

SEALING SOLUTIONS FOR INJECTION MOLDING MACHINES

FREUDENBERG
SEALING TECHNOLOGIES

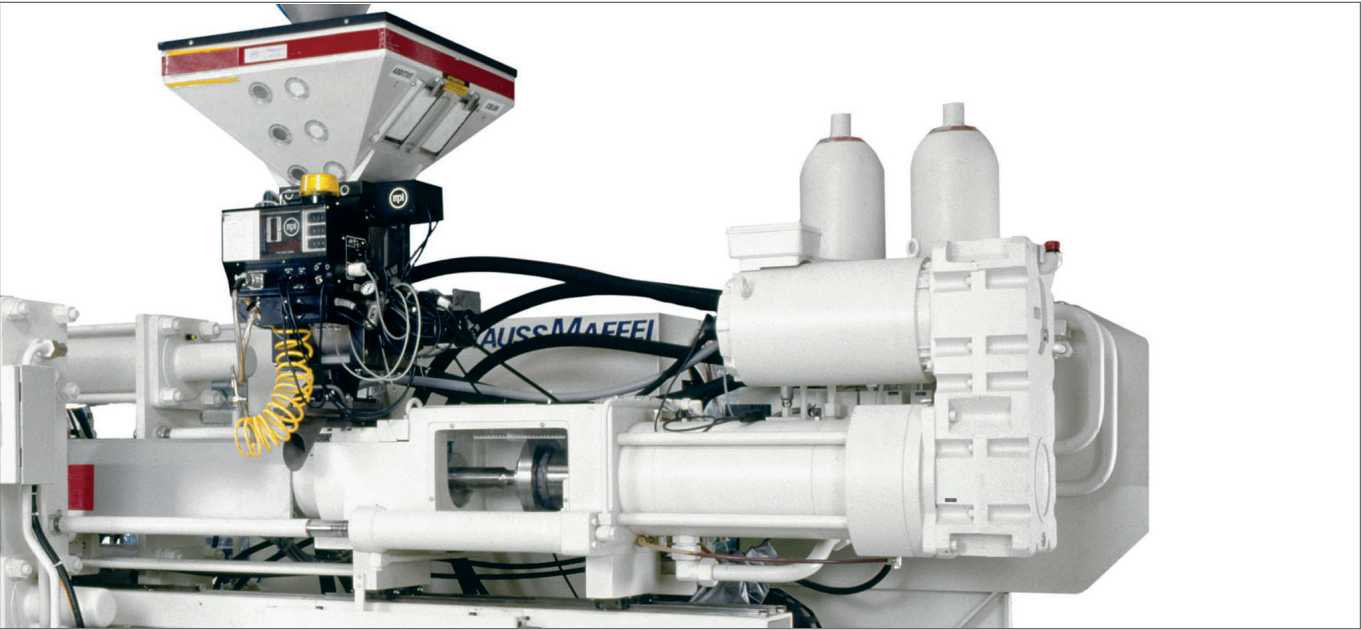
 **FREUDENBERG**
INNOVATING TOGETHER

TYPICAL, RECOMMENDED SEALS AND SEALING SYSTEMS FOR INJECTION MOLDING MACHINES

Freudenberg Sealing Technologies supplies compact sealing systems – among others comprising the well known seals of the Merkel® product brand – that ensure reliable sealing even under the extreme conditions encountered in the wide field of injection molding machines. The individual elements involved are ideally designed in terms of both materials and functionality, perfectly arranged in a system solution, and supplied from a single source.

Special adaptation to the requirements of injection molding machines ensures a very high level of tightness in all hydraulic components and a long functional life.

We put much energy into common customer development projects. The target is always the same: we consistently seek the best sealing solution. Even under demanding conditions customers around the globe rely on our product quality.



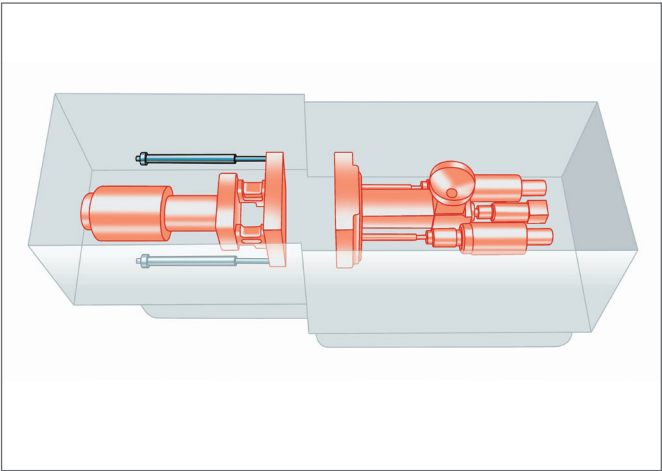
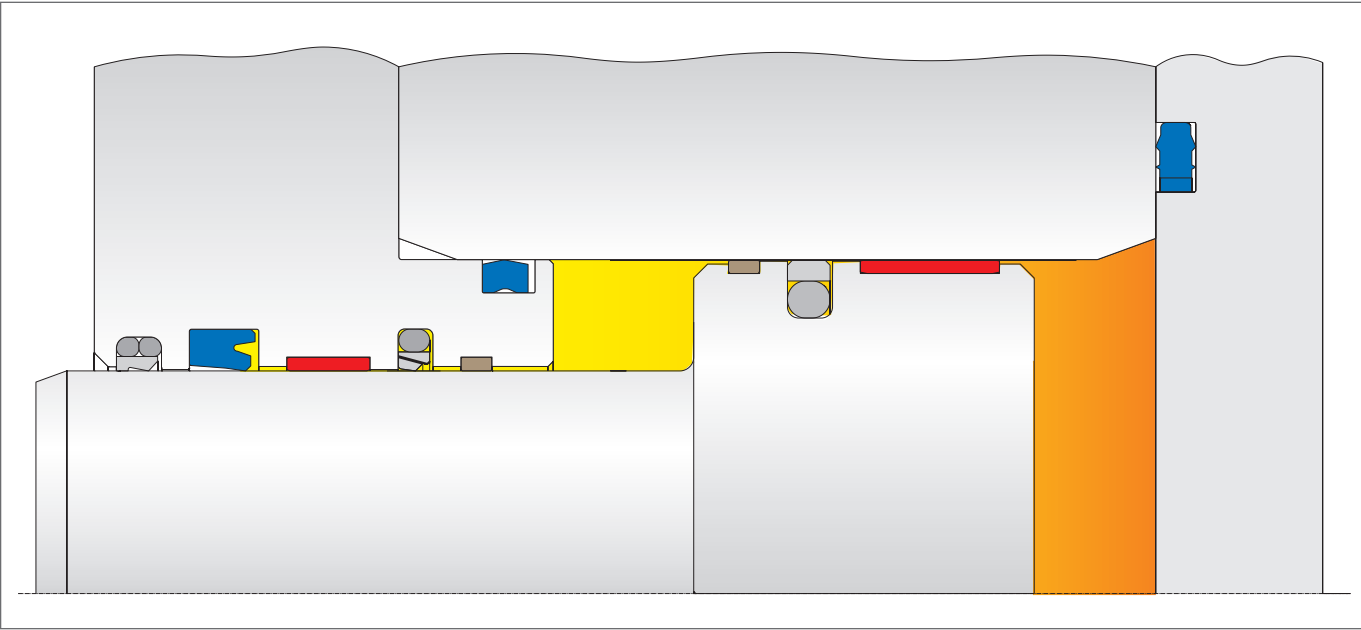
The figures indicated in this catalog are based on experiences gathered within the Freudenberg Group in the field of research over several decades for the development and manufacture of seals. They are in line with today's state-of-the-art expertise. However, the sealing effect provided by numerous products mentioned in this catalog is not only generated by the component proper. It is rather based to a very large extent – depending on the specific application involved – on other parameters such as the place of installation and counter rotation, the pressure applied, the operating temperature, the media to be sealed, the lubrication, vibration-related influences and possible dirt from outside.

These and further unknown factors are likely to exert a tangible influence on the function of seals in practical applications. Against this background, no standard statements can be made about the function of the products mentioned in the catalog. The data stated in the latter merely represent general, non-binding reference values which cannot be applied to every case of application. As a result, we recommend that you discuss concrete cases of application with our consulting services. In the event of higher and special stresses, e. g. exerted by aggressive media, the seal should be selected in cooperation with us, as functional reliability tests are frequently indispensable.

CLOSING UNIT – FAST-STROKE CYLINDER

Due to the high stroke speed, there remains a comparatively strong wetting of the counter surface with hydraulic oil. At the same time, due to the stroke length, a relevant amount of hydraulic medium is transported with each stroke. The use of an Omegat OMS-MR PR prevents a permanent pressure build-up in the intermediate space between the primary and secondary seals.

Typical Operating Parameters	
Movement	linear
Pressure	20 MPa
Stroke	1000 mm
Running Speed	1 m/s
Rod Diameter	80 mm
Piston Diameter	120 mm

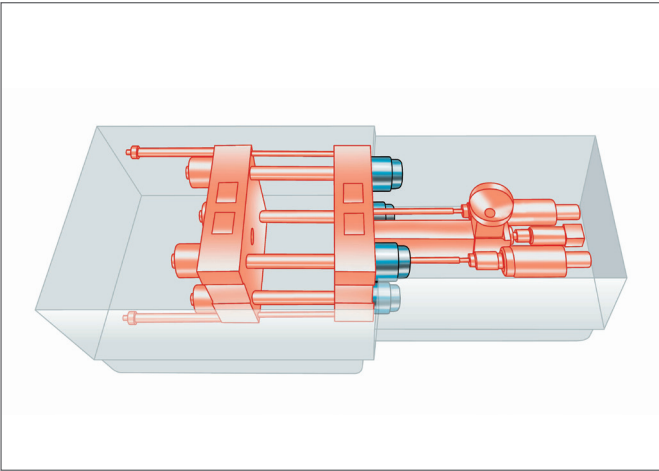
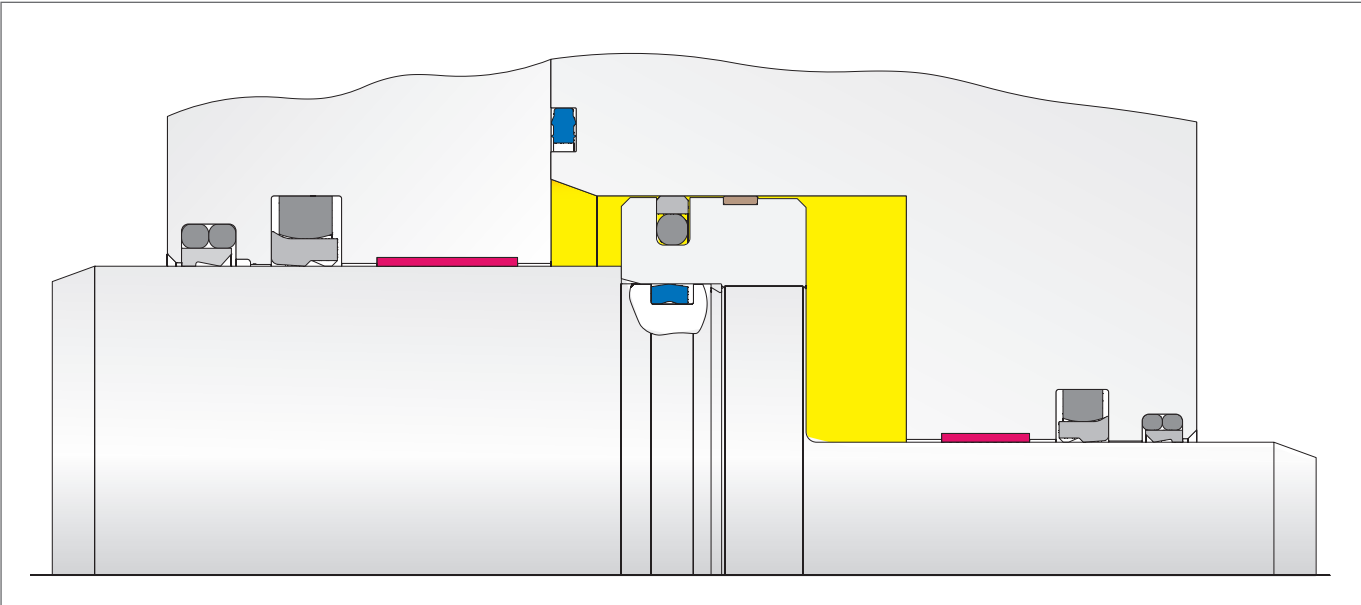


CLOSING UNIT – PRESSURE PAD

Due to the short stroke, only a little lubricant reaches the area of the sealing edge and the guide elements. A lubricating film is not built up. Sealing is quasi-static, so a secondary seal can be omitted here without restricting functionality. Operational reliability is ensured by the additional sealing edge of the PT1 double wiper.

The sealing materials used here, PTFE GM201 (PTFE-glass-MoS2 compound) or alternatively PTFE C104 (carbon fibre), have favorable sliding properties and behave neutrally towards the counter surface. The patented Guivex geometry of the guide bands improves the intake of lubricant. Due to the usually

compact design of the cylinders, only a short support length can be realized between the guide bands. This can result in a relatively large angular misalignment. Large sealing gaps can be achieved by using the Omegat OMS-S SR main seal. The excess stress in the edge area of the guide band, which is possible with a large angular offset, is avoided with the patented Guivex geometry. The operating pressure is maintained for several minutes. The solid support edge in the PTFE profile ring of the Omegat OMS-S SR increases the torsional stability and thus achieves favorable extrusion and wear behavior. The seal shows stable long-term behavior.

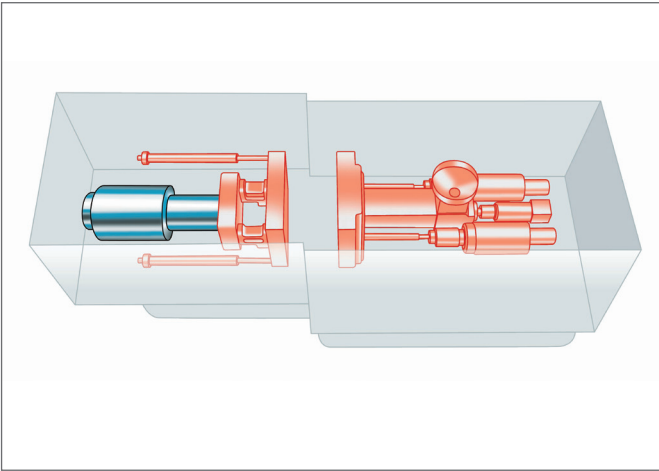
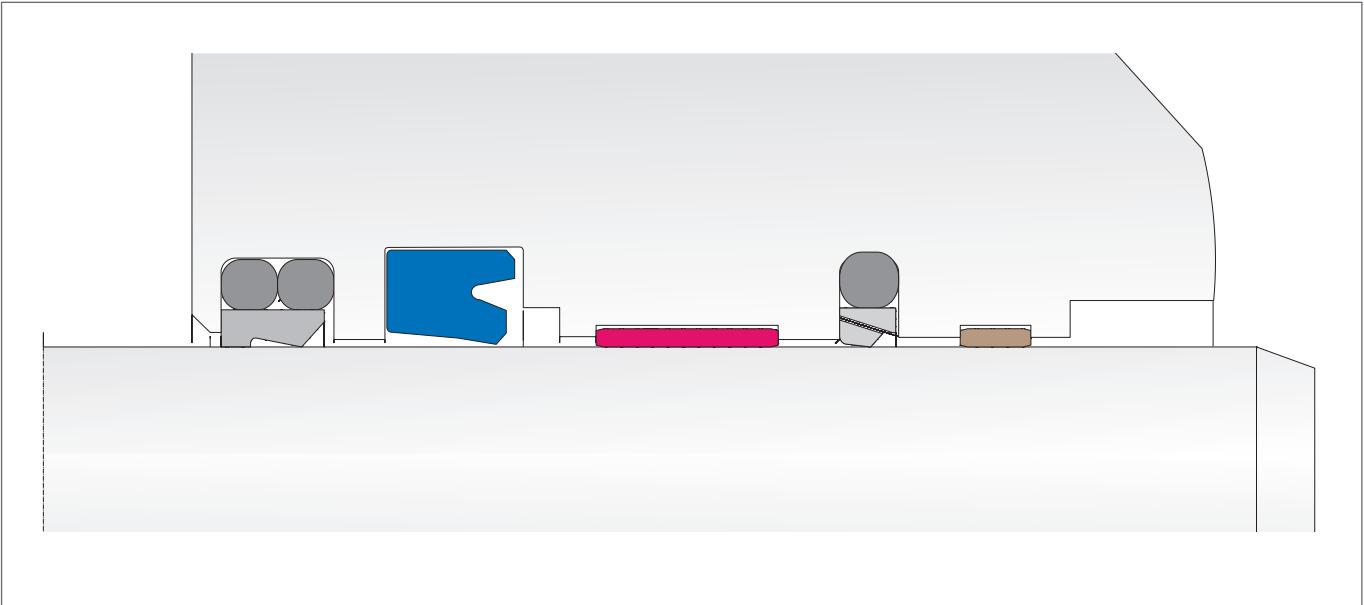


Typical Operating Parameters	
Movement	linear
Pressure	20 MPa
Stroke	5 mm
Running Speed	-
Rod Diameter	440/760 mm
Piston Diameter	800 mm

CLOSING UNIT – CLOSING CYLINDER

The maximum operating pressure is reached over a short stroke at minimum speed while reaching the end position. In this operating condition, an insufficient oil film is built up under the sealing edge. The sealing materials PTFE GM201 (PTFE-glass-MoS2 compound) or alternatively PTFE C104 (carbon fibre) prove themselves with favorable sliding properties and neutral behavior to the counter surface in the case of insufficient lubrication. Due to the high

stroke speed, there is comparatively strong wetting of the counter surface with hydraulic oil, especially during unpressurized operation. At the same time, due to the stroke length, a relevant quantity of hydraulic medium is transported with each stroke. The use of an Omegat OMS-MR PR reliably prevents a permanent pressure buildup in the gap between the primary and secondary seals.



Typical Operating Parameters	
Movement	linear
Pressure	20 MPa
Stroke	1000 mm
Running Speed	1 m/s
Rod Diameter	80 mm
Piston Diameter	120 mm

Typical Operating Parameters for Closing Cylinder	
Movement	linear
Pressure	20 MPa in the end position over 20 mm stroke
Stroke	800 mm
Running Speed	1 m/s pressureless or at low pressure
Rod Diameter	400 mm

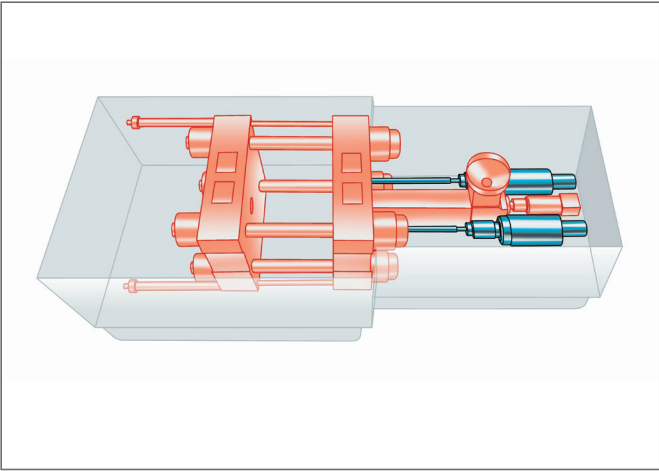
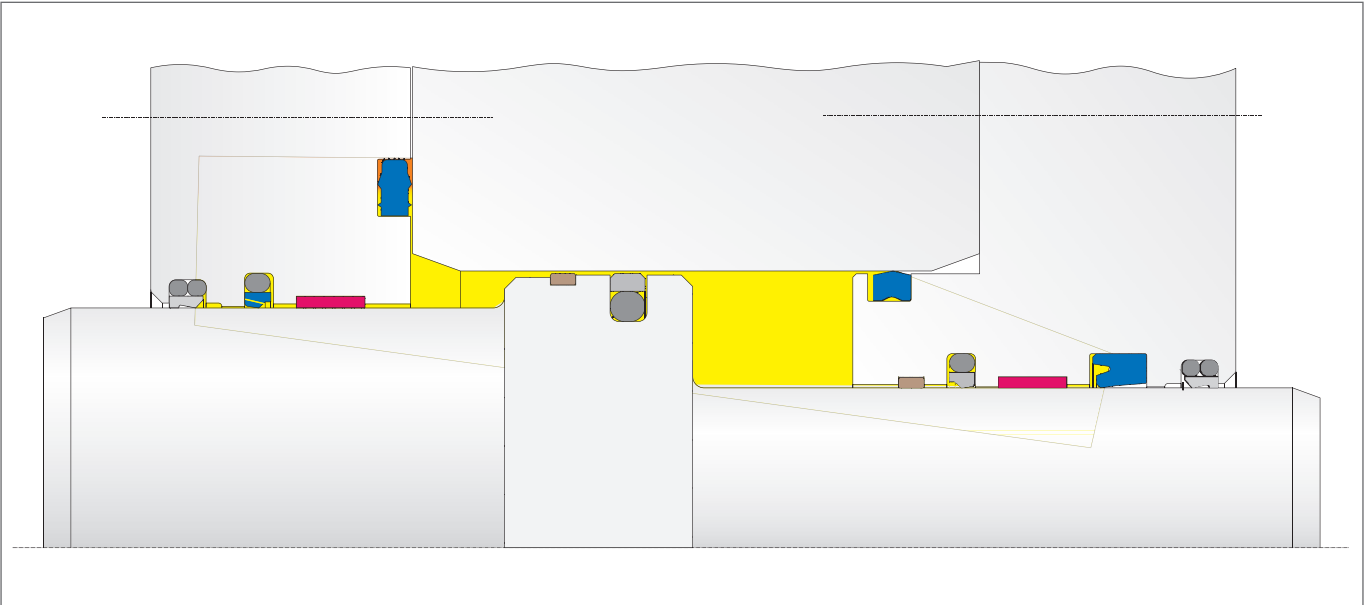
INJECTION UNIT – INJECTION CYLINDER

The operating pressure on the low-pressure side is comparatively low. No typical primary seal is required. The operational reliability of the sealing system is increased by the additional sealing edge of the PT 1 double wiper.

The stroke speed during injection differs significantly from that during plasticizing (retraction). Since the thickness of the lubricating film is influenced by the stroke speed and the pressure,

the oil balance is unbalanced, especially on the low-pressure side.

The required minimization of the dragged-out oil film with simultaneous improvement of the pump-back capacity in the low-pressure range is achieved with the optimized Omegat OMSU-MR PR made of polyurethane.

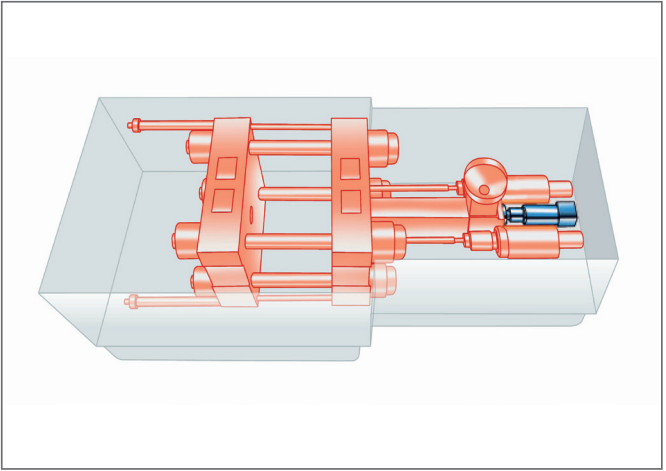
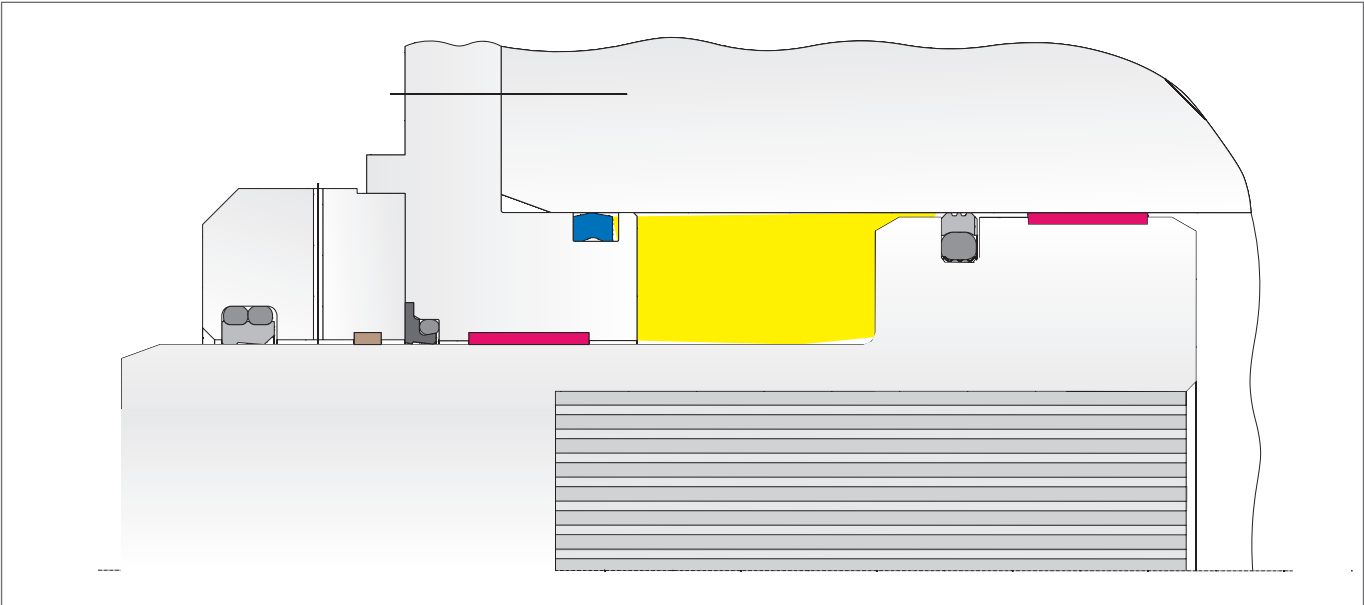


Typical Operating Parameters	
Movement	linear
Pressure (injection)	20 MPa/0,2 MPa
Pressure (pull-back)	3 MPa/0-3 MPa
Stroke	120 mm
Running Speed (injection)	0,4 m/s
Running Speed (pull-back)	0,04 m/s
Rod Diameter	70/105 mm
Piston Diameter	120 mm

INJECTION UNIT – INJECTION CYLINDER (TURN-STROKE)

The seals are stressed both in a stroke movement and in a combined rotary/stroke movement. The operating pressure for stroke movements is specified as 25 MPa. In rotary and rotary/stroke movements, the pressure of 2 MPa is applied for a maximum of 5 seconds. The matched geometry of the main seal takes into account both the requirements of the stroke movement with regard to sealing action and pressure

stability, and the requirements of the rotary movement with regard to the undesirable relative movement between the PTFE profiling and the preloaded element. In the combined rotary/stroke movement, additional frictional energy in the form of heat is introduced into the system compared with pure stroke movements.

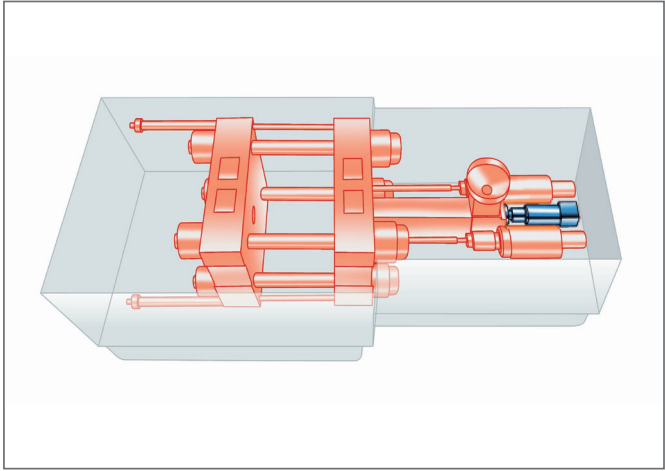
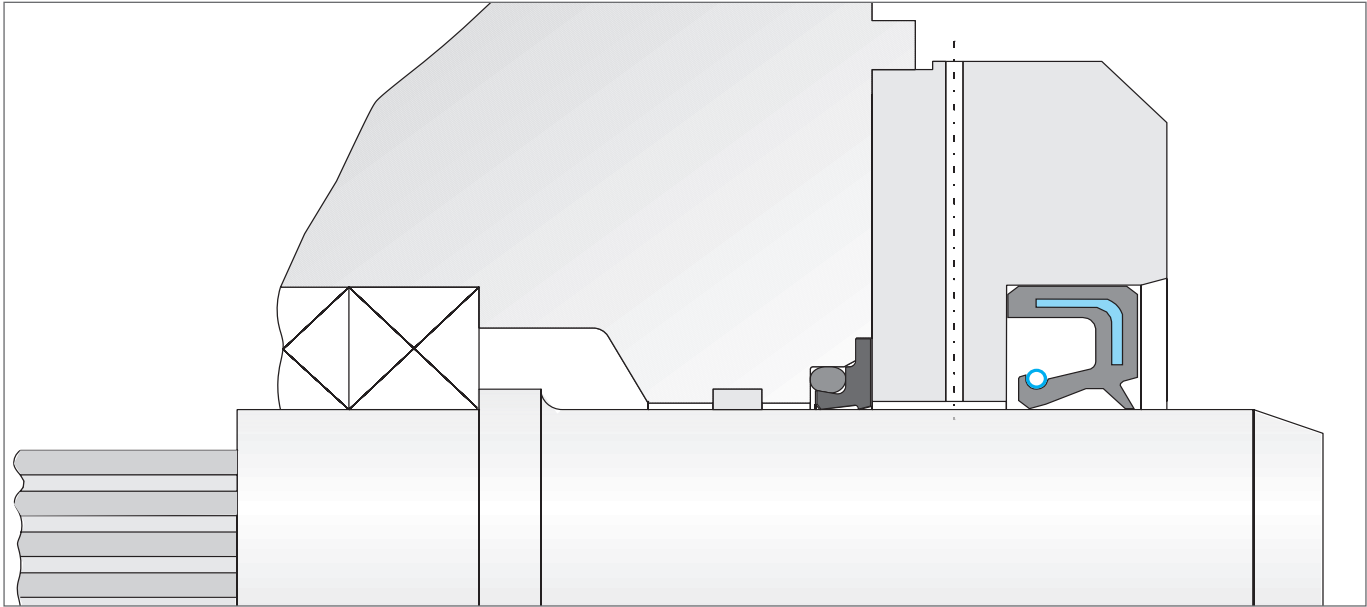


Typical Operating Parameters	
Movement	turn-stroke
Pressure (ring space)	2 MPa
Pressure (piston base)	2 MPa/ 25 MPa (stroke only)
Stroke	300 mm
Running Speed	0,5 m/s
Redation	3 m/s
Rod Diameter	250 mm
Piston Diameter	300 mm

INJECTION UNIT – DRIVE END (TURN-STROKE)

In addition to a purely static sealing function up to a pressure of 25 MPa, a rotational movement under short-term pressure load up to 2MPa is sealed.
The Omegat OMS-DR HB ensures that a relative movement takes place exclusively between the sealing element and the counter surface even during rotation. In addition, the geometric design of the PTFE profile ring as well as the PTFE compound used here,

PTFE C104 (TFM-PTFE carbon fiber compound), provide good extrusion and wear behavior.
In this application, the BAUMSLX7 Simmerring® designed for purely rotational movements provides an additional sealing edge that retains the residual oil film. The Simmerring® is not subjected to pressure.



Typical Operating Parameters	
Movement	turn-stroke
Pressure (rotation)	2 MPa
Pressure (static)	25 MPa
Velocity (rotation)	3 m/s tmax 5 s

Further Applications
Pressure cylinders, ejector cylinders, moving cylinders, locking cylinders. Sealing systems for fast stroke cylinders are used here for similar boundary conditions.

NOTES



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Bound by tradition – as a family owned company we know how important it is to rely on each other. For more than 165 years we’ve been listening to our customers to help reduce maintenance costs.



LOCAL SERVICE CENTER – MINIMIZING DOWNTIME, MAXIMIZING YOUR FLEXIBILITY

Our contacts at the service centers are qualified and able to give you competent advice. Their expertise will also be beneficial when it comes to choosing the most suitable sealing system. Here, the right choice is just as important for the best possible performance of the application as the quality of the individual seal.



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Maintenance, repair and overhaul cannot be avoided, but can be reliably controlled and economically organized by our heavy industry partners. We continuously train our staffs with the aim of successively increasing the efficiency of your production lines.



FREUDENBERG XPRESS® – SEALS WITHIN 24 HOURS, IF NEEDED

The worldwide Freudenberg Xpress® service comprises the complete range of machined seals as well as tailor-made elastomeric solutions and guides. It’s good to rely on a quality standard that keeps up with serial production.



Editorial Information

Freudenberg FST GmbH
Hoehnerweg 2–4
69469 Weinheim, Germany

Published by
Freudenberg Sealing Technologies GmbH
Heavy Industry, Hamburg

September 2021

www.fst.com

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