

INNOVATIVE
SEALING & POLYMER
SOLUTIONS



OmniLip™

PTFE ROTARY SHAFT SEALS



**PRODUCT
CATALOG**



Welcome to the Saint-Gobain Seals World: Experience You Can Rely On... Time After Time



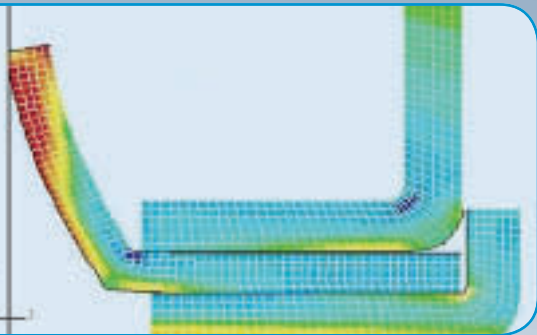
Saint-Gobain has a rich tradition of excellence that dates back over 345 years. Today, it is one of the world's top 100 industrial corporations and a leader in the development and production of engineered components and materials.

In 1665 Louis XIV signed the letters patent, leading to the creation of the Saint-Gobain Group on an industrial basis. One of the earlier and more notable projects was manufacturing the 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.



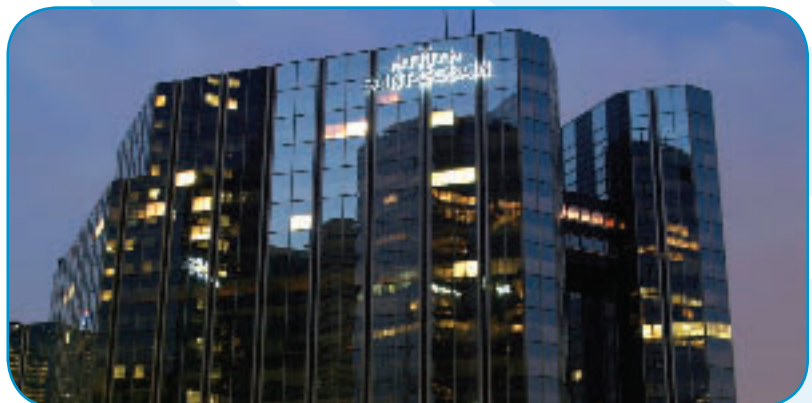
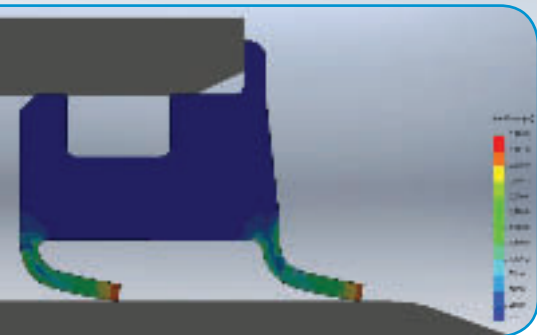
With over 195,000 employees, operations in 64 countries and 20 R&D centers, Saint-Gobain provides complete and thorough service to our customers, starting with our experienced design engineering team, moving to our high-tech labs, testing and research and development, and onto the manufacturing floor.

We believe that "the future is made of Saint-Gobain" and 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, packaging 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, Saint-Gobain Seals Group is dedicated to providing the most technologically advanced products on the market today and finding solutions for the future.



Saint-Gobain Group Headquarters, Les Miroirs, France

A Tour of Our Capabilities

Saint-Gobain Seals Group's global presence allows us to manufacture OmniLip™ and DynaLip® throughout the world, with sites located in Garden Grove, California, USA; Kontich, Belgium; Kolo, Poland; Minhang, Shanghai, China; and Suwa, Japan. The majority of our orders 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 also understand that there are times when simplicity is the best solution and offer standard profiles, which are shown on pages 18-19.

Design Engineering

- › 3D modeling
- › Finite Element Analysis (FEA)
- › CAD drawings
- › Spring force calculator

R&D, Lab & 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 & Molding, High Speed Rotary Test Rigs and High Pressure Hydraulic Test Chamber

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 leads 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, CA, USA and Kontich, Belgium are also AS 9100 and ISO 14001 certified with Minhang, China and Kolo, Poland being ISO 14001 certified as well.

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



Garden Grove,
California – USA

Kontich, Belgium

Minhang, Shanghai
– China

Kolo, Poland

Suwa, Japan

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When Our Lip Seals Journey Began

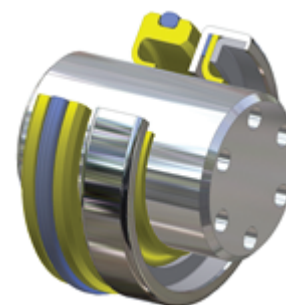


Innovation Is Our Business

OmniLip™ was introduced in the early 1970's and DynaLip® was 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 Saint-Gobain Seals Group's 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.

OmniLip™ and DynaLip® Options

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



Successful OmniLip™ and DynaLip® Applications

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



Proven in the Past...

Saint-Gobain Seals Group 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

A Closer Look at Our Metal-Cased Lip Seals

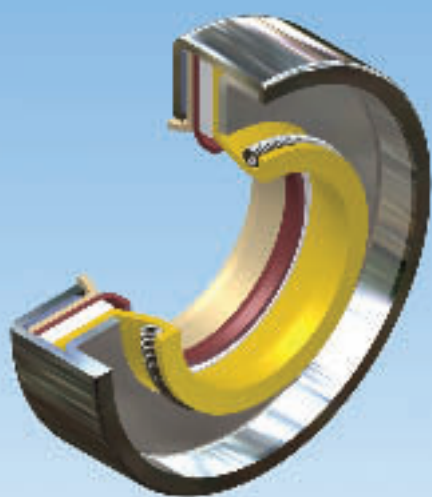
Saint-Gobain Seals Group offers a complete line of OmniLip™ metal-cased lip seals, which can be manufactured from a variety of materials for PTFE and PTFE-blended sealing elements.

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

Features/Benefits

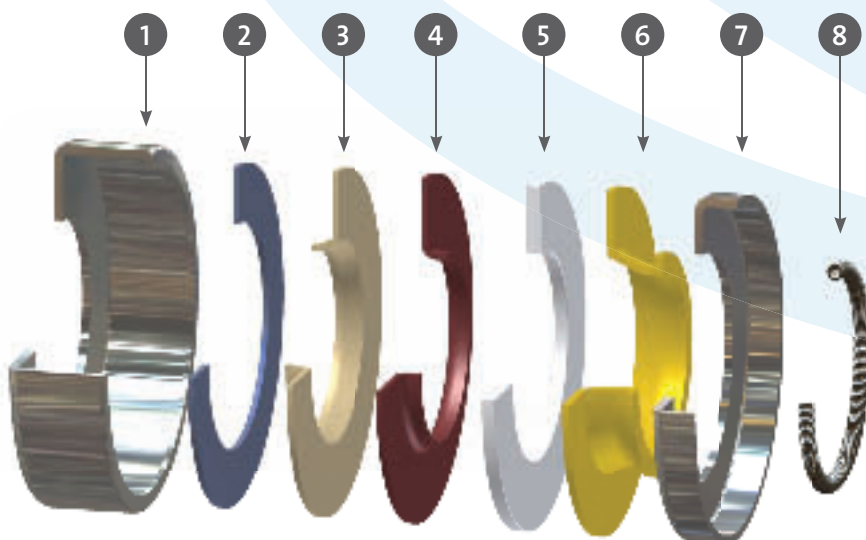
- › Excellent chemical resistance
- › Low friction (leads to long life)
- › Capable of surface speeds in excess of 7,000 ft./min. (35 m/s)
- › Capable of handling wide temperature ranges: -65°F to 450°F (-53°C to 232°C)
- › High pressure in excess of 500 PSI (35 BAR)
- › Has extended seal life in dry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

These 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 Outer case*
- 2 Gasket
- 3 Dust excluder
- 4 Secondary element*
- 5 Washer*
- 6 Primary element*
- 7 Inner case*
- 8 Extension spring

*See page 17
for material selection



A Closer Look at Our PTFE Lip Seals

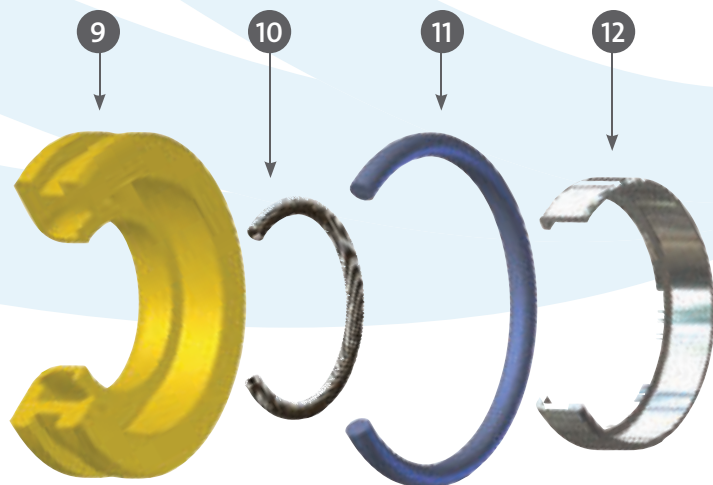
Our DynaLip® seals offer similar performance to our OmniLip™ seals in that they possess excellent chemical resistance and handle high pressure and temperatures. Based on our experience through the years, we have been able to assist our customers in determining when a DynaLip® seal would be more effective than an OmniLip™ 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 OmniLip™ 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 of 125 PSI (8 BAR)
- › Has extended seal life in dry or abrasive media
- › Extended shelf life
- › Large diameter capability with custom designs available



9 Seal material*

10 Extension spring
(stainless steel
302/304)

11 O-Ring (fluorocarbon)

12 Metal support case*

*See page 17 for
material selection

Where Our Lip Seals Achieve the Greatest Heights



At Saint-Gobain Seals Group, quality and innovation are of the utmost importance. We have extensive experience in meeting sealing requirements for various aerospace applications. We have seals in commercial, military, fixed wing and rotary wing aircrafts, 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 Aerospace Applications

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

Case Studies

OMNILIP™ AEROSPACE

Application: Turbine Engine Aircraft Accessory Gearbox

Product:	OmniLip™
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)
Typical Pressure:	0 to 25 PSI (0 to 1.7 BAR)
Typical Temperature:	-65°F to 350°F (-53°C to 177°C)
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



Application: Flap Actuator

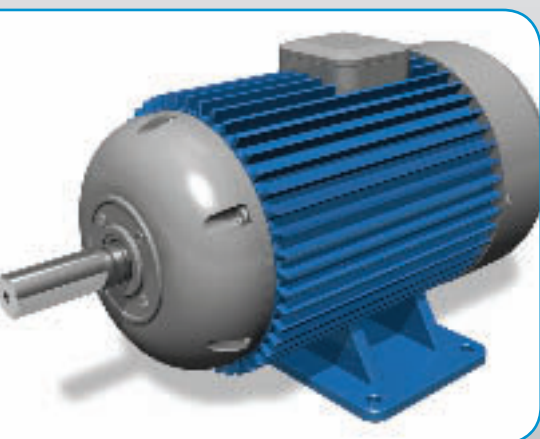
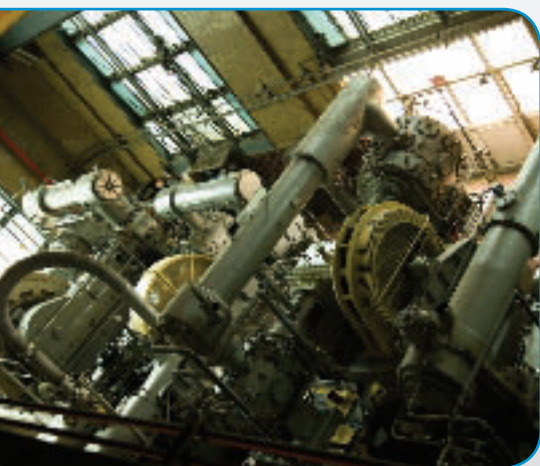


Product:	OmniLip™
Typical Shaft Speed:	Intermittent
Typical Shaft Size Range:	0.50 to 5.00 in. (13 to 127 mm)
Typical Surface Velocity:	Intermittent
Typical Pressure:	0 to 15 PSI (0 to 1 BAR)
Typical Temperature:	-65°F to 250°F (-53°C to 121°C)
Media:	Rainwater, De-icing Fluids, Dust, Greases and Oils

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

Why Our Lip Seals Are Forged to Last



Saint-Gobain Seals Group 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

Case Studies

OMNILIP™ INDUSTRIAL

Application: Freon Recovery Pump

Product:	OmniLip™
Typical Shaft Speed:	500 to 3,000 RPM
Typical Shaft Size Range:	.375 to .750 in. (10 to 19 mm)
Typical Surface Velocity:	50 to 600 ft./min. (0.3 to 3 m/s)
Typical Pressure:	0 to 400 PSI (0 to 27 BAR)
Typical Temperature:	0°F to 250°F (-18°C to 121°C)
Media:	Freon, Freon Oil



Our Added Value

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



Application: Screw Compressor

Product:	OmniLip™
Typical Shaft Speed:	1,000 to 6,000 RPM
Typical Shaft Size Range:	1.5 to 5.0 in. (38 to 127 mm)
Typical Surface Velocity:	400 to 7,800 ft./min. (2 to 40 m/s)
Typical Pressure:	Vacuum to 400 PSI (Vacuum to 27 BAR)
Typical Temperature:	-30°F to 325°F (-35°C to 163°C)
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



What Our Lip Seals Protect



Reliable performance in abrasive media is a prerequisite for a seal to be successful in Life Science applications. OmniLip™ 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 OmniLip™, 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

Case Studies

OMNILIP™ & DYNALIP® LIFE SCIENCE

Application: Pharmaceutical Mixer

Product:	OmniLip™/DynaLip®
Typical Shaft Speed:	25 to 350 RPM
Typical Shaft Size Range:	1.5 to 7.5 in. (38 to 190 mm)
Typical Surface Velocity:	10 to 3,500 ft./min. (0.05 to 18 m/s)
Typical Pressure:	0 to 25 PSI (0 to 1.7 BAR)
Typical Temperature:	35°F to 150°F (1.7°C to 65°C)
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



Application: Air Compressor (oxygen intensifier)

Product:	DynaLip®
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)
Typical Pressure:	15 to 125 PSI (1 to 9 BAR)
Typical Temperature:	35°F to 250°F (1.7°C to 121°C)
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



How Our Lip Seals Effectively Maneuver and Travel

The Automotive market is always evolving and our customers are looking for innovative solutions that meet and exceed these performance challenges. OmniLip™ is more than capable of handling these emerging technology requirements. Our seals offer light weight, high wear and temperature resistance for automotive and transportation applications.

Features/Benefits

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

Successful Automotive Applications

- › Superchargers
- › Turbochargers
- › Crankshaft and camshaft
- › Oil and fuel pumps
- › Axles



Case Studies

OMNILIP™ AUTOMOTIVE

Application: Turbocharger

Product:	OmniLip™
Typical Shaft Speed:	4,000 to 36,000 RPM
Typical Shaft Size Range:	0.5 to 1.5 in. (13 to 38 mm)
Typical Surface Velocity:	500 to 14,000 ft./min. (2.5 to 71 m/s)
Typical Pressure:	0 to 25 PSI (0 to 1.7 BAR)
Typical Temperature:	-40°F to 350°F (-40°C to 177°C)
Media:	Oil and Air

Our Added Value

- Able to run at high speed and temperature
- Extended seal life
- Able to run with limited lubrication



Application: Supercharger/Blower

Product:	OmniLip™
Typical Shaft Speed:	4,000 to 14,000 RPM
Typical Shaft Size Range:	0.5 to 2.5 in. (13 to 64 mm)
Typical Surface Velocity:	525 to 7,000 ft./min. (2.7 to 36 m/s)
Typical Pressure:	Vacuum to 25 PSI (Vacuum to 1.7 BAR)
Typical Temperature:	-40°F to 350°F (-40°C to 177°C)
Media:	Oil and Air

Our Added Value

- Able to run at high speed and temperature
- Extended seal life
- Able to run with limited lubrication



How to Order Our Standard OmniLip™ and DynaLip® Products

Part Number Example



Seal Type

(e.g., OmniLip™ Series 10/DynaLip® Series 13
– see pages 18-19)

Dash No.

(Shaft/Bore Size – 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 Support 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 Saint-Gobain Seals Group at (714) 688-2702 or sealsmarketing@saint-gobain.com.

A Quick Reference Guide

Sealing Lip Materials

Material Code	Name	Application Details
03	Fluoroloy® 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	Fluoroloy® 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	Fluoroloy® 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	Fluoroloy® 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	Fluoroloy® 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

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, 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.



OmniLip™ Standard Seal Types

PV = (Media Pressure in PSID x Surface Velocity in ft./min.)










Seal Type		Performance Information
 <p>Series 10</p>	 <p>Series 11</p>	<p>Series 10 and 11 are economical OmniLip™ 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.</p>
 <p>Series 20</p>	 <p>Series 21</p>	<p>Series 20 and 21 are modifications of Series 10 and 11 which 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.</p>
 <p>Series 30</p>	 <p>Series 31</p>	<p>Series 30 and 31 incorporate a threaded sealing lip which 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.</p>
 <p>Series 40</p>	 <p>Series 41</p>	<p>Series 40 and 41 are the same as Series 30 and 31 except they are designed for a counter-clockwise shaft rotation when viewed from the atmosphere side.</p>
 <p>Series 50</p>	 <p>Series 51</p>	<p>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.</p>
 <p>Series 60</p>	 <p>Series 61</p>	<p>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.</p>
 <p>Series 70</p>	 <p>Series 71</p>	<p>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.</p>
 <p>Series 80</p>	 <p>Series 81</p>	<p>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.</p>
 <p>Series 90</p>	 <p>Series 91</p>	<p>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.</p>



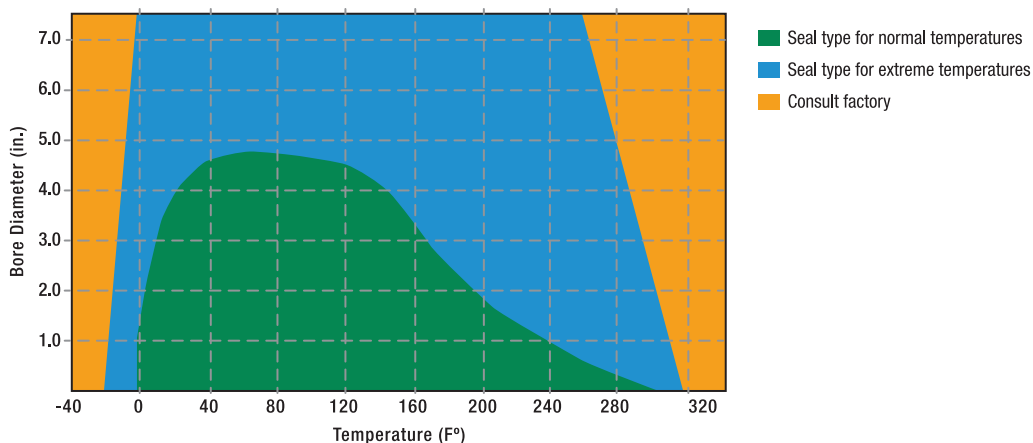
DynaLip® Standard Seal Types

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		Performance Information
For NORMAL Temperatures	For EXTREME Temperatures	
Series 13 	Series 14 	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 than 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



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	0.438
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

Dash Number Size Charts

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	0.437	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 Saint-Gobain Seals Group.

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 $0 \pm 0.05^\circ$. Contact Saint-Gobain Seals Group for methods used to measure lead angle or for additional information.

Recommended Shaft Surface Finish

Shaft Hardness Rockwell Hardness "HRC"	Recommended Shaft Surface Finish
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

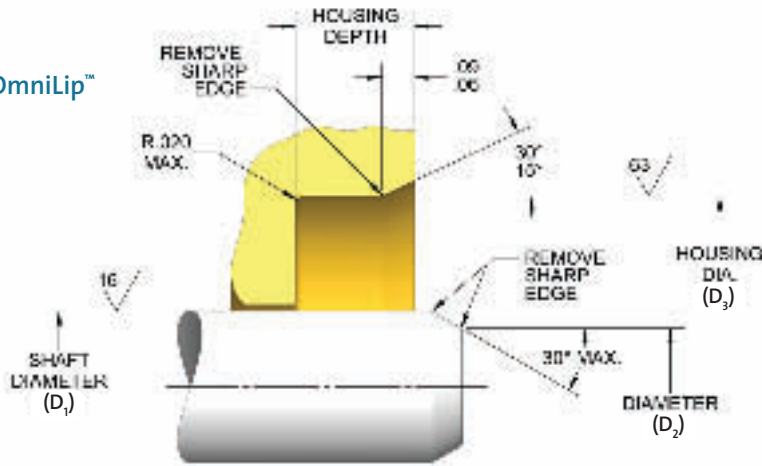
FT./MIN. = Shaft surface velocity, (Shaft diameter Inches x π x RPM)/12

HRC = Hardness measured using the Rockwell C Scale

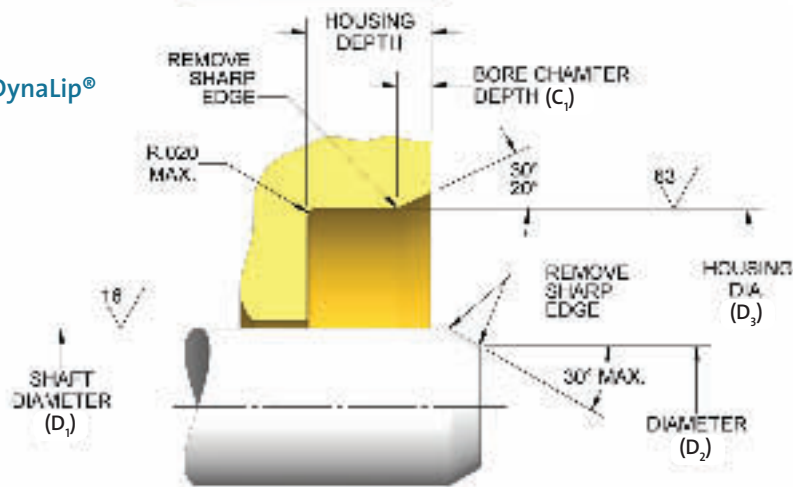
* Recommended maximum hardness for water service. Stainless steel materials may be required to prevent corrosion.

Hardware Design

OmniLip™



DynaLip®



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.

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)

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

Bore Tolerance

Bore Diameter D_3	Bore Tolerance
Up to 3.000	$\pm .001$
3.001 to 6.000	$\pm .0015$
6.001 to 8.000	$\pm .002$
8.001 to 10.000	$\pm .0025$

Shaft Tolerance

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

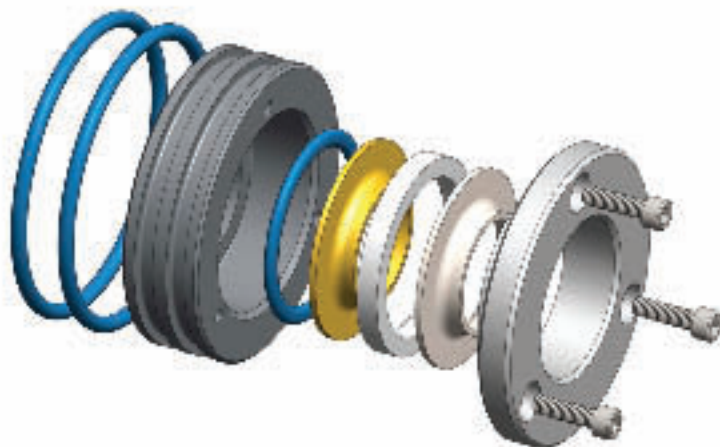
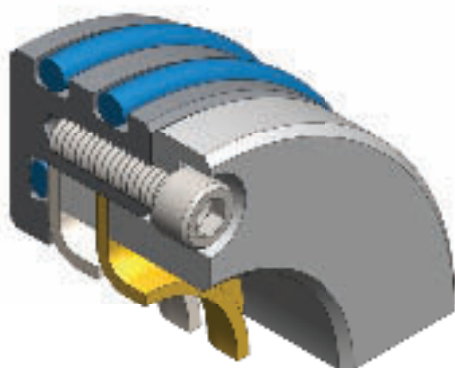
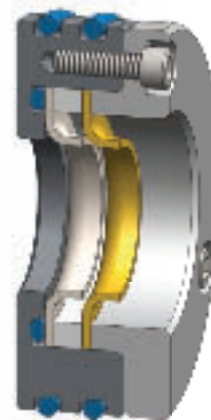
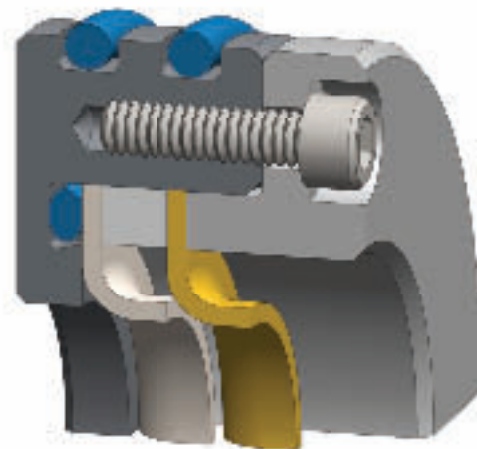


Rebuildable Lip Seal

With its patented-design rebuildable seal, Saint-Gobain Seals Group 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 science 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



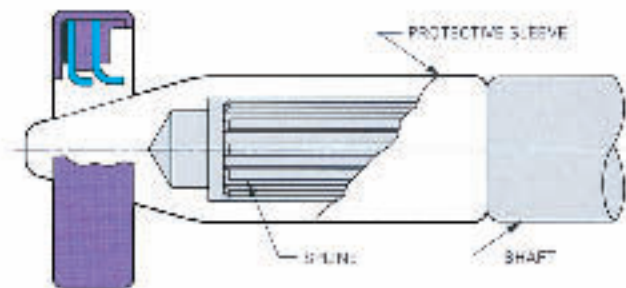
Lip Seal Installation

Seal Installation

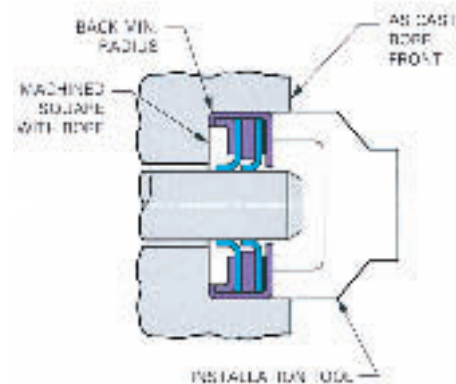
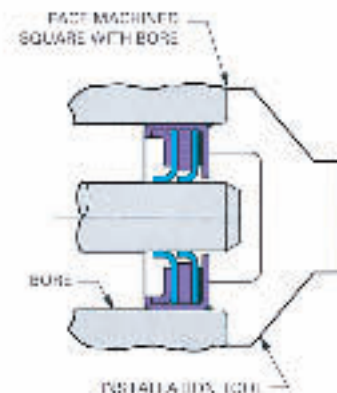
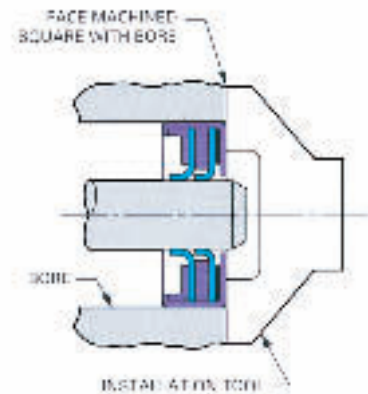
Care must be taken not to damage the sealing lip during the installation of the shaft through the seal. It is much easier to install the seal if the shaft enters the seal from the atmosphere side. If this is not possible, or if the seal must be installed on a shaft which has a keyway or splines, please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

Installation Tooling

Care is essential in the installation of OmniLip[™] 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 below) is necessary. Sleeve design information is available on request.



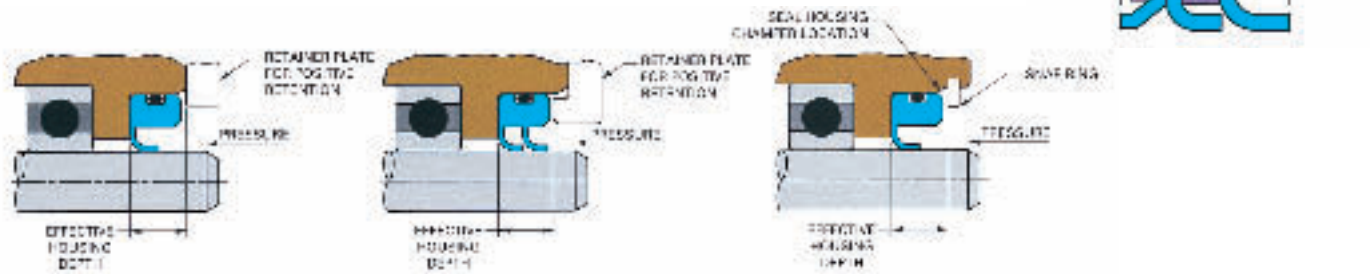
Press Fit Tools



Hardware Variations and Non-Standard Lip Seal Configurations

Sealing Lip Extension: OmniLip™ 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.

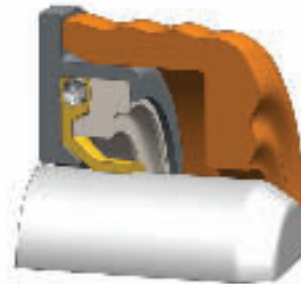
Hardware Variations



Non-Standard Lip Seal Configurations



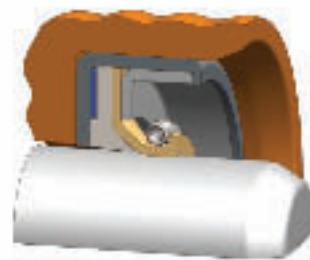
- Metallic spring energizer used for static sealing of internal seal components.
- For extreme temperature applications.



- Metallic spring energizer used for static sealing of internal seal components.
- Flange design for exact seal positioning.
- For extreme temperature applications.

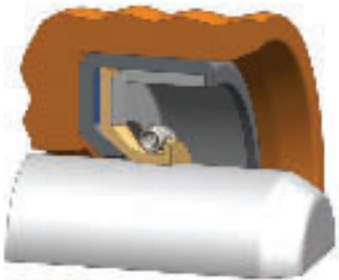


- Elastomer coating on the seal outside diameter.
- The elastomer coating protects the housing bore while providing tight sealing between the seal outside diameter and the customer's housing bore.

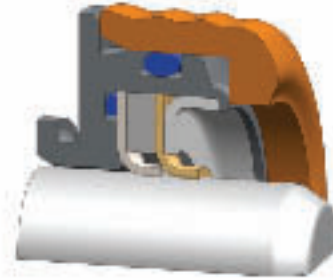


- High pressure seal design configured for extreme pressures and temperatures.

Non-Standard Lip Seal Configurations



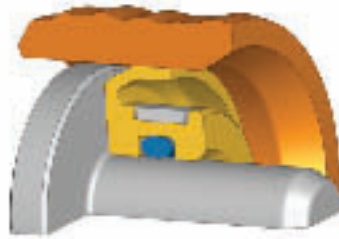
- High pressure seal design configured for extreme pressures and temperatures.



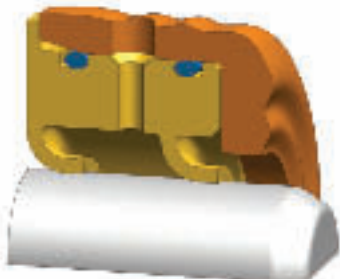
- Seal extraction feature for ease of seal removal.
- Elastomer o-ring on seal outside diameter for tight static sealing.
- Seal flange for positive seal positioning.



- 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.
- The 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.
- The flush design minimizes pockets that can trap solids.
- The seal is ideal for use in FDA and pharmaceutical equipment.

APPLICATION DATA FORM

Company Name _____ Street Address _____
City _____ State _____
Individual name _____ Zip code _____
Title _____ Email address _____
Phone number _____

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 (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 ☐ Saint-Gobain Performance Plastics to design ☐ Supply

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

Saint-Gobain Seals Group

Fax: 714-688-2702

Email: sealsmarketing@saint-gobain.com

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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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 (1 1/2%) 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's option become immediately due and payable. ALL PAYMENTS, WHETHER UNDER THE STANDARD PAYMENT TERMS OR OTHERWISE, SHALL BE CONSIDERED RECEIVED BY SGPPL AS FOLLOWS: (A) FOR PAYMENTS BY CHECK, WHEN THE CHECK IS RECEIVED AT SGPPL'S DESIGNATED PAYMENT LOCATION, AND (B) FOR PAYMENTS BY ELECTRONIC FUNDS TRANSFER, THE BUSINESS DAY IMMEDIATELY PRECEDING THE DAY ON 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.

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.
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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.






For more information please call us, email us at sealsmarketing@saint-gobain.com,
or visit our website at www.seals.saint-gobain.com.



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