

in the **groove**

The world of seals and service

Oil & Gas

Breaking the mold

Advanced range of PEEK products



Chemical & Processing

The perfect coupling

Extending life in processing equipment

Semiconductor

A new generation

New Isolast® Fab Range™ J9675 gives exceptional overall performance



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Editorial

Business growth gives continuous success

Welcome to our fifth edition of *'in the groove'* focusing on sealing solutions in the semiconductor market.

My team and I work with our 40 marketing companies globally in support of our chemical processing, semiconductor and oil & gas customers. Growth and more growth, has been a major feature of these industries. Recently I've visited a number of major customers and attended exhibitions; feedback from these is that processing sectors are buoyant.

One highlight is offshore, where relatively high oil prices have stimulated exploration and drilling. With fields moving further out to sea and wells becoming deeper, demands on seals are high and the need for innovative products and materials constant. In this industry our worldwide presence is a real advantage and in this issue we spotlight our North American capabilities in PEEK manufacture.

Our global network is also allowing us to make great inroads into sealing of semiconductor equipment. Facilities in America and Asia Pacific are supporting many new customers looking for effective seal configurations. A booming segment, as demand for wafers increases year on year, it requires continuous improvement to increase plant availability.

In this edition, we feature some of our latest innovations for the semiconductor industry. Our recently launched Isolast® Fab Range™ J9675 has proven excellent results over a wide range of wafer manufacturing processes. While the unique Turcon® Variseal® Ultra-Clean™ offers the ultimate in cleanliness, giving compatibility in virtually all chemicals and gases. Why not come and discuss these new products on our stand at Semicon West?

Not to forget the important chemical processing industry, you'll find details of our hygienic coupling sealing solutions in this issue. Choosing the optimum materials can give significant savings in total production cost.

Finally, as always, if you have any comments on our latest *'in the groove'*, email me at groove@trelleborg.com. We welcome your views.

A handwritten signature in blue ink that reads "Silverio". The signature is written in a cursive, flowing style.

Dr. Sandro Johannes Silverio
Global Director - CPI, Semicon, Oil & Gas segments

news

Busak+Shamban becomes Trelleborg Sealing Solutions

A new name with an outstanding history

Busak+Shamban operated as the global sales and marketing arm of Trelleborg Sealing Solutions. To consolidate our brand strategy, Busak+Shamban is now Trelleborg Sealing Solutions, effective April 2, 2007.

Busak+Shamban has been part of Trelleborg Group, with whom we share a foundation in polymer expertise, since our acquisition in October 1, 2003. With a pedigree going back over 50 years, the marketing arm continued to operate under the existing Busak+Shamban brand, while the manufacturing facilities adopted the Trelleborg name. Effective from April 2, 2007, to consolidate the group's brand strategy, Busak+Shamban has changed our name to Trelleborg Sealing Solutions.



Fast facts about Trelleborg Sealing Solutions

Trelleborg Sealing Solutions is one of the world's leading developers, manufacturers and suppliers of precision seals. We support our aerospace, industrial and automotive customers through 30 production facilities and more than 40 marketing companies globally. Within our portfolio are some of the longest established sealing brands, including Dowty, Forsheda, Palmer Chenard, Shamban, Skega and Stefa along with a large number of proprietary products

and materials such as Turcon®, Zurcon®, Orkot®, Isolast®, Stepseal®, and Wills Rings®.

www.tss.trelleborg.com

Fast facts about Trelleborg group

Trelleborg is a global industrial group whose leading positions are based on advanced polymer technology and in-depth applications know-how. Trelleborg develops high-performance solutions that seal, damp and protect in demanding industrial environments. The Trelleborg Group has annual sales of approximately SEK 27 billion (2.9 billion Euros, 3.8 billion US Dollars), with about 23,000 employees in 40 countries. The Group comprised of four business areas: Trelleborg Engineered Systems, Trelleborg Automotive, Trelleborg Sealing Solutions and Trelleborg Wheel Systems.

www.trelleborg.com

"The transfer will be seamless," says Claus Barsøe, President of the Trelleborg Sealing Solutions business area. "We feel this change will unify our

total brand offering, emphasizing that our marketing companies and manufacturing facilities run as a cohesive unit. The quality of support and service we give to our customers will not be affected. In fact, it can only be enhanced by our future plans.

"Our business is core within the Trelleborg Group. An exciting time ahead, the name change heralds more significant investment in our business area. This will further strengthen our position as one of the world's leading developers, manufacturers and suppliers of sealing solutions to aerospace, industrial and automotive markets globally."

Focus on service-based partnerships

Trelleborg Sealing Solutions shows its commitment to the offshore industry with the appointment of a dedicated US oil and gas segment manager.

With the goal of providing partnerships, not just technical solutions, the company appointed Eric Bucci to the position of oil and gas segment manager. Eric is responsible for overseeing all aspects of the company's relationships with its oil and gas customers in the Americas. This includes helping to facilitate the advancement of Supply Chain Management (SCM) to proactively meet customer requirements as efficiently as possible.

"Oil and gas customers require an incredibly diverse array of equipment for their applications," says Eric Bucci. "Trelleborg Sealing Solutions can supply any sealing component, from an elastomer O-Ring to a custom-engineered Turcon® Variseal®, from any local office. Worldwide Trelleborg Sealing Solutions locations mirror those of our customers. Therefore, not only can we be a one-stop-shop for offshore sealing, once specified we can provide those products anywhere in the world."



Eric Bucci

SCM is key to servicing the fast-paced oil and gas industry, providing effective and timely supply of product from global manufacturing facilities. This involves developing, implementing and managing supply chain operations. With it, customers' stock can be maintained, low stock is automatically replenished and total stock is continuously monitored.

Backed by the smooth-running supply chain between our manufacturing locations and the Logistics Center Americas (LCA), our strong base of technical expertise and our global support system, Trelleborg Sealing Solutions is in position to continue its customer-focused approach.

SEMI.org

A website serving the semiconductor industry

SEMI.org is a leading global industry association. Its focus is the advanced manufacturing supply chain, and it serves the semiconductor, display, micro-electromechanical systems (MEMS) and related industries. With members spanning the globe, SEMI.org is the place to go to find out about industry trade shows and conferences, public policy, market research, international standards and workforce development.

Benefits of a Semi.org membership:

- Access to, and inclusion in, the global directory of suppliers, including company information and lists of products and services
- Access to electrical data, equipment and processes to bring your products to the market quickly
- Access to the SEMI Industry Classification System (SICS). This is a classification system for products supplied by all industry segments of the SEMI Trade Association
- Discounts for business and technical programs, executive programs, products, expositions and employee benefit programs



Trelleborg Sealing Solutions

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Any reliance on information is therefore at the user's own risk. While every effort is made to ensure the accuracy of information contained herewith, Trelleborg Sealing Solutions cannot warrant the accuracy or completeness of information.

For exceptional operating conditions, please contact your Trelleborg Sealing Solutions representative.

A new generation

Trelleborg Sealing Solutions Isolast® Fab Range™ J9675, our next generation sealing material for semiconductor manufacturing, has proven capabilities over a wide range of wafer processes.

Isolast® Fab Range™ J9675 from Trelleborg Sealing Solutions is a newly developed sealing compound engineered to offer excellent chemical resistance and minimal particulation across a wide range of semiconductor wafer processes. In particular, it gives enhanced performance in fluorine and oxygen based plasma environments. Its unique curing and filler system ensures superior long-term properties in operating temperatures up to +300°C/ +572°F.

Isolast® Fab Range™ J9675 proven through independent and laboratory field tests

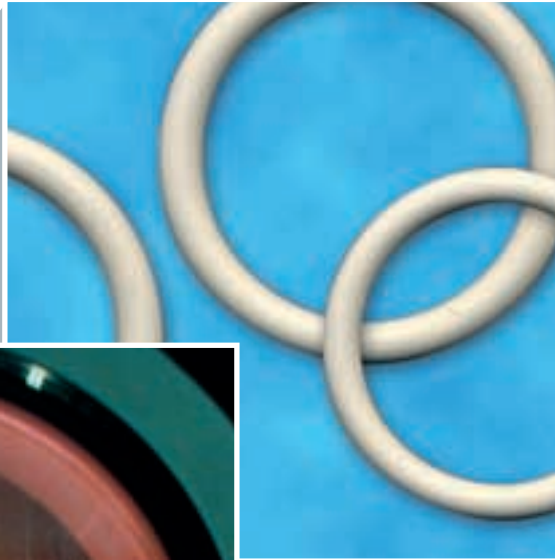
"Isolast® Fab Range™ J9675 is proven in dry and plasma semiconductor processing environments through independent tests," says Ursula Porelle, product manager for Isolast®. "We have found that the material gives an unrivalled combination of attributes in terms of plasma resistance, purity, physical properties, outgassing, leach out and high temperature resistance. It is not necessarily the best in class on each material attribute, but the best overall.

The best possible attributes in a single material means no compromise is required

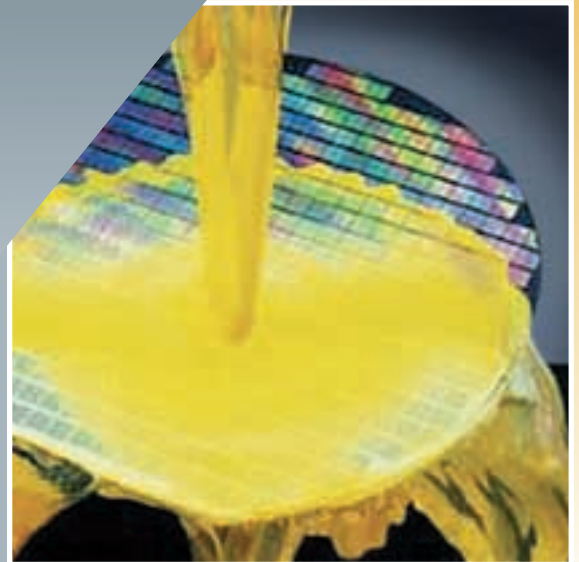
"The compound and polymer technology available up until now has meant that engineers needed to choose a material on the basis of a single characteristic," continues Ursula. "To achieve good plasma resistance linked with low outgassing and particulation could result in sacrificing high temperature performance and physical properties, compression set especially. While to ensure the highest purity, surface energy properties were compromised. With Isolast® Fab Range™ J9675 this compromise is not required."

When specifying seals for wafer processing equipment it is no longer necessary to compromise.

Isolast® Fab Range™ J9675 gives enhanced performance in fluorine and oxygen based plasma environments.



Isolast® Fab Range™ J9675 is proven in dry and plasma semiconductor processing environments through independent tests.

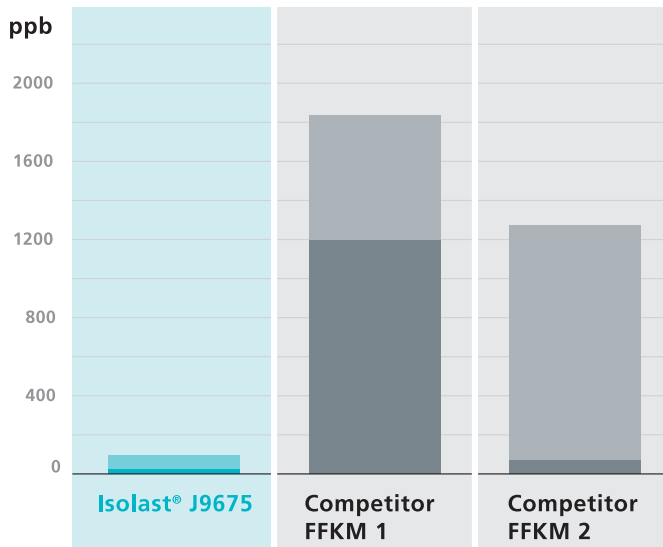


For more information on the Isolast® Fab Range™, visit

www.tss.trelleborg.com



To download the range of brochures, go to the Download Area.

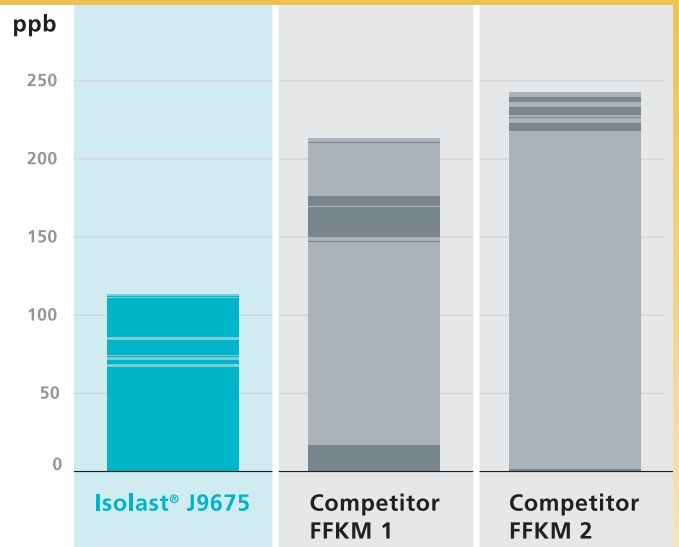


Results of a leach out test in Enthone DA 18-20 ECP fluid with 50 ppm Chloride and measuring 16 cations* according to SEM Standard F40/F57 (50°C/200h) along with TOC.

* Pb, Ba, Sr, Zn, Cu, Ni, Fe, Mn, Cr, Ca, K, Al, Mg, Na, B, Li and TOC

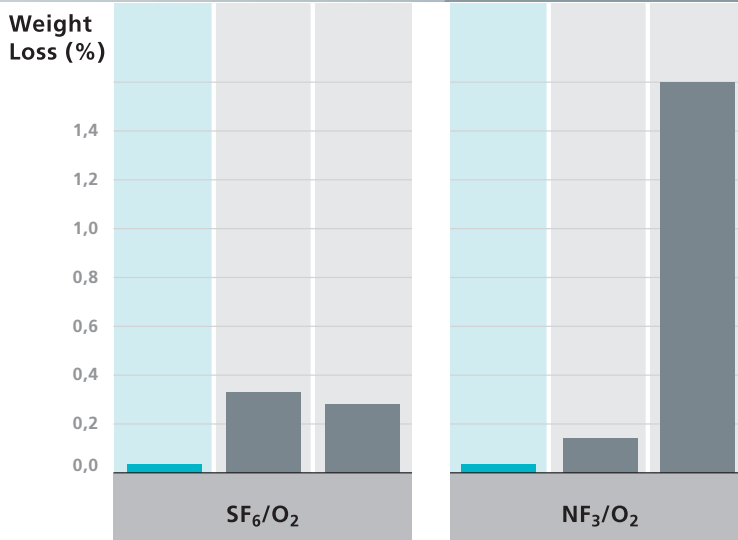
Results of leach out test in TMAH (Tetra Methyl Ammonium Hydroxide) and measuring 16 cations** according to SEMI Standard F40/F57 (168h/85°C) with ICP/MS.

** Al, Ba, B, Ca, Cr, Cu, Fe, Pb, Li, Mg, Mn, Ni, K, Na, Sr, Zn



In tests Isolast® J9675 gives excellent results in wet process and plasma environments

Isolast® J9675 underwent a series of intensive independent tests in an internationally accredited test house and with a globally recognized Asian chip manufacturer. These proved its capabilities in dry and wet process and plasma semiconductor applications.



Results of plasma tests in NF₃/O₂ and SF₆/O₂

Plasma System	SF ₆ / O ₂	NF ₃ / O ₂
Pressure (mTorr)	270	248
Time (minutes)	90	90
Power (Watt)	150	350
Gas flow (sccm)	55/5 (SF ₆ /O ₂)	25/7 (NF ₃ /O ₂)

■ Isolast® J9675
■ Competitors 1 and 2

Isolast® Fab Range™ J9675: An advanced material for semiconductor applications



Isolast® is the Trelleborg Sealing Solutions proprietary range of perfluoroelastomer (FFKM) materials. Part of the Isolast® Fab Range™, specifically engineered for semiconductor applications, J9675 is the universal choice for dry process and plasma environments.

Features and benefits:

- Provides a universal solution in dry process and plasma semiconductor wafer processing environments
- Offers extended life in these applications
- Helps extend mean time between planned maintenance
- Especially suited to fluorine and oxygen based plasma environments
- High purity, minimal particulation
- Very low metallic ion content
- Excellent resistance to all dry and plasma based wafer processing chemistries
- Continuous service temperatures to +300°C / +572 °F
- Outstanding retention of long-term properties
- Available in O-Rings, square and special section seals, V-Rings®, as well as custom molded seals and engineered solutions
- Standard product finishing in Class 100 Cleanroom

Typical applications:

- Deposition (CVD, PECVD, HDPCVD, RPCVD, APCVD, SACVD, DCVD)
- Oxidation
- Diffusion
- Etching
- Ashing
- Metallization
- RTP

Seals that are used in electrical and electronic equipment must comply with the RoHS directive. Trelleborg Sealing Solutions has systematically analyzed our range of proprietary materials to confirm their compliance to this.



Avoiding the hazards

Excluding prohibited materials has proven a challenge for the sealing industry

The Restriction of use of Certain Hazardous Substances (RoHS) came into effect in July 2006. Part of legislation attempting to cut down environmental risk from e-waste, the directive aims to limit toxic materials, including some heavy metals, in electrical and electronic equipment components. The original formulation of many sealing materials contained these heavy metals and the restriction therefore encompassed such compounds. Excluding these hazardous substances from sealing formulations, while maintaining their properties, has proven a challenge for the industry.

Trelleborg Sealing Solutions provides one of the most advanced environmentally friendly ranges of sealing materials

"Environmental responsibility is a primary concern for the Trelleborg Group," says Elke Voehringer-Klein, semiconductor segment manager for Trelleborg Sealing Solutions Europe. "We were therefore at the forefront of ensuring harmful metals were excluded from our sealing formulations. We made it an objective long before the directive came into force."

This early focus means that Trelleborg Sealing Solutions can provide one of the most advanced environmentally friendly sealing offerings on the market.

A market leading number of certificated compounds compliant to RoHS directive

"Our polymer laboratories undertook a major project to analyze our entire range of proprietary compounds. Systematically, using sophisticated metrology equipment, they examined each for any trace of prohibited metals," continues Elke. "We can therefore certify a market leading number of compounds as compliant to the RoHS directive. The breadth of capabilities of available materials means that we are able to meet the specific requirements of customers, whatever they may be."





Peter Nilsson

Environmental issues are a major concern to the Trelleborg Group

The Trelleborg Group issues a full sustainability report every year and within that environmental matters are covered in detail. The statement within this from president and

CEO, Peter Nilsson outlines the Group's attitude to the environment.

"In the Trelleborg Group, we work to create added value for our stakeholders without compromising our high ambitions with regard to our environmental and social responsibility. Through our main task - to seal, damp and protect in demanding industrial environments - we make a contribution through many of our products and services to promoting positive development in environmental, health and safety areas. At the same time, we endeavor to prevent and minimize the negative impact of our activities, products and services on the environment and to establish our company as a good example and a respected member of society."

To see the full Trelleborg Group sustainability report go to:

www.trelleborg.com/en/Sustainability/Home/

Applications in Semiconductor Industry and Nanotechnology

TSS Compounds*

Chemical Vapor Deposition (CVD)	Isolast® Perfluoroelastomers (FFKM), Isolast® bonded to metal and Turcon® Variseals®
Chemical Mechanical Planarization (CMP)	Semicon Ethylene Propylene Diene (EPDM)
Etching and etch chambers	Isolast® Perfluoroelastomers (FFKM)
Photolithography	Isolast® Perfluoroelastomers (FFKM), and Semicon Fluorelastomers (FKM)
Diffusion	Isolast® Perfluoroelastomers (FFKM) and Semicon Fluorelastomers (FKM)

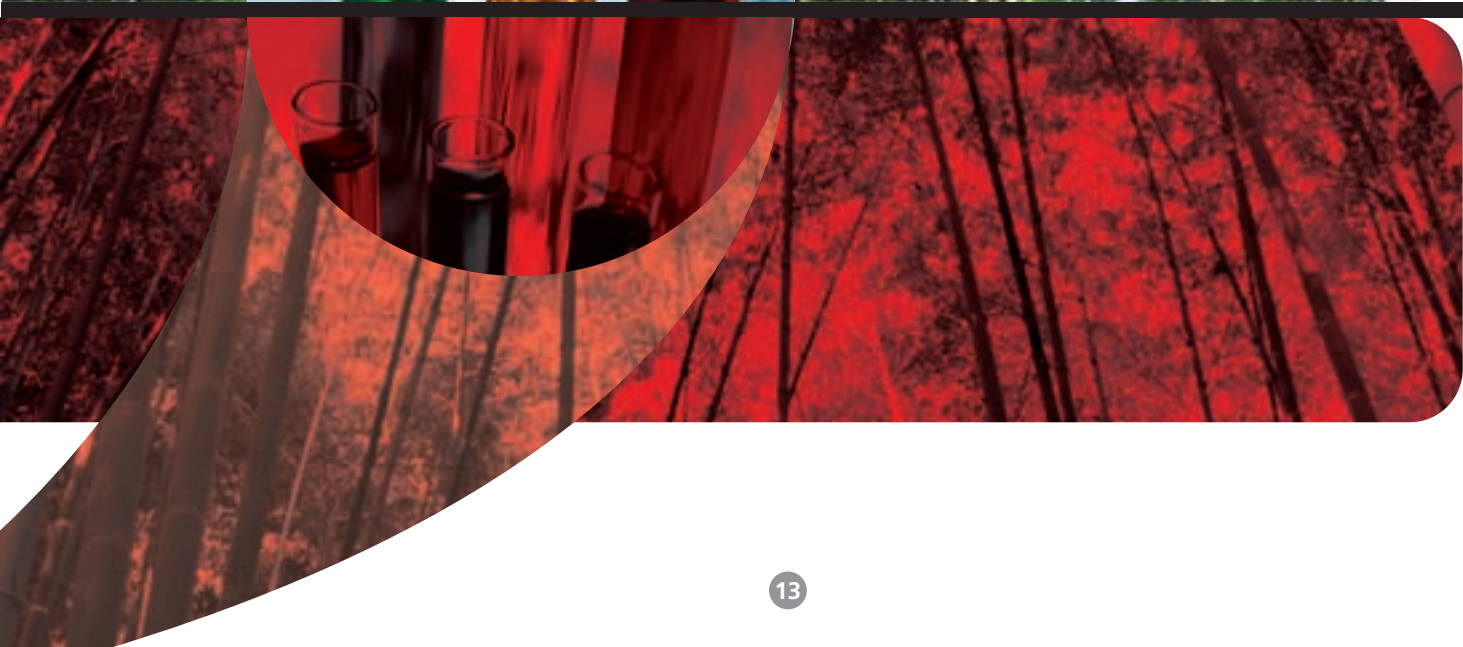
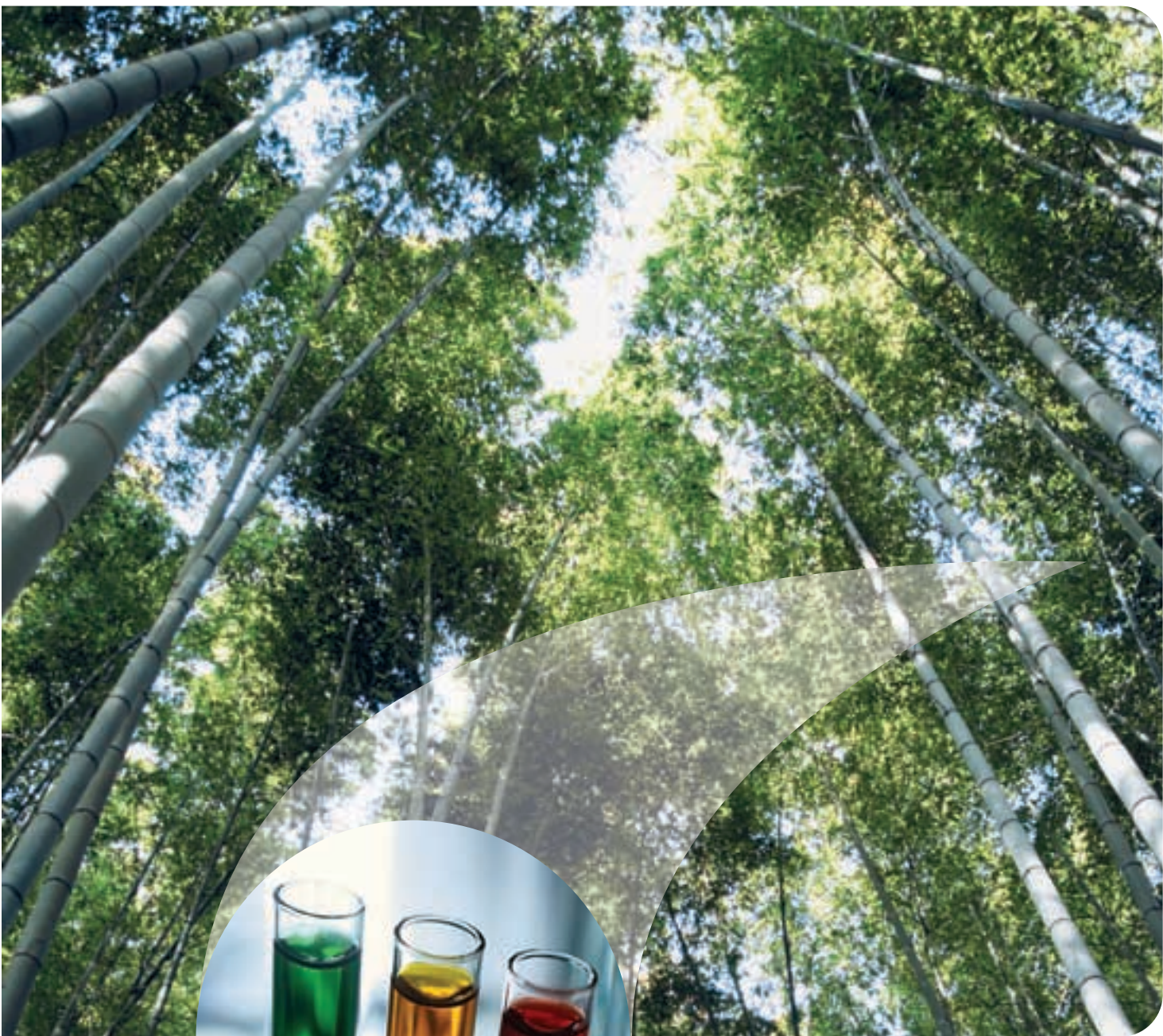
*All compounds are available in various sealing geometries and designs such as O-Rings, square and special section seals, custom-molded and engineered solutions. Certificates for each specific compound are available.

RoHS: The facts

The Restriction of Hazardous Substances Directive (RoHS) was adopted by the European Union in February 2003 and took effect on July 1, 2006. It restricts the use of six hazardous materials in the manufacturing of electronic and electrical equipment. These are heavy metals lead, mercury, cadmium and hexavalent chromium along with two bromated compounds, polybrominated biphenyls (PBB) and diphenyls (PBDE). The maximum concentrations are 0.1% or 1000 ppm by weight of homogeneous material, except for cadmium, which is limited to 0.01% or 100 ppm.

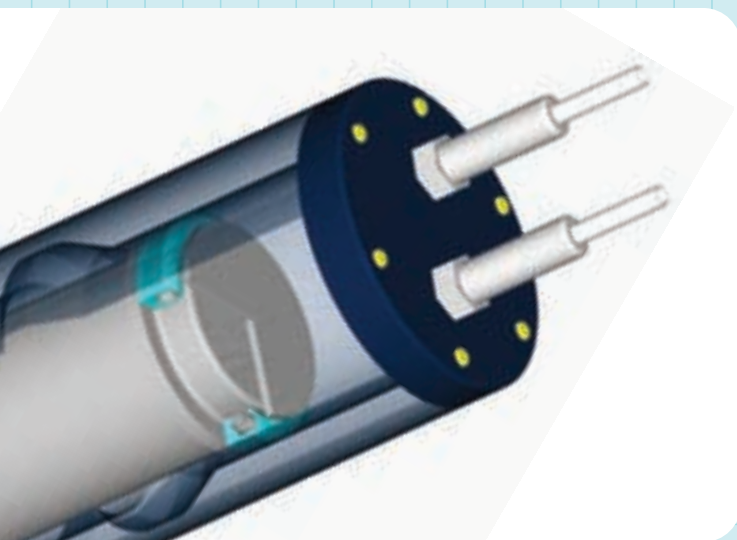
The limits do not apply to the weight of the finished product but any single assembly that could theoretically be separated mechanically.

Closely linked with the Waste Electrical and Electronic Equipment Directive, which sets collection, recycling and recovery targets for electrical goods, it is part of legislation aiming to solve the problem of huge amounts of toxic e-waste. Various countries around the world and states in the US are also beginning to impose regulations in line with the EU directive.



Keeping it ultra clean

Maintaining an ultra clean environment is the primary priority in some processing systems. The unique, newly developed Turcon® Variseal® Ultra-Clean™ from Trelleborg Sealing Solutions, manufactured in our MF grade materials, offers the ultimate in cleanliness for a spring-energized PTFE based seal.



Seal configuration for processing application incorporating the new Turcon® Variseal® Ultra-Clean™ seal.

Compatible with virtually all chemicals, Turcon® Variseal® is ideal in processing systems

Variseal® is commonly used in processing systems. One of the main reasons for this is that Turcon®, the Trelleborg Sealing Solutions proprietary PTFE based material, offers compatibility with virtually all chemical media. It also has superior wear resistance, unrivalled friction characteristics and can withstand extreme operating temperatures.

PTFE, though, has no elasticity, which means that Turcon® Variseal® is energized with a spring fitted into the seal profile. In most applications the open spring of the standard Turcon® Variseal® is acceptable. However, in some industries, where cleanliness is paramount, the area of dead space around the spring where bacteria can potentially be caught can pose a risk of contamination.



Turcon® Variseal® Ultra-Clean™: A unique seal

Features and benefits:

- Operates in extreme temperatures from -253°C/-423°F to 260°C/500°F
- Withstands high pressures in excess of 100 bar (1450 psi)
- Excellent wear and friction characteristics
- Compatible with virtually all chemicals such as aggressive CIP fluids and superheated steam up to 260°C/500°F
- Unrivalled cleanability in super clean processing environments
- Materials available compliant to FDA 21 CFR 177.1550, 3-A, USP Class VI, Cytotoxicity <USP 87>, NSF and the EU Machinery Directive
- Suitable for piston, rod, face, rotary, reciprocating and static situations
- Fits into standard O-Ring and Variseal® grooves for easy retro fitment
- Can be cleaned and packed to class 100 standards

Materials:

- Variseal® case can be supplied in premium grade Turcon® PTFE based materials
- Spring can be supplied in stainless steel, Elgiloy or Hastelloy

The spring that energizes the Turcon® Variseal® Ultra-Clean™ is fully enclosed in a PTFE case, so there can be no risk of contamination

Patent is pending on
Variseal® Ultra-Clean™

For more information on
Turcon® Variseal® Ultra-Clean™,
visit

www.tss.trelleborg.com



To download the brochure,
go to the Download Area.
To search for specific parts,
visit the Electronic Catalog.

Turcon® Variseal® Ultra-Clean™ has a fully enclosed spring preventing risk of contamination

“Some sectors of the processing industry are extremely demanding about the cleanliness of components within their systems,” says Stuart Moares, product manager for Trelleborg Sealing Solutions Bridgwater where the Turcon® Variseal® Ultra-Clean™ was developed. “We recognized the need to offer an enclosed Turcon® Variseal® design for super clean environments. Our initial solution was Variseal® Hi-Clean, where the spring cavity is filled with silicone. This has proven extremely popular with our food and beverage customers.”

Turcon® Variseal® Ultra-Clean™ seal in Turcon® MF material provides the ultimate in cleanliness

“In search of even greater cleanliness, we have invested considerable resources in research of a design where the spring is fully enclosed in PTFE,” continues Stuart. “This has resulted in the unique Turcon® Variseal® Ultra-Clean™. Choose Turcon® MF for this product, a material which has been specially engineered for super clean situations and you have a seal that offers the ultimate in cleanability and cleanliness.”

Turcon® MF Grades

Based on ultra-clean technology, these compounds are manufactured from high-purity PTFE grades and additives. Their smooth finish, with high gloss and low porosity, avoids the risk of contamination

build up and reduces particle shedding. Each batch of Turcon® MF is manufactured using high grade material and issued with a certificate of conformity.

Grade	Features	Approvals
Turcon® MF1	<ul style="list-style-type: none"> • Exceptional friction characteristics • Unrivalled low temperature capabilities • Suitable for use with soft mating surfaces 	FDA
Turcon® MF2	<ul style="list-style-type: none"> • Good wear resistance 	FDA
Turcon® MF3	<ul style="list-style-type: none"> • Very good wear and abrasion resistance • Suitable for use with soft mating surfaces 	FDA
Turcon® MF4	<ul style="list-style-type: none"> • Unique lubricating properties • Withstands higher pressures • Suitable for use with medium to hard mating surfaces 	FDA, USP Class VI
Turcon® MF5	<ul style="list-style-type: none"> • High wear resistance • Good friction and sliding properties 	FDA



Turcon® Variseal® Ultra-Clean™ is ideal for filling machines



Super clean wafer manufacturing requires the ultimate in ultra clean sealing

Turcon® Variseal® Ultra-Clean™ meets the requirements of industries that demand the ultimate in cleanliness

Food, beverage and pharmaceutical processing

Manufacturers of food, beverage and pharmaceutical products must avoid contamination at all costs. It is vital, as seals are housed within the processing environment, that their design has no dead space. This guarantees that bacteria cannot accumulate, avoiding the risk of contamination. As does ensuring seals are compatible with process media so they will deteriorate as little as possible. In addition, they must be able to withstand the aggressive chemicals of rigorous CIP and SIP cleaning regimes, often at extreme temperatures and with steam. Turcon® Variseal® Ultra-Clean™ answers all these needs.

Semiconductor fabrication

The effectiveness of a semiconductor wafer can be destroyed by the minutest of contamination. Ultra clean in this processing environment is measured at a microscopic level. The fully enclosed spring of the Turcon® Variseal® Ultra-Clean™ means that there is no risk of metal extractables entering the system. That is important as these can act as dopants, impurity elements that can alter the optical or electrical properties of a semiconductor. Combine this with the purity and low particle shedding of Turcon® MF, along with inherent compatibility with aggressive semiconductor process chemicals, and Turcon® Variseal® Ultra-Clean™ becomes the ideal choice for sealing in semiconductor manufacturing equipment.

Advanced sealing solutions are the secret to extending life in pipe coupling systems in processing equipment.

The perfect



In today's processing plants, there are thousands of lengths of piping and at each juncture, a coupling. These are sealed with clamp gaskets and O-Rings. Though the individual cost of these may be relatively insignificant, their cost in terms of maintenance can be extremely high. Ineffective sealing can mean extended downtime due to frequent planned or even unplanned replacement at failure. Maximizing the life of seals and gaskets in piping can therefore be a major contributor to improved production efficiency and yield.

The best options for hygienic couplings

"We have recently concentrated significant resources to identifying the best options for hygienic couplings," says Jonas Karlsson, chemical processing segment manager for Trelleborg Sealing Solutions Europe. "One of the keys to long life is matching the material to the processing system.

It's about making sure that it can stand up to chemicals that are being processed, those in the cleaning regimes and the operating temperatures."

Trelleborg Sealing Solutions supplies a range of compounds that means engineers have cost-effective options. Offerings start with a standard Ethylene Propylene Diene Rubber (EPDM). For greater chemical resistance there is Resifluor™ 500 and for the ultimate in media compatibility combined with high temperature capability, there are our proprietary Isolast® perfluoroelastomer (FFKM) materials.

Matching compound to conditions provides cost-effective solutions

"We are always trying to make sure we can provide our customers with cost-effective options," continues Jonas. "With perhaps several thousand couplings that need to be

coupling

sealed in any one processing system, extended life can give real benefits.

“What we call our standard material, gives performance well beyond standard when compared to other compounds on the market. It will give good service life, if you know that it will withstand the operating conditions. If the chemicals processed are more aggressive, especially when there are extreme temperatures too, then Resifluor™ 500 and Isolast® are the best options. Many of our customers have found, when calculating total processing cost, these compounds provide real savings by minimizing intervals between planned maintenance.”

O-Rings are available in a wide variety of materials to match processing needs.



EPDM E7502

Performance beyond the standard

Trelleborg Sealing Solutions has maximized the usability of Ethylene Propylene Diene Rubber (EPDM) in processing applications. Compound E7502 has high chemical resistance, giving it long life in polar solvents, steam and hot water along with suitability for contact with alkaline cleaning fluids. Tests prove it to be the best choice in liquid dairy applications and with WFI (Water For Injection) at high temperatures. Peroxide cured, it contains the smallest amount of softeners and process aids possible. This reduces potential leach out to a minimum, lowering the risk of contamination. It is engineered to achieve enhanced chemical and thermal stability.

RESIFLUOR™ 500

Outstanding capabilities

The Resifluor™ 500 range is a premium FKM with a modified polymer architecture, engineered to combine the chemical resistance of an EPDM towards polar fluids, alkalis and acids, with the performance characteristics of FKM materials in a variety of aggressive fluids. It has outstanding resistance to attack by a large number of chemicals and fluids, including aliphatic and aromatic hydrocarbons, acids and bases, all types of alcohols and even low molecular ketones, esters and aldehydes. With resistance to superheated steam and caustic cleaning regimes, it has low total organic carbon and metal extractables similar to PTFE, which gives the ultimate in cleanliness.

ISOLAST®

Almost universal chemical resistance

Isolast® is the Trelleborg Sealing Solutions range of advanced perfluoroelastomer (FFKM) materials, combining the resilience and sealing force of an elastomer with the chemical inertness and thermal stability of PTFE. Isolast® J9515 and J9516 are virtually inert, performing well in a broad range of chemical media including organic and inorganic oxides, acids, alkalis, amines, esters and steam at continuous operating temperatures up to +240°C/+464°F. Ideal for sealing in the most aggressive of solvent based cleaning fluids, the compounds have excellent performance in CIP and SIP regimes. With special gasket designs that minimize Isolast® content, a cost-effective perfluoroelastomer solution can be provided for these.

Conforming to standards

The Trelleborg Sealing Solutions range of materials recommended for hygienic couplings conforms to standards required by the industry.

Compound	FDA	USP Class VI	3-A
E7502	✓	✓	✓
Isolast® J9515 & J9516	✓	✓	✓
Resifluor™ 500 Black & white	✓	✓	—

In today's processing plants, there are thousands of lengths of piping and at each juncture, a coupling. These are sealed with clamp gaskets and O-Rings



Proven performance

Materials recommended by Trelleborg Sealing Solutions for hygienic couplings have undergone significant testing designed to predict behavior in real processing situations. For a major pharmaceutical company, leakage has been reduced to virtually zero, providing considerable savings to the customer.



Breaking the mold

Using leading-edge manufacturing capabilities, Trelleborg Sealing Solutions offers an advanced range of PEEK seals to meet the sealing needs in the severe conditions of oil and gas applications.



PEEK materials are an excellent choice for oil and gas applications, but can be difficult to machine

For some applications, there is a need for a material that can withstand very high temperatures and pressures and have excellent wear resistance capabilities. PEEK material is a known solution, but manufacturing parts from this material is difficult because of its hardness. We at Trelleborg Sealing Solutions have the ability to machine parts from this material. The PEEK materials that Trelleborg Sealing Solutions offers can be manufactured

to almost any shape to fit nearly any application, from the most basic components to the unique specifications that may be required for connectors, back-up rings, HAT rings, bearings and seals. Through the process of injection molding into tubes or rod stock, PEEK material can be readied for shaping. Additionally, PEEK materials can be injection-molded into a finished shape.

Trelleborg Sealing Solutions successfully machines PEEK into complex geometries

“The need for machined parts that can withstand the harsh environments in the oil and gas industry is driving the development of PEEK machining capabilities,” says Eric Bucci, oil and gas segment manager, Trelleborg Sealing Solutions Americas. “At Trelleborg Sealing Solutions, we have been aware of and been addressing this need for quite some time. We have product design experience and extensive manufacturing capabilities. This, along with our industry-leading research and development laboratories and FEA expertise, enables us to provide precision PEEK components to oil and gas equipment designers, as well as end users.”

A tough material for tough situations

Materials used in oil and gas sealing applications must be able to stand up to harsh conditions. These usually involve high pressures and temperatures in corrosive, caustic or virulent media. PEEK (polyetheretherketone) materials are often used in these situations. PEEK materials are partially crystalline, aromatic polyethers. They have outstanding mechanical properties, such as excellent resistance to wear, pressures, hydrolysis and radiation. Capable of

withstanding virtually all chemicals, PEEK is commonly used in high-temperature and high-pressure applications. This makes it an ideal material for use in the extreme sealing environments of offshore applications such as drilling, production and exploration. Other applications are mud motors, valves, MWD (measurement-while-drilling) tools, LWD (logging-while-drilling) tools and various other down-hole tools to name a few.



What are the advantages of PEEK?

- Withstands temperatures up to +400°F / +204°C
- Excellent resistance to aggressive chemicals, severe environments
- Wear-resistant
- Withstands high pressures

Trelleborg Sealing Solutions



Our manufacturing location in Hudson, Massachusetts supports many processing industries, including biotechnology, food, beverage and pharmaceutical, along with mechanical seals in Isolast®.

Trelleborg Sealing Solutions Hudson has specialized in engineered silicone products since it first opened in 1982. Adding to its portfolio in 2006, the facility began production of Isolast®, the proprietary perfluoroelastomer from Trelleborg Sealing Solutions.

Focus on medical and pharmaceutical sealing

Trelleborg Sealing Solutions Hudson manufactures a broad line of products ranging from silicone tubing to extruded profiles and over molded assemblies, serving many applications. These include feeding pumps, drug-dispensing equipment and catheters to name but a few. They also supply a unique LIM (Liquid Injection Molding) product for orthopedics and sanitary gaskets used in the food and beverage industry. In addition, LIM 'Y' and 'T' connections on silicone tubing manifold systems for the biotechnology market are available.

All of these products are tested intensively and undergo an extremely rigid validation process. The Hudson facility operates in a controlled

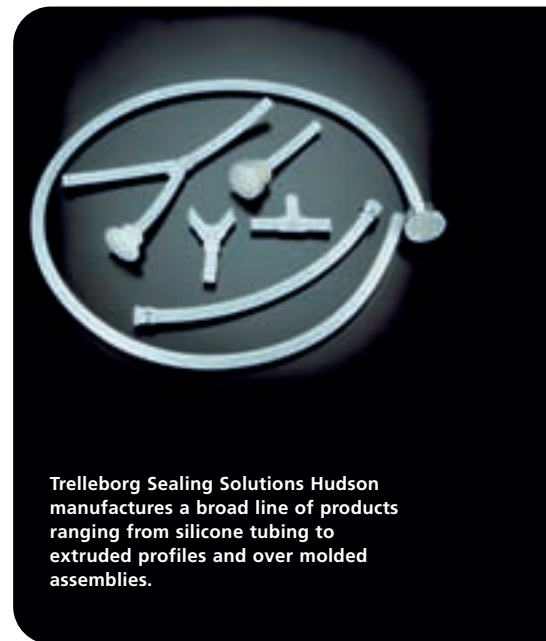
environment to Class 100,000 conditions. This means ambient temperature, humidity and particulate count are monitored continuously. Trelleborg Sealing Solutions Hudson adheres to strict Good Manufacturing Practices as defined by the FDA in the US, and in accordance with quality standards AS9100 and ISO 9001-2000.

Advanced mechanical seals

Trelleborg Sealing Solutions Hudson began exclusive production in the Americas of Isolast®, the company's proprietary perfluoroelastomer (FFKM), last year.

"The facility was chosen by Trelleborg Sealing Solutions in order to bring Isolast® production into a closer alignment with the Global Elastomers Products Group of Trelleborg Sealing Solutions," says James Hederman, product manager, life sciences at Trelleborg Sealing Solutions Hudson. "To ensure consistency of product quality we manufacture Isolast® matching standards and process to its original production site in Ashchurch, near Tewkesbury UK.

"We share a common mission to lead and support globally the activities in the semiconductor market," continues Hederman. "Isolast® production in Hudson positions Trelleborg Sealing Solutions as a major domestic supplier of FFKM sealing products for this sector in the United States."



Trelleborg Sealing Solutions Hudson manufactures a broad line of products ranging from silicone tubing to extruded profiles and over molded assemblies.



What happens in Hudson?

Trelleborg Sealing Solutions Hudson utilizes specialized silicone materials to provide solutions for disposable fluid transfer conduits and injection-molded parts. These are used in the medical device, healthcare, biotechnology, pharmaceutical, food and beverage industries. Isolast®, our proprietary perfluoroelastomer material, with almost universal chemical resistance and excellent thermal capabilities, is also manufactured at the Hudson plant.

Serving the medical, pharmaceutical, food and beverage industries

Trelleborg Sealing Solutions Hudson manufactures silicone products for such applications as:

- Enteral feeding pumps
- Dialysis machines
- Surgical trays
- Catheters
- Diagnostic equipment
- Filtration gaskets
- Disposable fluid transfer manifolds
- Disposable closure assemblies
- Processing equipment
- Sanitary fluid transfer
- Fuel cell manufacturing
- Fiber optic sets

About Gish Biomedical

Gish Biomedical, Inc., a CardioTech International company, designs, manufactures and markets disposable medical devices for various surgical specialties including cardiovascular surgery, orthopedics and oncology. All of Gish's products are single-use disposable products or have a disposable component. The company's principal products include custom cardiovascular tubing systems, blood reservoirs, cardioplegia delivery systems, oxygenators, central venous access catheters and ports and blood recovery devices for post-operative use in orthopedic surgeries.

Trelleborg Sealing Solutions Hudson working with Gish Biomedical

Gish Biomedical of Rancho Santa Margarita, California, awarded Trelleborg Sealing Solutions Hudson a contract to produce multi-lumen tubing and liquid injection over-molding connectors for their Central Vascular Access Catheters. The award was based on our years of experience within the life science market producing high quality engineered solutions.

The challenge of producing multi-lumen tubing while maintaining the orientation of the feeding lines was met by using both extrusion and liquid injection molding. This medical manufacturing is undertaken in Trelleborg Sealing Solutions Hudson state-of-the-art FDA-registered facility in Massachusetts.

Did you know?

Trelleborg Sealing Solutions Hudson is one of only a few medical manufacturing facilities in the US to be FDA registered to manufacture Class II medical devices.

The calculator that



The Trelleborg Sealing Solutions online O-Ring calculator is an easy to use way of calculating O-Ring specifications and housing designs. Already helping save time and energy for many engineers, this industry-leading program has just been updated.

The industry-leading Trelleborg Sealing Solutions O-Ring calculator has unique capabilities, is wholly intuitive and remarkably easy to use. Functions of the calculator include a sizing capability, recommendation on design parameters and complete measurements. Results and comments may be printed, saved on-line or as a PDF.

The O-Ring calculator gives certainty of design and substantial timesaving

Incorporating a great deal of sealing expertise, the calculator even considers the complexities of compression, seal expansion and groove fill. It also lets the user add notes to their results. The benefits of having this easy to use calculator are considerable, giving certainty of design and substantial timesaving.

Well received by engineers globally since its launch in 2005, it has now been updated inline with their needs. New features make the program even more versatile and user-friendly.

To access the O-Ring calculator visit

www.tss.trelleborg.com



Inner Sealing

Axial Sealing

saves time & energy

Enhancements in the latest update include:

- 1 Design recommendations for a broader range of materials including perfluoroelastomers
- 2 Warning messages when there are input errors or deviations from design recommendations
- 3 Operating temperatures for elastomer groups take into account cross section changes
- 4 Linear thermal expansion coefficients are included as preset values which can be overwritten
- 5 Design recommendations are available at the click of an i-button



1



2



3



4



5

The O-Ring Calculator is available free of charge for on-line use on www.tss.trelleborg.com website through our registration area, which gives access to other enhanced services including:

- Powerful electronic catalog -With innovative interactive quote facility
- Versatile CAD service - Makes drawing production easier
- In depth product detail - Industry leading catalogs on-line

Trelleborg Sealing Solutions at a glance

- A business area of the Trelleborg Group
- Employees: 5700
- Research and Development Centers in Europe and America
- 30 manufacturing plants worldwide
- 40 Marketing Companies globally
- Quality Certifications: ISO 9001:2000 and ISO/TS 16949:2002
- In-house polytetrafluor-ethylene, polyurethane development and elastomer development
- More than 2000 material formulations
- Worldwide distribution network

Contact your local Trelleborg Sealing Solutions
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Busak+Shamban
has a new name:
Trelleborg Sealing Solutions
Quality & Service remain!


TRELLEBORG
SEALING SOLUTIONS