



Rod seals of PTFE

The classic **type SE** rod seal has a proven track record as a low-friction component that has been successfully employed over many years for the sealing of piston rods in hydraulic cylinders. The compact design featuring an NBR O-ring as the preload element and a special geometry, is ideal as the optimum sealing system for many applications in hydraulics. The specially shaped sealing edge profile offers optimum flow-back while at the same time preventing pressure build-up between tandem-arranged rod seals.

Depending on the application and operating conditions, the combination of different materials for primary and secondary sealing can improve both the operational behaviour and the service lifetime of the sealing system.

In the case of particularly tough service conditions, it may be advisable to select a PTFE compound as the primary seal and a thermoplastic material for the secondary seal. Such redundant sealing systems should be combined with a double-wiper.

The wide range of material combinations available for the sealing system and selection of the appropriate material for the preload element provides for significant variation possibilities, so enabling virtually unlimited suitability for different applications.

Benefits

- Outstanding friction behaviour
- No stick-slip effect, even at low velocities
- Good static and dynamic sealing
- High abrasion resistance
- Very good thermal and chemical resistance
- Individual size ranges possible
- Simple groove design

Application ranges

Velocity:	reciprocating up to 15 m/s frequency up to 5 Hz
Temperature:	-60°C to +200°C depending on material combination and O-ring material
Pressure:	up to 80 MPa (800 bar)
Groove root:	$R_a \leq 1.8 \mu\text{m} / R_t \leq 10 \mu\text{m}$
Groove flanks:	$R_a \leq 3.0 \mu\text{m} / R_t \leq 16 \mu\text{m}$
Contact area:	$R_a \leq 0.3 \mu\text{m} / R_t \leq 3.0 \mu\text{m}$

Installation

The **type SE** and **SD** rod seals can be fitted without problem in continuous grooves. To facilitate mounting, the seal can be rendered more pliable by heating it in oil at a temperature of approx. 80°C prior to fitting.

In order to fit the rod seal in the groove, it needs to be deformed into a kidney shape – ensuring there is no kinking – and then inserted in this form. Once inserted, the seal can be reformed back to its ring shape in the groove. Once the preload and sealing elements have been fitted, the PTFE rod seal must be sized with a mandrel featuring a bevel of approx. 10° - 20° and a length of approx. 30 mm. The piston rod can also be used for the sizing operation provided that it has a sufficient insertion bevel.

It must always be ensured that sharp edges are removed by rounding or bevelling. Thread tips should be covered. Before fitting, ensure that all machining residues such as swarf, chips, dirt and other foreign particles have been removed.

When employing these seals in a tandem arrangement, it should generally be ensured that there is sufficient space between the two seal assemblies to receive the hydraulic fluid. The surface quality of the mating faces being sealed is of decisive importance for the functional reliability and service life of the seal.

It is important to ensure that there are no ridges, scratches or recesses, nor any concentric or spiral machining marks on the surface.

The parameters usually applied for surface description such as R_a , R_z , R_t and R_{max} are defined in DIN 4762 and DIN 4768.

In order to properly assess surface quality for sealing applications, the material ratio (bearing curve t_p) should also be taken into account. This profile shape parameter is influenced by the machining process applied. The material ratio (M_r) should lie between 50 and 70% as determined at a slice depth of approx. $0.25 \times R_z$ based on a reference percentage of approx. 5%.

