

PS-SEAL®

GYLON® Powered High Performance Seal



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PS-SEAL®

The PS-SEAL product line stands for reliable sealing of rotating shafts at high circumferential speed, high pressure and extreme temperatures. Abrasive media is sealed as good as aggressive media. Usual radial shaft seals are only partially or even not usable at all under these conditions, as their seal lips are made of elastomeric materials.

PS-SEALS are usable in many different applications and can also be an alternative to mechanical seals and braided packings.

The product line PS-SEAL offers cost-effective and practical solutions to a wide range of applications. The portfolio of Garlock shaft seals offers standardized as well as special customized seals.

The high performance seals PS-SEAL work with a sealing lip made of GYLON® or other modified PTFEs. Garlock produces GYLON® in a process that has been specially developed.

ADVANTAGES AT A GLANCE

- » Useable under high pressure and extreme vacuum
- » Very suitable for high circumferential speed
- » Temperature resistant from -130°F (-90°C) up to 500°F (260°C)
- » Excellent chemical resistance
- » Useable in food and pharma applications (FDA)
- » EN 1935/2004 certificate
- » SIP/CIP compatible
- » Good dry running capability
- » Wear resistant and low friction



PS-SEAL® Standard

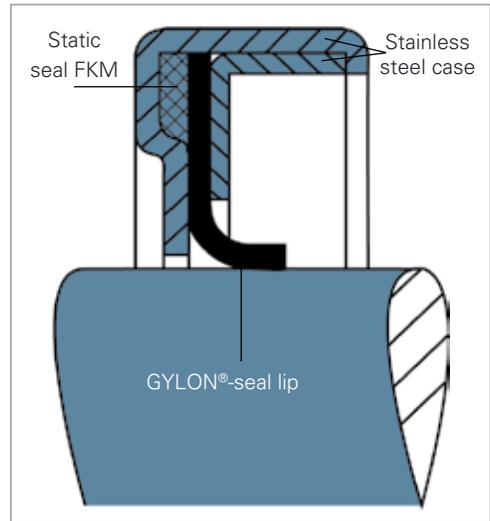
PS-SEAL Standard* is a Garlock shaft seal consisting of a stainless steel 1.4571 (316Ti) case, a GYLON® BLACK seal lip and a static sealing element made of FKM. Products with measurements listed in the table below are in stock and can be delivered immediately.

MOUNTING DIMENSIONS

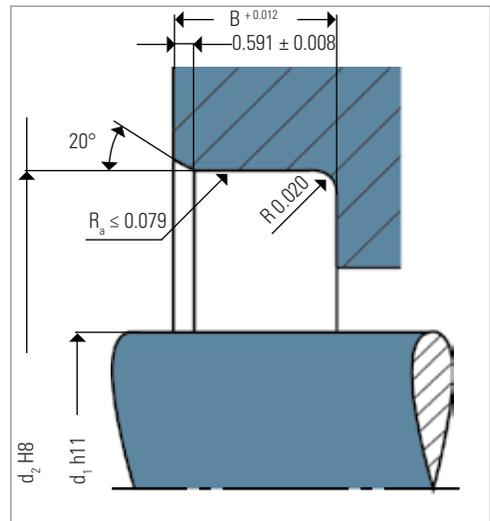
Item code	d1 [inch]	d2 [inch]	B [inch]	Item code	d1 [inch]	d2 [inch]	B [inch]
MEC03-10005	0.315	0.709	0.197	MEC03-10026	1.772	2.441	0.394
MEC03-10048	0.394	0.866	0.236	MEC03-10028	1.772	2.559	0.394
MEC03-10006	0.472	1.102	0.315	MEC03-10029	1.890	2.559	0.394
MEC03-10007	0.591	1.181	0.315	MEC03-10030	1.969	2.559	0.394
MEC03-10008	0.630	1.181	0.315	MEC03-10031	1.969	2.756	0.394
MEC03-10010	0.669	1.102	0.315	MEC03-10032	1.969	2.835	0.394
MEC03-10009	0.669	1.378	0.315	MEC03-10033	2.165	2.835	0.394
MEC03-10011	0.787	1.378	0.315	MEC03-10035	2.362	2.953	0.315
MEC03-10012	0.899	1.575	0.315	MEC03-10036	2.362	3.150	0.394
MEC03-10014	0.984	1.378	0.315	MEC03-10037	2.441	3.150	0.394
MEC03-10013	0.984	1.654	0.315	MEC03-10038	2.559	3.346	0.394
MEC03-10050	0.984	2.047	0.276	MEC03-10039	2.756	3.543	0.394
MEC03-10015	1.102	1.850	0.394	MEC03-10040	2.874	3.937	0.394
MEC03-10016	1.181	1.850	0.394	MEC03-10041	2.953	3.937	0.394
MEC03-10017	1.260	1.850	0.315	MEC03-10042	2.953	3.740	0.512
MEC03-10018	1.260	1.850	0.394	MEC03-10043	3.150	3.937	0.394
MEC03-10019	1.378	1.850	0.315	MEC03-10054	3.346	4.724	0.500
MEC03-10020	1.378	1.969	0.394	MEC03-10044	3.543	4.331	0.394
MEC03-10004	1.500	2.500	0.500	MEC03-10051	3.740	4.724	0.472
MEC03-10021	1.575	2.165	0.394	MEC03-10001	3.937	5.118	0.512
MEC03-10022	1.575	2.362	0.394	MEC03-10002	4.331	5.512	0.512
MEC03-10023	1.575	2.441	0.394	MEC03-10052	4.724	5.906	0.472
MEC03-10049	1.575	2.677	0.394	MEC03-10003	5.512	6.496	0.394
MEC03-10025	1.654	2.441	0.315	MEC03-10053	5.906	7.087	0.472
MEC03-10024	1.654	2.362	0.394				

* PS-SEAL Standard
maximum 745 psi (10 bar), maximum 400°F (205°C), no FDA

STANDARD CONFIGURATION



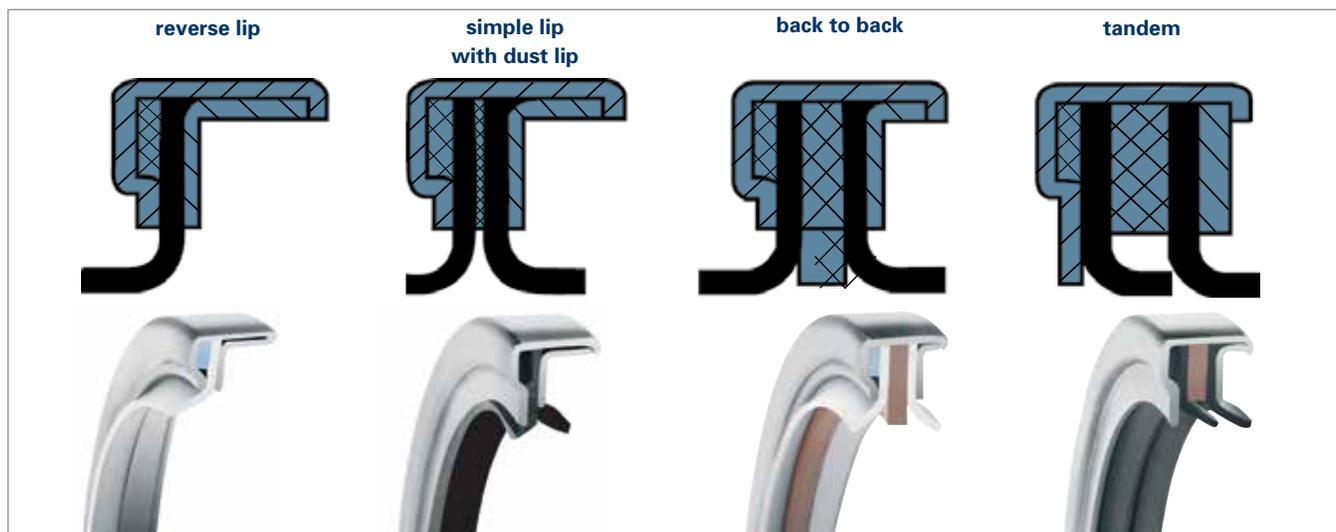
DIMENSIONS



All statements in inch

PS-SEAL® Non-Standard

Garlock PS-SEAL Non-Standard are shaft seals in standard sizes with different configurations of their seal lips and different materials (see page 10).



The overview shows the most common configurations. Other configurations are also available.

If your application demands a shaft seal different from the PS-SEAL Standard version we will manufacture a shaft seal appropriate to your needs. The PS-SEAL Non-Standard offers an economic way of producing special configurations, as it is based on the standard version. Both the lip material and its configuration can be varied. Even the case can be adjusted within technical limitation. If this is not fulfilling your needs, we also manufacture a custom-made PS-SEAL based on your drawings/designs.

The PS-SEAL Non-Standard is in principle available in the same sizes as the PS-SEAL Standard is, but its dimensions for shaft diameter (d1) and width (B) can be slightly modified.

MOUNTING DIMENSIONS

d1 [inch]	d2 [inch]	B [inch]	d1 [inch]	d2 [inch]	B [inch]	d1 [inch]	d2 [inch]	B [inch]
0.315	0.709	0.197	1.378	1.850	0.315	2.362	2.953	0.315
0.394	0.866	0.236	1.378	1.969	0.394	2.362	3.150	0.394
0.472	1.102	0.315	1.500	2.500	0.500	2.441	3.150	0.394
0.591	1.181	0.315	1.575	2.165	0.394	2.559	3.346	0.394
0.630	1.181	0.315	1.575	2.362	0.394	2.756	3.543	0.394
0.669	1.102	0.315	1.575	2.441	0.394	2.874	3.937	0.394
0.669	1.378	0.315	1.575	2.677	0.394	2.953	3.937	0.394
0.787	1.378	0.315	1.654	2.441	0.315	2.953	3.740	0.512
0.866	1.575	0.315	1.654	2.362	0.394	3.150	3.937	0.394
0.984	1.378	0.315	1.772	2.441	0.394	3.346	4.724	0.500
0.984	1.654	0.315	1.772	2.559	0.394	3.543	4.331	0.394
0.984	2.047	0.276	1.890	2.559	0.394	3.740	4.724	0.472
1.102	1.850	0.394	1.969	2.559	0.394	3.937	5.118	0.512
1.181	1.850	0.394	1.969	2.756	0.394	4.331	5.512	0.512
1.260	1.850	0.315	1.969	2.835	0.394	4.724	5.906	0.472
1.260	1.850	0.394	2.165	2.835	0.394	5.512	6.496	0.394
						5.906	7.087	0.472

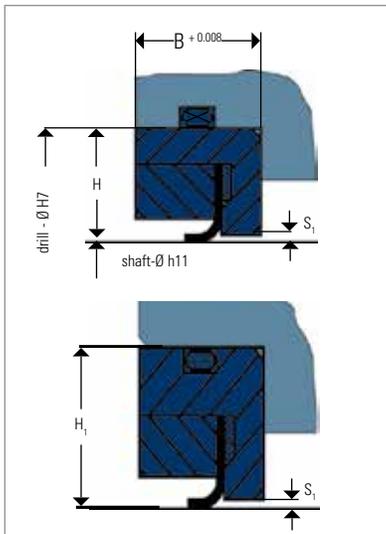
Shaft diameter (d1) and width (B are slightly adjustable.

PS-SEAL® Special

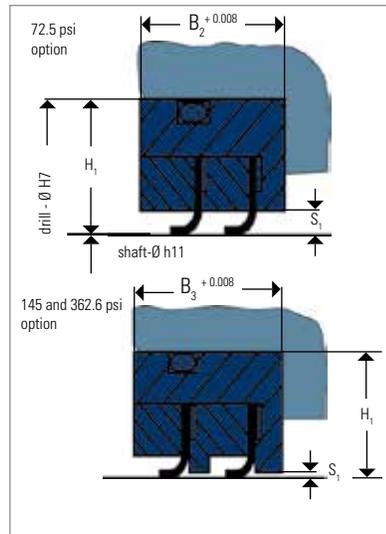
Due to the complex application of high performance seals, PS-SEAL Standard and PS-SEAL Non-Standard may not always provide the best solution for application-specific needs. That is why Garlock offers other sealing options with single and multiple lip assemblies. As far as practicable these seals are standardized to supply our customers with cost-efficient special solutions.

We recommend consulting our specialists for the usage of these PS-SEAL configuration options. PS-SEAL Special is available in many different lip and housing materials.

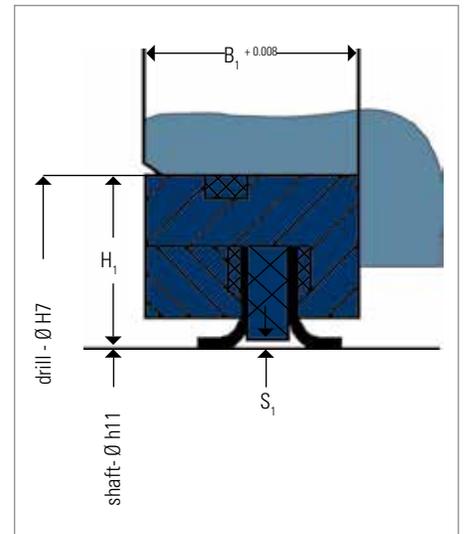
PS-SEAL SPECIAL, SINGLE LIP



PS-SEAL SPECIAL, TANDEM



PS-SEAL SPECIAL, BACK TO BACK



The overview shows the most common configurations. Other configurations are also available.

All statements in inch

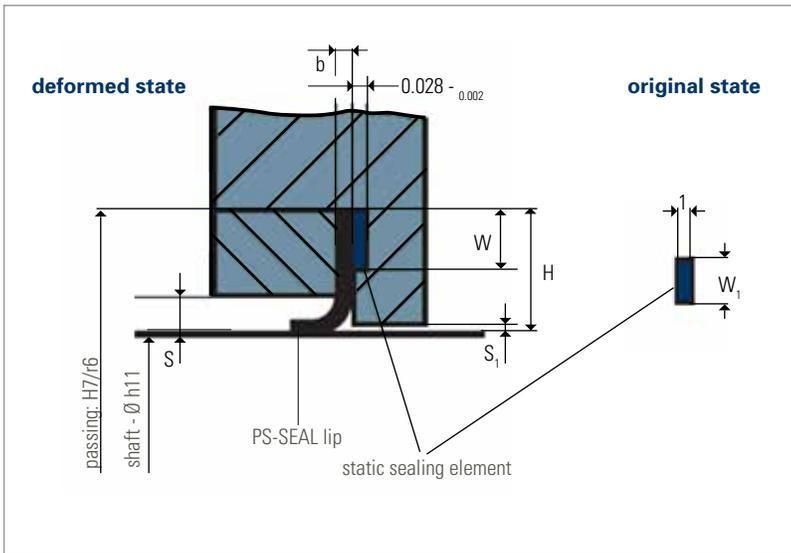
The table below shows the gap S1 (relative to pressure) and the minimal dimensions for width and height relative to the diameter of the shaft.

Shaft - Ø [inch]	H [inch]	H ₁ [inch]	B [inch]	B ₁ [inch]	B ₂ [inch]	B ₃ [inch]	S ₁ [inch]		
							73 psi	145 psi	363 psi
< 0.748	0.315	0.394	0.315	0.472	0.551	0.630	0.551	0.025	0.630
0.748-2.519	0.433	0.492	0.394	0.591	0.669	0.748	0.669	0.029	0.748
2.519-4.685	0.551	0.591	0.394	0.669	0.709	0.787	0.709	0.031	0.787
4.685-7.834	0.591	0.669	0.472	0.787	0.787	0.945	0.787	0.037	0.945
7.834-11.771	0.689	0.787	0.591	0.945	0.906	1.024	0.906	0.040	1.024
11.771-17.716	0.787	0.984	0.787	0.984	0.984	1.181	0.984	0.047	1.181

PS-SEAL® Lip

In shaft sealing constructions with restrictions in mounting space or where other constructional issues argue against the installation of a ready-to-mount PS-SEAL, the option PS-SEAL Lip could be a solution. PS-SEAL Lip is available in different material versions (see page 10).

The installation drawing and the associated table below show our recommended installation measurements. Garlock offers a static sealing element in addition to the PS-SEAL Lip to provide an optimal fit in the installation space. The standard material for these elements is FKM, alternatively they are available in GYLON® WHITE or GYLON® BLUE.



All statements in inch

Shaft-Ø [inch]	H [inch]	b [inch]	W [inch]	W ₁ [inch]	S [inch]	S ₁ [inch]		
						73 psi	145 psi	363 psi
< 0.748	0.236	0.031	0.098	0.079	0.079	0.079	0.020	0.008
0.748-1.929	0.295	0.031	0.138	0.098	0.098	0.098	0.020	0.008
1.929-5.866	0.394	0.039	0.177	0.138	0.118	0.118	0.020	0.008
5.866-11.771	0.492	0.039	0.236	0.177	0.118	0.118	0.020	0.008
11.771-17.716	0.591	0.039	0.315	0.236	0.118	0.118	0.020	0.008

EXAMPLE FOR SHAFT Ø3.937:

Garlock PS-SEAL Lip Ø 3.937 x 4.724 x 0.035 inch
 Static sealing element Ø 4.449 x 4.724 x 0.039 inch

Technical Information

SEAL CASE

The standard material for the PS-SEAL seal case is stainless steel 1.4571 (316Ti). Other materials can be supplied on request.

OPERATING PRESSURE

- » PS-SEAL Standard max. 145 psi
- » PS-SEAL Non-Standard max. 362.5 psi (depending on version)
- » PS-SEAL Special max. 362.5 psi (depending on version)
- » PS-SEAL Lip max. 362.5 psi (depending on version)

For maximum pressure applications please check the $p \times v$ - value. Garlock recommends an axial fixation of the PS-SEAL when it is used in applications under high pressure.

TEMPERATURE RANGE

The PS-SEAL lip material can handle temperatures between -130°F (-90°C) and +500 (260°C). Please note, that there is a difference between the temperature on the seal and the process-temperature due to the friction which releases additional energy/heat.

MATERIAL

GYLON® is being used as lip seal material of PS-SEAL and significantly responsible for its successful operation. We offer highly diverse seal options and combinations of materials to cope with the very different requirements of many diverse industrial branches. GYLON® is a modified PTFE and is used due to its high chemical resistance, its high temperature range and its low friction.

COUNTER SURFACE

As the counter surface has a major impact on the efficiency and life-time of our seals, its configuration needs also to be considered. Garlock can offer an appropriate package of seal and counter surface (protection sleeve) to provide an optimal and durable sealing solution. For an optimal interaction between sealing and abrasion the following surface characteristics should be complied with:

SURFACE ABRASIVENESS

Ra = 3.94 – 15.75 μin
Rz = 23.62 – 78.74 μin
Rmax = 157.48 μin

The running surface may not have a helical spiralling indentations as the arising conveying effect could cause leakage.

SURFACE HARDNESS

60 HRC

Under high stress ($p \times v$ - value) of more than 290 psi x m/s Garlock recommends an untwisted machined chromium oxide coating. Suitable coatings can be ordered from Garlock. Please consider a hard enough basic material when using micro-coatings.

Technical Information

LIP MATERIAL

The applied GYLON® lip materials guarantee a stopped cold flow with brilliant running characteristics when it comes to impermeability, abrasion and frictional heat. Many different compounds can be used for different applications. To cope with rising demands in terms of rotational speed and pressure in lubricated - as well as in dry running conditions. A higher operating safety and a longer service life can be reached by using multiple lip-seals arrangements. Please feel free to contact us for individual consulting.

Lip Material	Ingredients	Properties
GYLON® BLACK	graphite	<ul style="list-style-type: none"> » standard material » perfectly suitable for lubricated applications
GYLON® WHITE	barium sulfate	<ul style="list-style-type: none"> » special material » FDA EN1935 conformity » recommended for food, pharmaceutical and beverage industries » partially capable of dry running
GYLON® BLUE	glass-microspheres	<ul style="list-style-type: none"> » special material » FDA EN1935 conformity » very flexible (high recovery capacity) » recommended for food, pharmaceutical and beverage industries » brilliant dry running characteristics
F	Econol	<ul style="list-style-type: none"> » special material » FDA EN1935 conformity » recommended for food, pharmaceutical and beverage industries » suitable for vacuum-applications » brilliant dry running characteristics
MS	molybdenum disulfide	<ul style="list-style-type: none"> » special material » suitable for abrasive media
KF	carbon fiber	<ul style="list-style-type: none"> » special material » suitable for partial-abrasive media » good dry running characteristics

Please note: Surface finish and shaft hardness are critical in dry running applications.

Technical Information

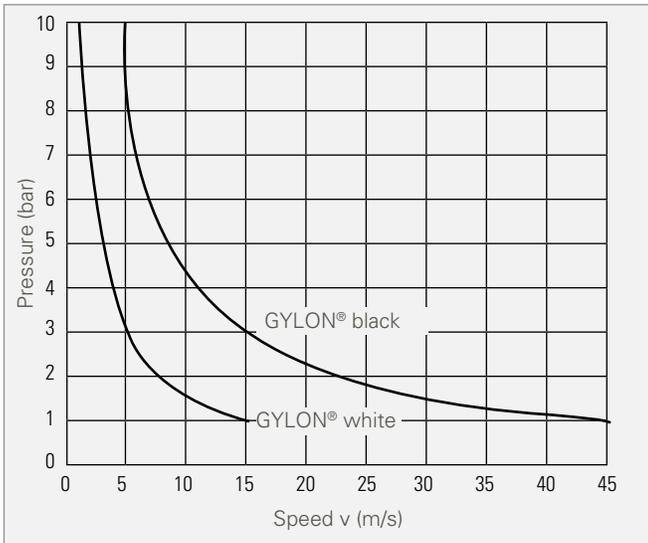
APPLICATION AREA

With pressure higher than 72.5 psi and peripheral speed higher than 36.85 in/s we recommend to check the limitations of use. The p x v-diagram below shows the range of use of GYLON® BLACK and GYLON® WHITE.

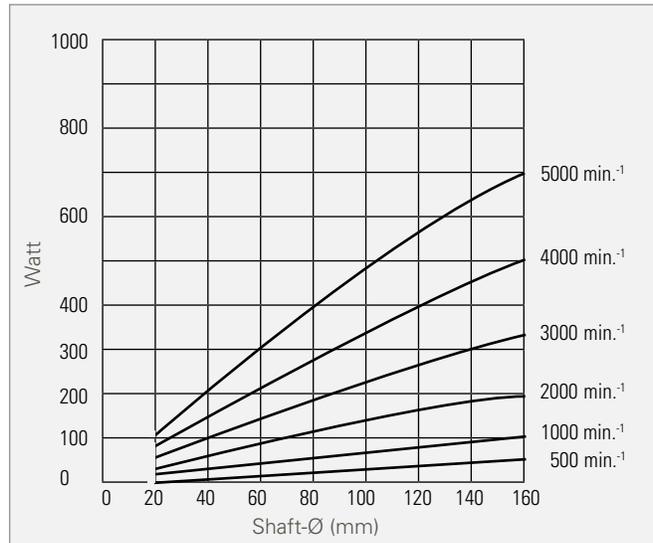
P X V FOR PS-SEAL

The p x v - value shown are valid for heavy lubrication at room temperature and for all PS-SEAL options capable of pressures up to 45.03 psi. A bad state of lubrication, such as lack of lubricant or even dry running, creates a need for reducing the maximal acceptable p x v - value as well as the necessity for an optimal counter surface.

P X V - DIAGRAM

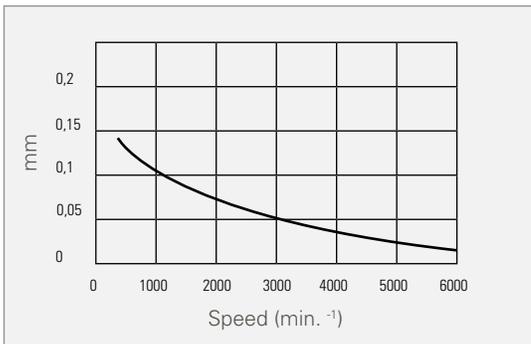


POWER LOSS THROUGH FRICTION ON SEAL LIP



The following concentricity and shaft to bore misalignment (STBM) curves depend on the maximum speed and shaft-diameter. The sum of both values (Runout and STBM) may not exceed the maximum.

ACCEPTABLE RADIAL RUNOUT



ACCEPTABLE STBM

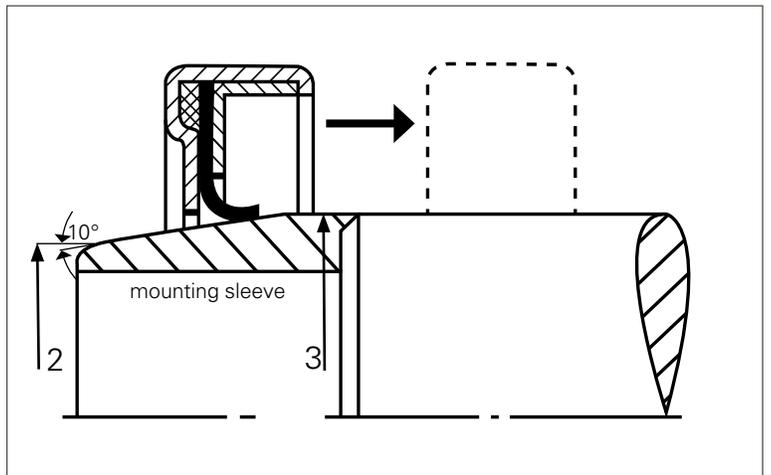
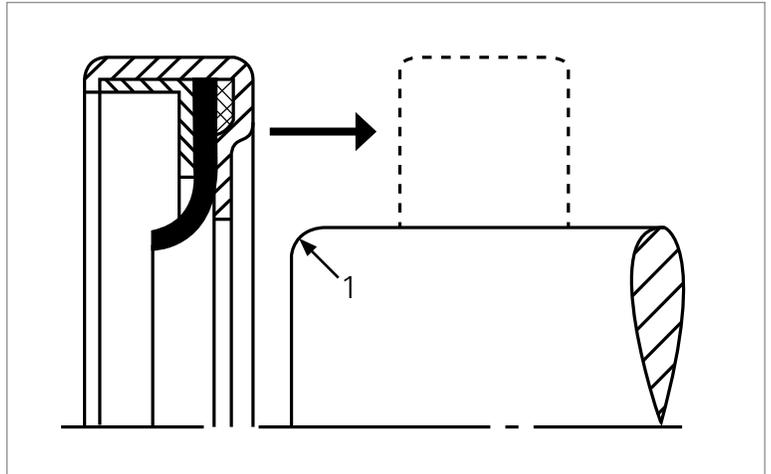


Installation and Assembly Advice

ASSEMBLY

PS-SEAL shaft seals must be installed without damage. Therefore never insert over sharp edges! The use of a common mounting paste makes installation easier.

- 1 R min 0.03 inch and polished
- 2 Shaft-Ø minus 0.196 inch
- 3 Shaft-Ø plus 0.157 inch



Application Data Sheet

SERVICE

Of course you can contact Garlock for an application-specific seal construction any time. To get this service as fast as possible, please order our application data sheet, which also can be found on our website www.garlock.com.

Garlock
in the EnPro Industries family of companies

Application Data Sheet: KLOZURE® and PS-SEAL

Contact Information:

Company: _____
 Name: _____
 Phone: _____
 Email: _____
 Country: _____
 Demand: _____
 Annual Demand: _____

Other manufacturers Information

Company: _____
 Item code: _____
 Seal model: _____
 Lip material: _____
 Housing material: _____
 Garlock ID: _____

Application Data

Shaft diameter d (mm): _____
 Housing diameter D (mm): _____
 Depth w (mm): _____
 Shaft speed (rpm): _____
 Shaft deflection (mm): _____
 Shaft misalignment (mm): _____
 Dry running: Yes No
 FDA: Yes No
 Medium, Side A: _____
 Medium, Side B: _____
 Absolute pressure, [psi(a)], SIDE A: _____
 1 psi (a) = 6.895 kPa (abs. pressure)
 Absolute pressure, [psi(a)], SIDE B: _____
 1 psi(a) = 6.895 kPa (abs. pressure)
 Temperature [°F], Side A: _____
 Temperature [°F], Side B: _____

Side A **Side B**

Surface roughness: Ra _____
 Surface hardness: R_e _____ (HRC)
 R_{max} _____

Remarks:

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Garlock Great Britain Limited
Garlock Middle East

Note:
 Properties/applications shown throughout this brochure are typical. Your specific application should not be undertaken without independent study and evaluation for suitability. For specific application recommendations consult Garlock. Failure to select the proper sealing products could result in property damage and/or serious personal injury. Performance data published in this brochure has been developed from field testing, customer field reports and/or in-house testing. While the utmost care has been used in compiling this brochure, we assume no responsibility for errors. Specifications subject to change without notice. This edition cancels all previous issues. Subject to change without notice GARLOCK is a registered trademark for packings, seals, gaskets, and other products of Garlock.
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