

Garlock

PS-SEAL Thermo-Elastic High-Performance Seals



Garlock
SEALING TECHNOLOGIES®

an EnPro Industries company

PS-SEAL - the shaft seal you're looking for

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Seals in the thermoelastic high-performance PS-SEAL series operate with a sealing lip made from modified PTFE. This material is produced using a method specially developed by Garlock and marketed under the brandname GYLON. Sealing lips made from GYLON have a particularly effective memory characteristic, are highly elastic and flexible, cause very low friction, thanks to their non-stickslip motion, suffer little wear and tear, and need no metallic spring element.

Garlock's high-performance PS-SEAL are specially designed for the task of reliably sealing rotating shafts with high peripheral speeds, high pressure and temperature fluctuations, and aggressive media. In such demanding applications conventional radial shaft seals with elastomer sealing lips are of only limited use or often no use at all. A seal in the thermo-elastic high-performance PS-SEAL series is the sensible alternative to mechanical seals and packings. Use of Garlock's high-performance PS-SEAL offers in many applications the ideal answer to your problem and really reliable sealing.

For over 25 years the PS-SEAL has proven its value as a sealing element. The PS-SEAL is suitable for a wide range of applications, in the chemicals industry, process engineering, and general machine construction.

Here are just a few typical applications:

- centrifuge machinery
- separators
- rotating air compressors
- mixers
- agitators
- spiral conveyors
- rotary lead-throughs
- pumps

The advantages of PS-SEAL are:

- suitable for applications under pressurized or vacuum conditions
- capable of handling high peripheral speeds
- suitable for a temperature range of -60 °C to +260 °C
- outstanding resistance to chemical media
- can be used in the food and drinks industry and in the pharmaceuticals industry
- good dry-running characteristics
- low friction, and good resistance to wear and tear.

Given the many different needs involved in practical applications, Garlock's thermo-elastic high-performance PS-SEAL series is also the economical solution. Garlock offers users four different product versions, ranging from the standard sealing ring, available from stock and ready-to-install, right through to customized special designs:

PS-SEAL Standard

PS-SEAL Lip

PS-SEAL Special

PS-SEAL Floating Seal Device

Technical data

Materials

GYLON, the basic material used for the sealing lips, is the most significant reason for the success of the PS-SEAL series. Several variants of this sealing lip material are available. Suitable application-specific materials must also be selected for the case and for the static seal.

Unless specifically requested otherwise in the order documentation, all seals in the PS-SEAL series are delivered in the standard materials.

Materials for the sealing lip

GYLON-B	Standard material
GYLON-W	Special material for the pharmaceutical industry and for the food and drinks industry (carries FDA approval)
GYLON-F	Special material with good dry-running characteristics and suitable for soft counter-running surfaces
GYLON-BI	Special material with very good dry-running characteristics and FDA approval. Not suitable for pressure applications
GYLON-KF	Special lip material for water services

Case material

PS-SEAL Standard	Standard material: Stainless steel 1.4571 (AISI 316 Ti)
PS-SEAL Special	Standard material: Stainless steel 1.4571 (AISI 316 Ti)

Static sealing element

Fluoroelastomer FKM	Standard material
GYLON	Special material for applications where improved chemical resistance or FDA approval is required.

Shaft surface

In order to achieve optimum sealing performance between PS-SEAL and shaft thus ensuring high functional reliability and a long service life, the shaft should have the following surface roughness characteristics:

Ra	=	0.10 - 0.40 µm
Rz	=	0.65 - 2.50 µm
Rmax	=	4.00 µm

The shaft surface must have been machined without any nicks, gouges, or other surface defects which might lead to a leak. The surface hardness must be selected in accordance with the pressure ranges as listed below:

up to 1.5 bar	minimum 45 HRC
above 1.5 bar	minimum 60 HRC

For unusually exacting combinations (p x v) of over 20 bar x m/s we recommend a plasma coating with chromium oxide, ground without any nicks, gouges, or other surface defects, and PTFE-sealed.

Pressure/Vacuum

PS-SEAL Standard	max. 10 bar
PS-SEAL Lip	max. 25 bar
PS-SEAL Special	max. 25 bar

For maximum pressure applications please check the p x v value. To this, please also see page 4 "Application limits". The PS-SEAL is also recommended in applications with vacuum.

Operating temperatures

GYLON, the lip material used in the PS-SEAL series, has a theoretical temperature range of -90 °C to +260 °C. However, when used in dynamic shaft seals, GYLON is of course subject a number of operating parameters besides temperature, e.g. pressure and the shaft's rotational speed. These other parameters may reduce this maximum theoretical operating temperature range.

ATEX Conformity

The Garlock PS-SEAL complies with the requirements according to the ATEX - Directive 94/9/EC.

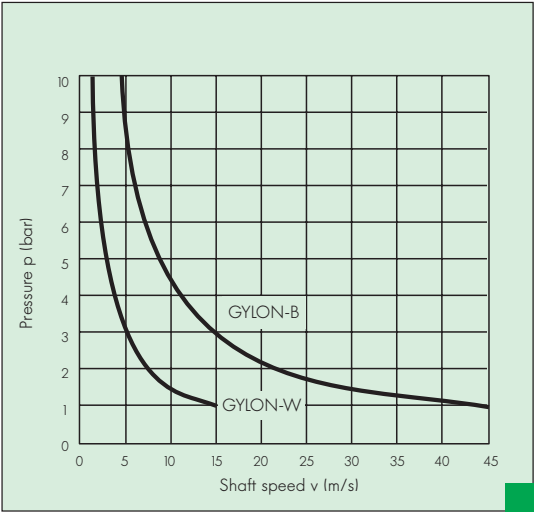
Technical data

Application limits

The simultaneous effects of several operating parameters, e.g. pressure and peripheral speed, makes it necessary to regularly check the tolerances. The following $p \times v$ diagram gives the limits for GYLON-B and GYLON-W:

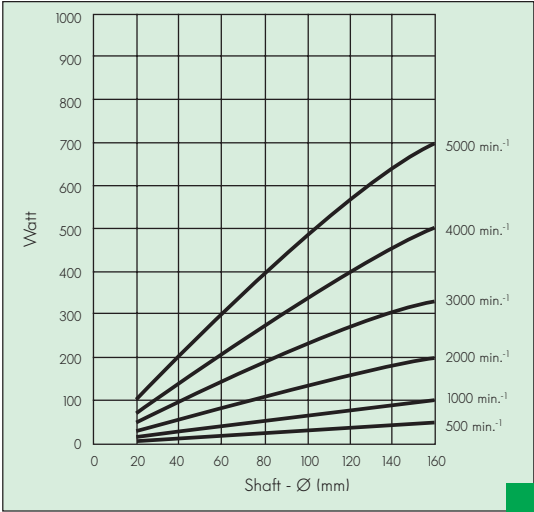
Unfavourable lubrication conditions, i.e. inadequate lubrication and running dry, may make it necessary to substantially lower the maximum permissible $p \times v$ value even with an optimal counter-running surface. In such cases we recommend that you seek advice from our Garlock specialists.

$p \times v$ -diagramm for PS-SEAL



The $p \times v$ values shown in the previous diagram are for systems with full lubrication, approximately 100 °C operating temperature, and for all PS-SEAL designs up to 10 bar pressure.

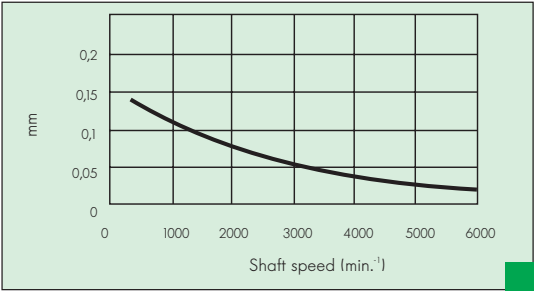
Loss of power caused by lip friction



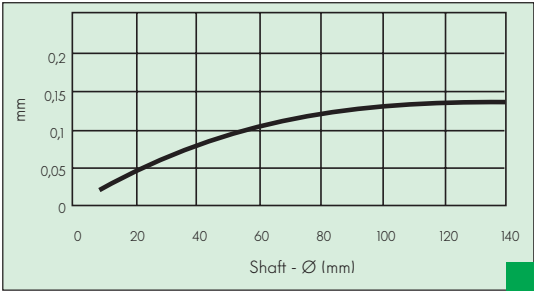
The power dissipation through friction shown in this diagram represents typical values obtained under laboratory conditions. Under operating conditions with a medium temperature of 80 °C - 100 °C power dissipated through friction may be as much as 50 percent lower.

Test conditions:
engine oil 15-W-40
room temperature, not pressurized

Maximum shaft runout



Maximum shaft misalignment



PS-SEAL Standard

The PS-SEAL Standard is a ready-to-install radial sealing ring with a stainless steel case and a sealing lip made from GYLON-B. Models with dimensions printed in the list in bold face are available from stock and for models with dimensions not featured in the list we can make a suitable offer. If you need non-standard materials for the case and/or the sealing lip, please contact us.

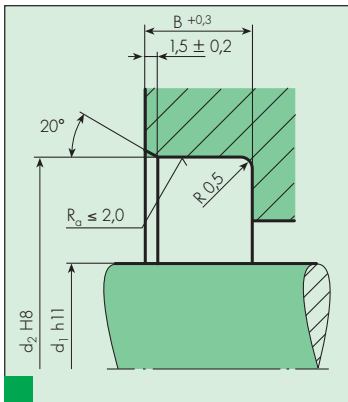
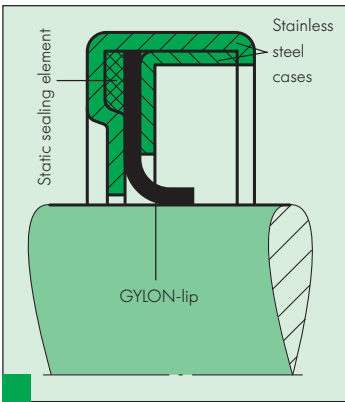
PS-SEAL Standard sizes

d1	d2	B	d1	d2	B
8	18	5	28	47	10
10	25	7	30	47	10
12	25	7	32	47	8
12	28	8	32	47	10
14	30	7	35	47	8
15	30	8	35	50	10
16	30	8	38	55	7
17	28	8	40	55	10
17	35	8	40	60	10
18	35	7	40	62	10
20	35	8	42	60	10
22	40	8	42	62	8
25	35	8	45	62	10
25	42	8	45	65	10
25	47	7	48	62	8
			48	65	10

PS-SEAL Standard sizes

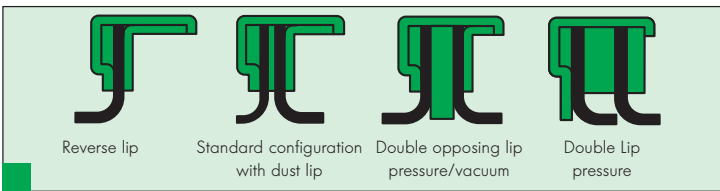
d1	d2	B	d1	d2	B
50	65	10	80	110	10
50	70	10	85	110	12
50	72	10	90	110	10
55	72	10	90	120	12
55	80	8	95	120	12
60	75	8	100	120	12
60	80	10	100	130	13
62	80	10	105	130	12
65	85	10	110	130	12
70	90	10	110	140	13
70	95	10	115	140	12
73	100	10	120	150	12
75	95	13	125	150	12
75	100	10	130	160	12
80	100	10	135	170	12
			140	165	10

Stock sizes are indicated with bold type face.



PS-SEAL Standard, special versions

Garlock PS-SEAL seals are also available in series dimensions but with different PS-SEAL lips and configurations.



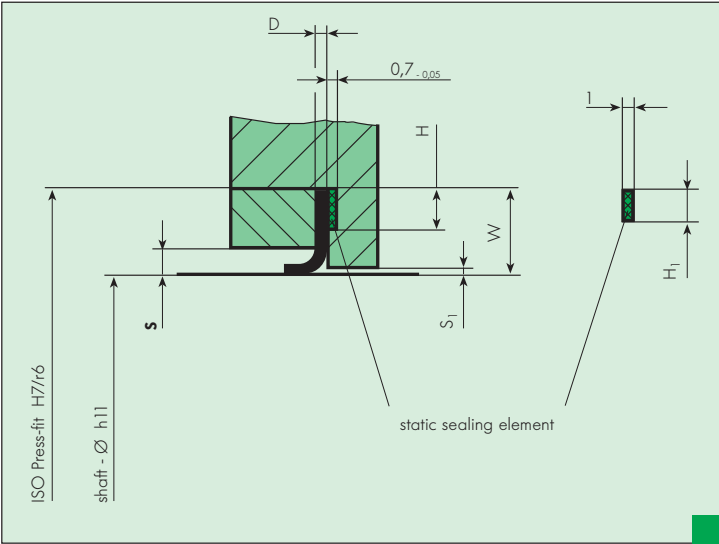
PS-SEAL Lip

For shaft sealing, where for space and/or design reasons the ready-to-install PS-SEAL Standard ring cannot be used, we recommend the PS-SEAL Lip version.

With its PS-SEAL Lip Garlock supplies a ready-to-assemble sealing set comprising a GYLON sealing lip and the necessary static seal.

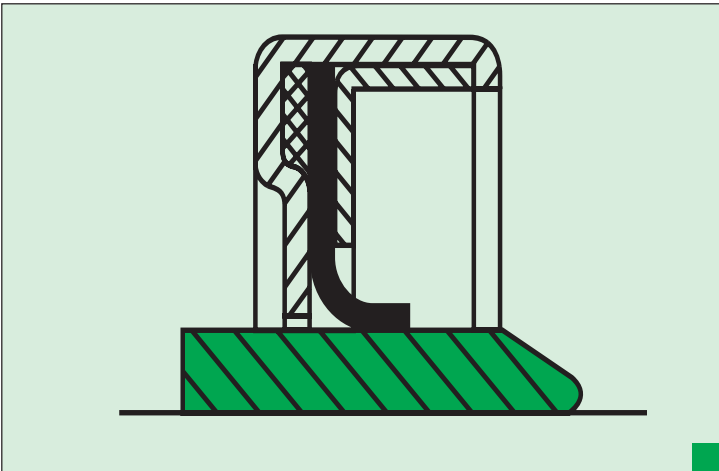
This sealing set is normally supplied in GYLON-B and Viton. Other material variants are available for the sealing lip and the static seal. Please refer to the materials selection tables.

For the standard installation dimensions recommended by Garlock please refer to the following installation diagram and dimensions table.



Shaft - Ø	W	D	H	H ₁	S	S ₁		
						5 bar	10 bar	25 bar
up to 19	6	0,8	2,5	2,0	2,0	2,0	0,5	0,2
20-49	7,5	0,8	3,5	2,5	2,5	2,5	0,5	0,2
50-149	10	1,0	4,5	3,5	3,0	3,0	0,5	0,2
150-299	12,5	1,0	6,0	4,5	3,0	3,0	0,5	0,2
300-450	15	1,0	8,0	6,0	3,0	3,0	0,5	0,2

Ordering example for shaft - Ø 100 mm:
Garlock PS-SEAL-Lip- Ø 100 x 120 x 1
static sealing element - Ø 113 x 120 x 1



For PS-SEAL Standard and PS-SEAL Special we also supply ready-to-install shaft sleeves.

PS-Seal Special

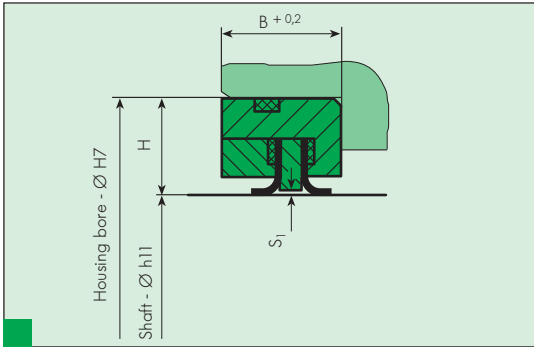
Since the range of possible applications for seals in Garlock's thermo-elastic high-performance PS-SEAL series is so wide, the PS-SEAL Standard or PS-SEAL Lip versions may, for dimensional and/or application-specific reasons, not always represent the ideal solution.

In order to be able to offer customers an economical answer for such special situations, Garlock produces other single-lip and dual-lip variants in standardized dimensions.

If you wish to use any of these PS-SEAL Special variants we recommend that you seek advice from our Garlock specialists.

PS-SEAL Special is available not only in the standard materials here listed but also in other material variants.

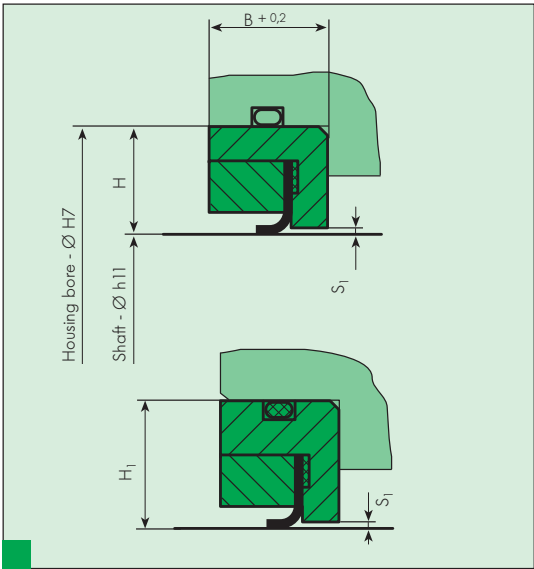
PS-SEAL Special, double lip pressure/vacuum



Shaft - Ø	H	B	S ₁		
			5 bar	10 bar	25 bar
up to 19	10	12	2,2	0,5	0,2
20-64	12,5	15	2,5	0,5	0,2
65-119	15	17	3,0	0,5	0,2
120-199	17	20	3,0	0,5	0,2
200-299	20	24	3,0	0,5	0,2
300-450	25	25	3,0	0,5	0,2

Ordering example for shaft - Ø 100; 10 bar:
Garlock PS-SEAL Special, double lip, pressure/vacuum
100 x 130 x 17; 10 bar with O-ring

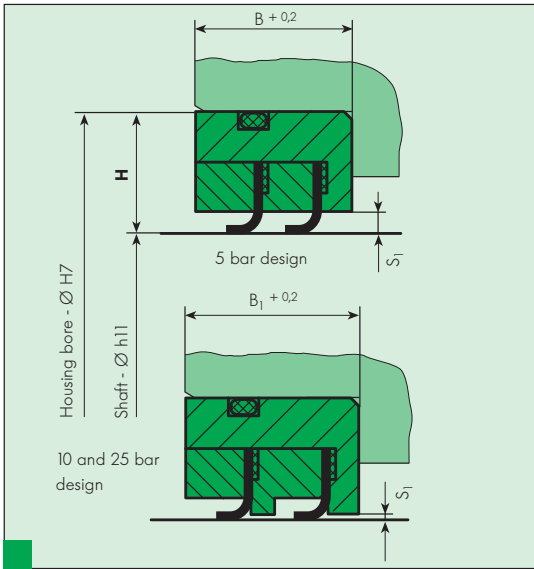
PS-SEAL Special, single lip



Shaft - Ø	H	H ₁	B	S ₁		
				5 bar	10 bar	25 bar
up to 19	8	10	8	2,2	0,5	0,2
20-64	11	12,5	10	2,5	0,5	0,2
65-119	14	15	10	3,0	0,5	0,2
120-199	15	17	12	3,0	0,5	0,2
200-299	17,5	20	15	3,0	0,5	0,2
300-450	20	25	20	3,0	0,5	0,2

Ordering example for shaft - Ø 100; 10 bar:
Garlock PS-SEAL Special 100 x 128 x 10; 10 bar
Ordering example with O-ring:
Garlock PS-SEAL Special - 100 x 130 x 10; 10 bar with O-ring

PS-SEAL Special, double lip



Shaft - Ø	H	B	B ₁	S ₁		
				5 bar	10 bar	25 bar
up to 19	10	14	16	2,2	0,5	0,2
20-64	12,5	17	19	2,5	0,5	0,2
65-119	15	18	20	3,0	0,5	0,2
120-199	17	20	24	3,0	0,5	0,2
200-299	20	23	26	3,0	0,5	0,2
300-450	25	25	30	3,0	0,5	0,2

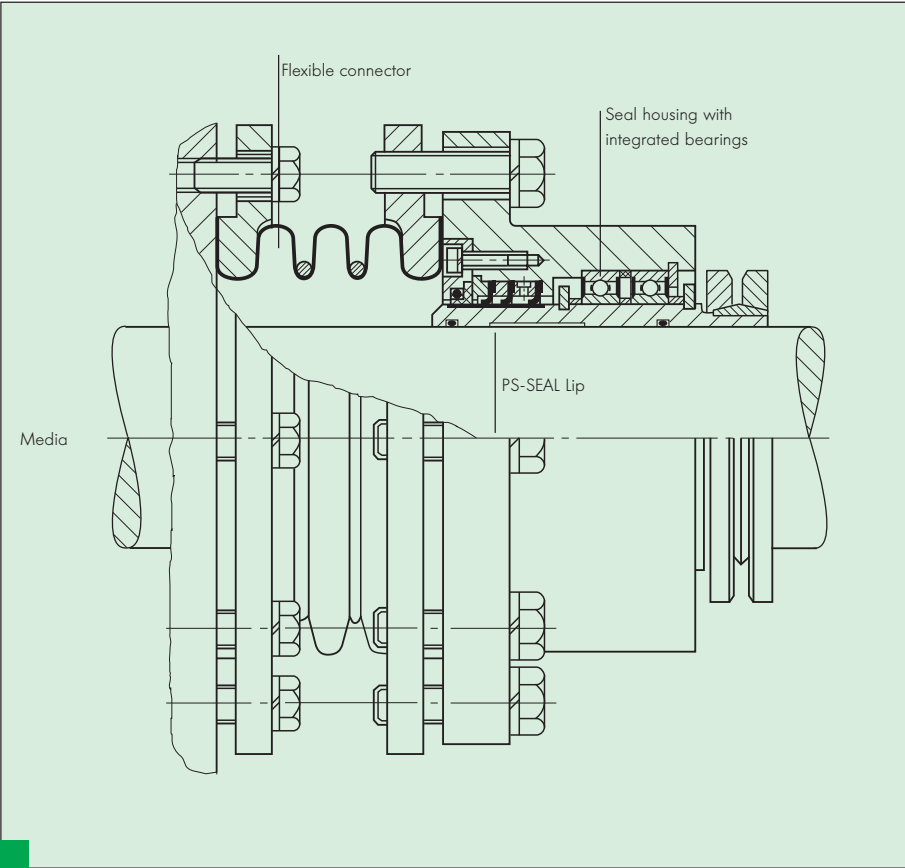
Ordering example for shaft - Ø 100; 10 bar:
Garlock PS-SEAL Special, double lip
100 x 130 x 20; 10 bar with O-ring

PS-SEAL Floating Seal Device

Garlock's PS-SEAL Floating Seal Device is designed to provide a complete solution to very individual problems. This version can be used in mixers and other similar machines involving substantial excursion or deflection in the shaft area to be sealed. With conventional radial sealing rings or gland packings, shaft movement of this nature might lead to immediate short-term failure.

The basic idea behind Garlock's PS-SEAL Floating Seal Device is to separate the sealing assembly on the shaft from the fixed parts of the case and to provide a permanently elastic connection between these two elements.

All applications for which Garlock's PS-SEAL Floating Seal Device might be used require individual consultation and customized design and construction. You can contact us at Garlock at any time and without any obligation.



All the information and recommendations provided in this catalogue are based on our many years of experience and on state-of-the-art technology. However, the validity of these generally applicable values may be restricted by the influence of unknown variables. Binding

statements regarding the compatibility of our products can only be made therefore after practical trials on the customer's premises under realistic operating conditions. Information provided in our catalogues does not represent an attestation of any particular characteristics.

All sizes in this catalogue are in mm.



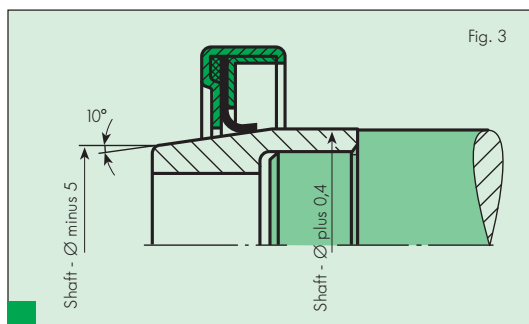
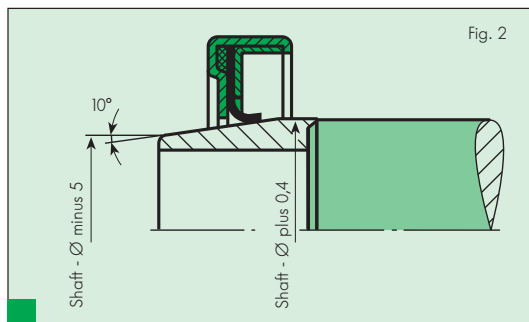
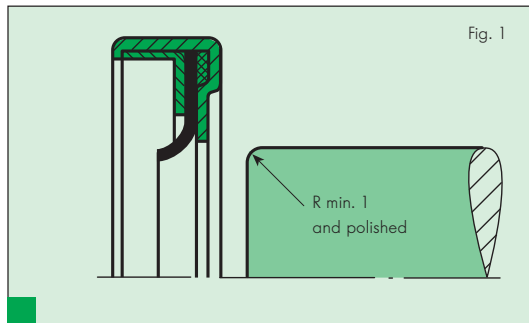
Assembly and Installation Instructions

The sealing lip of seals in the Garlock PS-SEAL series must be installed without being damaged. It must never be mounted over sharp edges.

When installing the GYLON sealing lip with its back to the shaft, auxiliary radii or bevels must be used on the shaft end; (see Figure 1). All edges must be chamfered, rounded, and polished.

When installing the GYLON sealing lip towards the shaft end, an auxiliary bevel of approximately 10 degrees is required. This auxiliary bevel can be placed directly on the shaft end. If, however, for structural reasons this is not possible, we recommend using a specially made mounting cone as an installation aid; (see Figure 2).

The use of the auxiliary bevel and examples for the shape of the mounting cone are shown in Figure 2 and Figure 3. The surface of these installation aids must be smooth and free from all nicks and gouges. All edges must be rounded off.

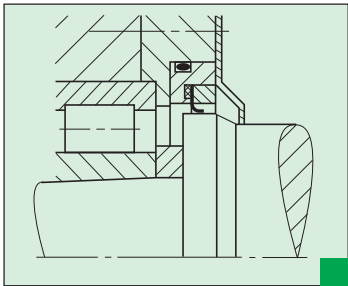


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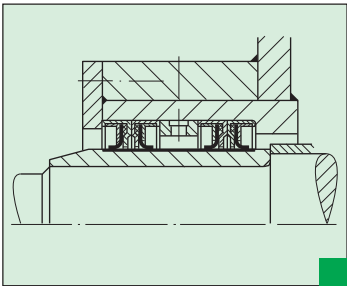
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Application examples

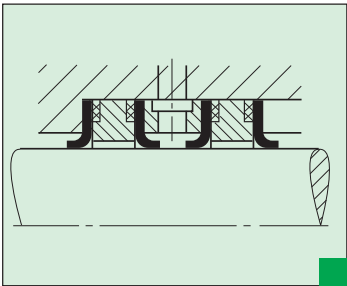
PS-SEAL Special:
Sealing a bearing



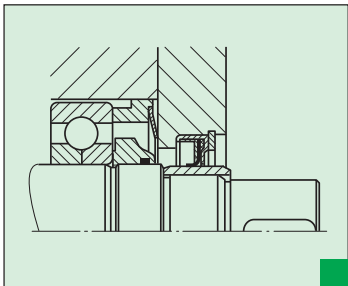
PS-SEAL Standard:
Sealing a spiral conveyor shaft



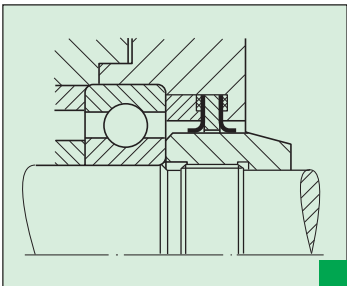
PS-SEAL Lip:
Lip arrangement for overpressure
or vacuum with a block



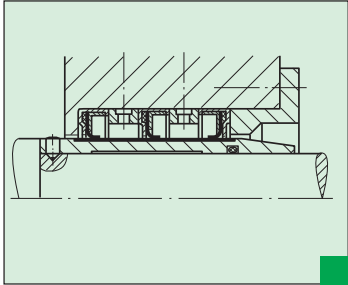
PS-SEAL Standard: Sealing a
screw-type compressor shaft



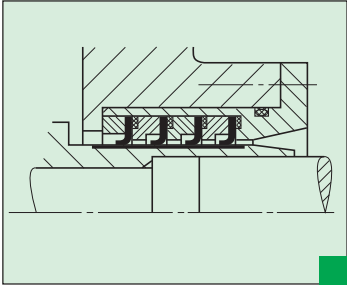
PS-SEAL Lip:
Sealing a worm shaft bearing



PS-SEAL Standard:
Sealing a boring head



PS-SEAL Lip: Sealing a pump as
substitute for gland packing



Our staff are available for advice at any time, ensuring that your particular application is assigned exactly the right design. Take us at our word. Talk to us.

**Please use the following fax form for your initial enquiry.
Simply photocopy it and fax us.**



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Hydraulic Components



Oil Seals



Gasketing Products



Metallic Gasketing



Resilient Metal Seals



Assemblies



Compression Packings



Graphite Seals



Inflatable Seals



Mechanical Seals



Valves



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