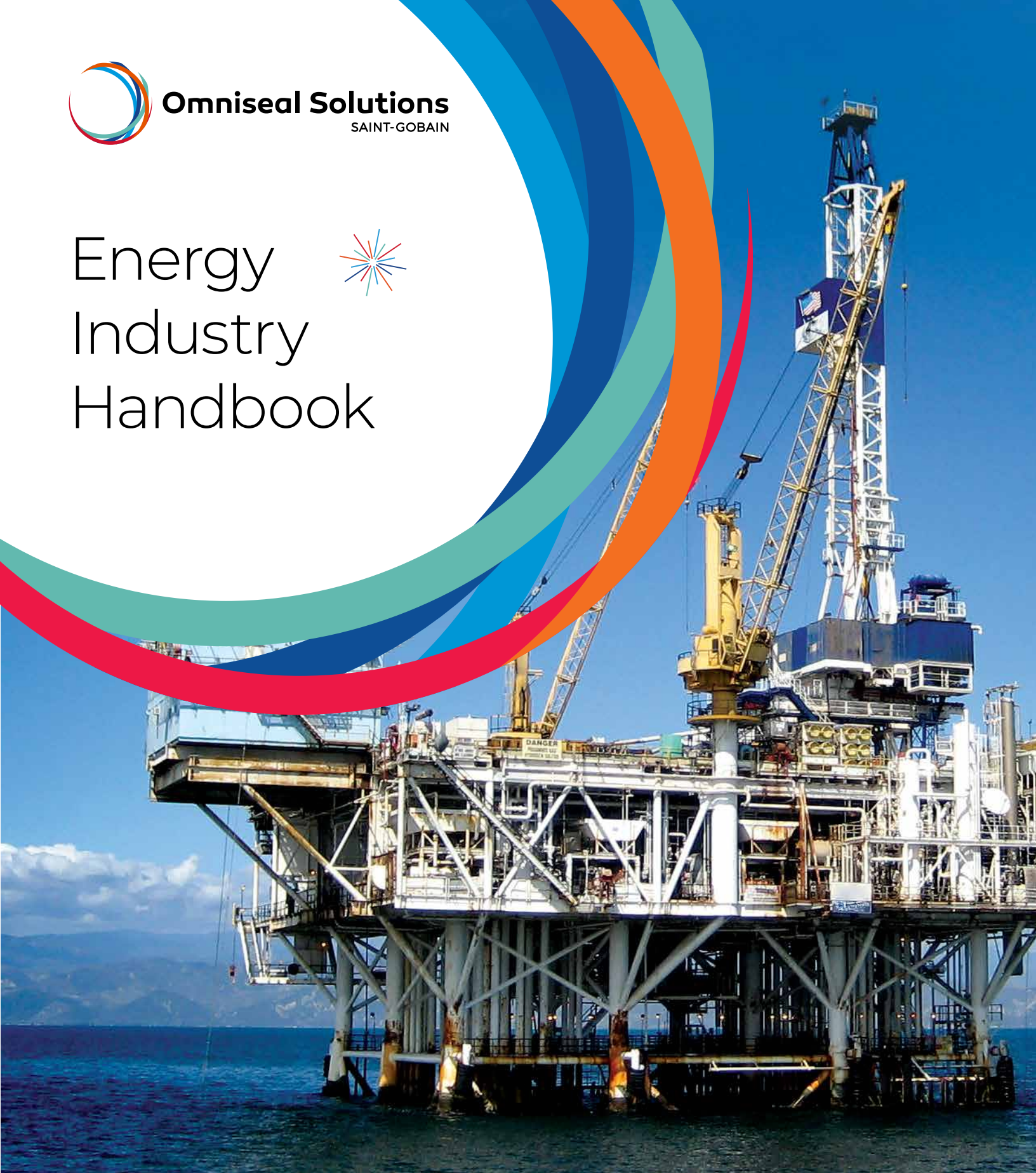




Energy Industry Handbook

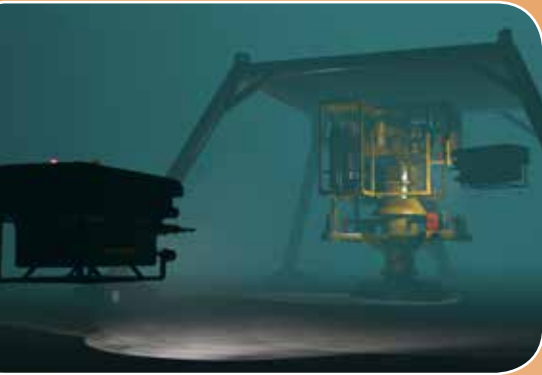


Beyond the boundaries of
POSSIBLE



CUSTOM DESIGNED SEALING SYSTEMS & POLYMER SOLUTIONS

Subsea



Since the recent fall of oil prices, O&G majors have developed new strategies to lower break-even costs and reduce cycle times of their deepwater projects. A key contributor was a systematic effort to standardize subsea trees and components. Meanwhile, there is a shift towards more extreme pressure/temperature operating conditions pushed by production from more complex reservoirs.

To meet and exceed customer demand for high-performance sealing solutions, we drew from the best of R&D investments as well as our broad experience addressing extreme pressure and temperature conditions.

We provide our customers with pre-validated and field-proven sealing solutions delivering reliable fluid control for the most critical applications.

KEY APPLICATIONS

Subsea ball, gate, choke valves	Multiphase flowmeters
API 17D subsea wellhead and Christmas tree equipment	API 6DSS subsea pipeline valves
	Hydraulic couplings

Floating Equipment



In fluctuating market conditions, Floating Production, Storage and Offloading (FPSO) vessels demonstrate inherent advantages compared to other floating production system types: operating flexibility, range of water depth, conversion possibilities, and storage capacity range. With other offshore facilities, FPSO technical characteristics are still impacted by fluid viscosity, pressures and temperatures that could lead to more complexity and technical challenges for the topside equipment.

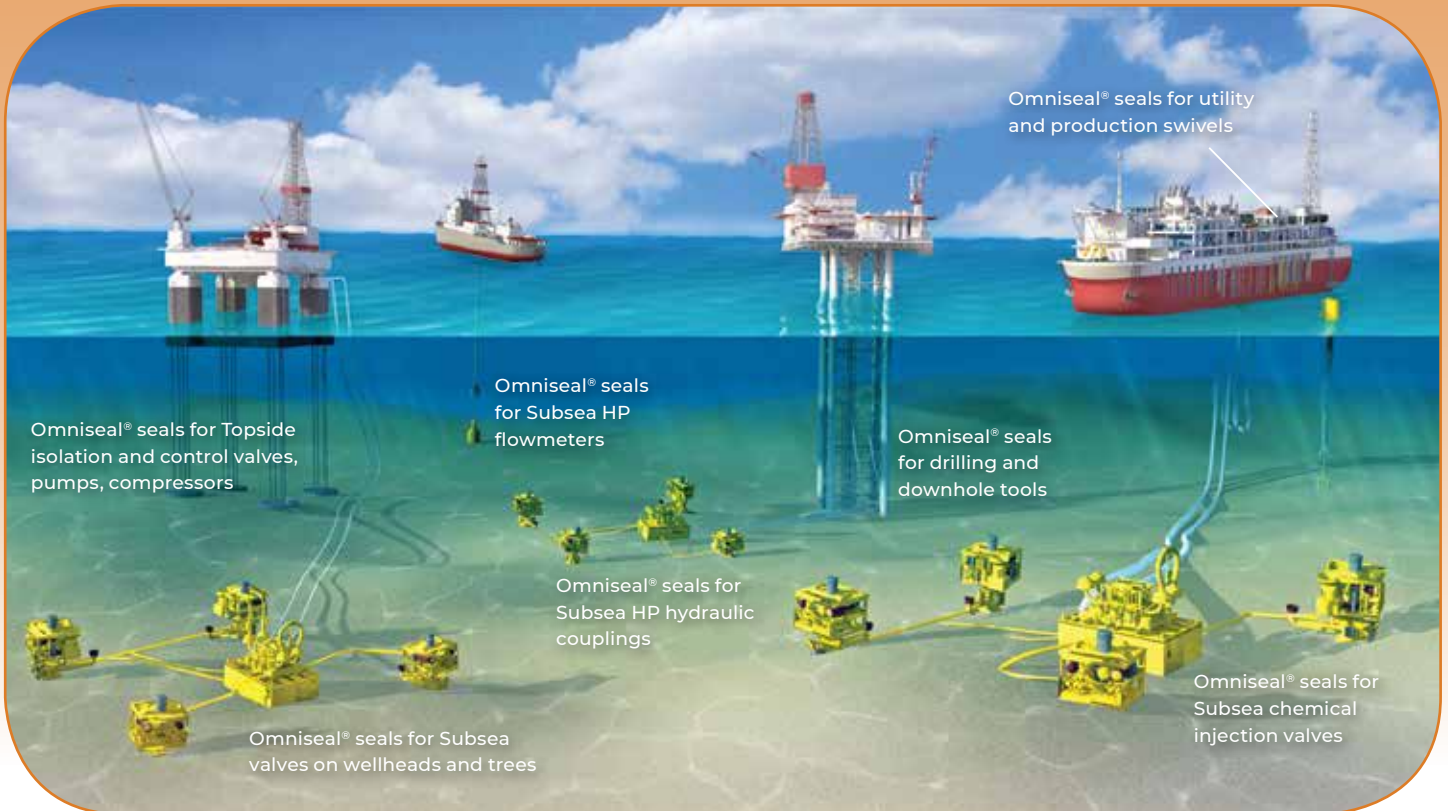
To meet with harsher reservoir conditions, HPHT FPSO turret swivel stacks systems are being developed to cope with the above operating condition challenges that push the limits of existing sealing solutions.

Consequently, we have developed a cost-effective, flexible and highly scalable technique to manufacture large diameter sealing systems, incorporating anti-extrusion rings in Meldin® 5000 series (proprietary PEEK based materials) without any limitations in diameters.

KEY APPLICATIONS

Production and utility swivels	CALM buoys
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GOING BEYOND WITH SEALING & MATERIAL SOLUTIONS



Omniseal® 103A seal with V-packing



Various Omniseal® spring-energized seals designed to your needs



Omniseal® RACO® spring-energized seals

Proven in the Past...

In the 1970s, Omniseal Solutions™ introduced Omniseal® spring-energized seals to the oil and gas market in order to solve reliability and durability problems caused by the severe limitations of elastomeric seals. These spring-energized seals, which had already proven themselves extensively in the aerospace industry, addressed critical issues including aggressive media, sour gas environment, resistance to rapid gas decompression and extreme operating conditions.

This additional experience inspired the Omniseal Solutions™ to design a series of innovative sealing solutions that consistently and reliably met the ever-increasing requirements of high-performance equipment manufacturers.

... Prepared for the Future

USED FOR THE MOST DIFFICULT OPERATING CONDITIONS

Cryogenic

Driven by industry standards, strict regulations and end user demands, manufacturers of cryogenic valves and transfer equipment are faced with the daunting responsibility of finding sealing solutions that cope with low leakage challenge requirements while lowering operating costs.

We have developed a new generation of bespoke Omniseal® spring-energized seat seals for cryogenic trunnion mounted ball valves (TMBV) compliant with the most stringent industry standards such as SHELL MESC SPE 77-300. These are ideal solutions for the LNG value chain: export and import terminals, carriers, bunkering and small scale logistics.

KEY APPLICATIONS	
Cryogenic valves	Cryogenic hoses
Cryogenic rotary swivels for LNG, LPG, LEG	Cryogenic pumps
	Cryogenic breakaway couplings, ERS, QCDC

Surface

For leading oil and gas surface systems equipment manufacturers, we are very much the expert of choice for field-proven sealing solutions in numerous surface applications in conventional and unconventional areas. Our innovative solutions comply with industry standards such as as PR2 test procedure as per API 6A annex F and the most stringent fugitive emission specifications. Designed to minimize cost, enhance lifetime and ensure safety, we help you reach sustainable performance excellence.

KEY APPLICATIONS	
API 6D pipeline valves	API 6A valves for wellhead and Christmas tree equipment
Downhole tools	

Fugitive Emission Valves

Major energy companies have made big investments in natural gas in recent years, steadily growing their production volumes. Methane, the main component in natural gas, is a potent greenhouse gas that has drawn negative attention due to fugitive emissions leaking into the atmosphere.

In response, O&G majors recently signed a set of guiding principles, committing to drive down methane emissions to ensure that natural gas continues to play a critical role in helping meet future energy needs.

Our response to the critical need for low fugitive emissions from valves was to develop a range of high-performance stem sealing systems for ON/OFF and CONTROL valves that pass leakage tightness of Class A according to the ISO 15848-1 standard from -50°C to +200°C.

KEY BENEFITS	
No need for secondary seal	Self-energized solution, does not need to be compressed axially
Simplified hardware design	
Lower operating torques / forces, long life	Easier installation compared to compression packings

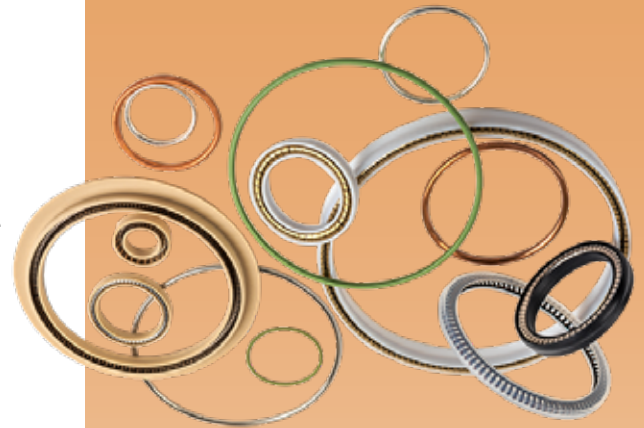


Critical Parts Protecting Oil & Gas Energy Core Systems

Over four decades, Omniseal Solutions™ has built unique expertise in designing high-performance sealing systems and polymer components that meet and exceed the continuously increasing performance requirements for extreme temperatures, high pressure and fugitive emissions.

We support our customers with strong technical competencies in design engineering, testing and R&D tools such as finite element analysis using our proprietary thermoplastic material models.

Our thermoplastic materials are certified in accordance with API 6A specification (ISO 10423) Appendix F.1.13.5.2 relating to sour fluid (FF/HH) resistance and with NORSOK M710, rev3 up to 25% H₂S / 200°C.



Testing Capabilities	Applications	Test Protocol
HPHT	Surface or Subsea Valve Stem Seal	Compliant with PR2 test procedure as per API 6A annex F and API 17D
	Surface or Subsea Valve Seat Seal SPE / DPE	Compliant with PR2 test procedure as per API 6A annex F and API 17D
Fugitive Emission	Surface Valve Stem Seal	Compliant with ISO 15848-1
Cryogenic	Trunnion Mounted Ball Valve Seat Seal	Compliant with SHELL SPE 77-300, ISO 28921-2, BS 6364

Our Core Competencies:

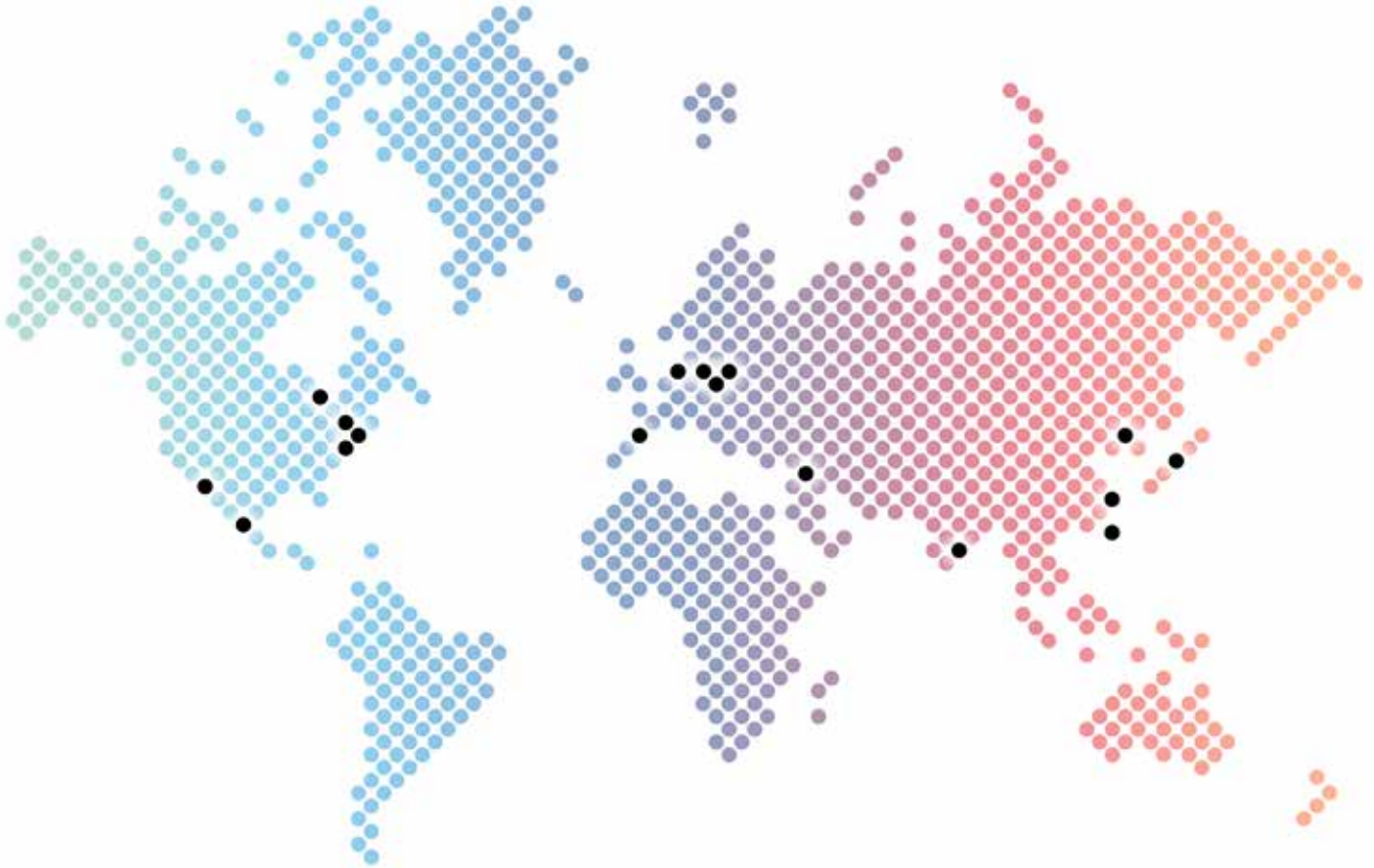
- Resistance to HPHT conditions
- Excellent chemical resistance
- Cryogenic static and dynamic sealing
- Low Fugitive Emission
- Long durability

Solutions

Main Features

OMNISEAL® POLYMERS	High-Performance Spring-Energized Seals	<ul style="list-style-type: none"> · Temperatures from -210°C to +316°C (-346°F to +600°F). · Pressure: Vacuum up to 3,448 bar (50,000 psi). · Low and controlled friction. · Broad chemical resistance.
	High-Performance PTFE Rotary Shaft Seals	<ul style="list-style-type: none"> · Temperatures from -53°C to +232°C (-65°F to +450°F). · Shaft speed in excess of 36 m/s (7,000 fpm). · Pressures up to 35 bar (508 psi).
RULON® FLUOROPOLYMERS	High-Performance Fluoropolymer Compounds	<ul style="list-style-type: none"> · Temperatures from -268°C to +316°C (-450°F to +600°F). · Low friction, high wear life and broad chemical resistance.
MELDIN® POLYIMIDES	High-Performance Thermoset Polyimide Materials	<ul style="list-style-type: none"> · Temperatures from cryogenic through +316°C (+600°F), intermittently up to +482°C (+900°F). · Superior strength and rigidity combined with self-lubrication properties.
OMNISEAL® METALS	High-Performance Metal Seals	<ul style="list-style-type: none"> · Temperatures from cryogenic up to +1,093°C (+2,000°F). · From ultra-high vacuum to 6,894 bar (100,000 psi). · Leakage performances as low as 10⁻¹⁰ sccs with GHe

ONE GLOBAL TEAM... A DEDICATED CUSTOMER FOCUS



GLOBAL & LOCAL PRESENCE

With 17 manufacturing facilities in 10 different countries, Omniseal Solutions™ is a diverse group that is committed to being customer centric.

Contact our team of experts for more information. We have local resources to support you!

- **Americas:** Garden Grove, CA, USA; Bristol, RI, USA; Orange, CT, USA; Cleveland, OH, USA; Northboro, MA; Saltillo, MX
- **Europe:** Kontich, Belgium; Mechelen, Belgium; Vimercate, IT; La Rioja, Spain; Kolo, Poland; Willich, Germany
- **Asia:** Shanghai, China; Bangalore & Chennai, India; Suwa & Tokyo, Japan; Seoul & Incheon, South Korea; Taipei, Taiwan

help@omniseal-solutions.com
www.omniseal-solutions.com

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