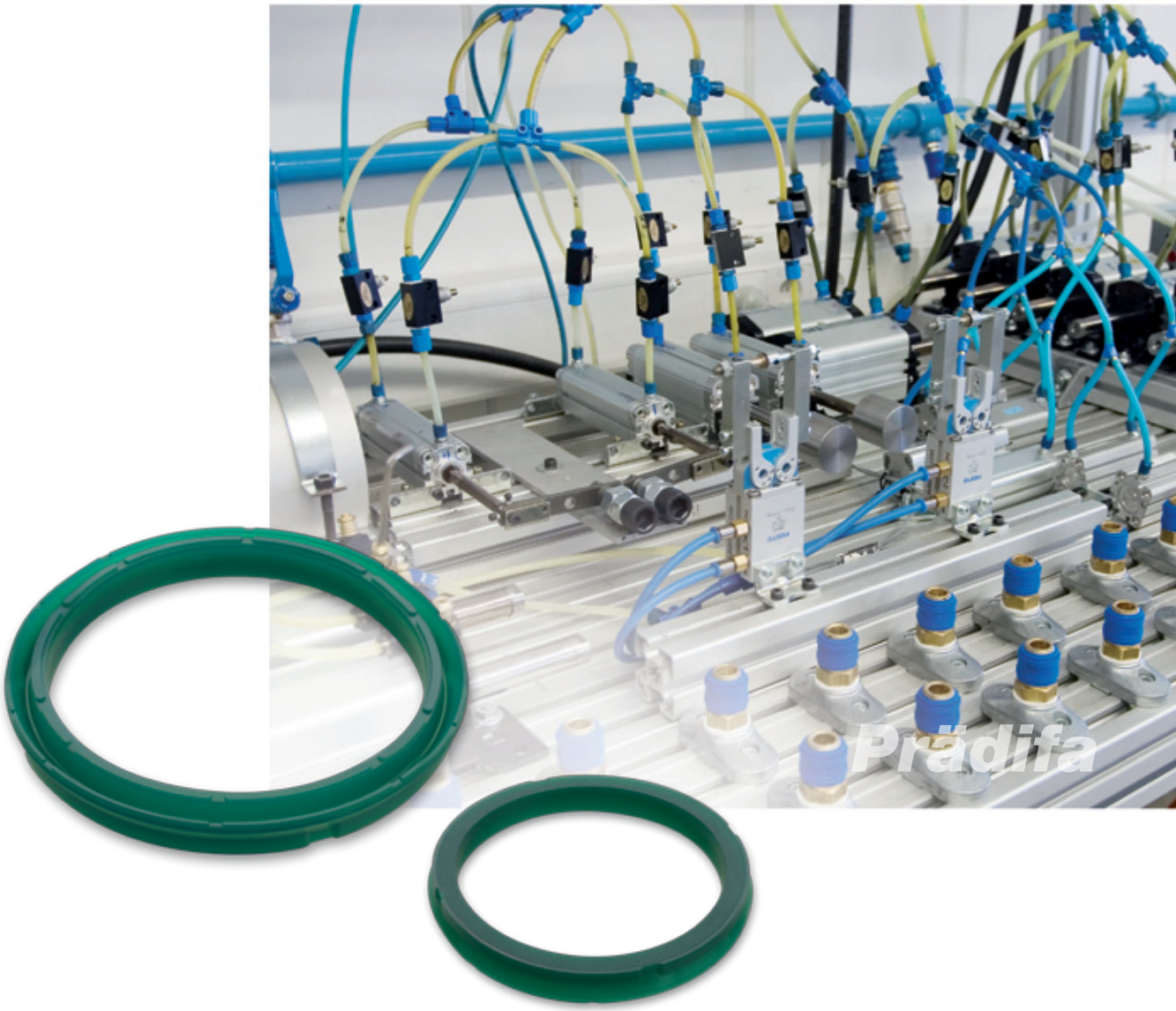
Parker Seals

E4 Ultrathan® Piston Seal

Enhanced functional reliability through modified design



E4 Ultrathan® piston seal
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The Profile E4 piston seal is a lip seal specifically designed for pneumatic applications. The dimensions of the standard E4 range correspond to the cylinder diameters according to ISO 3320, CETOP RP 52 P, RP 43 P and 53 P. Pressure relief grooves prevent pressure from being generated between the seals, which also makes the E4 piston seal suitable for “back-to-back“ applications in pneumatic cylinders.

Benefits

- Sealing lip geometry adapted to service in lubricated as well as dried and oil-free compressed air.
- Robust design due to optimum dimensions of seal cross-sections.
- High functional reliability due to lip seal design with interference fit in the groove.
- Optimal friction conditions after careful initial greasing during assembly due to lubricant-preserving lip seal design.
- Suitable for cylinders with cushioning.
- Long service due to excellent abrasion resistance of the polyurethane material.
- Easy snap assembly in simple-to-make grooves.
- Pressure relief grooves on the back of the seal as well as knobs on the static and dynamic sealing lips ensure optimum operation even in conditions of throttled exhaust air and prevent pressure from being generated between the seals.

FEA-supported design optimisation

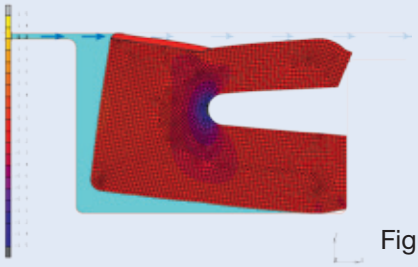


Figure 1

Using the Finite Elements Analysis, the performance of the seal – without pressure relief grooves – was simulated with a potential generation of pressure between the seals: If continuous pressure is applied to the back of the seal, this results in both sealing lips contacting the groove frontally. If the pressure between the seals continues to rise, there is a risk that the seal turns inside the groove, with its “back” contacting the cylinder wall, thus sealing the assembly. In this case, pressure can no longer be relieved, except by disassembling the cylinder (figure 1).

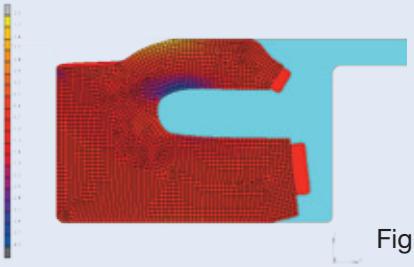


Figure 2

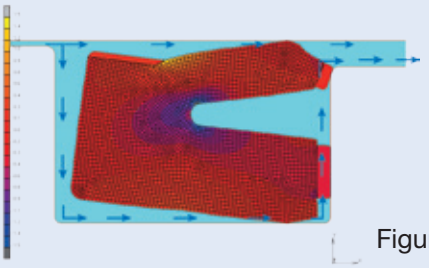


Figure 2

Pressure relief grooves alongside the outer diameter ensure that pressure is relieved between the seals. If their effect is insufficient – causing the seal front to contact the groove – they are supported by additional pressure relief grooves achieved by knobs on the static and dynamic sealing lip (see flow depicted in figure 3).

Range of application

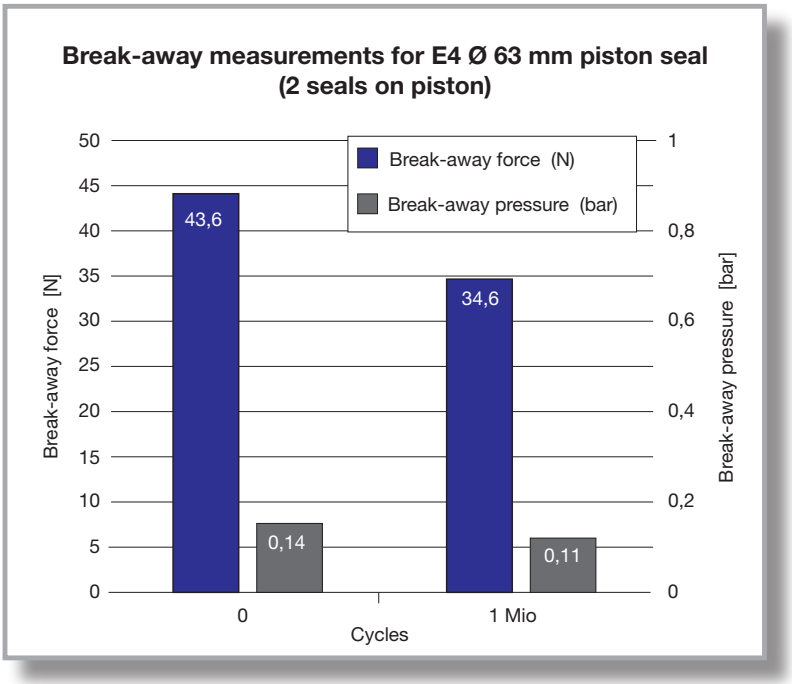
Operating pressure:	max. 16 bar
Operating temp.:	-35 bis +80 °C
Sliding speed:	max. 1 m/s
Medium:	compressed air, lubricated as well as dry and oil-free (after assembly lubrication)

Material

As standard material we recommend our green-transparent P5007 polyurethane compound with a hardness of approx. 82 Shore A. The material was specifically designed for pneumatic applications and is resistant to nearly all pneumatics lubricants.

Assembly instructions

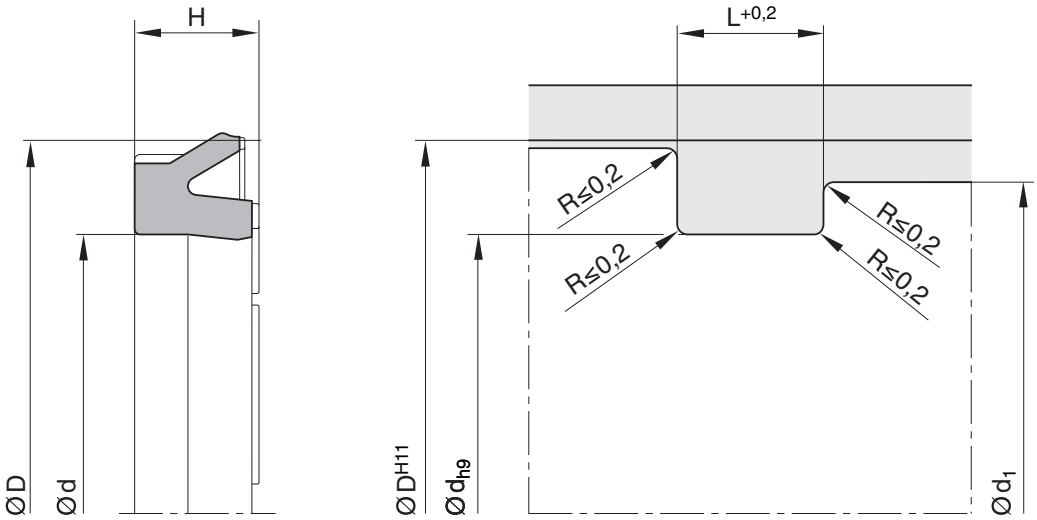
Profile E4 lip rings are simply inserted into the groove by pulling them across the piston collar. To prevent damage to the seals during assembly it is necessary to chamfer sharp edges on the piston and cylinder.
For dry operation, the application of a continuous lubricant film in the cylinder before assembly is absolutely essential to achieving long service life.
To guide the piston we recommend our F2 piston guiding element adapted to these applications.



Physical specifications

Test	Norm	Dimension	Result
Hardness	DIN 53 505	Shore A	82 ±5
Spec. weight (±0.02)	DIN 53 479	g/cm³	1.16 ±0,02
Modulus 100 %	DIN 53 504	N/mm² (min.)	4.5
Modulus 100 %	DIN 53 504	N/mm² (min.)	9
Tensile strength	DIN 53 504	N/mm² (min.)	40
Ultimate elongation	DIN 53 504	% (min.)	400
Tear strength	DIN 53 515	N/mm	40
Compression set 70 h / 70 °C	DIN ISO 815 7.5.1	% (max.)	27
Rebound resilience	DIN 53 512	% (min.)	52
Low-temperature performance (TR 10)	ASTM D 1329	°C	–40
Temperature range		°C	–35 / +80
Temperature range short-term		°C	+110

Seal Group Europe
Packing Division



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100	88	8.5	9.5	98	E4 C088 P5007
125	110	10	11	122.5	E4 C010 P5007
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160	145	10	11	157.5	E4 G022 P5007
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