

Isolast® Sealing Solutions

INNOVATIVE ENGINEERED FFKM SOLUTIONS
FOR EXTREME ENVIRONMENTS



Isolast® Sealing Solutions

WITHSTANDING THE EXTREME

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

Developing alongside the industries we support, Trelleborg Sealing Solutions actively invests in leading-edge production technologies to produce more effective, durable and resilient 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 equipped to handle special requirements for many industries, such as Class 100 cleanroom production, quality management systems and certifications.

**Custom
designs with
engineering
support**

**Advanced
manufacturing
capabilities**

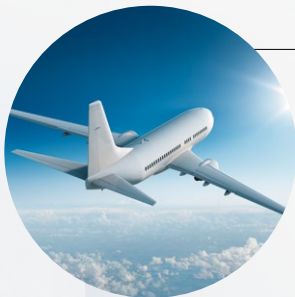
**Extend
machine
service
life**

**Reduce
total cost of
ownership**

MicroPower 15

APPLICATIONS

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



Aerospace



Food and beverage processing



Pharmaceutical production and biotechnology



Semiconductor manufacturing

FEATURES AND BENEFITS OF ISOLAST® MATERIALS

- **Withstands the most aggressive chemicals and extreme temperatures** – tackling the toughest environments
- **Long service life** – reducing downtime and maintenance requirements to lower total cost of ownership
- **Low compression set** – increasing sealing force and reducing risk of leakage for a longer period of time
- **High purity with cleanroom production** – for ultra-clean semiconductor applications
- **Withstands rapid gas decompression** – for challenging oilfield conditions
- **Available with a wide range of regional and industry specific approvals** – including AMS 7257E, USP, API-16C and NORSOK M-710

Chemical processing



Oil, gas and energy production

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.

trelleborg.com/en/seals/about-us/customer-solution-centers



Any Good Seal Design Starts with the Right Material

Over decades, Trelleborg Sealing Solutions has extended and refined its material portfolio to excel in challenging and complex applications. Our in-house material development and testing ensures full confidence in Isolast® compound performance while ensuring traceability, purity and quality. The following materials offer benefits to a wide range of different applications.

GENERAL PURPOSE

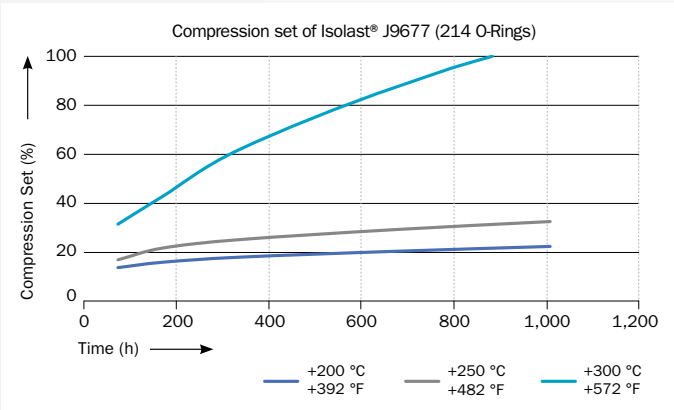
Isolast® J9677

WITHSTANDS HIGH TEMPERATURES AND AGGRESSIVE CHEMICALS TO EXTEND SERVICE LIFE

Isolast® J9677 delivers exceptional sealing in extreme temperatures with superior resistance to hot fluids and harsh chemicals. Its industry-leading low compression set ensures long-lasting, virtually leak-free performance with minimal deformation.

APPLICATION EXAMPLES:

Vacuum pumps, compressors, mechanical seals, turbo chargers, valves, reactors and couplings



Compound	Temperature Range	Hardness	Color	Benefits
Isolast® J9677	-10 °C to +300 °C/+14 °F to +572 °F	75 Shore A	Black	High temperature suitability

CHEMICAL PROCESSING

FIND OUT MORE

Download detailed material flyers on our Isolast® materials from our website.



Isolast® J9503

LOW-TEMPERATURE FFKM WITH OUTSTANDING CHEMICAL COMPATIBILITY

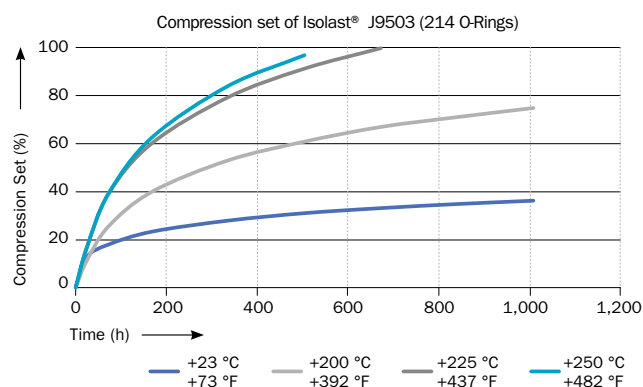
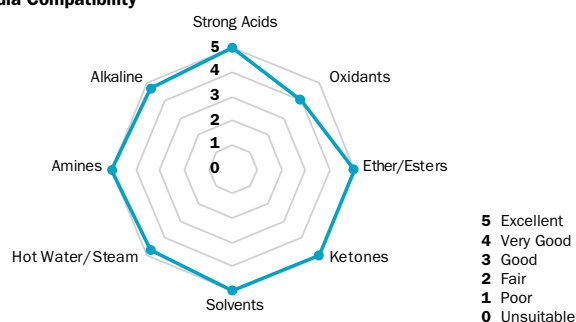
Offering wide thermal stability from -25 °C to +225 °C/-13 °F to +437 °F, Isolast® J9503 provides exceptional chemical compatibility with oxidizing agents, acids, alkalis, amines, esters and steam. Its low compression set and hysteresis behavior ensures long-lasting, leak-tight performance.

APPLICATION EXAMPLES:

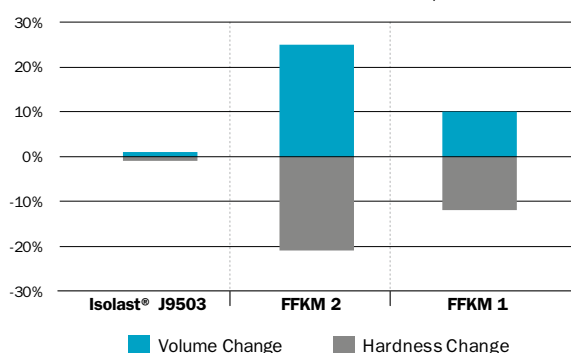
Chemical and hydrocarbon processing, offshore and onshore oil and gas, aerospace, diesel engines, power generation



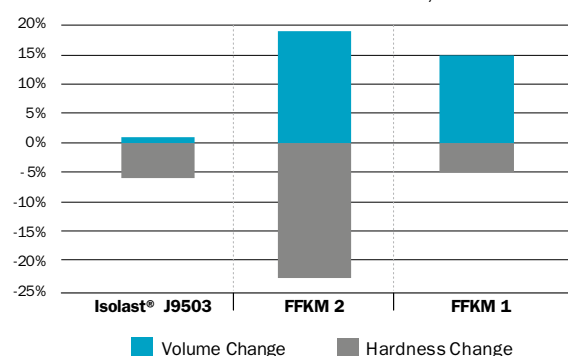
Media Compatibility



Immersion in Nitric Acid at +98 °C/+208 °F



Immersion in Acetic Acid at +98 °C/+208 °F



Compound	Temperature Range	Hardness	Color	Benefits
Isolast® J9503	-25 °C to +225 °C/-13 °F to +437 °F	75 Shore A	Black	Low temperature suitability, high chemical compatibility

AEROSPACE

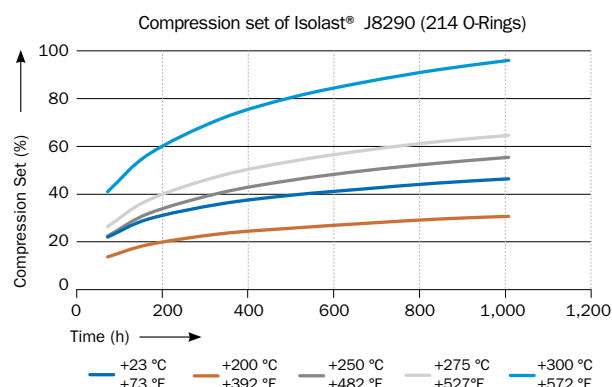
Isolast® J8290

AMS 7257E COMPLIANT FFKM FOR SUPERIOR RESISTANCE TO HEAT, HARSH CHEMICALS AND STEAM

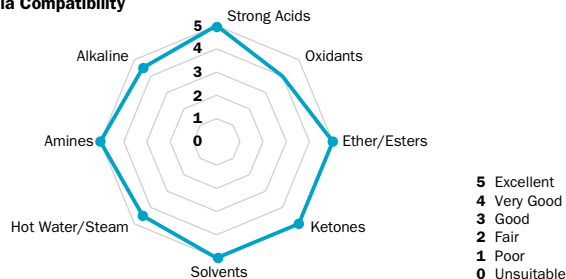
Isolast® J8290 meets the rigorous AMS 7257E Aerospace Certification, distinguishing it from other FFKM materials. It delivers superior sealing at temperatures from -10 °C to +290 °C/+14 °F to +554 °F and exceptional compatibility with aggressive chemicals, including HTS oils, steam and hot aqueous environments above +200 °C/+392 °F.

APPLICATION EXAMPLES:

Aerospace engine seals, high-temperature oil, fuel and hydraulic systems, boilers, steam valves, mechanical seals, vacuum pumps



Media Compatibility



Compound	Temperature Range	Hardness	Color	Benefits
Isolast® J8290	-10° C to +290 °C/+14 °F to +554 °F	75 Shore A	Black	High temperature suitability, enhanced hot oil and steam resistance (AMS 7257E)

CHEMICAL PROCESSING

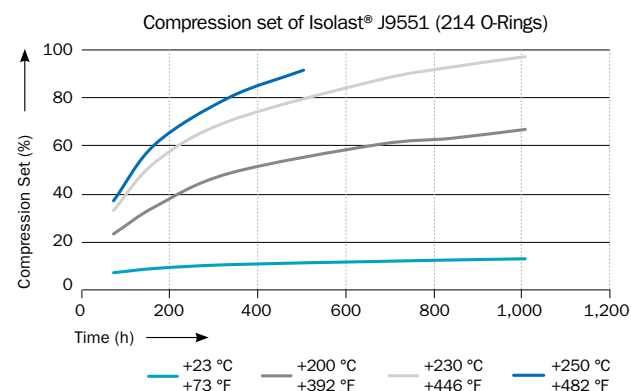
Isolast® J9551

VALUE-ENGINEERED FFKM TO EXTEND SERVICE LIFE IN CHEMICAL PROCESSING AND INDUSTRIAL APPLICATIONS

Isolast® J9551 offers exceptional chemical compatibility with various substances including hydrocarbons, steam, acids, alkalis, amines, alcohols, esters and ketones. It withstands temperatures from -10 °C to +225 °C/+14 °F to +437 °F (with brief excursions to +250 °C/+482 °F). Its low compression set ensures long-lasting, leak-tight sealing performance.

APPLICATION EXAMPLES:

Chemical processing, pumps, valves, mechanical seals, compressors



Compound	Temperature Range	Hardness	Color	Benefits
Isolast® J9551	-10° C to +250 °C/+14 °F to +437 °F	80 Shore A	Black	Wide ranging chemical compatibility

SEMICONDUCTOR MANUFACTURING

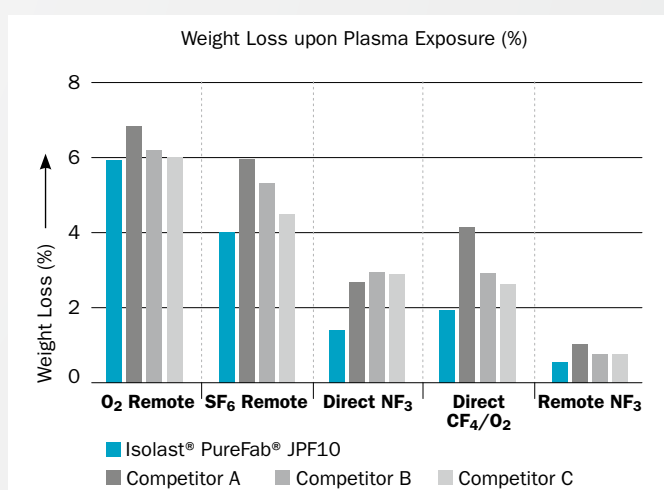
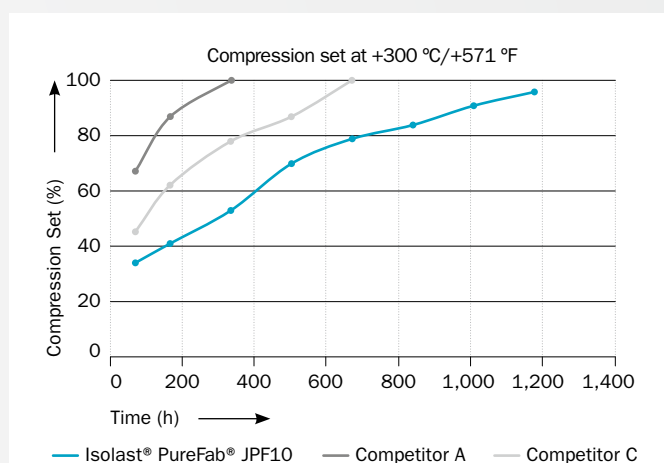
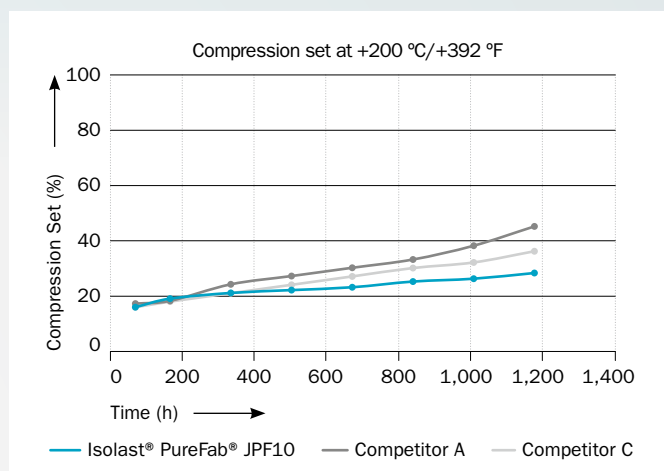
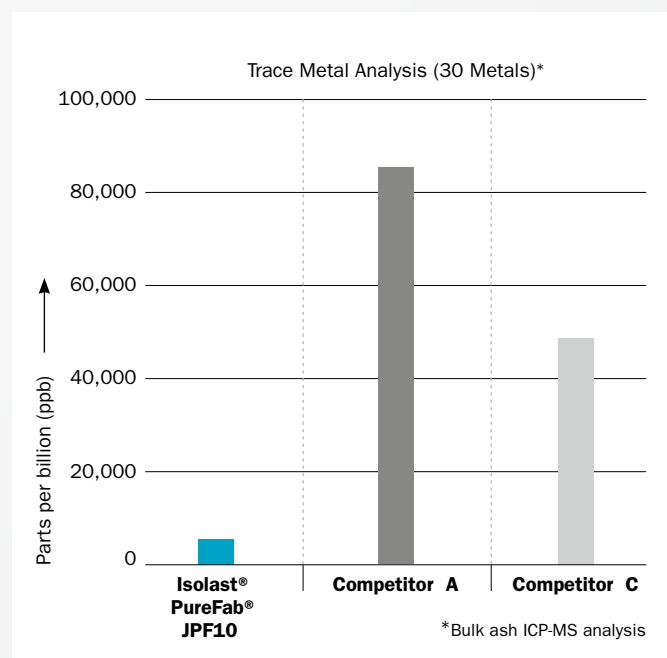
Isolast® PureFab® JPF10

FULLY ORGANIC MATERIAL FOR DEMANDING HIGH-TEMPERATURE SEMICONDUCTOR APPLICATIONS

This fully organic, extremely high-purity material features exceptional thermal stability above +300 °C/+572 °F with superior compatibility with amine-based process chemicals. Its proprietary cross-linking technology ensures low compression set while maintaining strong sealing force. With outstanding plasma resistance, ultra-low outgassing, and the ability to operate in process temperatures up to +310 °C/+590 °F, it delivers excellent performance in demanding environments.

APPLICATION EXAMPLES:

Deposition processes: PECVD, HDPCVD, PEALD;
etch processes: ALE, dry etch; chamber lid seals,
gas inlet seals, bonded slit valve doors



Compound	Temperature Range	Hardness	Color	Benefits
Isolast® PureFab® JPF10	-5 °C to +310 °C/+23 °F to +590 °F	65 Shore A	Light brown	Fully organic

Specialty Materials

Specifically engineered to meet the demands of modern industry, our engineering experts collaborate with you to determine the best solution for your unique application, from initial design and development, to FEA analysis, testing and serial production.

With decades of experience solving problems for challenging applications and our innovative manufacturing and tooling technologies, Trelleborg Sealing Solutions is uniquely positioned 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 into every step of our processes.

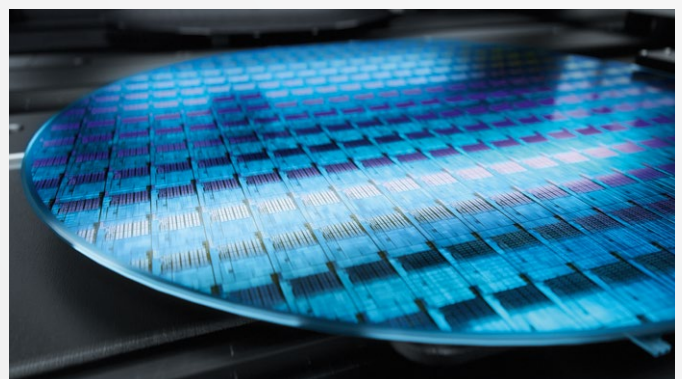


SEMICONDUCTOR MANUFACTURING

ENHANCING PURITY AND PERFORMANCE

The Isolast® Purefab® range comprises leading-edge FFKMs matched to the requirements of the semiconductor manufacturing industry. These specially formulated compounds are optimized for key operating parameters including high-temperature stability, purity, extremely low trace metal content and superior plasma resistance.

These properties minimize particle generation and outgassing in high vacuum conditions, allowing end-users to extend maintenance cycles and maximize process yield.



ISOLAST® PUREFAB® PORTFOLIO

Learn more about our specially engineered portfolio of Isolast® PureFab® materials for semiconductor manufacturing.

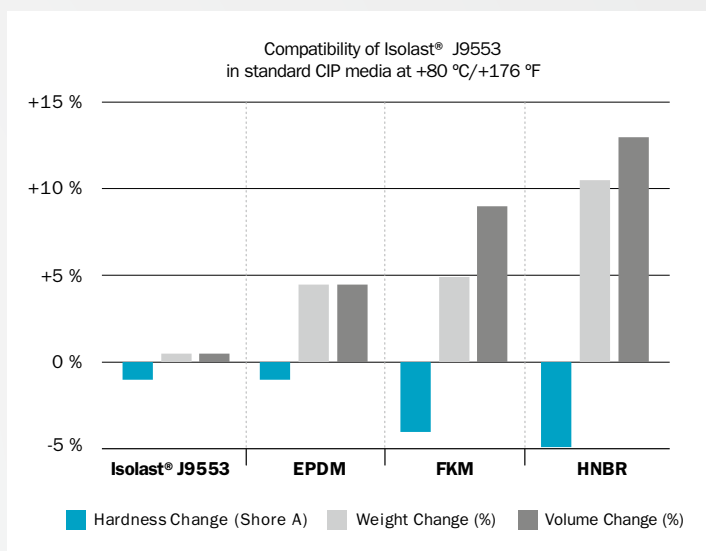


FOOD, BEVERAGE, PHARMACEUTICAL, BIOTECH

IMPROVING CLEANLINESS WITH PROCESS MEDIA COMPATIBILITY

Sealing solutions in the pharmaceutical and biotechnology industries require exceptional cleanliness and quality. Isolast® J9553 was developed to meet these requirements for a wide range of pharmaceutical and food applications.

Extensive testing shows this material has outstanding compatibility with the most common Clean-in-Place (CIP) cleaning media and is also appropriate for Water-for-Injection (WFI) and Sterilize-in-Place (SIP) applications.



Compound	Temperature Range	Hardness	Color	Benefits
Isolast® J9553	-5 °C to +250 °C/+23 °F to +482 °F	75 Shore A	Black	Compatible with bases, acids, polar solvents and steam
Isolast® J9556	-5 °C to +250 °C/+23 °F to +482 °F	73 Shore A	Black	USP 87/USP 88 approved material

ULTRA-CLEAN PRODUCTION

Trelleborg Sealing Solutions has invested in state-of-the-art cleanroom technology to support the rigorous demands of semiconductor, medical and pharmaceutical industries.

Our customers can be assured that their products are manufactured to the highest standard to ensure reliability.

- **Production in a Class 10,000 (ISO 7) environment according to ISO 14644-1**
- **Cleaning, drying and packaging in a Class 100 (ISO 5) environment**
- **Our sites are also accredited to ISO 9001, AS 9100 and ISO 14001 management systems to ensure complete end-to-end control**



OIL, GAS AND ENERGY

EXTENDING SERVICE LIFE AND IMPROVING SAFETY

In oil and gas applications, seals are exposed to many different types of aggressive media, including crude oil, natural gas, sour gases, carbon dioxide, acids, seawater, hydrogen sulfide and anti-corrosion chemicals. They also risk damage from rapid gas decompression, which can lead to premature failure.

The Isolast® XploR™ range is specifically engineered for the harsh conditions of oil and gas processing. It provides excellent chemical compatibility and features a specially developed density that withstands rapid gas decompression. These materials are verified to the Norsok M-710 standard by an independent testing institute.



Compound	Temperature Range	Hardness	Color	Benefits
Isolast® XploR™ 9513	-5 °C to +225 °C/+23 °F to +437 °F	95 Shore A	Black	Standard Norsok M-710 Grade
Isolast® XploR™ 9523	-35 °C to +225 °C/-31 °F to +437 °F	90 Shore A	Black	Low-temperature stability (Norsok M-710 & BS EN ISO 23936-2)
Isolast® XploR™ 9554	-10 °C to +275 °C/+14 °F to +527 °F	90 Shore A	Black	Suitable for high temperatures, steam

PAINT, PRINT AND LACQUER APPLICATIONS

COMPATIBLE WITH AGGRESSIVE CHEMICALS TO REDUCE MAINTENANCE

Isolast® materials are ideally suited for paint, print and lacquer applications due to their compatibility with highly aggressive cleaning solvents and silicone-free composition.

In automotive paintlines, for example, Isolast® has proven suitable for use with cleaning solvents for hydrolacquer and maintains the highest quality of surface finish from the initial filler coating to the final clear coat.



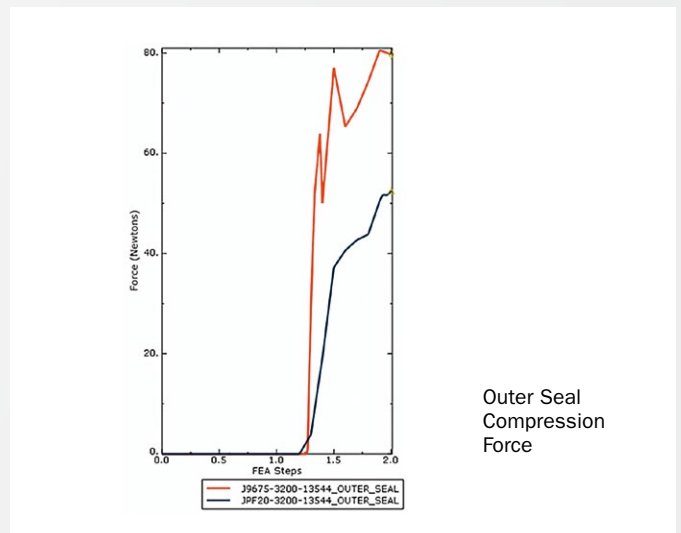
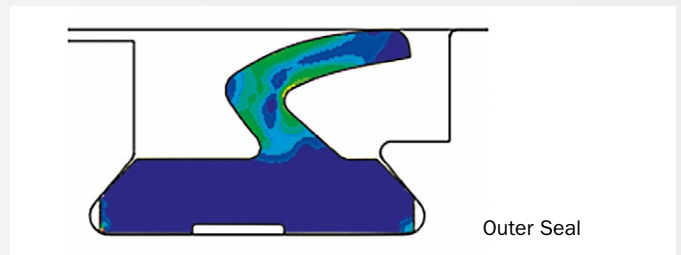
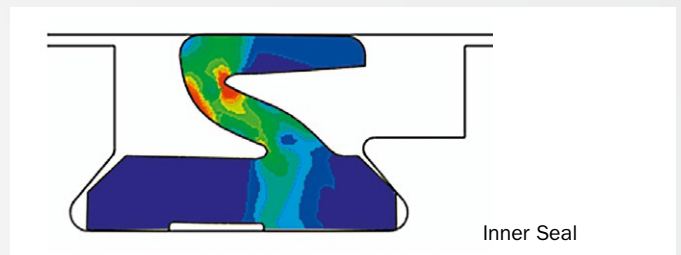
Compound	Temperature Range	Hardness	Color	Benefits
Isolast® J9551	-10 °C to +250 °C/+14 °F to +482 °F	80 Shore A	Black	General purpose, cost-effective
Isolast® J9503	-25 °C to +225 °C/-13 °F to +437 °F	75 Shore A	Black	Suitable for low temperatures, high chemical compatibility
Isolast® J9570	-40 °C to +250 °C/-40 °F to +482 °F	70 Shore A	Black	Ultra-low temperature stability

Engineering and Support

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.

Our engineers are at 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 facilities, 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 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 management process integrated at every stage



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

Customizable Solutions

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, as well as a wide variety of standardized parts. These products can improve performance, reduce maintenance requirements and consolidate functions within a single part.

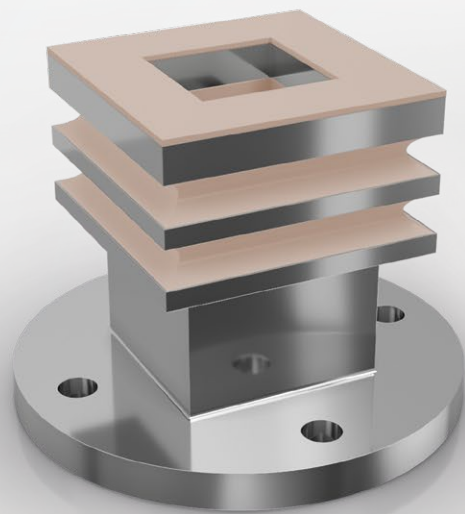
ISOLAST® METAL BONDED SEALS AND DAMPERS

Isolast® metal bonded components can be manufactured using various metals, such as stainless steel, mild steel and aluminum, and elastomers to suit specific application requirements. Our unique bonding process enhances seal integrity while creating cost-effective parts that are both easy to assemble and capable of combining multiple functions into a single component.

APPLICATION EXAMPLE SEMICONDUCTOR:

Isolast® PureFab® Metal Bonded Seals and Dampers for Lithographic Equipment

Manufactured in a cleanroom, these complex rubber-to-metal bonded geometries demonstrate high purity, the lowest possible outgassing and unique damping properties.



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

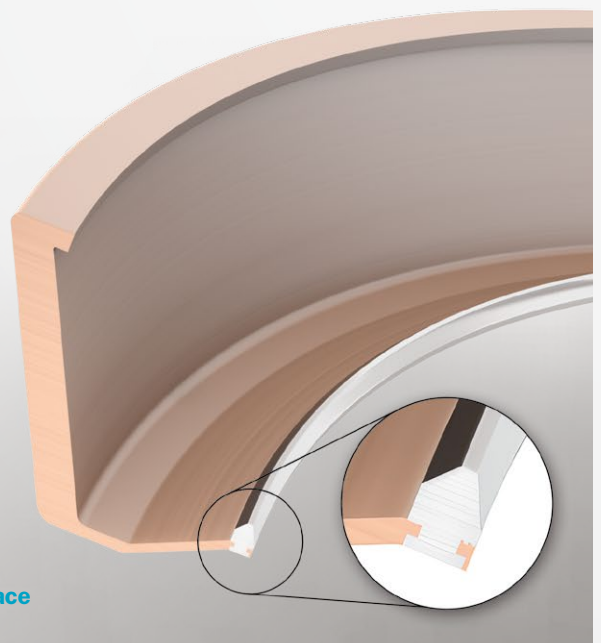
ISOLAST® PLASTIC BONDED SEALS

Isolast® can be strongly bonded to a range of different plastic materials to increase cleanliness and reduce cost of ownership. This innovative rubber-to-plastic bonding technology produces components that improve performance, extend seal life and allow multiple parts to be consolidated into one. They can be produced in a cleanroom environment and demonstrate low outgassing properties to ensure purity in critical applications. With easy assembly and installation, Isolast® bonded components provide optimal sealing performance and lower total cost of ownership.

APPLICATION EXAMPLE SEMICONDUCTOR:

Isolast® PureFab® Wafer Support Seals

Extreme chemical compatibility and avoids 'stiction' with wafer, increasing uptime of machines and tools.



ADVANTAGES: Reduced stiction – Chemical resistance – No bond failure from lip-lock design – Maximum processable wafer surface

CUSTOM AND STANDARD PRODUCTS

- **O-Rings**

High-performance sealing element for a wide range of static and dynamic applications; they can be molded to both standard and non-standard sizes, meeting nearly any specification, such as AS 568A, DIN 3701 and ISO 3601

- **Gaskets**

Molded, punched or laser-cut to intricate patterns to suit customers' specific requirements

- **Bonded Gaskets**

Flange gaskets with stainless steel or alternative metal compression retainers

- **Bonded Products**

In a variety of geometries, material grades and metals

- **V-Rings**

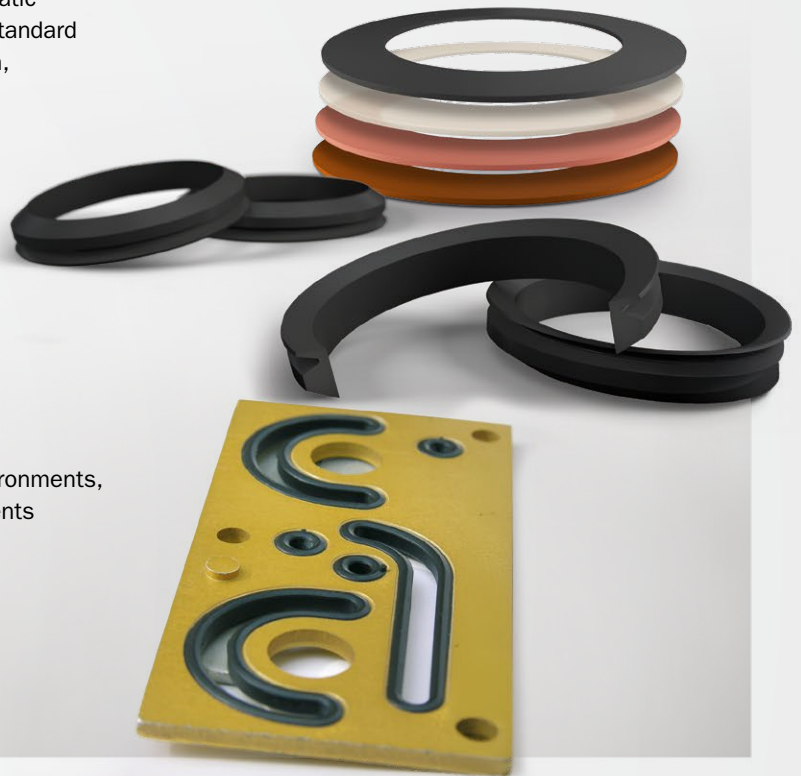
For effective axial dirt sealing in static and dynamic environments, particularly for additional protection in hostile environments

- **Molded Parts**

Custom-molded parts in virtually any shape

- **Specialty Seals**

Homogeneous and layered diaphragms, inflatable seals, bellows, T-Seals and valve seals



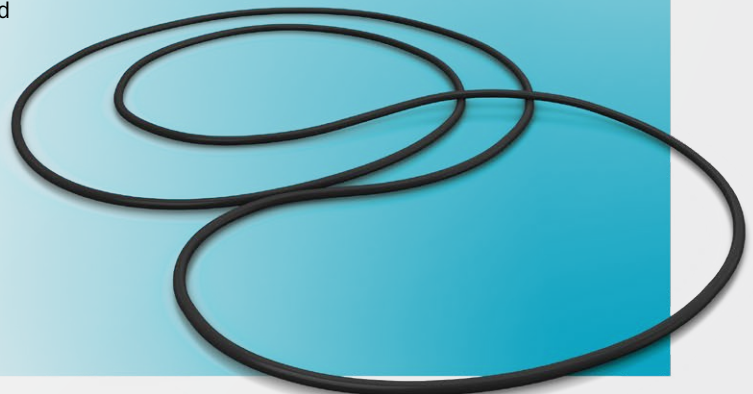
FLEXIMOLD™ GIANT SEALS

The Trelleborg Sealing Solutions proprietary FlexiMold™ technology allows high-precision, low volume large diameter O-Rings (from 600 mm to near-infinite diameters) and other seal profiles to be manufactured without tooling costs. The world record breaking 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:

Large diameter Isolast® PureFab® display panel seals, O-Rings for the semiconductor industry and large customized environmental gaskets for marine applications

ADVANTAGES: No upfront tooling costs – Small quantity production batches possible – Suitable for nearly all materials – Available in joined or open cords



Design Considerations

Isolast® FFKM materials are designed to meet your unique sealing requirements, whether you need a standardized part or a complex, custom-designed multicomponent solution. By considering factors like thermal expansion, compression set and chemical compatibility, Isolast® enables reliable, high-performance solutions tailored to even the most demanding applications.

Isolast® combines perfluoroelastomer with fillers, additives, and curing agents to optimize application-specific properties. Material response to fluid immersion mainly depends on the base polymer, though some media may react with other components.

When evaluating materials, both physical and fluid compatibility should be considered. Compression set, hardness, abrasion resistance and thermal expansion all influence suitability for specific applications.

Laboratory testing cannot always accurately simulate real-world conditions or predict long-term behavior of additives and impurities. Despite this limitation, Isolast® provides exceptional chemical resistance and generally delivers outstanding service life.

Chemical Compatibility

- ✓ Concentrated organic and inorganic acids
- ✓ Strong alkalis and bases
- ✓ Organic compounds: Alcohols, aldehydes, ketones, esters, ethers
- ✓ Aliphatic and aromatic amines
- ✓ Epoxides: Ethylene oxide and propylene oxide
- ✓ Hydraulic and fuel oils, fuels (e.g. Skydrol®, Pydraul®)
- ✓ Most organic solvents
- ✓ Halogens and strong oxidizing media
- ✓ Hot water/steam
- ✓ CIP/SIP cleaning media

KEY FACTORS WHEN DESIGNING SEALING SYSTEMS WITH ISOLAST®

- 1 FFKMs have a higher volumetric coefficient of expansion than fluoroelastomers (FKMs) or other sealing materials. When warming from +20 °C to +240 °C/+68 °F to +464 °F the volumetric expansion reaches approximately 25%. At room temperature, the groove should only be 75% filled to prevent seal extrusion when temperatures rise.
- 2 For static applications, maintain installation pressure between 12% and 18%. Higher pressures will eventually increase compression set and may cause premature seal failure. For operating temperatures below 0 °C/+32 °F, use an installation pressure of 15% to 21%.
- 3 Under pressure, elastomers behave like highly viscous fluids and need support or anti-extrusion devices in high-pressure and/or high-temperature environments. Isolast® seals used in applications exceeding 10 MPa/1,450 psi require PTFE Back-up Rings.
- 4 Avoid shock loads when operating at or below TR-10 values to maintain sealing integrity.
- 5 During installation, avoid over-stretching the seal (maximum 50%).

O-RING CALCULATOR: SIMPLIFY YOUR DESIGN PROCESS

Quickly determine dimensions, housing layouts and part numbers based on ISO 3601 standards. With features like material selection, application-specific recommendations and offline functionality, it's the ultimate resource for precise and efficient O-Ring design.
www.trelleborg.com/en/seals/resources/design-support-and-engineering-tools/o-ring-calculator



Isolast® Material Overview

Industry	Compound	Temperature Range	Hardness	Color	Benefits
Aerospace	Isolast® J8290	-10° C to +290 °C +14 °F to +554 °F	75 Shore A	Black	High temperature suitability, enhanced hot oil and steam resistance (AMS 7257E)
Oil & Gas	Isolast® XploR™ 9513	-5 °C to +225 °C +23 °F to +437 °F	95 Shore A	Black	Standard NORSOK M-710 Grade
	Isolast® XploR™ 9523	-35 °C to +225 °C -31 °F to +437 °F	90 Shore A	Black	Low temperature stability (NORSOK M-710 & BS EN ISO 23936-2)
	Isolast® XploR™ 9554	-10 °C to +275 °C +14 °F to +527 °F	90 Shore A	Black	Suitable for high temperatures and steam environments
Food & Beverage	Isolast® J9553	-5 °C to +250 °C +23 °F to +482 °F	75 Shore A	Black	Resistance to bases, acids, polar solvents and steam
	Isolast® J9556	-5 °C to +250 °C +23 °F to +482 °F	73 Shore A	Black	USP 87/USP 88 Approved Material
Chemical Processing	Isolast® J9551	-10 °C to +250 °C +14 °F to +482 °F	80 Shore A	Black	Wide ranging chemical compatibility
	Isolast® J9503	-25 °C to +225 °C -13 °F to +437 °F	75 Shore A	Black	Suitable for low temperatures, high chemical compatibility
	Isolast® J9570	-40 °C to +250 °C -40 °F to +482 °F	70 Shore A	Black	Ultra-low temperature stability
General purpose	Isolast® J9677	-10 °C to +300 °C +14 °F to +572 °F	75 Shore A	Black	Suitable for high temperatures
	Isolast® J9509	-25 °C to +225 °C -13 °F to +437 °F	90 Shore A	Black	Low temperature stability, high hardness
	Isolast® J9505	-25 °C to +225 °C -13 °F to +437 °F	68 Shore A	White	Oxidizing fuels (lower shore hardness)
	Isolast® J9538	-10 °C to +250 °C +14 °F to +482 °F	75 Shore A	Black	Suitable for high temperatures, high chemical compatibility

Isolast® PureFab® for Semiconductor Applications

Trelleborg Sealing Solutions offers a best-in-class range of materials specifically engineered to increase product yield and reduce process defects while minimizing downtime and lowering total cost of ownership.

Visit Isolast® PureFab® online to find out more.



The information in this publication is intended for general reference only and not for specific applications. Customers must satisfy themselves of the suitability of a product and material for their individual applications. For food and beverage applications, verify compliance with statutory regulations. For medical and pharmaceutical uses, consult directly with the manufacturer. Other materials, including specialized compounds for specific purposes, are available.

Storage

Isolast® materials have a minimum 18-year storage life when sealed in their original packaging.

Trelleborg is a world leader in engineered polymer solutions that protect essential applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way.

Trelleborg Sealing Solutions combines deep materials and applications expertise with close customer collaboration to fulfil our mission as a leading provider of precision seals, bearings and custom polymer components. We focus on meeting the most demanding needs of aerospace, food and beverage, semiconductor and general industrial customers.

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