

PS-SEAL®

PTFE based high performance seal



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PS-SEAL®: PTFE based high performance seal

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 in extreme vacuum
- » Very suitable for high circumferential speed
- » Temperature resistant from -90 °C up to +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



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Business Sealing Integrity

PS-SEAL®: PTFE based high performance seal

PS-SEAL® Standard

PS-SEAL Standard* is a Garlock shaft seal consisting of a stainless steel (1.4571) 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.

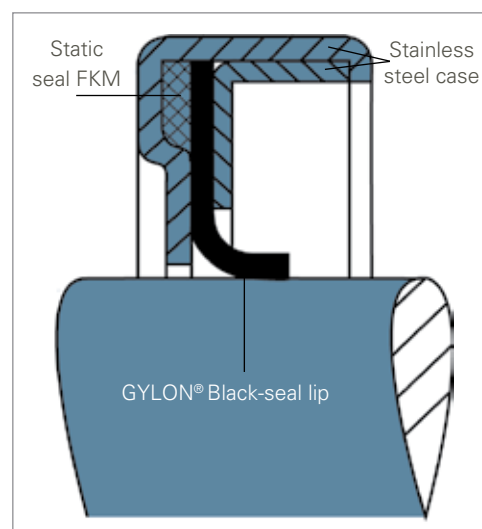
Mounting Dimensions

Item code	d1 [mm]	d2 [mm]	B [mm]
MEC03-10005	8,0	18,0	5,0
MEC03-10048	10,0	22,0	6,0
MEC03-10006	12,0	28,0	8,0
MEC03-10007	15,0	30,0	8,0
MEC03-10008	16,0	30,0	8,0
MEC03-10010	17,0	28,0	8,0
MEC03-10009	17,0	35,0	8,0
MEC03-10011	20,0	35,0	8,0
MEC03-10012	22,0	40,0	8,0
MEC03-10014	25,0	35,0	8,0
MEC03-10013	25,0	42,0	8,0
MEC03-10050	25,0	52,0	7,0
MEC03-10015	28,0	47,0	10,0
MEC03-10016	30,0	47,0	10,0
MEC03-10055	30,0	52,0	10,0
MEC03-10017	32,0	47,0	8,0
MEC03-10018	32,0	47,0	10,0
MEC03-10019	35,0	47,0	8,0
MEC03-10020	35,0	50,0	10,0
MEC03-10004	38,1	63,5	12,7
MEC03-10021	40,0	55,0	10,0
MEC03-10022	40,0	60,0	10,0
MEC03-10023	40,0	62,0	10,0
MEC03-10049	40,0	68,0	10,0
MEC03-10025	42,0	62,0	8,0
MEC03-10024	42,0	60,0	10,0

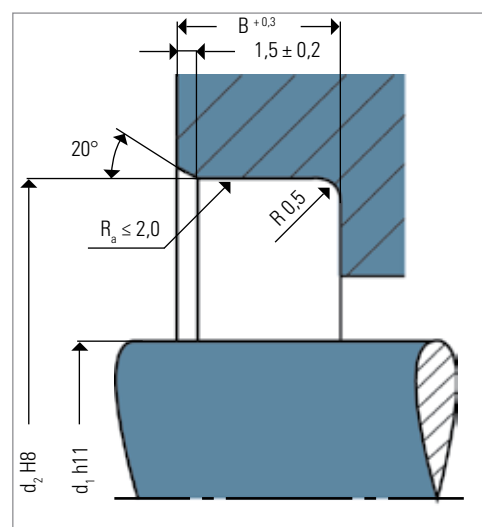
Item code	d1 [mm]	d2 [mm]	B [mm]
MEC03-10026	45,0	62,0	10,0
MEC03-10028	45,0	65,0	10,0
MEC03-10029	48,0	65,0	10,0
MEC03-10030	50,0	65,0	10,0
MEC03-10031	50,0	70,0	10,0
MEC03-10032	50,0	72,0	10,0
MEC03-10033	55,0	72,0	10,0
MEC03-10035	60,0	75,0	8,0
MEC03-10036	60,0	80,0	10,0
MEC03-10037	62,0	80,0	10,0
MEC03-10038	65,0	85,0	10,0
MEC03-10039	70,0	90,0	10,0
MEC03-10040	73,0	100,0	10,0
MEC03-10041	75,0	100,0	10,0
MEC03-10042	75,0	95,0	13,0
MEC03-10043	80,0	100,0	10,0
MEC03-10054	85,0	120,0	12,7
MEC03-10044	90,0	110,0	10,0
MEC03-10056	90,0	120,0	12,0
MEC03-10051	95,0	120,0	12,0
MEC03-10001	100,0	130,0	13,0
MEC03-10002	110,0	140,0	13,0
MEC03-10052	120,0	150,0	12,0
MEC03-10003	140,0	165,0	10,0
MEC03-10053	150,0	180,0	12,0

* PS-SEAL Standard
maximum 10 bar, maximum 205°C, no FDA

Standard configuration



Dimensions



All statements in mm

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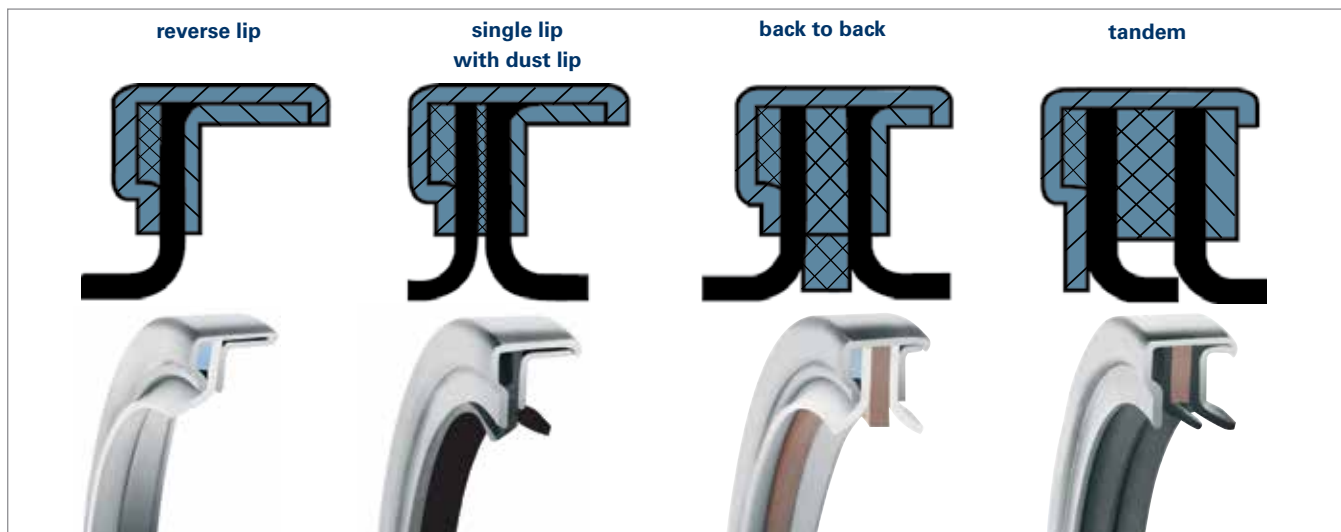
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PS-SEAL®: PTFE based high performance seal

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.

Mounting Dimensions

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.

d1 [mm]	d2 [mm]	B [mm]
8,0	18,0	5,0
10,0	22,0	6,0
12,0	28,0	8,0
15,0	30,0	8,0
16,0	30,0	8,0
17,0	28,0	8,0
17,0	35,0	8,0
20,0	35,0	8,0
22,0	40,0	8,0
25,0	35,0	8,0
25,0	42,0	8,0
30,0	52,0	10,0
28,0	47,0	10,0
30,0	47,0	10,0
32,0	47,0	8,0
32,0	47,0	10,0
35,0	47,0	8,0
35,0	50,0	10,0
38,1	63,5	12,7
40,0	55,0	10,0
40,0	60,0	10,0
40,0	62,0	10,0
40,0	68,0	10,0
42,0	62,0	8,0
42,0	60,0	10,0

d1 [mm]	d2 [mm]	B [mm]
45,0	62,0	10,0
45,0	65,0	10,0
48,0	65,0	10,0
50,0	65,0	10,0
50,0	70,0	10,0
50,0	72,0	10,0
55,0	72,0	10,0
60,0	75,0	8,0
60,0	80,0	10,0
62,0	80,0	10,0
65,0	85,0	10,0
70,0	90,0	10,0
73,0	100,0	10,0
75,0	100,0	10,0
75,0	95,0	13,0
80,0	100,0	10,0
90,0	120,0	12,0
90,0	110,0	10,0
95,0	120,0	12,0
100,0	130,0	13,0
110,0	140,0	13,0
120,0	150,0	12,0
140,0	165,0	10,0
150,0	180,0	12,0

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



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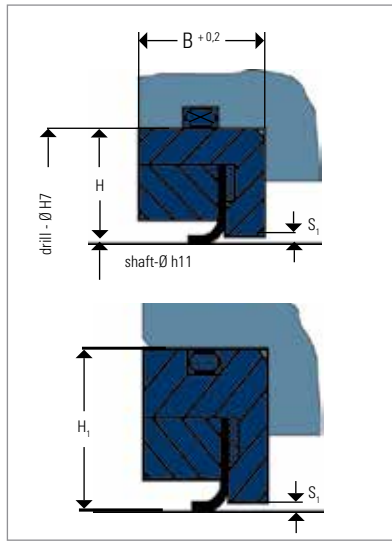
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PS-SEAL[®] Special

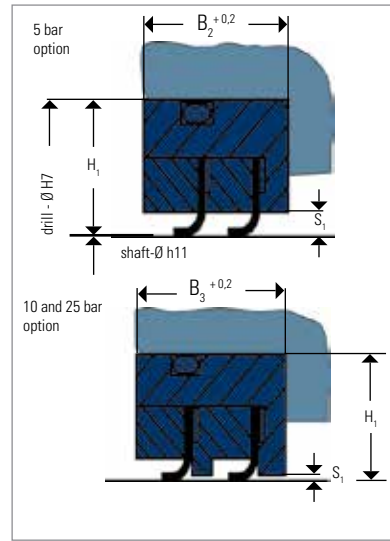
Due to the complex application of high performance seals, PS-SEAL Standard and PS-SEAL Non-Standard may not always provide the best solution for application-specific needs. That is why Garlock offers other sealing options with single and multiple lip assemblies. As far as practicable these seals are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

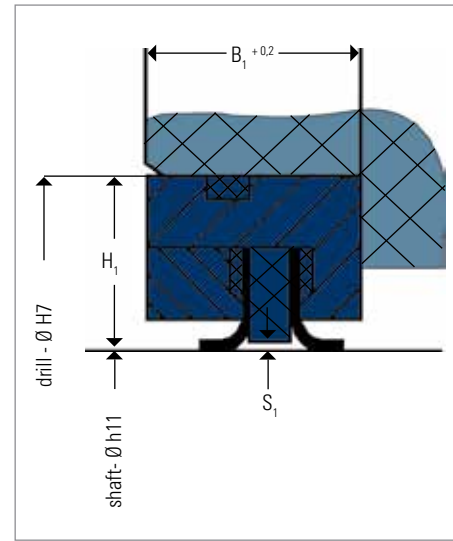
PS-SEAL Special, single lip



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 mm

The table below shows the gap S_1 (relative to pressure) and the minimal dimensions for width and height relative to the diameter of the shaft.

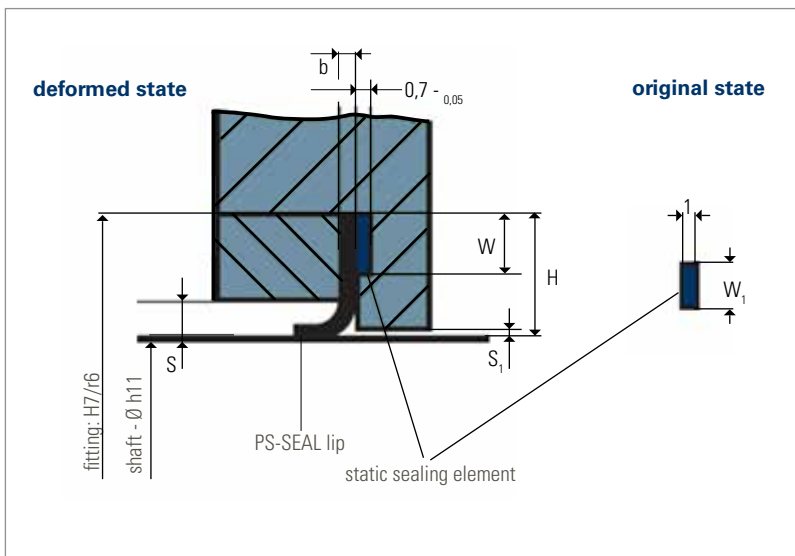
Shaft - Ø [mm]	H [mm]	H ₁ [mm]	B [mm]	B ₁ [mm]	B ₂ [mm]	B ₃ [mm]	S ₁ [mm]		
							5 bar	10 bar	25 bar
< 19	8	10	8	12	14	16	2,2	0,5	0,2
20-64	11	12,5	10	15	17	19	2,5	0,5	0,2
65-119	14	15	10	17	18	20	3,0	0,5	0,2
120-199	15	17	12	20	20	24	3,0	0,5	0,2
200-299	17,5	20	15	24	23	26	3,0	0,5	0,2
300-450	20	25	20	25	25	30	3,0	0,5	0,2

PS-SEAL[®]: PTFE based high performance seal

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 GLYON[®] WHITE or GYLON[®] BLUE.



All statements in mm

Shaft-Ø [mm]	H [mm]	b [mm]	W [mm]	W ₁ [mm]	S [mm]	S ₁ [mm]		
						5 bar	10 bar	25 bar
< 19	6,0	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	10,0	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	15,0	1,0	8,0	6,0	3,0	3,0	0,5	0,2

Example for shaft Ø100:

Garlock PS-SEAL Lip Ø 100 x 120 x 1 mm

Static sealing element Ø 113 x 120 x 1 mm

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PS-Cartridge/ProSet (+Flex)

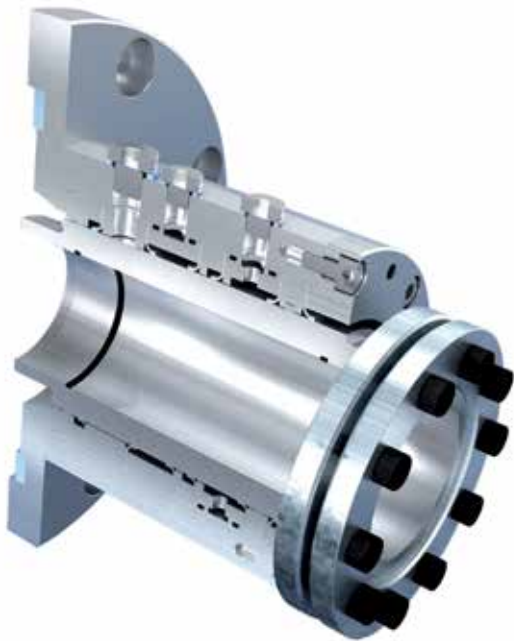
With the PS-Cartridge Garlock offers a sealing unit that serves as the perfect solution for individual cases of applications. Possible applications for this construction are machine parts, where high misalignment occurs and quick service and safety are most important. By using the available all-in-one solution a revision can be carried out fast and secure on site. Typical examples of applications are agitators, mixers, dryers and screw conveyors, which account for only a small part of the possibilities of applications.

The PS-ProSet® is a standardized PS-Cartridge suitable for specific standard dimensions having the advantage of better price and shorter lead times. The PS-ProSet® Flex is a cartridge that can handle the utmost misalignment and runout by its special design of an integrated compensator.

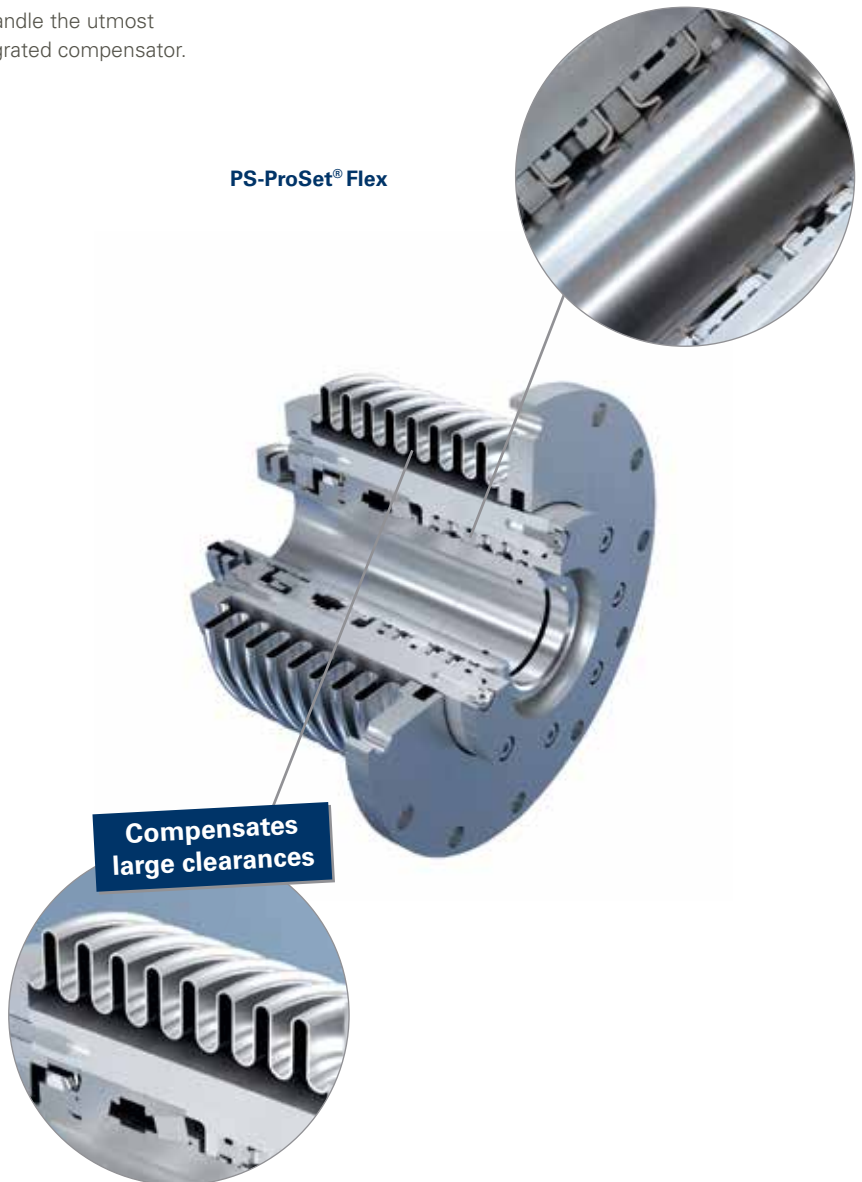
Ready-to-use in just a few seconds - Easy mountable unit

The pre-finished cartridge unit can be mounted onto the shaft without special equipment. In this way mistakes during the assembly can be avoided. The installation of PS-Cartridge could save money and time, because of its advantage being an entirely preassembled unit. It is a so called "swimming seal" meaning that it can cope with high misalignment and runout.

PS-ProSet®



PS-ProSet® Flex



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Technical Information

Seal case

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

Operating Pressure

» PS-SEAL Standard	max. 10 bar
» PS-SEAL Non-Standard	max. 25 bar (depending on version)
» PS-SEAL Special	max. 25 bar (depending on version)
» PS-SEAL Lip	max. 25 bar (depending on version)
» PS-SEAL ProSet®	max. 25 bar (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 -90 °C and $+260$ °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 =	0,1 – 0,4 μm
Rz =	0,6 – 2,0 μm
Rmax =	4 μm

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 20 bar 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 used 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 deal 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

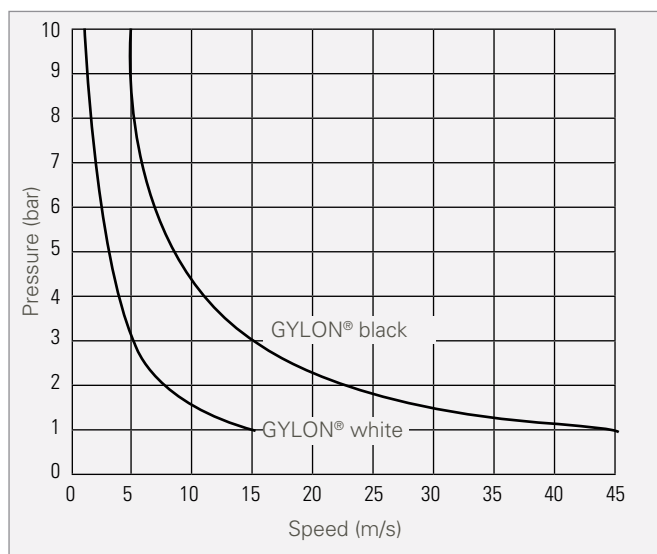
Application Area

With pressure higher than 5 bar and peripheral speed higher than 5 m/s Garlock recommends to check the limitations of use. The p x v-diagram below shows the range of use of GYLON[®] BLACK and GYLON[®] WHITE.

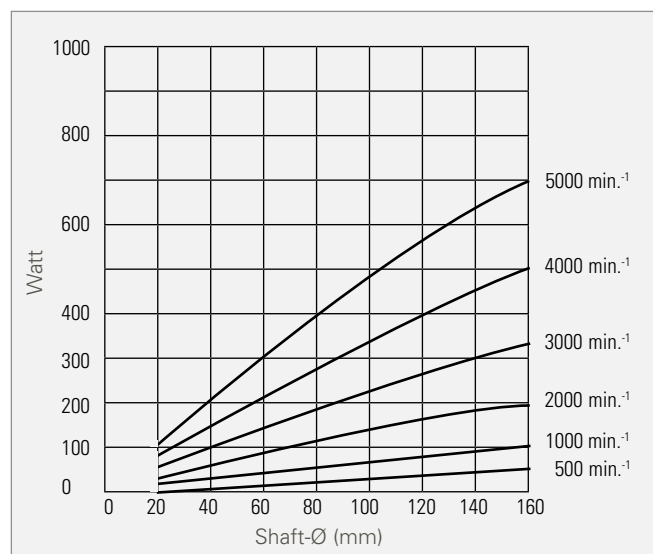
p x v for PS-SEAL

The p x v - values shown are valid for heavy lubrication at room temperature and for all PS-SEAL options capable of pressures up to 10 bar. 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

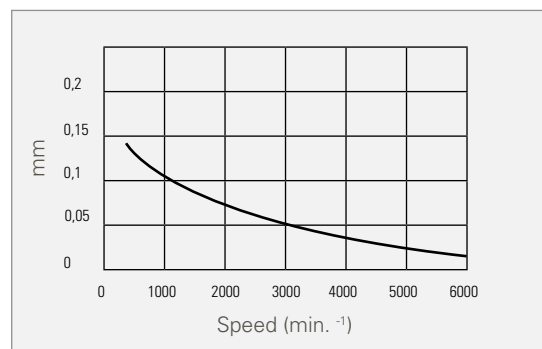


Power loss through friction on seal lip

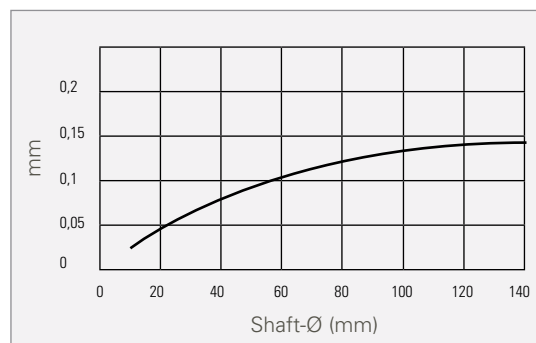


The following concentricity and shaft to bore misalignment (STBM) curves depend on the maximum speed and shaft diameter. The sum of both values (runout and STBM) may not exceed the maximum.

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 1 mm and polished
- 2 Shaft-Ø minus 5 mm
- 3 Shaft-Ø plus 0,4 mm

