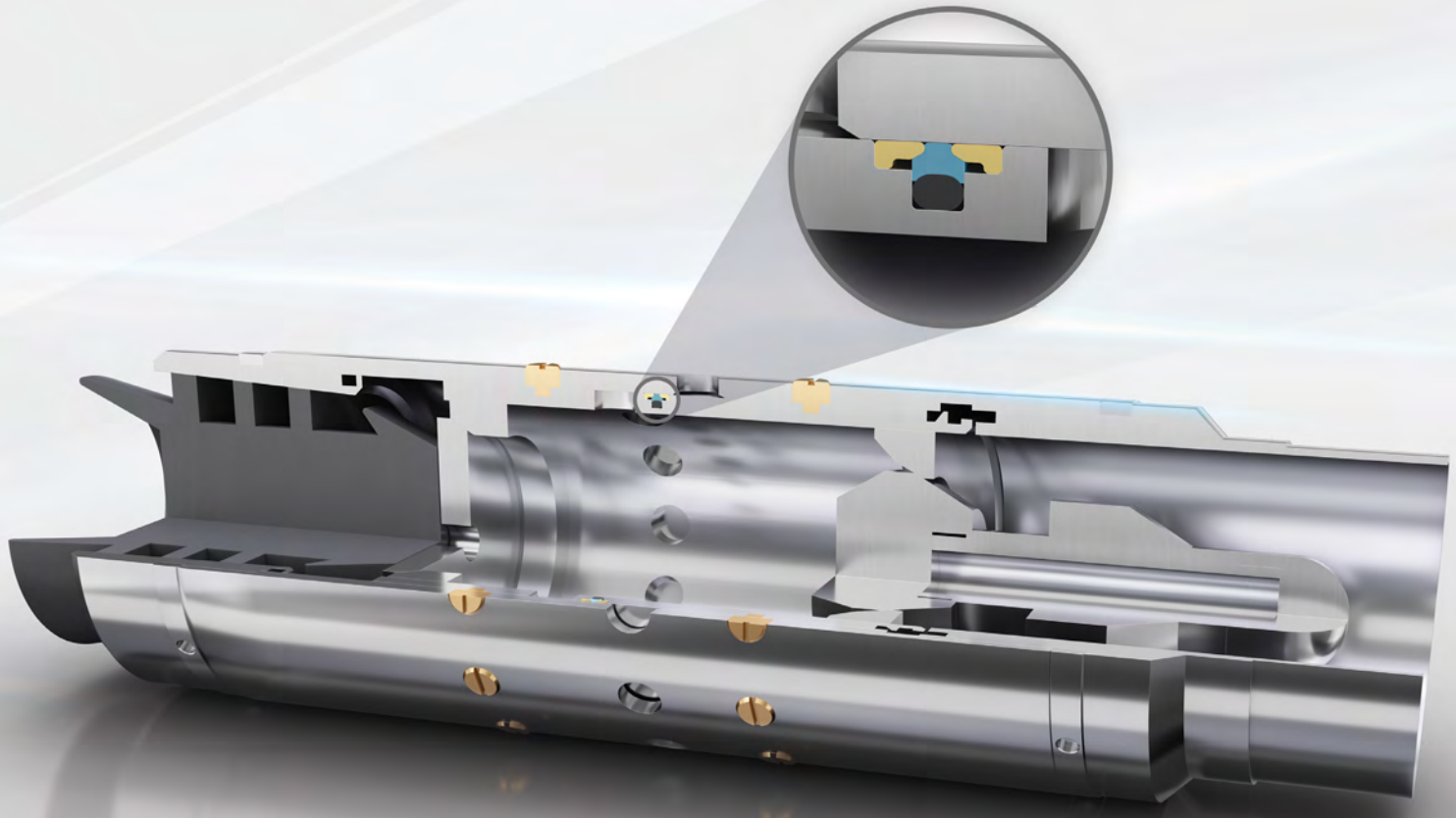
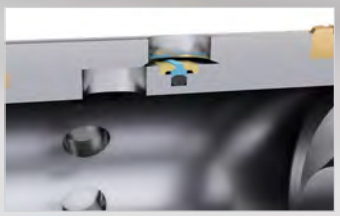
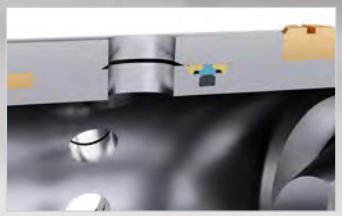
Port Crossing Seal

SIMPLIFY YOUR DYNAMIC PORT CROSSING SEALING REQUIREMENTS







Enhanced Design

Trelleborg's Port Crossing Seal is an enhanced solution for applications where space constraints or complexity is a challenge. The seal can be easily installed into a single-piece hardware design with a solid groove, similar to an O-Ring groove, which greatly simplifies the hardware design and reduces costs and complexity.

Each seal design is customized and created specifically for an application. The materials chosen will depend upon mating surface finishes, chemical compatibility, cycle life requirements, and industry material requirements. Groove dimensions can be optimized to application requirements.

ELASTOMER O-RING ENERGIZER

Provides radial energizing force on the seal cap during low pressure conditions

TURCON® CAPTIVE GLYD RING®

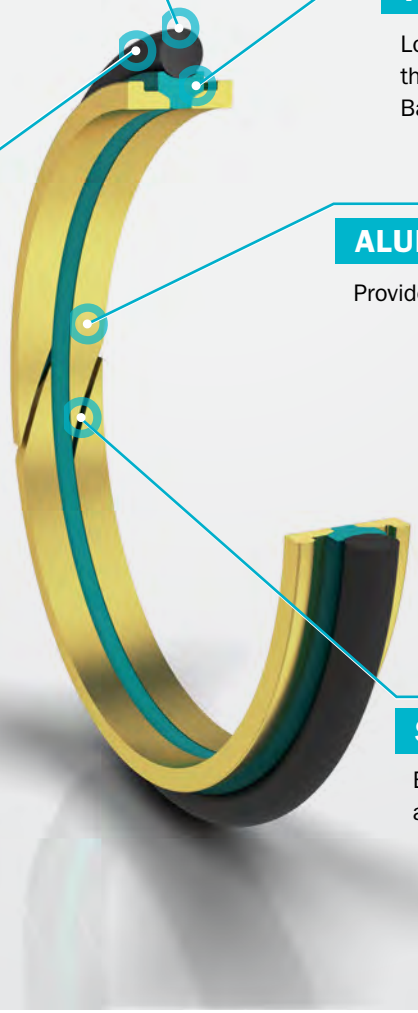
Low friction sealing element retained in the hardware groove by the split retainer Back-up Ring

ELASTOMER MATERIALS

Specified from a range of materials to ensure compatibility with media and temperatures

ALUMINUM BRONZE BACK-UP RING

Provides anti-galling properties



SPLIT RETAINER BACK-UP RING

Eliminates the need for a split hardware design and allows easy installation

Figure 1: Port Crossing Seal

Port Crossing Seal Introduction

ENHANCED DESIGN FOR SINGLE-PIECE HARDWARE INSTALLATIONS

There is increased potential for damage to occur to a seal used in dynamic port crossing applications, especially when subjected to high pressures. Prevention of damage can be a challenge. Trelleborg's Port Crossing Seal provides a reliable solution to successfully cross ports and other hardware features without damage.

It is designed for use in applications where seals need to transition across a port or slot within hardware, typically within oilfield linear valves or sliding sleeves used to direct fluid flow from an annulus to production tubing. Port Crossing Seals can also be used in cement port collars where they allow the cement to flow to the correct area.

The unique design of the Port Crossing Seal utilizes Trelleborg's Turcon® Captive Glyd Ring® technology, which combines a seal and O-Ring with a split retainer Back-up Ring, removing the requirement for a split seal hardware design to capture the seal.

High-pressure static sealing performance

Easy to Install

Retrofits to existing hardware

Withstands repeated port crossings

APPLICATIONS

- Gas lifts
- Isolation valves
- Chemical injection
- Plug and packer settings
- Drill stem test tools
- Cement port collars
- Sliding sleeves

BENEFITS

- Enables a single-piece hardware design
- Withstands multiple port or slot crossings under pressure
- Provides high-pressure static sealing capabilities
- Reduces tool complexity and part count
- Suitable for temperatures up to +176 °C / +350 °F
- Easily retrofitted to existing hardware
- Available in both rod and piston design configurations

Proven Performance

TESTING DEMONSTRATED EFFECTIVE LEAKAGE PREVENTION FOR UP TO 30 CYCLES AT TEMPERATURES OF +21 °C / +70 °F AND PRESSURES OF 28 MPA / 4000 PSI

To verify the seal concept and performance, Trelleborg Sealing Solutions conducted in-house testing using a 1 inch diameter rod and split aluminum bronze Back-up Rings, with a Turcon® T46 seal cap energized by a 70 durometer Fluoroelastomer (FKM) O-Ring.*

The hardware groove is a custom-made, solid groove, with no splitting of the hardware.

Rod Design Considerations

During testing, the seal was subjected to several pressure and temperature combinations using a rod with recessed ports and ports flush to the outer diameter (OD) of the rod. These tests concluded that ports must be recessed and not be flush with the OD of the rod to prevent potential damage to the seal (see Figure 2).

* This is the same standard seal design found in the Trelleborg' Sealing Solutions Turcon® Captive Glyd Ring® brochure.

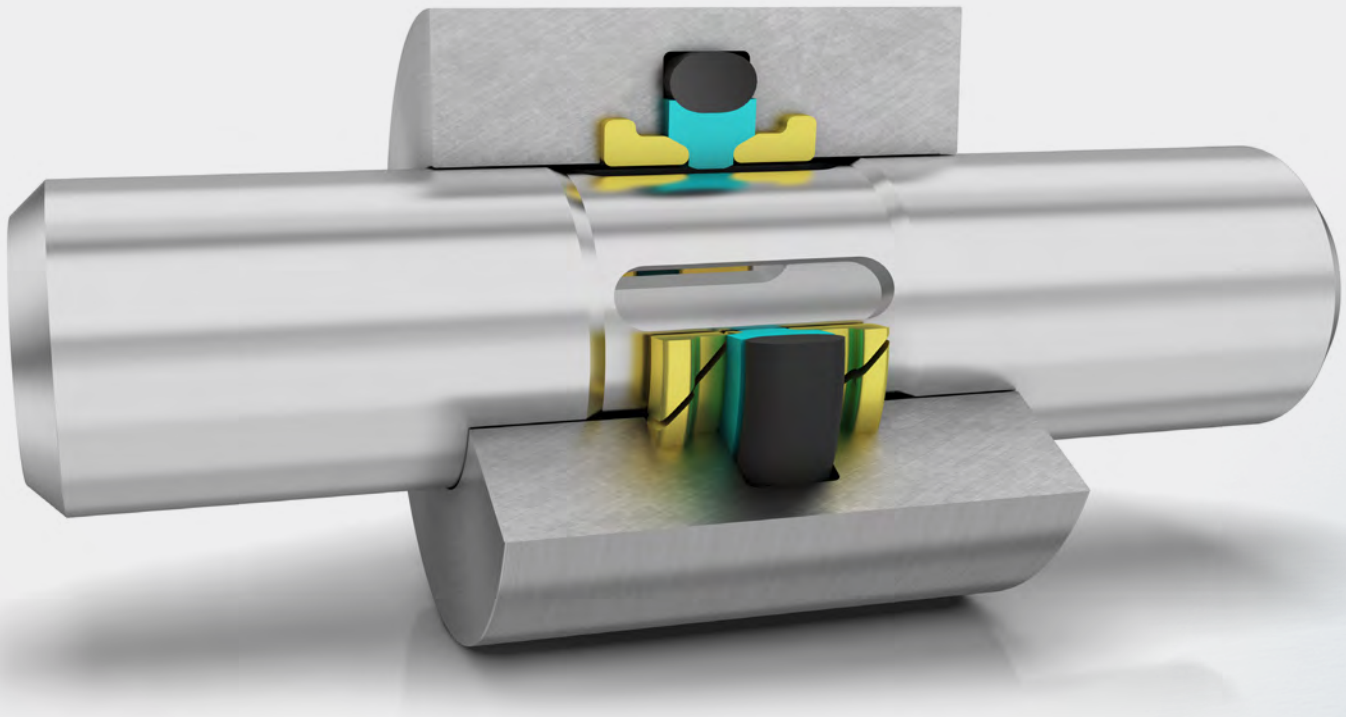


Figure 2: Recessed rod ports

Temperature and Pressure Conclusions

Using recessed ports, further tests used nitrogen gas under high pressures, which increased by 7 MPa / 1000 psi increments if there was no leakage.

The seal was stroked across the ports under pressure and then stopped on the non-ported sections of the rod to test the ability of the seal to withstand pressure levels. Tests demonstrated:

- At +21 °C / +70 °F, the Port Crossing Seal effectively prevents leakage for 30 cycles at up to 28 MPa / 4000 psi. As pressure further increases, cycle life drops, resulting in a maximum of 17 cycles at 42 MPa / 6000 psi.
- At +176 °C / +350 °F, the Port Crossing Seal performs effectively for 30 cycles at up to 7 MPa / 1000 psi. Cycle life decreased to 27 cycles at 14 MPa / 2000 psi.
- At +176 °C / +350 °F with pressures over 14 MPa / 2000 psi, leakage resulted in every port crossing pass.

Detailed results can be obtained from Figure 3.

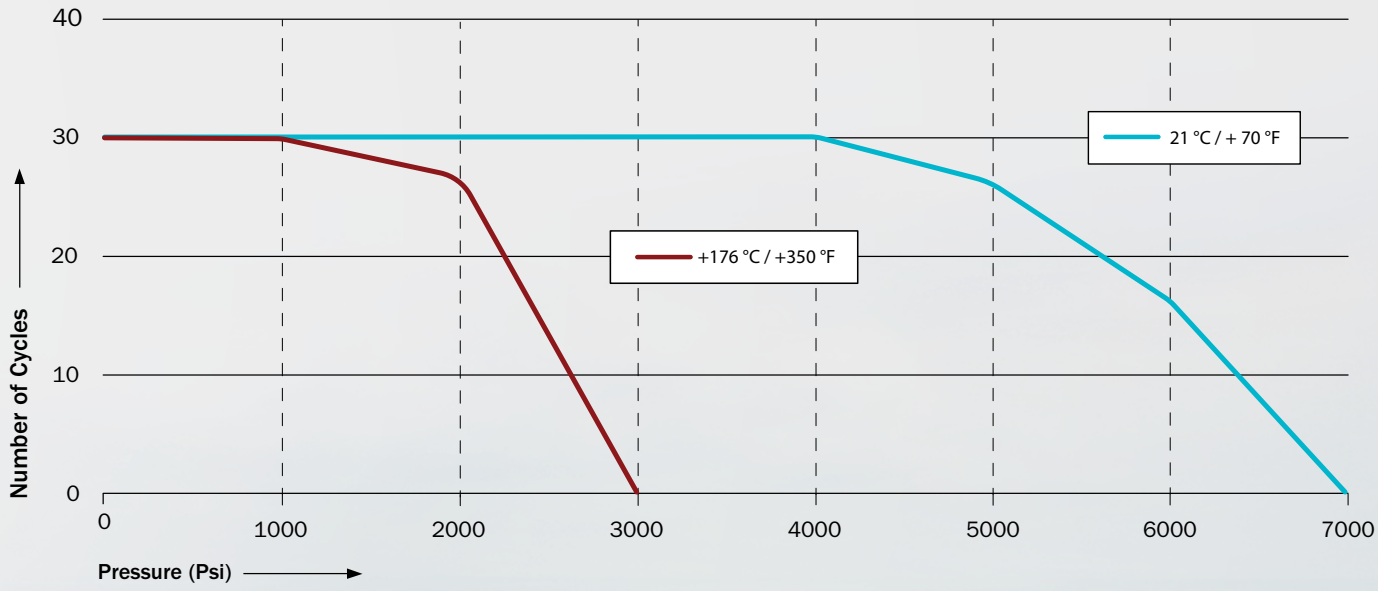


Figure 3 : Port Crossing Seal - number of cycles by temperature

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way.

Trelleborg Sealing Solutions is a leading developer, manufacturer and supplier of precision seals, bearings and custom-molded polymer components. It focuses on meeting the most demanding needs of aerospace, automotive and general industrial customers with innovative solutions.

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Version no. 9900111ENGG0822