Advanced Isolast® Capabilities

INNOVATIVE ENGINEERED FFKM SOLUTIONS FOR EXTREME ENVIRONMENTS

YOUR PARTNER FOR SEALING TECHNOLOGY

Advanced Isolast® Capabilities

Engineered FFKM solutions for the most demanding operating conditions.

WITHSTANDING THE EXTREME

Isolast® is the brand name for the proprietary Trelleborg Sealing Solutions range of high-performance perfluoroelastomers. These best-in-class FFKM materials withstand extreme temperatures and harsh media to provide effective and long-life sealing. Under the most challenging operating conditions, Isolast® succeeds where other high-performance elastomers fail.

Moving with the industries we support, Trelleborg Sealing Solutions actively invests in leading-edge production technologies to produce more effective, stronger, and longer-lasting seals.

The complete range of Isolast® manufacturing options enables us to create custom products to any scale that improve overall performance and reduce maintenance. Trelleborg Sealing Solutions is set up to handle special requirements for many industries, such as Class 100 cleanroom production, quality management systems, and certifications.

ANY GOOD SEAL DESIGN STARTS WITH THE RIGHT MATERIAL

Our engineering experts work with you to determine the best solution for your application, from initial design and development to FEA analysis, testing, and production.

Decades of experience problem-solving for challenging applications, combined with novel manufacturing and tooling technologies, uniquely position Trelleborg Sealing Solutions as the ideal development partner when looking to improve application performance or reduce total cost of ownership.

Anything from high-specification O-Rings to complex, custom components can be manufactured. Using patented processes, seals are possible from a microscale to near-infinite diameters, without mold or flash lines, and developed with quality integrated within our processes.

FEATURES AND BENEFITS OF ISOLAST® MATERIALS

- **Withstands the most aggressive chemicals and extreme temperatures** – tackling the toughest environments
- **Long service life** – reducing downtime, maintenance requirements and low total cost of ownership
- **Low compression set** – increased sealing force and reduced leakage for a longer period of time
- **High purity with cleanroom production** – for ultra-clean semiconductor applications
- **Resists Rapid Gas Decompression** – for challenging oilfield conditions
- **Available with a wide range of regional and industry specific approvals** – including FDA, USP and NORSOK M-710

APPLICATIONS

Products made from Isolast® materials can withstand conditions that no other seals can survive. They are well suited to:

Chemical and process industries

Food and beverage processing

Pharmaceutical production and biotechnology

Oil, gas and energy production

Semiconductor manufacturing

FIND OUT HOW WE CAN HELP YOU

Contact your local Customer Solution Center to find out how our Isolast® products can solve your engineering challenges.

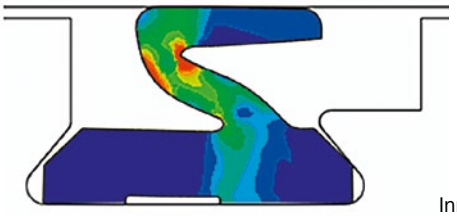
Isolast® Engineered Sealing Solutions

Trelleborg Sealing Solutions solves the most challenging applications with engineered solutions designed specifically to the conditions encountered. Complex, custom components can be manufactured using a range of innovative processes from a carefully-selected portfolio of Isolast® materials – making solutions that work more efficiently for longer.

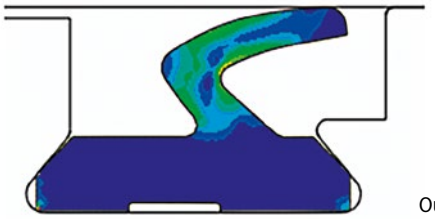
ENGINEERING AND SUPPORT

Our engineers are on-hand to assist with product specification and design in your area and your language. Backed by a global network of R&D, logistics and manufacturing, we leverage our entire organization to follow you wherever you are in the world as your development partner.

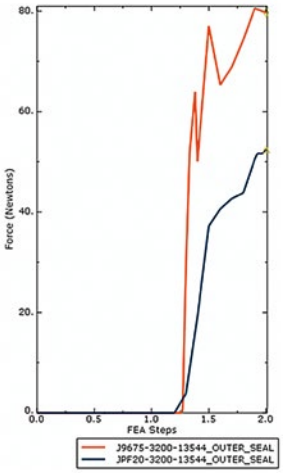
- **Develop specialized and custom components** – overcome nearly any engineering challenge or choose from proven, high-performance designs
- **Work with our expert teams** – dedicated product engineers and technical support to ensure the correct solution, including FEA, CAD service and rapid prototyping
- **Leading-edge simulation capabilities** – modeling hyperelastic and viscoelastic behavior, the Mullins effect, and temperature- and frequency-dependent behavior
- **Fully equipped testing and qualification laboratories**, – plasma testing, failure analysis and material evaluation. Specialized capabilities include damping characterization of materials, friction calculations for seals and stiction testing for semiconductor applications
- **Advanced CT scanning and 3D printing capabilities** – speed up and improve analysis and product development
- **Zero-defect quality policy** – quality in process and integrated at every stage



Inner Seal



Outer Seal



Outer Seal Compression Force

Simulating seal behavior reduces time to market and overall costs, while increasing design quality and reliability.

ISOLAST® ADVANCED MATERIALS

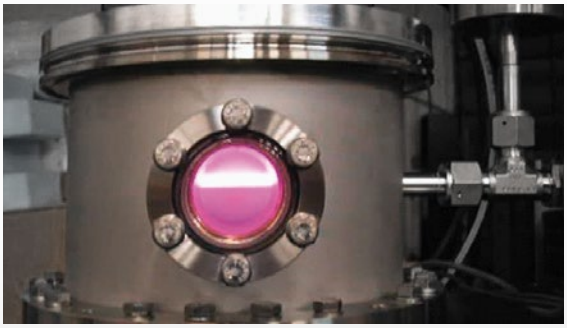
Over decades, Trelleborg Sealing Solutions has extended and refined its material portfolio to excel in challenging and complex application conditions. Material research, development and testing is undertaken in-house to give full confidence in our Isolast® compound performance and ensure traceability, purity and quality.

Industry	Compound	Temperature Range	Hardness	Color	Comments
Semiconductor	Isolast® PureFab™ JPF10	Up to +310 °C	65 Shore A	Light brown	Remote fluorine plasma resistance with fully organic formulation
	Isolast® PureFab™ JPF20	Up to +300 °C	68 Shore A	Gray	Excellent resistance to both oxygen- and fluorine-based plasmas with minimal particulation
	Isolast® PureFab™ JPF21	Up to +320 °C	68 Shore A	White	Long-term thermal stability and low trace metal content
	Isolast® PureFab™ JPF30	Up to +300 °C	53 Shore A	Translucent	Market-leading purity and best-in-class high temperature performance in a translucent material
	Isolast® PureFab™ JPF40	Up to +327 °C	75 Shore A	Black	Excellent high temperature performance and chemical resistance
Oil & Gas	Isolast® XploR™ 9523	-40 °C to +250 °C	90 Shore A	Black	Superior high pressure sealing performance under sub zero temperature for extended periods
	Isolast® XploR™ 9554	-10 °C to +275 °C	90 Shore A	Black	Exceptional resistance in hot steam environments
Food, Beverage & Pharmaceuticals	Isolast® J9515 (and J9516)	-10 °C to +250 °C	75 Shore A	Black (White)	Compliant with FDA, USP Class VI and 3-A Standards
	Isolast® J9538	-10 °C to +250 °C	75 Shore A	Black	Maximum temperature and chemical resistance with approvals
Chemical Processing Industries	Isolast® J9503	-19 °C to +250 °C	75 Shore A	Black	Excellent compression set and volume change properties in extremely harsh chemicals
	Isolast® J9567	-10 °C to +225 °C	75 Shore A	Black	Maximum chemical resistance with low cost of ownership
All purpose	Isolast® J8290	Up to +290 °C	75 Shore A	Black	High temperature steam resistance
	Isolast® J8325	-5 °C to +290 °C	75 Shore A	Black	High-temperature grade for thermal stability
	Isolast® J9552	-10 °C to +250 °C	75 Shore A	Black	Cost-effective dedicated injection molding grade

Other materials, including specialized compounds for specific purposes are available.
Contact your local Customer Solution Center for more information.

ISOLAST® PUREFAB™ SEMICONDUCTOR MATERIALS

The Isolast® Purefab™ range comprises leading-edge Perfluoroelastomers (FFKMs) matched to the requirements of the semiconductor industry. Specially formulated compounds are optimized for different operating parameters including high-temperature stability, purity, exceptionally-low trace metal content, and outstanding plasma resistance. This reduces particle generation and outgassing in high vacuum conditions, enabling end-users to extend their product maintenance cycles and ensure that process yield is maximized.



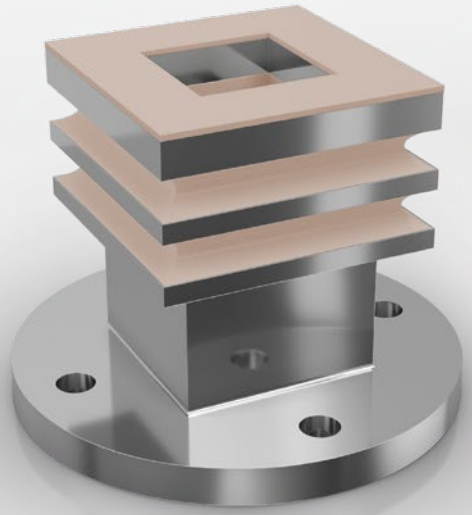
MANUFACTURING CAPABILITIES

To extend the benefits of Isolast® to more applications, Trelleborg Sealing Solutions offers an extensive range of manufacturing options that enable production of high-specification seals to any size and unique fully-bonded components. These products can improve performance, reduce maintenance requirements and consolidate functions within a single part.

ISOLAST® METAL BONDED SEALS AND DAMPERS

Fully bonded components are available in a variety of metals combined with different Isolast® compounds, depending on application conditions. Our bonding process maximizes seal integrity and makes cost-effective products that are easy to assemble and combine functions in one part.

- Extend maintenance intervals, consolidate parts and reduce secondary operations to lower Total Cost of Ownership
- Bond many different Isolast® compounds to metals, such as stainless steel, mild steel and aluminum



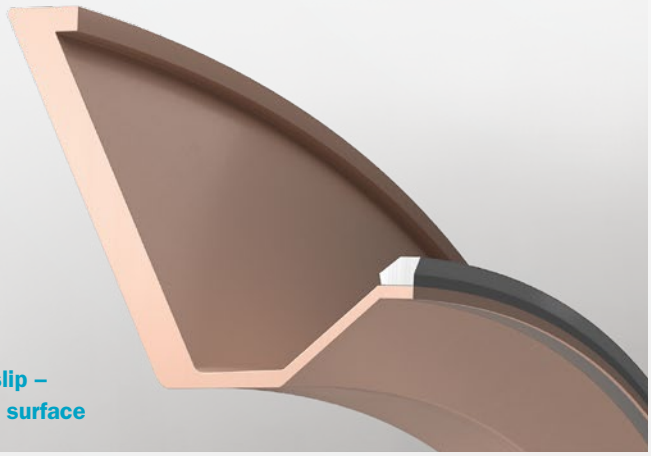
APPLICATION EXAMPLE SEMICONDUCTOR
Isolast® PureFab™ Metal Bonded Seals and Dampers for Lithographic Equipment
Complex rubber-to-metal bonded geometries with the lowest possible outgassing and unique damping properties.

ADVANTAGES: Low outgassing – Combined sealing and damping – Cleanroom production – Easy assembly and installation

ISOLAST® PLASTIC BONDED SEALS

Isolast® can be strongly bonded to a range of different plastic materials to increase cleanliness and reduce cost of ownership.

- Improve performance, extend seal life, and reduce total cost of ownership
- Wide range of plastic materials that can be bonded with FFKM for optimum sealing performance
- Innovative Rubber to Plastic bonding enables new designs and solutions based on customer requirements
- Consolidate multiple parts into one with improved performance to lower Total Cost of Ownership
- Cleanroom and non-cleanroom production
- Low outgassing for purity in semiconductor applications
- Easy assembly and installation



APPLICATION EXAMPLE SEMICONDUCTOR
Isolast® PureFab™ Wafer Support Seals
Extreme chemical resistance and avoids ‘stiction’ with wafer, increasing uptime of machines and tools.

ADVANTAGES: Chemical resistance – Minimal friction – No stick-slip – No bond failure from lip-lock design – Maximum processable wafer surface

MICRO INJECTION MOLDING

Manufacturing cost-effective Isolast® micro-parts in high volumes

Using the latest machinery, tooling and automation technologies, Trelleborg Sealing Solutions can manufacture micro-components in high performance materials for critical applications.

Features and Benefits:

- **Precision** – Flashless, wasteless tool design concepts ensure high precision and quality with short cycle time and automated inspection
- **Consistent quality** – Controlled in the process, not through extra control steps
- **Cost-effectiveness** – Low Total Cost of Ownership through low manufacturing costs and long-lasting material choices
- **Choose from the proven range of Isolast®** compounds for different requirements

APPLICATION EXAMPLES

Our range of Isolast® materials can produce micro-parts to resist aggressive chemicals and extend service life in:

General Industry

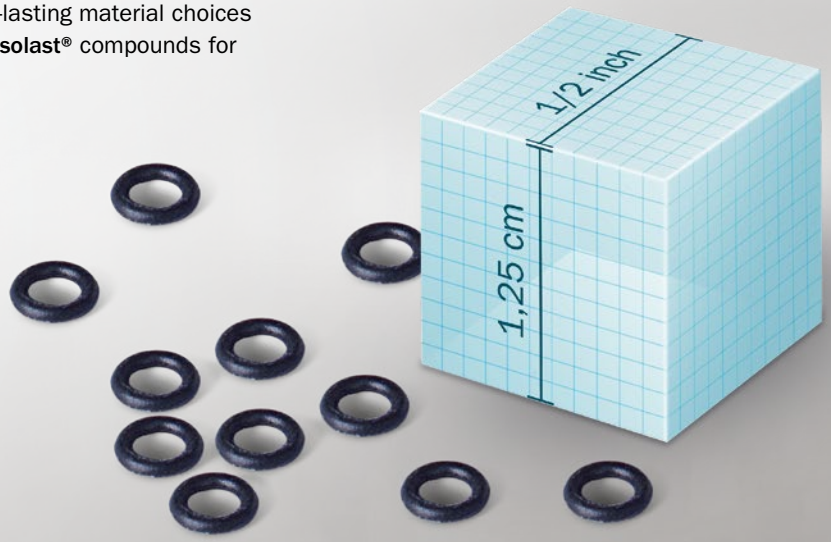
- O-Rings for Micropumps
- O-Rings and seals for microsensors
- Seals for flow control valves

Healthcare & Medical

- Micro-seals for analytical equipment

Semiconductor

- Wafer support pads and other seals



FLEXIMOLD™ GIANT SEALS

The Trelleborg Sealing Solutions proprietary FlexiMold™ technology allows high-precision, large diameter O-Rings (from 600 mm to near-infinite diameters) and other seal profiles to be manufactured without tooling costs. The seals produced are of superior quality to standard spliced seals and extruded products, demonstrating the full visual and dimensional integrity of a molded product. Produced without the need for a dedicated tool, lead times and costs are minimized.

APPLICATION EXAMPLES

Oversized O-Rings and other profiles for the oil & gas industry

Large diameter Isolast® PureFab™ display panel seals and O-Rings for the semiconductor industry

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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If you'd like to talk to Trelleborg Sealing Solutions, find your local contact at: www.trelleborg.com/seals/worldwide

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