Oil & Gas Sealing Capabilities

YOUR PARTNER FOR SEALING TECHNOLOGY
Providing a high performance sealing solution for nearly all applications, our materials and products can be utilized on anything from downhole drilling motors to oil platform tensioner systems, from subsea valves to refinery separation equipment. Seals from Trelleborg Sealing Solutions provide proven performance in a wide variety of systems used in exploration, refining, production and completion activities.

Trelleborg Sealing Solutions has been involved in oil & gas operations since the 1960s. Based on unrivalled experience, we have developed an outstanding range of sealing materials for our products including PTFE, PEEK, elastomers and composites. Meeting industry standards, most of these are proprietary and specifically engineered to withstand severe conditions encountered during offshore or onshore operations.

The technological horizon of the oil & gas industry is ever changing. As wells become deeper and processing more aggressive, the working conditions for seals and bearings become more demanding. Through significant investment in research and development, Trelleborg Sealing Solutions meets these challenges with continuous advances.
OUTSTANDING SERVICE

Trelleborg Sealing Solutions is committed to optimizing customer partnerships through value-added services.

LOCAL PRESENCE, GLOBAL REACH
- Manufacturing and engineering resources in over 40 countries
- Unrivalled global footprint
Benefit: Consistent product and support worldwide

ADVANCED DELIVERY
- Stock holding for rapid delivery
- Global stocking programs
Benefit: Helps avoid downtime

FINITE ELEMENT ANALYSIS (FEA)
- Market leading non-linear analysis
- Qualifies prototype candidates without testing
Benefit: Accelerates time to market

PROVING APPLICATIONS
- Rotary, reciprocation and static testing available
- Utilize customers’ test equipment
Benefit: Proves solutions before fitment

ENGINEERING EXPERTISE
- Shoulder-to-shoulder engineering
- Present at all stages, from prototype development to bringing equipment to market
Benefit: Partnerships for the optimum sealing solution

MANUFACTURING CAPABILITIES
- Seals in elastomers, PTFE, PEEK and composites
- Fleximold™ large seal manufacturing
Benefit: One-stop-shop for all bearing and sealing requirements
A revolutionary seal welding technology from Trelleborg Sealing Solutions allows seals to be welded in-situ on an FPSO platform, eliminating the need for the vessel to disconnect and return to shore.

Utilizing Trelleborg’s already well-established seal materials, this technology will massively reduce the downtime and associated costs that come from maintaining an FPSO swivel stack. Currently, swivel stack maintenance requires a vessel to travel back to shore so that components can be completely disassembled and seals replaced. Through optimized billet welding, Trelleborg’s SealWelding™ technology means a replacement seal can be welded in-situ in its original material.

Offshore, onboard the FPSO, the seal is unpacked and installed onto the swivel by personnel from Trelleborg’s service team; the skilled engineer installs it in the Weld Head Enclosure (part of the welding machine) which, certified to ATEX zone 1, is then pressurized so that the welding can take place. Fully enclosed, production on other swivel stacks can continue without risk.

1. Swivel seal is leaking in operation.
2. Opened swivel stack reveals damaged seal on-site.
3. Damaged seal is removed and new split Turcon® Variseal® is inserted inside swivel.
4. Turcon® Variseal® is welded to correct diameter using the Trelleborg Sealing Solutions proprietary SealWelding™ process.
5. SealWelding™ process is complete, equipment is removed and the Turcon® Variseal® is successfully welded together and ready for service.
The broad range of Trelleborg Sealing Solutions products feature in numerous demanding and critical applications.

**DOWNHOLE TOOLS**
Downhole tools need solutions that withstand extreme temperatures and aggressive media. Offering extended life they allow oil & gas extraction from the lowest depths – reliability and leak-free operation are critical.

**Turcon® V-Stack**
- Custom stack of Chevron rings and/or Variseal® elements
- Suits specific working requirements
- Robust sealing with proven success

**Turcon® Wedgpak®**
- Compact, space saving bi-directional seal
- Improvement on traditional seal options

**Turcon® T-Seal**
- Fits into standard O-Ring grooves for retrofit
- Long proven track record

**Turcon® Captive Glyd Ring®**
- Utilized for crossing ports under pressure
- Minimizes or eliminates damage from port or undercut crossing

**ALL SEALS**
- Available in industry approved materials – NORSOK M-710, API
- Accelerated speed to market with rapid prototyping
BALL VALVES & GATE VALVES
Seals must withstand elevated temperatures and pressures in severe-service valve stem applications.

Turcon® Variseal® MC
- Spring-energized PTFE based seal for low break out even after extended installation periods
- Compatible with virtually all media
- Inherently immune to RGD (Rapid Gas Decompression) effects

TENSIONER CYLINDERS
Twenty year or longer maintenance-free seal life is critical to prevent downtime and loss of revenue.

Turcon® AQ-5
- Available in large diameters with no tooling charges
- Proven extended life with low maintenance costs
- Very low coefficient of friction

HYDRAULIC SWIVELS
Increasing speeds and pressures require innovative and unique seal designs to handle challenges in swivels.

Turcon® Roto Glyd Ring® II
- Double-acting elastomer-energized seal with unique rubber-to-PTFE bonded profile
- Low-friction operation
- Made for any diameter or hardware retrofit
Trelleborg Sealing Solutions offers a number of industry specific compounds compliant with various national and international standards. A range of elastomer and thermoplastic materials are available which are tested in accordance with NORSOK M-710 specifications.

**ELASTOMERS**

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>XploR™ H9T20</td>
<td>HNBR</td>
<td>One of the more popular choices for EDR service conditions</td>
</tr>
<tr>
<td>XploR™ V9T20</td>
<td>FKM</td>
<td>Our standard XploR™ fluoroelastomer (FKM) EDR elastomer</td>
</tr>
<tr>
<td>XploR™ V9T22</td>
<td>FKM</td>
<td>Offers high and low temperature EDR capability</td>
</tr>
<tr>
<td>XploR™ J9513</td>
<td>FFKM</td>
<td>Extreme H₂S resistance combined with high temperature performance</td>
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**POLYETHEREHERKETONE (PEEK) FOR BEARINGS AND BACK-UP RINGS**

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<th>Material</th>
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<tr>
<td>HiMod® 550</td>
<td>PEEK</td>
<td>Standard virgin PEEK</td>
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<tr>
<td>HiMod® 914</td>
<td>PEEK</td>
<td>Excellent chemical resistance and good thermal properties</td>
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<tr>
<td>HiMod® 921</td>
<td>PEEK</td>
<td>Highly lubricated, medium-modulus compound</td>
</tr>
<tr>
<td>HiMod® 924</td>
<td>PEEK</td>
<td>Provides low thermal expansion and high mechanical properties</td>
</tr>
<tr>
<td>HiMod® 960</td>
<td>PEEK</td>
<td>Standard virgin PEEK</td>
</tr>
<tr>
<td>Zurcon® Z43</td>
<td>PEEK</td>
<td>For high pressure and temperature applications</td>
</tr>
<tr>
<td>Zurcon® Z431</td>
<td>PEEK</td>
<td>Standard virgin PEEK</td>
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<tr>
<td>Turcon® T05</td>
<td>PTFE</td>
<td>Offers gas-tight sealing with long service life</td>
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<tr>
<td>Turcon® T07</td>
<td>PTFE</td>
<td>Preferred material for downhole tool service</td>
</tr>
<tr>
<td>Turcon® T12</td>
<td>PTFE</td>
<td>Gives very good performance in valve applications</td>
</tr>
<tr>
<td>Turcon® T24</td>
<td>PTFE</td>
<td>Ideal for slow rotation or poorly lubricated applications</td>
</tr>
<tr>
<td>Turcon® T29</td>
<td>PTFE</td>
<td>Offers excellent performance in rotary or linear applications</td>
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<tr>
<td>Turcon® T42</td>
<td>PTFE</td>
<td>Good for service in hydraulic systems with good dielectric properties</td>
</tr>
<tr>
<td>Turcon® T99</td>
<td>PTFE</td>
<td>Preferred compound for dry running or poorly lubricated applications</td>
</tr>
<tr>
<td>Turcon® M12</td>
<td>PTFE</td>
<td>Unrivalled across-the-board performance</td>
</tr>
<tr>
<td>TFM Q2J</td>
<td>TFM</td>
<td>Offers outstanding stability at elevated temperatures</td>
</tr>
<tr>
<td>TFM M02</td>
<td>TFM</td>
<td>For cryogenic applications due to ultra-low temperature resilience</td>
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Additionally, Trelleborg Sealing Solutions has a large number of materials independently tested against ISO 10423 Annex F.1.3.5.2 for use in drilling and production equipment:

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<tr>
<td>XploR™ V9T22</td>
<td>FKM</td>
<td></td>
</tr>
<tr>
<td>XploR™ V9T82</td>
<td>FKM</td>
<td></td>
</tr>
<tr>
<td>XploR™ J9503</td>
<td>FFKM</td>
<td></td>
</tr>
<tr>
<td>XploR™ J9510</td>
<td>FFKM</td>
<td></td>
</tr>
<tr>
<td>XploR™ H9T20</td>
<td>HNBR</td>
<td></td>
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For more information on Trelleborg’s comprehensive portfolio of approved materials, visit tss.trelleborg.com or contact your local Trelleborg Sealing Solutions marketing company.
Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative engineered solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has local presence in over 40 countries around the world.

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