



FTL TECHNOLOGY

Sealing, Bearing and Engineered Solutions



Precision Polymer Engineering

Advanced sealing solutions for critical applications

High performance sealing solutions for the
OIL & GAS INDUSTRY



High Performance Sealing Solutions for Oil and Gas Applications

IDEX Sealing Solutions (ISS) is a division of IDEX Corporation comprising of Precision Polymer Engineering (PPE) and FTL Technology; two companies dedicated to providing sealing solutions for some of the world's most demanding applications and environments.

With over 30 years experience, both PPE and FTL engineering and materials teams possess a thorough understanding of the challenges facing upstream and downstream operations. This technical know-how combined with unique elastomer materials, ensures that the correct solution is delivered for every application.

- ▶ Unique leading-edge materials
- ▶ Extensive portfolio of products
- ▶ Custom design and consultancy service
- ▶ Industry leading delivery times
- ▶ Expert technical support, pre and post-sale
- ▶ Comprehensive testing and failure analysis service

Your global sealing partner

IDEX Sealing Solutions is a leading supplier to the oil and gas industry with manufacturing operations in Texas and the UK, and a network of direct sales and regional distributors around the world.

ISS teams work closely with many of the market leading oil and gas service companies and original equipment manufacturers (OEM) to develop sealing solutions for downhole tools, compressors, pumps, valves and other equipment operating in hostile environments.

To support today's fast paced working environment ISS offers a rapid manufacturing service to allow maintenance-repair-overhaul (MRO) operators to swiftly repair essential equipment when a failure occurs, thereby reducing downtime and returning critical equipment back into the field with minimal loss to production.

Reliability and Safety

Oil exploration and extraction presents some of the most challenging conditions for seals; a combination of extreme temperatures, aggressive chemicals and gases, abrasive media, high pressure and destructive forces, subject seals to the harshest environments. Combined with the importance of reliability and safety, there is no margin for error. IDEX Sealing Solutions specializes in critical sealing applications where failure is not an option, providing its customers with the confidence that their seals will deliver optimum performance.



Exceeding Your Expectations

As the techniques employed to exploit reserves become more complex, ISS continually strives to develop the next generation of materials and products that not only keep pace with the current needs of the industry but look to future requirements. Regardless of the application, you can be sure that ISS seals will continue to meet and exceed your expectations.

Below are some examples of the benefits PPE and FTL sealing solutions have provided in various oil and gas applications:-

- ▶ Increased reliability and safety with seals that resist rapid gas decompression and high temperatures in centrifugal compressors.
- ▶ Extended service life and reduced repair costs with chemically inert sealing materials for pumps.
- ▶ Extended service life and reductions in fugitive emissions in valves.
- ▶ Improved seal integrity and environmental safety in pipeline closures.
- ▶ Reduced risk of failure and loss of capital equipment with critical PTFE lip seals for remotely operated vehicles (ROVs).
- ▶ Increased operating periods between maintenance cycles in high pressure rotary and hydraulic sealing systems.
- ▶ Fail safe seals for platform decommissioning that meet stringent safety requirements.



Innovative materials

Innovation is a way of life at IDEX Sealing Solutions, a team of polymer scientists operate a continuous development program to design and create compounds that push the boundaries of sealing technology. Comprehensive testing is carried out to rigorous standards to ensure ISS materials are verified and validated to industry and customer-specific requirements.



The EnDura[®], Perlast[®] and Perlast[®] ICE range of high performance elastomer materials offer unique properties such as high pressure capability, extreme high/low temperature stability and chemical resistance that traditional seal materials are not able to match.

With state-of-the-art polymer laboratories and advanced analytical equipment located in the UK and Houston, ISS provides a comprehensive range of services to assist with material testing, failure analysis and material recommendations.

Material Qualifications

Rapid Gas Decompression (RGD) is a particular concern to users of oil and gas equipment. PPE's laboratories contain several high pressure test rigs for the development and testing of RGD resistant elastomers to industry standards such as NACE TM-0297, NORSOK M710 Annex B, and ISO 23936-2. For critical applications customer-specific testing is often carried out to much more challenging criteria, beyond the standard tests, to validate materials and provide confidence in a sealing solution that meets an application's specification or environmental conditions.

PPE carefully controls material formulations and chemistry for consistency and reliability, so seals that are qualified from prototypes are the same materials that go into production.

For seals operating in sour gas conditions, PPE materials have undergone extensive testing to standards such as NORSOK M710 Annex A. Additional testing has also been carried out at H₂S levels of 25%, much higher than the standard tests, which provides a thorough understanding of sealing performance in high concentration sour gas. ISO 10423 (API 6A) testing in FF/HH conditions to support the qualification of trees and wellhead equipment is also available.



Engineered Solutions

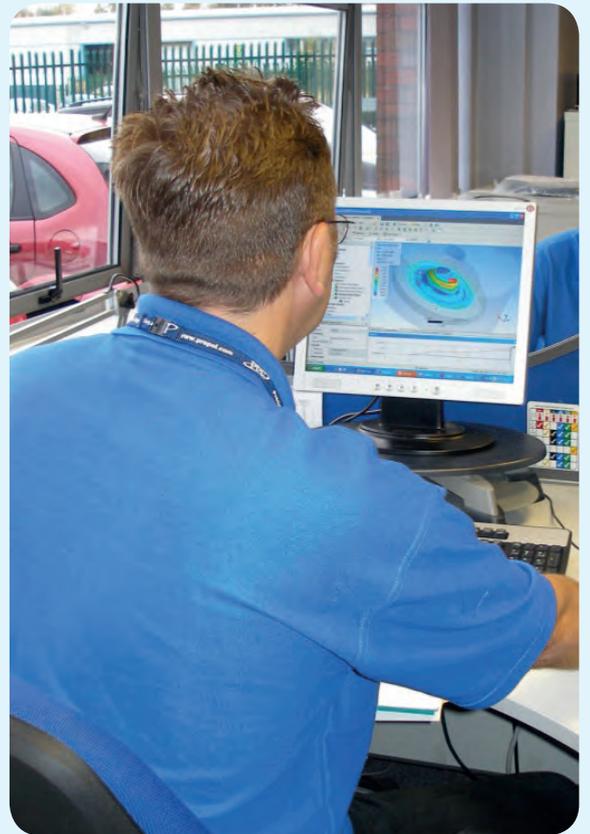
Design Service

ISS offers a comprehensive design service to ensure maximum performance in extreme temperatures and pressures. An experienced applications engineering team, integrated with polymer scientists, provides a holistic approach to the design and customization of the seal geometry and/or hardware. Computer simulation helps ISS engineers to predict optimal seal geometry using mathematical and non-linear finite element analysis (FEA); these techniques are utilized in the development of new and unique seals, and serves to reduce application testing time and the number of prototypes required, bringing products to market faster.

Technical Support

Customer support and expert technical advice is available, on any sealing matter from both PPE and FTL. Application engineers can provide support on component design, material selection and compatibility, testing and post-use analysis. A consultancy service and field support includes on-site assistance with problem solving and troubleshooting. A collaborative approach towards problem solving ensures successful project completion with regular client interaction throughout.

ISS offers customized training courses which are tailored to sealing applications experienced within the oil and gas industry.



Products

IDEX Sealing Solutions offers a portfolio of products used with in the oil and gas industry.



O-rings

Fully molded O-rings can be manufactured in any size or quantity ranging from 0.030" to 96" (0.8mm to 2.4m) internal diameter and 0.030" to 0.470" (0.8mm to 12mm) cross section, allowing PPE O-rings to be specified in all locations. Standard AS/metric sizes, international and custom non-standard sizes available.



Specialty PTFE Seals

Typically used for sealing rotary shafts in dry operating conditions and high operating temperatures, PTFE seals are designed for durability and offer exceptional chemical resistance to aggressive media. Spring energized PTFE seals offer efficient sealing of reciprocating, rotary or swiveling equipment. Other PTFE products include piston rings, packings and composite seals.



Rotary Seals

High performance rotary components for pumps, compressors and other oilfield equipment provide easy fitting, extended service life, leak tightness, reliability and low friction in arduous applications



Spring Seals

Molded from a high modulus elastomer with two integrated anti-extrusion springs; spring seals provide a versatile sealing system for bi-directional, high pressure applications in static conditions. Specifically designed for downhole, wellhead, surface equipment and high pressure pipelines, and riser systems.



Custom Molded Seals and Bonded parts

Seals can be designed and manufactured to customer-specific requirements, molded in almost infinite shapes, sizes and profiles. Customized rubber-to-metal or plastic parts for specialized oil tools, subsea production equipment and valves can be provided where engineered solutions are required.



Bushings and Bearings

Various types of sliding element bearing products are available to suit extreme applications; including custom materials for applications where there is a lack of lubrication, elevated temperatures or aggressive chemicals. Self-lubricating components can withstand temperatures up to 400°C (752°F) and provide extended performance in dynamic sealing applications.

X-rings, T-seals, lip seals, wipers, packers and back-up rings also available.

Case study: Perlast® ICE G90LT spring seals to last 40+ years.

A subsea application required a spring seal that would operate in demanding HPHT field conditions and provide a life expectancy of 40 years plus.

Field conditions included a combination of aggressive control fluid, potential 20% CO₂, 10,000psi pressure and an operating temperature range of +155°C (+311°F) down to -40°C (-40°F) due to system blow down and the risk of the adiabatic effect taking place.

PPE's Perlast® ICE G90LT (FFKM) in the form of a spring seal was the recommended solution. The material was tested to API 6A (PR2) by the customer and also RGD tested by PPE at +155°C (+311°F) with 20% CO₂ (third party witnessed).

The customer benefit of the Perlast® ICE FFKM spring seals is that they will provide long term elastomeric properties for the life of the field, thereby eliminating expensive servicing of the equipment and seal replacement.

During the process of solving this particular sealing problem PPE has become the leading seal manufacturer of molded FFKM spring seals.





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PERLAST®

The ultimate perfluoroelastomers for sealing applications where chemical resistance and high temperature performance are critical.

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PERLAST® ICE

Exceptional perfluoroelastomers for extreme low temperature sealing applications.

ENDURA®

The ultimate range of elastomers for sealing applications in the world's most aggressive high pressure environments.

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