Omniseal Solutions
SAINT-GOBAIN

OMNISEAL® POLYMERS

PTFE ROTARY LIP SEALS HANDBOOK

BEYOND
the boundaries of possible

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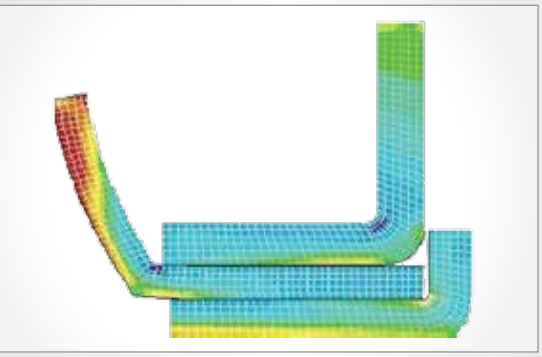
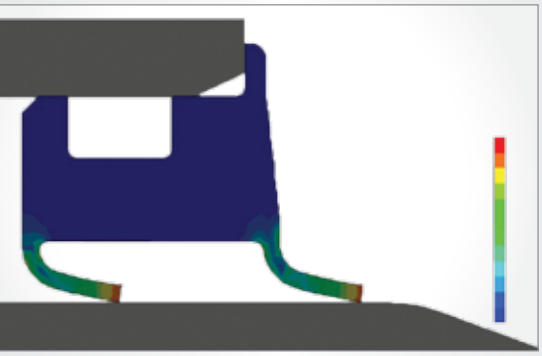
Welcome to the Omniseal Solutions World: Experience You Can Rely On … Time After Time





Saint-Gobain has a rich tradition of excellence that dates back more than 350 years. Today, it is among the world's top 100 industrial corporations and a leader in the development and production of engineered components and materials.

In 1665, King Louis XIV signed the letters patent, leading to the creation of Saint-Gobain on an industrial basis. Among the company's earlier and more notable projects was the manufacturing of 357 mirrors for the Hall of Mirrors in the Palace of Versailles. From these glassmaking origins, Saint-Gobain continues its long history of developing new and innovative materials and products through arduous research.

With more than 170,000 employees, operations in 67 countries and eight major cross-business research centers that serve all Activities, Saint-Gobain provides complete and thorough service to our customers, beginning with our experienced design engineering team, moving to our high-tech labs for testing and research and development, and continuing on to the manufacturing floor.

As a key ingredient in the wellbeing of each of us and the future of all, we have devoted much of our resources to creating strong research and development centers and establishing partnerships with prestigious universities and laboratories. Our commitment to innovation has resulted in the rapid progression of new Saint-Gobain products that did not exist five years ago.

Saint-Gobain is among the global leaders in each of its businesses: construction products, building distribution and innovative materials, including high-performance seals. Our seals are manufactured throughout the world with sites located in the Americas, Europe and Asia.

With a strong history of innovation, Omniseal Solutions is dedicated to providing the most technologically advanced products on the market today and finding solutions for the future.

Saint-Gobain Group Headquarters, France

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A Tour of Our Capabilities

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Omniseal Solutions' global presence allows us to manufacture Omniseal® PTFE lip seals throughout the world, with sites located in Garden Grove, California, USA; Kontich, Belgium; Kolo, Poland; Willich, Germany; Minhang, Shanghai, China; Suwa, Japan and Vinhedo, Brazil. To further support your needs we also have a technical office available in Vimercate, Italy. The majority of our products are custom designed through careful and detailed collaboration with each customer, giving them access to the market-leading engineering, research and customer service expertise of our organization.

We are proud of our more than 50 years of experience in manufacturing, along with our spirit of continuous improvement utilizing WCM, 5S, Kaizen and Six Sigma, which lead to superior process control, high product quality and consistent performance. As a result of our dedication to excellence, our worldwide facilities are ISO 9001 certified. Our sites in Garden Grove, Kontich, Minhang, Kolo and Willich are also ISO 14001 certified. Additionally, our Garden Grove and Bristol sites are certified for AS 9100, and the Willich site for TS 16949 and OHSAS 18001.

Design Engineering

- 3D modeling
- Finite Element Analysis (FEA)
- CAD drawings
- FEA-based spring force calculator

R&D, Lab and Testing

- DMA (Dynamic Mechanical Analyzer), TMA (Thermomechanical Analyzer), TGA (Thermogravimetric Analyzer) and DSC (Differential Scanning Calorimetry)
- FTIR (Fourier Transform Infrared Spectroscopy) and SEM (Scanning Electron Microscopy), Malvern Particle Analyzer, Digital Microscopes and Surface Finish Profilometer
- Tribological Material Testing; Mechanical, Electrical and Optical Testing; and EMI/RFI Testing
- Blending and Molding, High-Speed Rotary Test Rigs and High Pressure Hydraulic Test Chamber

Manufacturing

- Metal fabrication
- Multi-axis precision manufacturing
- Injection and co-injection molding, liquid injection molding, hot and cold compression molding, automatic molding, hot and cold isostatic molding
- Direct forming
- Tool design and fabrication
- Coiling/winding and punching
- Casting and coating
- Skiving and sintering
- Rapid prototyping

AS 9100 Rev.D

ISO 13485:2016

ISO 9001:2015

ISO 14001:2015

ISO 45001:2018

Garden Grove, California, USA

Kontich, Belgium

Minhang, Shanghai, China

Kolo, Poland

Suwa, Japan

Willich, Germany

Vinhedo, Brazil

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When Our Lip Seals Journey Began

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Innovation Is Our Business

Omniseal® PTFE rotary lip seals were introduced in the early 1970's and DynaLip® seals were created in the late 1980's. The seals were designed to bridge the gap between conventional elastomer lip seals and mechanical face seals. The ability to perform in hostile environments such as extreme temperatures, aggressive media, high surface speeds, high pressure and lack of lubrication are important features of Omniseal® PTFE lip seals. They provide the designer with a significant improvement in performance over elastomer lip seals while delivering value-added benefits. Both lip seals are used in a variety of applications in different industries.

Omniseal® Lip Seal

- Primary element
- Extension spring
- Secondary element
- Rebuildable
- Dust excluder
- O-Ring

Omniseal® Lip Seal Applications

- Pumps
- Gearboxes
- Motors
- Turbine engines
- Compressors
- Alternators and generators
- Mixers

Proven in the Past ...

Omniseal Solutions has proven to be the right partner for the most demanding engineering applications in multiple industries. The majority of our products are customized for each individual application, requirement and specification, and we are dedicated to assisting our partners with their emerging challenges.

... Prepared for the Future

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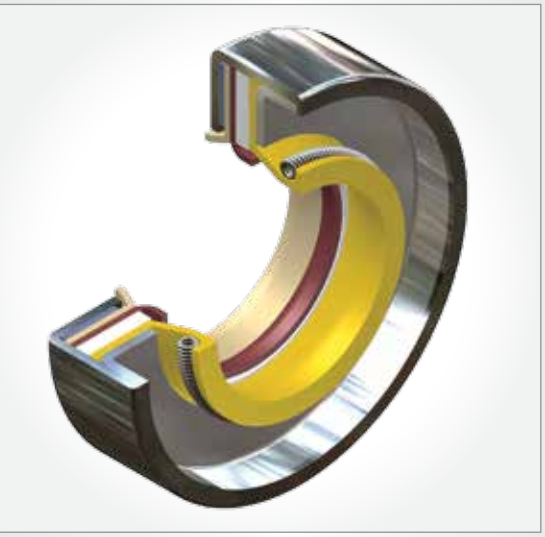
A Closer Look at Our Metal-Cased Lip Seals



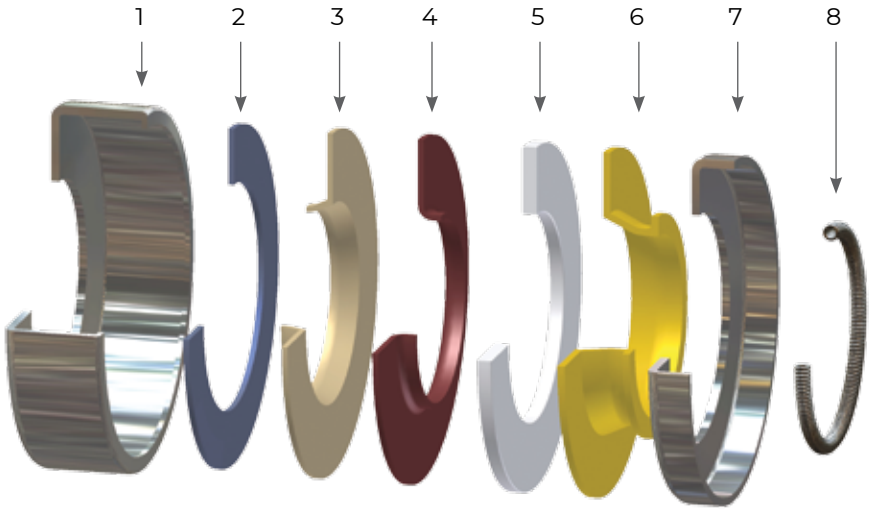
Omniseal Solutions offers a complete line of Omniseal® metal-cased lip seals, which can be manufactured from a variety of materials for PTFE and PTFE-blended sealing elements.

Omniseal® lip seals withstand hostile environments and other demanding conditions. They exceed the performance of elastomer lip seals in the following areas:

Features/Benefits

- Excellent chemical resistance
- Low friction (leads to long life)
- Capable of surface speeds in excess of 7,000 ft./min. (35 m/s)
- Capable of handling wide temperature ranges: -65°F to 450°F (-53°C to 232°C)
- High pressure in excess of 500 PSI (35 BAR)
- Has extended seal life in dry or abrasive media
- Unlimited shelf life
- Large diameter capability with custom designs available

Omniseal® lip seals are used in dynamic rotary sealing applications such as turbine engines, APU, RAT, pumps, compressors, robotics, diesel engines, pharmaceutical processing, food processing, blowers, mixers, heavy industry and steel mills.



1 Extension spring

2 Inner case

3 Primary element*

4 Washer*

5 Secondary element

6 Dust excluder

7 Gasket

8 Outer case*

*See page 17 for material selection

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A Closer Look at Our PTFE Lip Seals

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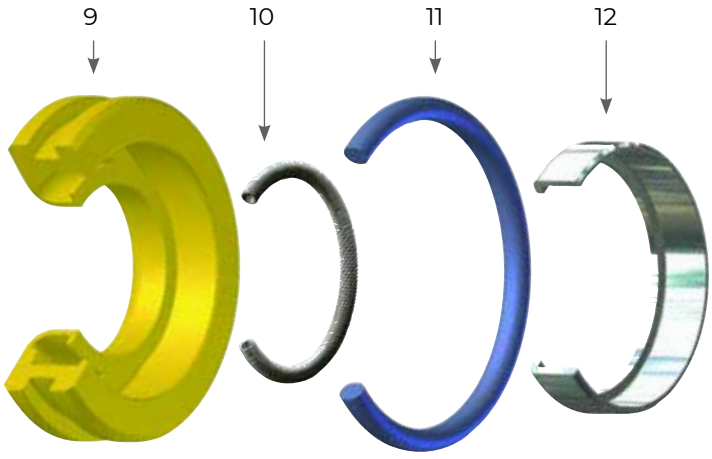
Our DynaLip® seals offer similar performance to our Omniseal® lip seals in that they possess excellent chemical resistance and handle high pressure and temperatures. Based on our experience through the years, we have been able to assist our customers in determining when a DynaLip® seal would be more effective than an Omniseal® lip seal.

The soft surface of the seal's outer diameter prevents damage of the housing and allows the seal to be easily installed and removed. These seals are used most often in applications that require seal removal in order to be changed or cleaned such as in medical or pharmaceutical instrumentation and devices. Furthermore, our DynaLip® seals are usually composed of one material, manufactured with an elastomer O-Ring on the outer diameter, and do not use a metal casing, while our Omniseal® lip seals are composed of three or more different materials that are enclosed in a metal casing.

Due to the simple but still powerful design of our DynaLip® seals, they are much more economical and cost less in smaller quantities. Saint-Gobain recommends that DynaLip® seals are retained in the gland as shown on page 26.

Features/Benefits

- Excellent chemical resistance
- Low friction
- Capable of surface speeds in excess of 7,000 ft./min. (35 m/s)
- Works to temperature extremes: -20°F to 320°F (-29°C to 160°C)
- Handles pressure up to 125 PSI (8 BAR)
- Has extended seal life in dry or abrasive media
- Extended shelf life
- Large diameter capability with custom designs available



9 Metal support case*

10 O-Ring (fluorocarbon)

11 Extension spring (stainless steel 302/304)

12 Seal material*

*See page 17 for material selection

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Aviation Market: Where Our Lip Seals Achieve the Greatest Heights

At Omniseal Solutions, quality and innovation are of the utmost importance. We have extensive experience in meeting sealing requirements for various aerospace application. We have seals in commercial, military, fixed wing and rotary wing aircraft, as well as spacecraft. Our design engineering team and technical staff provide customized solutions that meet your needs. This process includes developing a prototype, testing the solution, manufacturing the part to specifications and delivering it on time.

Our product quality and capabilities are the reason we are the preferred supplier for many large aerospace corporations.

Features/Benefits

- Elastomer coating for easy installation without damaging the mating hardware surface
- Wide range of sizes and materials
- Custom designs available (e.g., Puller feature for easy seal removal)
- Resistance to abrasive or corrosive material
- Excellent chemical resistance
- Capable of handling wide temperature ranges: -65° F to 450°F (-53°C to 232°C)
- Functions well under high pressure in excess of 500 PSI (34 BAR)
- Withstands high speed in excess of 7,000 ft./min. (35 m/s)
- Low friction (leads to long life)

Successful Aviation Applications

- Turbine engines
- Starters
- Alternators/generators
- Fuel pumps
- RAT (Ram Air Turbine)
- Flap actuators

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Aviation Market: Case Studies

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Turbine Engine Aircraft Accessory Gearbox

Product:	Omniseal® lip seal
Typical Temperature:	-65°F to 350°F (-53°C to 177°C)
Typical Pressure:	0 to 25 PSI (0 to 1.7 BAR)
Typical Shaft Speed:	In excess of 20,000 RPM
Typical Shaft Size Range:	0.50 to 2.00 in. (13 to 51 mm)
Typical Surface Velocity:	2,000 to 4,000 ft./min. (10 to 20 m/s)
Media:	Turbine oils, all types

Our Added Value +

- Improves performance over elastomer seals
- Reduces leakage
- Provided with installation tool and extraction feature
- Available with elastomeric seal case coating to prevent damage to the mating housing bore
- Requires less space than mechanical carbon face seal

Flap Actuator

Product:	Omniseal® lip seal
Typical Temperature:	-65°F to 250°F (-53°C to 121°C)
Typical Pressure:	0 to 15 PSI (0 to 1 BAR)
Typical Shaft Speed:	Intermittent
Typical Shaft Size Range:	0.50 to 5.00 in. (13 to 127 mm)
Typical Surface Velocity:	Intermittent
Media:	Rainwater, de-icing fluids, dust, greases and oils

Our Added Value +

- Provides zero measurable leakage over life of actuator
- Reduces torque generated by seal
- Configured as a face seal to fit space provided for seal
- Extends seal life, eliminating actuator corrosion caused by moisture ingress

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Industrial Market: Why Our Lip Seals Are Forged to Last

Omniseal Solutions designs rotary shaft seal solutions for many demanding applications within the industrial and manufacturing markets. In most cases, this requires lip seals capable of enduring extreme speeds, pressures and temperatures. Our innovative designs, combined with high-quality lip materials and product capabilities at extreme conditions, make us the right partner to help you meet your dynamic sealing requirements.

Features/Benefits

- Excellent chemical resistance
- Can endure abrasive media
- Can perform with poor/limited lubrication
- Custom designs available
- Wide range of seal case materials available
- High PV
- Low friction (leads to long life)
- Capable of handling wide temperature ranges: -65°F to 450°F (-53°C to 232°C)
- Functions well under high pressure in excess of 500 PSI (34 BAR)
- Withstands high speed in excess of 7,000 ft./min. (35 m/s)

Successful Industrial Applications

- Vacuum pumps
- Blowers
- Encoders and alternators
- Chemical pumps
- Drilling and tapping spindles
- Rotary compressors
- Air conditioning recovery pumps
- Electric motor shafts
- Hydraulic motors and pumps

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Industrial Market: Case Studies

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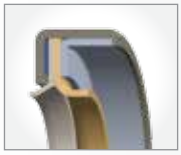
Freon Recovery Pump

Product:	Omniseal® lip seal
Typical Temperature:	0°F to 250°F (-18°C to 121°C)
Typical Pressure:	0 to 400 PSI (0 to 27 BAR)
Typical Shaft Speed:	500 to 3,000 RPM
Typical Shaft Size Range:	0.375 to 0.750 in. (10 to 19 mm)
Typical Surface Velocity:	50 to 600 ft./min. (0.3 to 3 m/s)
Media:	Freon, freon oil

Our Added Value +



- Meets strict EPA leakage requirements
- Seals will last the life of the pump
- Accommodates small space for seal
- Ease of installation
- Compatible with a wide range of oils and refrigerants

Screw Compressor

Product:	Omniseal® lip seal
Typical Temperature:	-30°F to 325°F (-35°C to 163°C)
Typical Pressure:	Vacuum to 400 PSI (Vacuum to 27 BAR)
Typical Shaft Speed:	1,000 to 6,000 RPM
Typical Shaft Size Range:	1.50 to 5.00 in. (38 to 127 mm)
Typical Surface Velocity:	400 to 7,800 ft./min. (2 to 40 m/s)
Media:	Oil and air

Our Added Value +

- Seal life in excess of 15,000 hours
- Reduces warranty claims
- Tight leakage control
- Able to run in a wide range of lubricants

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Life Science Market: What Our Lip Seals Protect

Reliable performance in abrasive media is a prerequisite for a seal to be successful in Life Science applications. Omniseal® continues to perform under severe conditions while easily complying with FDA requirements, and we offer a wide range of FDA, USDA and USDA-3A compliant materials. The extraordinary sealing functionality of Omniseal®, combined with its low friction capabilities and extended seal life in dry or abrasive media, provides customers with unrivaled performance and value.

Features/Benefits

- Excellent chemical resistance
- Withstands abrasive media
- FDA, USDA and USDA-3A compliant materials
- Custom designs available
- Works in poor/limited lubrication conditions
- Low friction (leads to long life)
- Available in white and other colors
- Ease of removal for cleaning
- Flush mounting to eliminate pockets
- Capable of handling wide temperature ranges: -65°F to 450°F (-53°C to 232°C)
- High pressure in excess of 125 PSI (8 BAR)
- High speed in excess of 7,000 ft./min. (35 m/s)

Successful Life Science Applications

- Dispensing equipment
- Pharmaceutical and food processing equipment
- Medical drills
- Pharmaceutical mixers
- Medical devices
- Chemical processing equipment
- Compressors and pumps

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Life Science Market: Case Studies

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Pharmaceutical Mixer

Product:	Omniseal® & DynaLip® lip seals
Typical Temperature:	35°F to 150°F (1.7°C to 65°C)
Typical Pressure:	0 to 25 PSI (0 to 1.7 BAR)
Typical Shaft Speed:	25 to 350 RPM
Typical Shaft Size Range:	1.50 to 7.50 in. (38 to 190 mm)
Typical Surface Velocity:	10 to 3,500 ft./min. (0.05 to 18 m/s)
Media:	Various powders

Our Added Value +

- Seal materials comply with FDA, USDA and USDA-3A requirements
- Seals able to run in dry and abrasive environments
- Tight leakage control

Air Compressor (oxygen intensifier)

Product:	DynaLip® lip seal
Typical Temperature:	35°F to 250°F (1.7°C to 121°C)
Typical Pressure:	15 to 125 PSI (1 to 9 BAR)
Typical Shaft Speed:	Linear
Typical Shaft Size Range:	0.75 to 4.00 in. (19 to 102 mm)
Typical Surface Velocity:	500 to 2,000 ft./min. (2.5 to 10 m/s)
Media:	Air

Our Added Value +

- Over 15,000 hours of extended seal life
- Low friction seal designs
- Long wear life
- Able to run dry
- Performs as a seal and bearing

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How to Order Our Standard Omniseal® and DynaLip® Lip Seal Products

Part Number Example

EXAMPLE: 10-001M-03M1

Seal Type

(see pages 18-19)

Dash Number

(see pages 20-21)

Seal Width

N=Narrow / M=Medium / W=Wide

(see pages 20-21)

Sealing Lip Material Code

(see page 17)

Case or Supporting Ring Material Code

(see page 17)

Always use XX for DynaLip®, which does not have metal support cases

Should you require assistance on our seal designs, please fax or email a copy of the completed Application Data Form on page 28 to Omniseal Solutions at (714) 688-2702 or sealsmarketing@saint-gobain.com.

Material Charts:
A Quick Reference Guide

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SEALING LIP MATERIALS

Material Code	Name	Application Details
03	A16 (Black Color)	Standard material for secondary elements and dust excluders. Good general purpose material for heat and wear resistance. Performs well on shaft surfaces with moderate hardness. Good in both lubricated and non-lubricated media (good option for sealing water).
09	A12 (Tan Color)	Excellent in dry running applications or non-lubricated liquid medias such as water, freon, diesel fuel, gasoline, etc. Non-abrasive to the mating running shaft surface (good option for sealing water).
10	A72 (Beige Color)	Superior heat and wear resistance. Non-abrasive to running shaft surfaces. Recommended for limited lubrication or non-lubricated applications where running temperatures exceed 375°F (190°C). Not recommended for use in steam or water (fair wear resistance).
36	A15 (Gray Color)	Best wearing material in oil. Requires a hardened shaft surface of 55 HRC for best performance. May cause excessive shaft scoring on soft metals (excellent wear resistance).
72	A46 (White Color)	Meets FDA requirements. Suitable for soft shafts such as 316 stainless steel. Not recommended for water service (fair wear resistance).

METAL CASE OR SUPPORT RING MATERIALS

Material Code	Name	Application Details
M1	Low-Carbon Steel	Used for outer case, inner case and washers. Low cost. Limited corrosion resistance. Recommended for cast iron or steel seal housings.
M2	Aluminum Alloy	Lightweight material used for outer case, inner case and washers. Low cost. Limited corrosion resistance. Recommended for aluminum or magnesium alloy seal housings.
M3	Stainless Steel 304	Used for outer case, inner case, washers, spring and support ring. Good corrosion resistance. Recommended for stainless steel seal housings.
M4	Stainless Steel 316	Used for outer case, inner case, washers, spring and support ring. Excellent corrosion resistance. Recommended for stainless steel seal housings.

The above chart shows the most commonly used materials in a variety of applications.
Please contact us if you require more information about our other materials.

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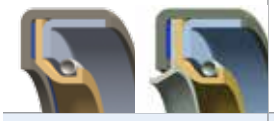
Omniseal® Standard Seal Types

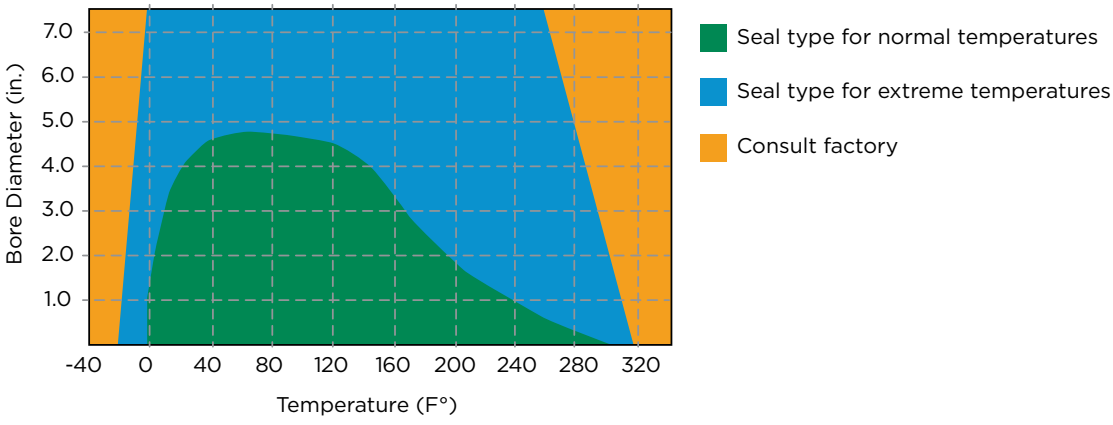
SEAL TYPE		PV = (Media Pressure in PSID x Surface Velocity in ft./min.)
Series 10	**Series 11**	**Performance Information**
		Series 10 and 11 are economical Omniseal® seal designs employed in a wide range of applications. They are used in lubricated and non-lubricated environments. They can be used at shaft speeds to 5,000 ft./min. in lubricated media and pressures to 75 PSID. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are gearboxes and environmental seals.
Series 20	**Series 21**	
		Series 20 and 21 are modifications of Series 10 and 11 that offer longer life and improved sealing of gases and abrasive media due to their higher lip load. They also offer additional runout capability. They can operate at speeds, pressure and PV as noted in Series 10 and 11. Recommended shaft hardness of 55 HRC or greater when operating at the higher PV limits. Typical applications are gearboxes, submersible pumps/motors, and mixers.
Series 30	**Series 31**	
		Series 30 and 31 incorporate a threaded sealing lip that pumps the media away from the seal. These designs should only be used in lubricating media. These designs offer long life and positive sealing at shaft speeds to 6,000 ft./min. They should not be used for pressures greater than 5 PSID. They are designed for clockwise shaft rotation when viewed from the atmosphere side. Typical applications are engine crank case seals and spindles.
Series 40	**Series 41**	
		Series 40 and 41 are the same as Series 30 and 31 except they are designed for a counterclockwise shaft rotation when viewed from the atmosphere side.
Series 50	**Series 51**	
		Series 50 and 51 offer low torque and long life. They can be used at shaft speeds to 6,000 ft./min., but are not recommended for pressures greater than 25 PSID. Due to their light lip loading, these designs should not be used where a leak-tight seal is required. They are an excellent environmental seal. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are dust/dirt excluders, spindle and conveyor seals.
Series 60	**Series 61**	
		Series 60 and 61 incorporate spring loading, which improves sealing where shaft runout or bore/shaft misalignment exist. These designs offer positive sealing during long-term storage. They can be used at shaft speeds to 2,000 ft./min. and pressures to 75 PSID. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are mixers, gearboxes and augers.
Series 70	**Series 71**	
		Series 70 and 71 are designed for pressures up to 400 PSID lubricating media, speeds up to 3,500 ft./min. Maximum PV 300,000 lubricated, 50,500 non-lubricated. Typical applications are hydraulic motors, pumps, hydrostatic transmissions and other high pressure hydraulic equipment.
Series 80	**Series 81**	
		Series 80 and 81 incorporate a threaded primary sealing lip with a standard secondary sealing lip. These series are designed for sealing lubricating media at high speeds 4,500 ft./min. and pressures up to 250 PSID. Maximum PV 200,000 lubricated. They are designed for clockwise shaft rotation viewed from the atmosphere side. Typical applications are air compressors, refrigeration compressors and vacuum pumps.
Series 90	**Series 91**	
		Series 90 and 91 are the same as series 80 and 81 except they are designed for a counterclockwise shaft rotation when viewed from the atmosphere side.

DynaLip® Standard Seal Types

Due to the seal's soft sealing on the OD, it is recommended that the seal be retained in the gland as shown on page 23. DynaLip® is designed for extreme temperatures, utilizing a metallic support ring to minimize temperature's effect on the seal. The DynaLip® seal selection chart below provides a guide on whether this metallic support is required.

SEAL TYPE		
For Normal Temp.	**For Extreme Temp.**	
Series 13	**Series 14**	**Performance Information**
		Series 13 and 14 are economical DynaLip® designs employed in a wide range of applications. They are used in lubricated and non-lubricated environments. They can be used at shaft speeds to 5,000 ft./min. in lubricated media and pressures to 75 PSID. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are gearboxes and environmental seals.
Series 15	**Series 16**	
		Series 15 and 16 are modifications of Series 13 and 14 that offer longer life and improved sealing of gases and abrasive media due to their higher lip load. They also offer additional runout capability. They can operate at speeds, pressure and PV as noted in Series 13 and 14. Recommended shaft hardness of 55 HRC or greater when operating at the higher PV limits. Typical applications are gearboxes, submersible pumps/motors, and mixers.
Series 23	**Series 24**	
		Series 23 and 24 offer low torque and long life. They can be used at shaft speeds up to 6,000 ft./min. They are not recommended for pressures greater then 25 PSID. Due to light lip loading, this design should not be used where a leak-tight seal is required. They are excellent environmental seals. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are dust/dirt excluders, spindle and conveyor seals.
Series 25	**Series 26**	
		Series 25 and 26 incorporate spring loading, which improves sealing where shaft runout or bore/shaft misalignment exist. These designs offer positive sealing during long-term storage. They can be used at shaft speeds to 2,000 ft./min. and pressures to 75 PSID. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are mixers, gearboxes and augers.
Series 33		
		Series 33 is designed for pressure up to 125 PSID in lubricating media, speeds up to 3,500 ft./min. in lubricating media. Maximum PV 200,000 lubricated, 50,500 non-lubricated. Typical applications are hydraulic motors, pumps, hydrostatic transmissions and other high pressure hydraulic equipment.

DYNALIP® SELECTION CHART



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Dash Number Size Charts

Dash No.	Diameter		Seal Width		
	Shaft	Bore	Narrow (N)	Medium (M)	Wide (W)
001	0.500	0.999	0.250	0.313	0.375
002	0.500	1.124	0.250	0.313	0.375
003	0.500	1.250	0.250	0.313	0.375
004	0.625	1.124	0.250	0.313	0.375
005	0.625	1.250	0.250	0.313	0.375
006	0.625	1.375	0.250	0.313	0.375
007	0.625	1.499	0.250	0.313	0.375
008	0.750	1.250	0.250	0.313	0.375
009	0.750	1.375	0.250	0.313	0.375
010	0.750	1.499	0.250	0.313	0.375
011	0.750	1.624	0.250	0.313	0.375
012	0.875	1.375	0.250	0.313	0.375
013	0.875	1.499	0.250	0.313	0.375
014	0.875	1.624	0.250	0.313	0.375
015	0.875	1.752	0.250	0.313	0.375
016	1.000	1.499	0.250	0.313	0.375
017	1.000	1.624	0.250	0.313	0.375
018	1.000	1.752	0.250	0.313	0.375
019	1.000	1.874	0.250	0.313	0.375
020	1.125	1.624	0.313	0.375	0.438
021	1.125	1.752	0.313	0.375	0.438
022	1.125	1.874	0.313	0.375	0.438
023	1.125	2.000	0.313	0.375	0.438
024	1.250	1.752	0.313	0.375	0.438
025	1.250	1.874	0.313	0.375	0.438
026	1.250	2.000	0.313	0.375	0.438
027	1.250	2.125	0.313	0.375	0.438
028	1.375	2.000	0.313	0.375	0.438
029	1.375	2.125	0.313	0.375	0.438
030	1.375	2.250	0.313	0.375	0.438
031	1.375	2.374	0.313	0.375	0.438
032	1.500	2.125	0.313	0.375	0.438
033	1.500	2.250	0.313	0.375	0.438
034	1.500	2.374	0.313	0.375	0.438

Dash No.	Diameter		Seal Width		
	Shaft	Bore	Narrow (N)	Medium (M)	Wide (W)
035	1.500	2.502	0.313	0.375	0.438
036	1.625	2.250	0.313	0.375	0.438
037	1. 625	2.374	0.313	0.375	0.438
038	1.625	2.502	0.313	0.375	0.438
039	1.625	2.623	0.313	0.375	0.438
040	1.750	2.374	0.313	0.375	0.438
041	1.750	2.502	0.313	0.375	0.438
042	1.750	2.623	0.313	0.375	0.438
043	1.750	2.750	0.313	0.375	o.438
044	2.000	2.623	0.375	0.437	0.500
045	2.000	2.750	0.375	0.437	0.500
046	2.000	2.875	0.375	0.437	0.500
047	2.000	3.000	0.375	0.437	0.500
048	2.000	3.125	0.375	0.437	0.500
049	2.125	2.750	0.375	0.437	0.500
050	2.125	2.875	0.375	0.437	0.500
051	2.125	3.000	0.375	0.437	0.500
052	2.125	3.125	0.375	0.437	0.500
053	2.125	3.251	0.375	0.437	0.500
054	2.250	3.000	0.375	0.437	0.500
055	2.250	3.125	0.375	0.437	0.500
056	2.250	3.251	0.375	0.437	0.500
057	2.250	3.371	0.375	0.437	0.500
058	2.375	3.125	0.375	0.437	0.500
059	2.375	3.251	0.375	0.437	0.500
060	2.375	3.371	0.375	0.437	0.500
061	2.375	3.500	0.375	0.437	0.500
062	2.500	3.251	0.375	0.437	0.500
063	2.500	3.371	0.375	0.437	0.500
064	2.500	3.500	0.375	0.437	0.500
065	2.500	3.623	0.375	0.437	0.500
066	2.625	3.371	0.375	0.437	0.500
067	2.625	3.500	0.375	0.437	0.500
068	2.625	3.623	0.375	0.437	0.500

The Dash Number Size Chart is based on RMA (Rubber Manufacturers Association) oil seal standard sizes. Nonstandard sizes can be manufactured to fit your existing hardware. Please contact Omniseal Solutions.

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Dash Number Size Charts

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Dash No.	Diameter		Seal Width		
	Shaft	Bore	Narrow (N)	Medium (M)	Wide (W)
069	2.625	3.751	0.375	0.437	0.500
070	2.750	3.500	0.375	0.437	0.500
071	2.750	3.623	0.375	0.437	0.500
072	2.750	3.751	0.375	0.437	0.500
073	2.750	3.875	0.375	0.437	0.500
074	2.875	3.623	0.375	0.437	0.500
075	2.875	3.751	0.375	0.437	0.500
076	2.875	3.875	0.375	0.437	0.500
077	2.875	4.003	0.375	0.437	0.500
078	3.000	3.751	0.375	0.437	0.500
079	3.000	3.875	0.375	0.437	0.500
080	3.000	4.003	0.375	0.437	0.500
081	3.000	4.125	0.375	0.437	0.500
082	3.125	4.125	0.375	0.437	0.500
083	3.125	4.249	0.375	0.437	0.500
084	3.125	4.376	0.375	0.437	0.500
085	3.125	4.500	0.375	0.437	0.500
086	3.250	4.249	0.375	0.437	0.500
087	3.250	4.376	0.375	0.437	0.500
088	3.250	4.500	0.375	0.437	0.500
089	3.250	4.626	0.375	0.437	0.500
090	3.375	4.249	0.375	0.437	0.500
091	3.375	4.376	0.375	0.437	0.500
092	3.375	4.500	0.375	0.437	0.500
093	3.375	4.626	0.375	0.437	0.500
094	3.500	4.376	0.437	0.500	0.625
095	3.500	4.500	0.437	0.500	0.625
096	3.500	4.626	0.437	0.500	0.625
097	3.500	4.751	0.437	0.500	0.625
098	3.625	4.626	0.437	0.500	0.625
099	3.625	4.751	0.437	0.500	0.625
100	3.625	4.876	0.437	0.500	0.625
101	3.625	4.999	o.437	0.500	0.625
102	3.875	4.876	0.437	0.500	0.625

Dash No.	Diameter		Seal Width		
	Shaft	Bore	Narrow (N)	Medium (M)	Wide (W)
103	3.875	4.999	0.437	0.500	0.625
104	3.875	5.125	0.437	0.500	0.625
105	3.875	5.251	0.437	0.500	0.625
106	4.000	4.999	0.437	0.500	0.625
107	4.000	5.125	0.437	0.500	0.625
108	4.000	5.251	0.437	0.500	0.625
109	4.000	5.375	0.437	0.500	0.625
110	4.250	5.251	0.437	0.500	0.625
111	4.250	5.375	0.437	0.500	0.625
112	4.250	5.501	0.437	0.500	0.625
113	4.250	5.625	0.437	0.500	0.625
114	4.500	5.501	0.437	0.500	0.625
115	4.500	5.625	0.437	0.500	0.625
116	4.500	5.751	0.437	0.500	0.625
117	4.750	5.751	0.437	0.500	0.625
118	4.750	6.000	0.437	0.500	0.625
119	5.000	6.000	0.500	0.625	0.750
120	5.000	6.250	0.500	0.625	0.750
121	5.000	6.375	0.500	0.625	0.750
122	5.250	6.250	0.500	0.625	0.750
123	5.250	6.375	0.500	0.625	0.750
124	5.250	6.500	0.500	0.625	0.750
125	5.250	6.625	0.500	0.625	0.750
126	5.500	6.500	0.500	0.625	0.750
127	5.500	6.625	0.500	0.625	0.750
128	5.500	6.750	0.500	0.625	0.750
129	5.500	6.875	0.500	0.625	0.750
130	5.750	6.750	0.500	0.625	0.750
131	5.750	6.875	0.500	0.625	0.750
132	5.750	7.000	0.500	0.625	0.750
133	5.750	7.125	0.500	0.625	0.750
134	6.000	7.125	0.500	0.625	0.750
135	6.000	7.500	0.500	0.625	0.750

The Dash Number Size Chart is based on RMA (Rubber Manufacturers Association) oil seal standard sizes. Nonstandard sizes can be manufactured to fit your existing hardware. Please contact Omniseal Solutions.

Hardware Design

Shaft Finish and Hardness Recommendations

Plunge ground surfaces are recommended at the seal-to-shaft interface locations for optimum leakage control. Plunge grinding provides a sealing surface with minimal or no lead. It is recommended to have a lead angle of zero with a tolerance of 0 ± 0.05°. Contact Omniseal Solutions for methods used to measure lead angle or for additional information.

RECOMMENDED SHAFT SURFACE FINISH

Shaft Hardness Rockwell Hardness "HRC"	Recommended Shaft Surface Finsih
20	6 to 20
35	6 to 18
50	6 to 16
62	6 to 12
72 or greater (hard coatings)	2 to 6 (consult factory)

RECOMMENDED MINIMUM SHAFT HARDNESS

Sealing Environment	500 ft./min.	1,000 ft./min.	2,000 ft./min.	3,000 ft./min.	4,000/ 7,000 ft./min.
Lubricated Service	35 HRC	40 HRC	52 HRC	58 HRC	58 HRC
Dry Service	40 HRC	52 HRC	58 HRC	62 HRC	62 HRC
Water Service	40 HRC*	40 HRC*	40 HRC*	40 HRC*	40 HRC*
Abrasive Service	52 HRC	62 HRC	62 HRC	62 HRC	62 HRC

ft/min. = Shaft surface velocity, (shaft diameter inches x PI x RPM)/12
HRC = Hardness measured using the Rockwell C Scale
* Recommended maximum hardness for water service. Stainless steel materials may be required to prevent corrosion.

Hardware Design

Housing Bore Material

Cast iron, steel, aluminum and other commonly used metallic and nonmetallic materials are acceptable. Plastics are only acceptable for DynaLip® seals.

Bore Surface Roughness

A bore finish of approximately 63 µ in Ra or smoother should be maintained to ensure proper sealing.

Shaft Lead-In Chamfer

The shaft should be provided with a lead-in chamfer with a diametral difference of D_1-D_2 and be free from burrs, sharp corners or rough machining marks.

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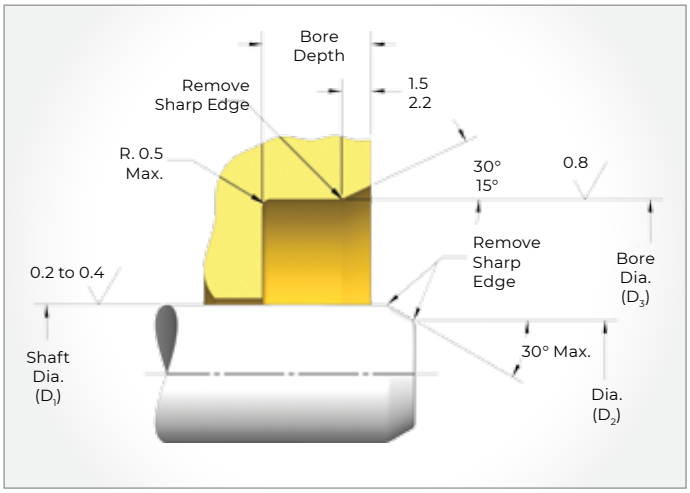
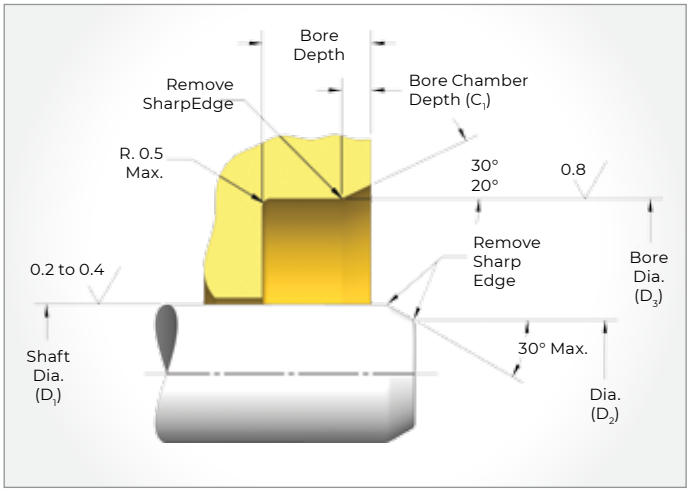


DYNALIP®



HOUSING AND SHAFT RECOMMENDATIONS

Shaft Lead-in Chamfer

D_1	D_1-D_2
Up to .375	.060 min.
.375 to .750	.080 min.
.751 to 1.188	.100 min.
1.189 to 1.562	.125 min.
1.563 to 2.000	.150 min.
2.001 to 2.750	.170 min.
2.751 to 3.750	.190 min.
3.751 to 5.000	.210 min.
5.001 to 7.000	.230 min.
7.001 to 8.000	.250 min.

Bore Lead-in Chamfer (DynaLip® Only)

Bore Diameter Sizes	Bore Chamfer C_1
.750 to 4.625	.050/.065
4.626 to 7.500	.080/.095

Bore Tolerance (H8)

Bore Diameter D_1	Bore Tolerance
Up to 3.000	± .001
3.001 to 6.000	± .0015
6.001 to 8.000	± .002
8.001 to 10.000	± .0025

Shaft Tolerance (H11)

Shaft Diameter D_1	Shaft Tolerance
Up to 4.000	± .003
4.001 to 6.000	± .004
6.001 to 10.000	± .005
10.001 and up	± .006

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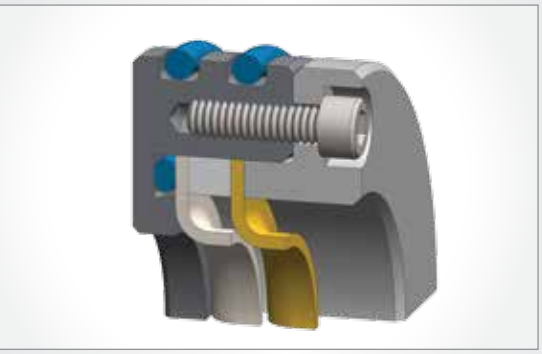
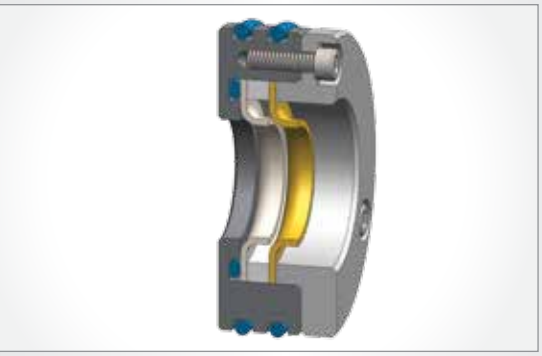
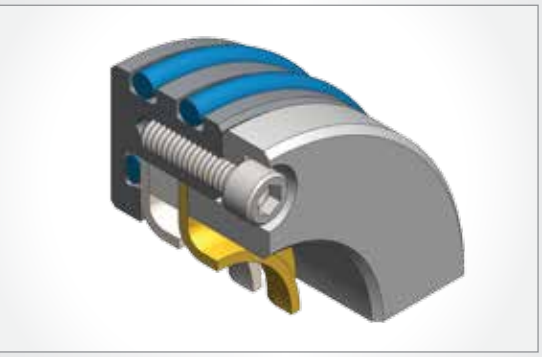
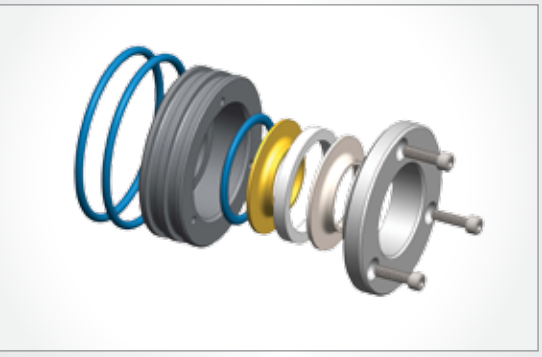
Rebuildable Lip Seal









With its patented-design rebuildable seal, Omniseal Solutions has designed a seal to eliminate higher replacement costs and material waste associated with throwaway metal-cased seals. This rebuildable seal was created for customers who use equipment that requires rebuilding and overhauls and large diameter seals, and who were searching for a product to bridge the gap between conventional elastomer seals and more costly mechanical face seals.

Customers can now quickly unscrew the metal case, replace the worn components and reassemble the seal without any special installation tools, and not worry about damaging the seal or mating hardware (a common problem that we set out to solve). Because the seal is essentially “a one-time buy,” downtime is minimized and housing rework is non-existent.

The seal, which comes in standard sizes as well as custom designs, is best suited for applications in the electronics, industrial and life sciences markets such as chemical processing equipment, encoders, radar and thermal optical devices, mixers, pharmaceutical and food processing equipment, heavy industry equipment, steel mills, hot melt equipment and paint spraying equipment.

Features/Benefits

- Rebuildable seal design reduces seal replacement cost
- Interchangeable with other standard seals
- Can be rebuilt without removing main seal body from housing bore, thus reducing replacement cycle time
- Temperature ranges: -74°F to 450°F (-58°C to 232°C)
- Surface speeds in excess of 7,000 ft./min. (35 m/s)
- Vacuum to 500 PSI (34 BAR) pressure differentiation
- Broad chemical resistance PTFE
- Extended life in abrasive media or dry running
- Custom designs available

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Lip Seal Installation

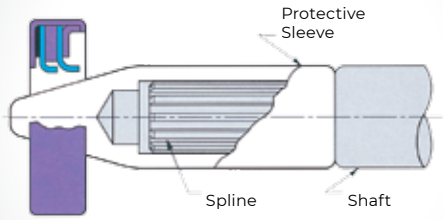
Seal Installation

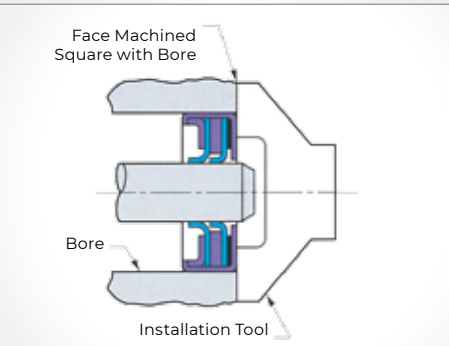
Care must be taken not to damage the sealing lip during the installation of the shaft through the seal. It is much easier to install the seal if the shaft enters the seal from the atmosphere side. If this is not possible, or if the seal must be installed on a shaft which has a keyway or splines, please contact the factory. We can help with the design and manufacture of simple tooling to assure that the seal is installed without damage. Omniseal® and DynaLip® seals should be pressed into the bore evenly.
A tool, as shown on the right, simplifies this operation.

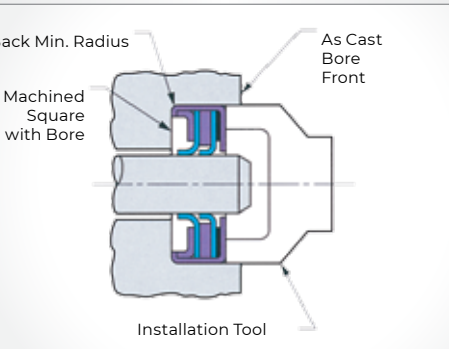
Installation Tooling

Care is essential in the installation of Omniseal® and DynaLip® seals onto the shaft. If sufficient chamfer (below I.D. of seal lip element) is not possible, and/or if lip must pass over spline or keyway, a tapered installation sleeve (shown on the right) is necessary. Sleeve design information is available on request.

PRESS FIT TOOLS







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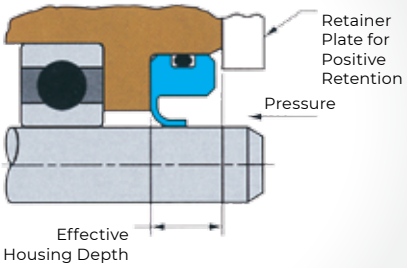
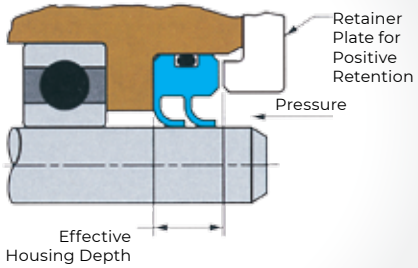
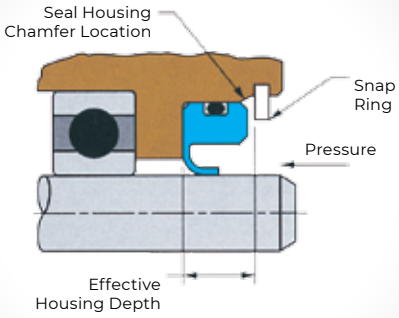
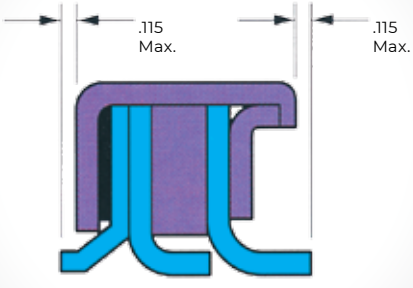
Hardware Variations and Non-Standard Lip Seal Configurations

Hardware Variations



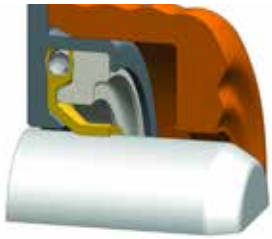
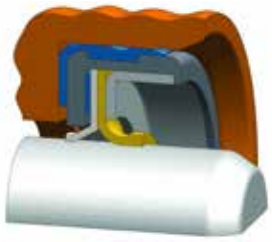






Sealing Lip Extension: Omniseal® seals incorporating two sealing lips or a dust excluder may have seal lip extensions as shown. This must be considered when designing a seal gland.

NON-STANDARD LIP SEAL CONFIGURATIONS

	· Metallic spring energizer used for static sealing of internal seal components · For extreme temperature applications
	· Metallic spring energizer used for static sealing of internal seal components · Flange design for exact seal positioning · For extreme temperature applications
	· Elastomer coating on the seal outside diameter · Elastomer coating protects the housing bore while providing tight sealing between the seal outside diameter and the customer's housing bore
	· High pressure seal design configured for extreme pressures and temperatures

Non-Standard Lip Seal Configurations

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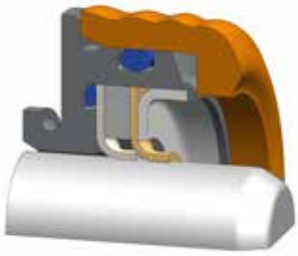
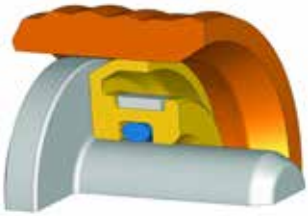
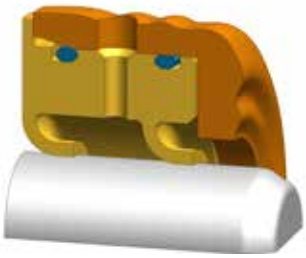
	· High pressure seal design configured for extreme pressures and temperatures
	· Seal extraction feature for ease of seal removal · Elastomer O-Ring on seal outside diameter for tight static sealing · Seal flange for positive seal positioning
	· Patented rotary shaft seal designed for extreme shaft runout · Seal wear occurs inside of the seal components, preventing shaft surface wear
	· DynaLip® seal configured for applications with a static shaft and rotating housing bore · Seal can be installed and removed without tools
	· DynaLip® seal configured to allow a purging system to be utilized or to allow fluid to flow from the stationary seal housing bore through a port located in the rotating shaft
	· DynaLip® seal is ideal for applications that require periodic cleaning · Flush design minimizes pockets that can trap solids · Ideal for use in FDA and pharmaceutical equipment

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Application Data Form

Name _____ Address _____
Title _____ City, State _____ Zip _____
Company _____ Phone number _____
Project Name _____ Fax _____
Date _____ Email address _____

Application Information and Conditions

Device sealed (Please attach drawing if available) _____

Number of units/year _____ Number of seals/unit _____

Type of motion: [ ] Rotary [ ] Oscillating [ ] Reciprocating [ ] Static [ ] Dither

Media/fluid _____

Amount in seal area: [ ] Full head [ ] Half shaft [ ] Splash

Operating pressure (units) _____ Proof pressure (units) _____ Burst pressure (units) _____

Temperature (units): [ ] High [ ] Low [ ] Operating RPM _____

Direction or shaft rotation (as viewed from air side or low pressure of side seal): [ ] CW [ ] CCW

Allowable leakage (define units) _____

Friction torque (units) _____ Breakaway _____ Running _____

Life requirement _____ Duty cycle _____

Type of seal evaluation: [ ] Bench [ ] Field [ ] Both [ ] Explain _____

Hardware Data

Can gland hardware be changed? _____

Bore DIA (include TOL) _____ Shaft DIA (include TOL) _____

Bore depth _____ X-section _____

Bore/shaft misalignment (T.I.R.) _____ Shaft runout (T.I.R) _____

Material: Bore _____ Shaft _____

Finish: Bore _____ Shaft _____

Hardness: Bore _____ Shaft _____

Direction which rod/shaft enters element: [ ] Air side or low pressure side [ ] Media side

Will sealing element be required to make contact with keyway, spline, etc.? [ ] Yes [ ] No
If yes, explain _____

Is installation tooling required? [ ] Yes [ ] No [ ] Omniseal Solutions to design [ ] Supply

Please email a copy of the completed Application Data Form to:

Omniseal Solutions
Email: help@omniseal-solutions.com

Warranty

WARNING: BEFORE USE OR INCORPORATION INTO A FINISHED GOOD, EACH PRODUCT MANUFACTURED OR SOLD BY SAINT-GOBAIN PERFORMANCE PLASTICS CORPORATION (EACH HEREINAFTER REFERRED TO AS A "PRODUCT") MUST BE TESTED AND EVALUATED BY THE END-USER UNDER ACTUAL SERVICE CONDITIONS WITH SUFFICIENT SAFETY FACTORS TO DETERMINE IF SUCH PRODUCT IS SUITABLE FOR THE INTENDED USE. THE END-USER, THROUGH ITS OWN ANALYSIS AND TESTING, IS SOLELY RESPONSIBLE FOR THE SUITABILITY OF THE PRODUCT FOR ITS INTENDED USE AND FOR COMPLIANCE OF THE PRODUCT WITH ALL APPLICABLE PERFORMANCE, SAFETY AND WARNING REQUIREMENTS. THE END-USER ASSUMES ALL RISK AND LIABILITY WHATSOEVER IN CONNECTION WITH THE USE OF THE PRODUCTS IN ANY FINISHED GOOD MANUFACTURED BY END-USER.

FAILURE OF A PRODUCT CAN CAUSE EQUIPMENT FAILURE, PROPERTY DAMAGE, PERSONAL INJURY, AND/OR DEATH. FINISHED GOODS INCORPORATING OR USING A PRODUCT MUST BE DESIGNED WITH SAFETY FEATURES TO PREVENT PROPERTY DAMAGE, PERSONAL INJURY, AND/OR DEATH THAT CAN RESULT IN THE EVENT OF A PARTIAL OR TOTAL FAILURE OF THE PRODUCTS.

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Saint-Gobain Performance Plastics Corporation warrants that its products do not infringe on any patent, copyright, trade secret or other proprietary right of a third party except to the extent Customer provides the specific design of the products or any part thereof.

IF ANY PRODUCT IS RESOLD BY BUYER, A COPY OF THIS NOTICE MUST BE PROVIDED TO THE SUBSEQUENT PURCHASER/END-USER.

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Terms and Conditions

1. Acceptance Of Orders/Terms: All orders are subject to acceptance by Saint-Gobain Performance Plastics Corporation ("SGPPL") at its Wayne, New Jersey headquarters. SGPPL reserves the right to reject any order. Possession of a price list does not constitute an offer to sell. Acceptance of any order by SGPPL is expressly conditioned on Customer's assent to the terms and conditions set forth herein ("Terms") and the waiver by Customer of any terms and conditions contained in any order form, confirmation, or any other communication of Customer, whether previously or hereafter delivered to SGPPL, which either add to, differ from, modify, conflict with or are otherwise inconsistent with any term or condition herein. SGPPL hereby gives notice of its objection to any additional or different terms or conditions in any such order form, confirmation or communication. Customer's failure to object in writing to these Terms prior to the earlier of Customer's acceptance of the products ordered or fifteen (15) days after delivery thereof to Customer will constitute agreement by Customer to these Terms.

2. Product Changes: SGPPL reserves the right to discontinue the manufacture or sale of any product at any time or to alter, modify or redesign its products.

3. Price: All prices are subject to change without notice. Should any governmental action or request prevent SGPPL from implementing any price or continuing any price already in effect, SGPPL may at its option cancel Customer's order or any part thereof.

4. Taxes/Duties: All federal, state or local sales, use or other taxes, and all duties, import fees or other assessments imposed on materials sold hereunder, or on the manufacture, sale or delivery thereof, shall be for Customer's account.

5. Credit Approval: Customer credit approval is required prior to any shipment. If SGPPL determines at any time that Customer's financial condition does not justify the extension of credit to Customer, then SGPPL may at its option require cash payments in advance or other satisfactory security prior to delivery.

6. Cancellation/Change Orders: Orders for standard products may only be revised or canceled by Customer prior to the date of loading at the place of shipment, and only with SGPPL's prior consent. Orders for nonstandard or custom products may only be revised or canceled by Customer prior to the commencement of production, and only with SGPPL's prior consent. Any product which SGPPL has the capability of producing but does not inventory, or does not have the capability of producing, is considered a nonstandard or custom product.

7. Packaging/Shipping/Risk of Loss: Unless otherwise agreed to by SGPPL in writing (i) SGPPL shall select the method of shipment, (ii) SGPPL shall ship materials FOB (SGPPL's point of shipment), and (iii) costs for special packaging and/or handling requested by Customer shall be the responsibility of Customer. In the event of any general freight increase or any governmental ruling or regulation that results in increased freight costs, such additional costs shall be for Customer's account. Title to, and the risk of loss, damage or shortage of, such materials shall pass to Customer upon delivery to the carrier regardless of notice to Customer. SGPPL assumes no responsibility for insuring shipments unless specifically agreed to in writing by SGPPL, in which case the cost of insurance shall be for Customer's account.

8. Delivery: Quoted shipping and/or delivery dates are based on estimates at the time of quotation. SGPPL shall use reasonable commercial efforts to meet such shipping and/or delivery dates, but SGPPL shall not be liable for any direct or indirect costs or damages, including without limitation incidental or consequential damages, resulting from late deliveries. For orders with indefinite delivery dates, SGPPL shall have the right to manufacture or procure the materials covered thereby and hold such materials for Customer's account pending receipt of definite shipping instructions. Except as expressly provided otherwise herein, Customer agrees to purchase and pay for all material ordered.

9. Claims for Loss, Damage or Shortage: Upon delivery, shipments must be inspected by Customer for damage, loss or shortage prior to acceptance from the carrier. If damage, loss or shortage exists with respect to any shipment and it is not concealed, Customer shall secure a notation of such damage, loss or shortage from the carrier on the freight bill or delivery receipt. If damage, loss or shortage is concealed, Customer must notify the carrier within 15 days, hold the merchandise for its inspection and secure a signed report from the carrier acknowledging the damage, loss or shortage. No claims for damage, loss or shortage will be allowed unless they are accompanied by an inspection report or signed delivery receipt noting such damage, loss or shortage signed by a representative of the carrier and forwarded to SGPPL within 30 days of the invoice date. Any claims for damage, loss or shortage should also be filed by Customer with the carrier in writing immediately upon receipt of the materials. In no event shall SGPPL be liable for damage or loss to a shipment caused by a carrier.

10. Payment: All invoices, whether partial or in full, shall be due and payable in full by Customer net 30 days from the date of shipment unless otherwise agreed to in writing by SGPPL. All past due, unpaid balances will bear a service charge of the lesser of one and one-half percent (11/2%) per month or the maximum interest rate permitted by applicable law. If Customer (i) becomes insolvent, files or has filed against it a petition in bankruptcy, makes any assignment for the benefit of creditors, or has a receiver or trustee appointed for it or its property, (ii) takes action to liquidate or otherwise cease doing business as a going concern, (iii) undergoes a change in ownership, (iv) fails to provide adequate assurance or security for credit extended, or (v) takes any other action that SGPPL determines in its sole discretion adversely impacts the conditions under which credit was extended, then all amounts outstanding from Customer hereunder shall at SGPPL'soption become immediately due and payable. ALL PAYMENTS, WHETHER UNDER THE STANDARD PAYMENT TERMS OR OTHERWISE, SHALLBE CONSIDERED RECEIVED BY SGPPL AS FOLLOWS: (A) FOR PAYMENTS BY CHECK, WHEN THE CHECK IS RECEIVED AT SGPPL'S DESIGNATEDPAYMENT LOCATION, AND (B) FOR PAYMENTS BY ELECTRONIC FUNDS TRANSFER, THE BUSINESS DAY IMMEDIATELY PRECEDING THE DAYON WHICH THE FUNDS ARE IMMEDIATELY AVAILABLE TO SGPPL. Customer shall pay all undisputed invoices regardless of any dispute that may exist as to other delivered or undelivered goods. With respect to any disputed invoice, Customer shall pay all amounts not in dispute. Customer expressly waives the right to assert any offset or counterclaim with respect to amounts due under any invoice issued by SGPPL hereunder.

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11. Returned Materials: Material may only be returned with the prior approval of SGPPL. Material returned without such approval will not be accepted and such approval may be conditioned upon Customer paying a restocking charge of up to 25% and freight costs of returned material (and out-freight if applicable). All returned materials must arrive at the point of return designated by SGPPL in salable condition, as determined by SGPPL's Quality Control Department, before any credit will be issued.

12. Warranty/Limitation of Liability: EXCEPT FOR PRODUCTS FOR WHICH SGPPL HAS ESTABLISHED A SPECIFIC WRITTEN WARRANTY, THE GOODS DELIVERED HEREUNDER ARE SOLD BY SGPPL WITHOUT ANY GUARANTY AND/OR WARRANTY, ORAL OR WRITTEN (WHETHER OR NOT SUCH GOODS REMAIN IN THE FORM IN WHICH THEY ARE ORIGINALLY DELIVERED TO CUSTOMER OR ARE FABRICATED BY CUSTOMER OR ANY OTHER PARTY TO PRODUCE A FINISHED PRODUCT). THE PRODUCT-SPECIFIC WRITTEN WARRANTIES REFERENCED ABOVE AND HEREBY INCORPORATED HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ORAL OR WRITTEN, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL SGPPL BE RESPONSIBLE FOR CONSEQUENTIAL, INCIDENTAL, INDIRECT OR SPECIAL DAMAGES OF ANY KIND, INCLUDING, WITHOUT LIMITATION, ANY EXPENSE FOR REMOVAL OR REINSTALLATION RESULTING FROM ANY DEFECT, INCLUDING ANY DIMENSIONAL DEFECT INVOLVING NONSTANDARD PRODUCTS. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR OF ANY EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO CUSTOMER. THE WARRANTY PROVIDED BY SGPPL GIVES CUSTOMER SPECIFIC LEGAL RIGHTS, AND CUSTOMER MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. NO FIELD REPRESENTATIVE, DISTRIBUTOR OR DEALER OF SGPPL IS AUTHORIZED TO MAKE ANY CHANGE OR MODIFICATION TO THESE WARRANTIES.

13. Remedies For Non-Warranty Claims: THE SOLE AND EXCLUSIVE REMEDY OF CUSTOMER AND THE SOLE AND EXCLUSIVE OBLIGATION OF SGPPL IN CONNECTION WITH CLAIMS RELATING TO MANUFACTURING DEFECTS ARE SET FORTH IN SECTION 12. THE SOLE AND EXCLUSIVE REMEDY OF CUSTOMER AND THE SOLE AND EXCLUSIVE OBLIGATION OF SGPPL FOR ANY BREACH OF CONTRACT CLAIM THAT MATERIALS DELIVERED DO NOT OTHERWISE CONFORM TO THE ACCEPTED ORDER SHALL BE EITHER THE RETURN OF CONSIDERATION PAID BY CUSTOMER TO SGPPL RELATED TO THE BREACH, OR UPON SGPPL'S ELECTION, THE DELIVERY OF CONFORMING PRODUCTS TO CUSTOMER. WITH RESPECT TO SGPPL'S NONCOMPLIANCE WITH ANY OTHER OBLIGATION OF SGPPL HEREUNDER, THE SOLE AND EXCLUSIVE REMEDY OF CUSTOMER AND THE SOLE AND EXCLUSIVE OBLIGATION OF SGPPL WILL BE AS SGPPL IN ITS DISCRETION WILL DETERMINE AS FOLLOWS: (1) SGPPL MAY ELECT TO CURE SUCH NONCOMPLIANCE WITHIN A REASONABLE PERIOD OF TIME, OR (2) IF SGPPL FAILS TO CURE SUCH NONCOMPLIANCE, CUSTOMER MAY RECOVER AN EQUITABLE AMOUNT NOT TO EXCEED SUCH CHARGES AS WERE PREVIOUSLY PAID TO SGPPL BY CUSTOMER HEREUNDER. CUSTOMER WAIVES ALL OTHER REMEDIES, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, THE REMEDIES OF SPECIFIC PERFORMANCE AND REPLEVIN. ANY ACTION BROUGHT BY CUSTOMER IN CONNECTION WITH SGPPL'S PERFORMANCE HEREUNDER MUST BE COMMENCED WITHIN SIX (6) MONTHS AFTER SUCH CAUSE OF ACTION ACCRUES OR IT WILL BE DEEMED WAIVED. SGPPL'S LIABILITY TO CUSTOMER, REGARDLESS OF WHETHER SUCH LIABILITY ARISES IN CONTRACT, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE, SHALL IN NO EVENT EXCEED AMOUNTS PAID BY CUSTOMER TO SGPPL FOR THE PRODUCTS INVOLVED, AND CUSTOMER RELEASES SGPPL FROM ALL CLAIMS AND LIABILITIES IN EXCESS OF THIS LIMITATION. IN NO EVENT SHALL SGPPL BE RESPONSIBLE FOR CONSEQUENTIAL, INCIDENTAL, INDIRECT OR SPECIAL DAMAGES OF ANY KIND.

14. Excused Performance: SGPPL shall not be liable for nor be deemed to be in default of these Terms on account of any failure to perform its obligations or attempt to cure any breach thereof if SGPPL has been delayed or prevented from doing so by any cause or condition beyond SGPPL's reasonable control. If SGPPL determines that its ability to supply the total demand for the products, or obtain any or a sufficient quantity of any material used directly or indirectly in the manufacture of the products, is hindered, limited or made impracticable, SGPPL may allocate its available supply of the products or such material (without obligation to require other supplies of any such products or material) among itself and its customers as SGPPL determines in its sole discretion without liability for any failure of performance which may result therefrom. Delivery suspended or not made by reason of this action shall be canceled without liability, but these Terms shall otherwise remain unaffected.

15. Fair Labor Standards Act: SGPPL hereby certifies that the materials sold hereunder that were produced in the United States were produced in compliance with all applicable requirements of Sections 6, 7 and 12 of the Fair Labor Standards Act, as amended, and of regulations and orders of the United States Department of Labor issued under Section 14 thereof.

16. Change In Terms And Conditions Of Sale: The terms and conditions contained herein constitute the entire agreement between SGPPL and Customer and supersede any and all prior representations, agreements or understandings, whether oral or written, relative to the materials delivered hereunder. No course of dealing or usage of trade shall be relevant to supplement or explain any of these terms or conditions. No modification of these terms and conditions shall be effective unless made in writing and executed by SGPPL.

17. General: This agreement shall not be assigned by Customer without the prior written consent of SGPPL, and any assignment made without such consent shall be null and void. This agreement shall inure to the benefit of and be binding upon the parties hereto and their respective successors and permitted assigns. This agreement shall be governed by and construed in accordance with the laws of the State of New Jersey, without giving effect to its conflicts of law provisions. The courts located in New Jersey shall have exclusive jurisdiction of all matters relating to or arising out of any sale of materials by SGPPL to Customer hereunder, and Customer hereby consents to the jurisdiction of such courts.

Omniseal Solutions
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Notes

help@omniseal-solutions.com

Notes

A Global Network of Expertise and Service

Manufacturing and sales locations Sales only locations R&D Centers

Manufacturing and sales locations

7301 Orangewood Ave.
Garden Grove, CA USA 92841
Phone: +1-800-544-0080

386 Metacom Avenue
Bristol, RI USA 02809
Phone: +1-401-253-2000

295 Indian River Rd.
Orange, CT USA 06477
Phone: +1 203-789-8819

17960 Englewood Dr.
Cleveland, OH USA 44130
Phone: +1 440-234-2002

Industria Aeroespacial 3601
Parque Industrial Saltillo-Ramos
Ramos Arizpe, Coahuila, Mexico 25900
Phone: +52-844-866-1200

Am Nordkanal 37
47877 Willich, Germany
Phone: +49 2154-600

Heiveldekens 22
2550 Kontich, Belgium
Phone: +32 3-458-2828

Blarenberglaan 5
Mechelen, Belgium B-2800
Phone: +32-1522-0281

Av. Independencia, 7031-Jd. Sao Matheus
Sao Paulo, Vinhedo, Brazil 13280
Phone: +55 19-2127-8521

45-46 Avda Ebro Pol El Sequero
26150 Agoncillo, La Rioja, Spain
Phone: +34 941-29-20-53

ul. Norton 1
62-600 Kolo, Poland
Phone: +48 63-26-17-281

10801-5, Haramura
Suwa, Japan 391-0106
Phone: +81 266-79-6400

11th Floor., Mitta Tower
427 Teheran-ro, Gangnam-gu
Seoul, 06159, South Korea
Phone: +82-2-508-8200

1468 Kun Yang Road
Minhang Development Zone
Shanghai, China
Phone: +86 21-5472-1568

Sales only locations

Via Torri Bianche 9, Palazzo Quercia
Vimercate, Italy 20871
Phone: +39 039 657 8900

Grindwell Norton Limited
Devanahalli Road, Via Old Madras Road
Bangalore, India 560049
Phone: +91 80 30978888

Fuchu South Building 6F,
1-40 Miyamachi
Fuchu-City, Tokyo, Japan 183-0023
Phone: +81 42 352 2100

Saint-Gobain Advanced
Materials Co., Ltd
3F-1, No. 147, Section 2, Jianguo North Road
Taipei, Taiwan 104
Phone: +886-2-2503-4201

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

Omniseal Solutions
SAINT-GOBAIN

BST-4184-OMNISEAL-LIP-SEAL-0723