

E11/BT/P/PTV

The E11/BT/P/PTV seal is a rotary shaft seal with the sealing lips working at the outer diameter with an additional dust lip, sufficiently robust to keep contamination out of the sealing system and prevent damage of the main lip.



The E11/BT/P/PTV seal is characterized by a particularly robust main lip with an exclusive antifriction band patented with number PCT/EP2006/004962.

It is mostly used in wind energy, pulp and paper as well as aluminium industries. The seal also is applicable for any application, where corrosion, sizes and overall dimensions can cause issues for traditional metal case seals.

Designed for external sealing, the E11/BT/P/PTV seal has a flexible sealing lip made of elastomer and a back reinforced with high resistant textile rubber.

For windmill applications, the E11/BT/P/PTV features a half O-ring on the top of its back for a better static sealing performance. A vulcanized finger spring provides a uniform distribution of pressure on the shaft exerted by the sealing lip. All the inconveniences shown by garter spring seals are avoided, such as lip overturning, the spring popping out from its housing and consequent damages of bearing and shaft.

The E11/BT/P/PTV can cope with a maximum pressure of 1 bar.

Exclusive features of E11/BT/P/PTV seals are:

- Antifriction material vulcanized on the main lip during the process according to patent PCT/EP2006/004962
- Significantly reduced friction and temperature generated by friction
- Sealing function at the outer diameter
- Mechanical locking of seal due to a rubber button (integrated half O-ring)
- Increased sealing capability at the static seal area due to the rubber button
- Additional barrier against external contaminants due to additional dust lip
- Vulcanized finger spring
- Uniform distribution of the sealing lip pressure on the shaft
- Spring fixed in groove – therefore no inconveniences related to the spring coming out of its position e.g. during mounting

The E11/BT/P/PTV is also available as split version (E11/BT/P/PTV/SPLIT) enabling easier assembly (no pressure applicable) in applications, where it would be difficult or even impossible to use an endless design. Due to the sealing function at the outer diameter, please contact TENUTE Technical Department / SKF Seals Application Engineering to agree on the clamping situation as well as how to glue the seal connection.

Both solutions, E11/BT/P/PTV endless and E11/BT/P/PTV/SPLIT, require a retainer plate for a correct operation.

Possible size range for E11/BT/P/PTV seals: $\varnothing D_{\min} = 55 \text{ mm}$; $\varnothing d_{\max} = 2\,540 \text{ mm}$ (please also see the drawing at the bottom of the page).

Materials

The standard material for the E11/BT/P/PTV is nitril elastomer NBR loaded with PTFE, but for particular working conditions the seals also are available in hydrogenated nitril elastomer (HNBR), fluorocarbon elastomer (FKM) or silicone elastomer (VMQ) materials. Other combinations are available on request.

Standard production		Special production on demand	
Lip	NBR	Lip	HNBR, FKM, EPDM, MVQ
Spring	AISI 301	Spring	AISI 301 – AISI 316

The table below shows working temperature ranges (minimum, maximum, peak (*)) applicable to each type of compound as well as possible spring configurations.

Material	Temperature	
	min	max
	°C	°C (*)
NBR	-30	+100 (+120)
HNBR	-40	+150 (+175)
VMQ	-50	+200 (+250)
FKM	-20	+200 (+250)

The PTFE compounds used for the E11/BT/P/PTV coating design may vary depending on the applications demand. The table below shows the most used ones with the relative coefficients of friction. For more details, please contact the TENUTE Technical Department / SKF Seals Application Engineering.

Material	Coefficient of friction
PTFE Virgin	0,06
PTV / MoS ₂ (1*)	0,08
PG (2*)	0,11
PB (3*)	0,13
PB / MoS ₂ (4*)	0,13

1* ... PTFE with glass and molybdenum bisulfide

2* ... PTFE with carbon and graphite

3* ... PTFE with bronze

4* ... PTFE with bronze and molybdenum bisulfide

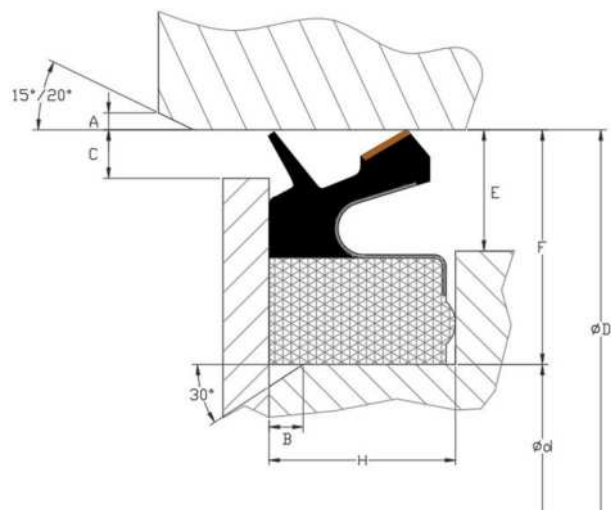
Assembly of E11/BT/P/PTV seals

The drawing shows the details of the housing dimensions and the assembly of the E11/BT/P/PTV seal.

Particular applications or requirements different from those details shall be agreed with the TENUTE Technical Department / SKF Seals Application Engineering.

$$C_{\text{maximum}} = 0,2 \times F$$

$$E_{\text{minimum}} = 0,3 \times F; E_{\text{maximum}} = 0,5 \times F$$



Cylinder and housing diameter tolerance

Housing diameter Ød		Tolerance	Cylinder diameter ØD		Tolerance
Over	Up to		Over	Up to	
mm	mm		mm	mm	
55	1 600	h10	75	1 600	H11
1 600	2 480	h9	1 600	2 540	H10

Housing height tolerance

Housing height H	Tolerance
mm	mm
Up to 15	+0 / -0,1
Over 15	+0,1 / -0,1

Cylinder and housing chamfers

Housing diameter Ød		Housing chamfers		Cylinder diameter ØD		Cylinder chamfer A
Over	Up to	H	B	Over	Up to	minimum
mm	mm	mm	mm	mm	mm	mm
55	250	15	1,5	75	250	3
250	800	20	2	250	800	4,5
800	1 500	30	3	800	1 500	6
1 500	2 480	40	4	1 500	2 540	7,5

Cylinder and housing surface finishing

A roughness of Ra from 0,2 to 0,6 µm is recommended for the shaft in standard applications, while in case of high speeds, a finishing to Ra from 0,2 to 0,4 µm is recommended. Plunge grinding is required. For the housing bore a finish turning is sufficient.

Cylinder hardness

Up to 15 m/s	Over 15 m/s
40 HRC	60 HRC and above
PTFE PG (2*)	PTFE PB (3*)

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