalore	+91 (80) 2655 5157
JAPAN - Tokyo	+81 (3) 5633 8008
KOREA - Gyunggi-Do	+82 (31) 386 3283
MALAYSIA - Kuala Lumpur	+60 (0) 3 9059 6388
TAIWAN - Taichung	+886 (4) 23 58 00 82
THAILAND - Bangkok	+66 (0) 2732-2861
SINGAPORE **and all other countries in Asia**	+65 (6)293 2500

www.tss.trelleborg.com

TRELLEBORG
SEALING SOLUTIONS

99GBD011AE0407