

INNOVATIVE
SEALING & POLYMER
SOLUTIONS



OmniLip[™]

PTFE ROTARY SHAFT SEALS



SAINT-GOBAIN
SEALS

PRODUCT
HANDBOOK



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.

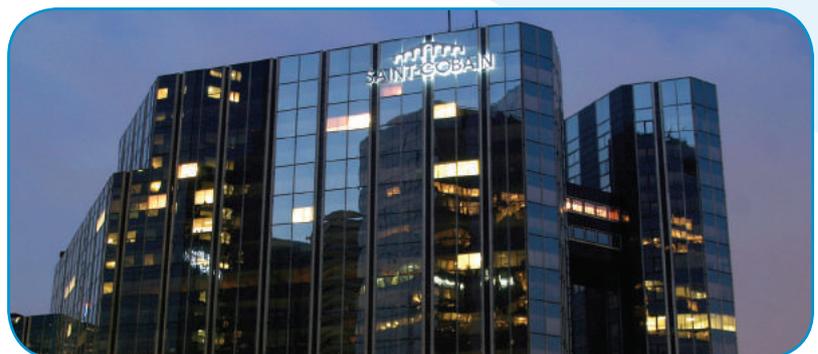
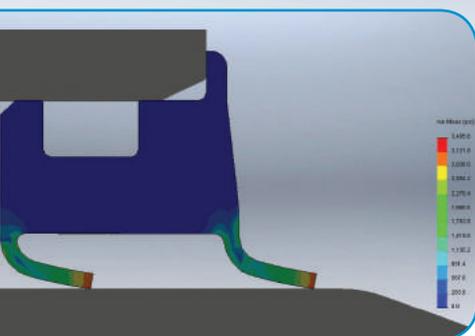
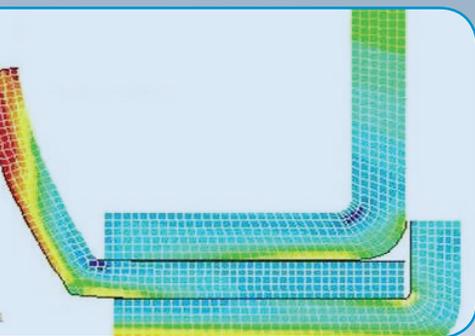
In 1665 Louis XIV signed the letters patent, leading to the creation of the Saint-Gobain Group on an industrial basis. One of the earlier and more notable projects was manufacturing the 357 mirrors for the Hall of Mirrors in the Palace of Versailles. From these glassmaking origins, Saint-Gobain continues 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 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' global presence allows us to manufacture OmniLip™ and DynaLip® 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 Agrate Brianza, 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 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, Kontich, Minhang, Kolo and Willich are also ISO 14001 certified. Additionally, our Garden Grove site is certified for AS9100, the Kontich site for EN9100 and the Willich site for TS16949 and OHSAS18001.

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

Willich, Germany

Vinhedo, Brazil

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When Our Lip Seals Journey Began



Innovation Is Our Business

OmniLip™ was introduced in the early 1970s and DynaLip® was created in the late 1980s. 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' 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 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

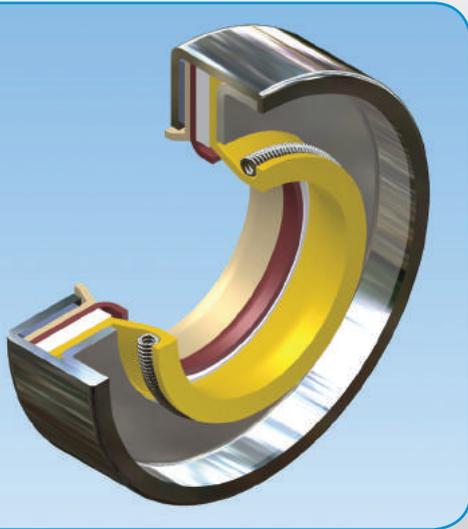
Saint-Gobain Seals offers a complete line of OmniLip™ metal-cased lip seals, which can be manufactured from a variety of materials for PTFE and PTFE-blended sealing elements.

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

Features/Benefits

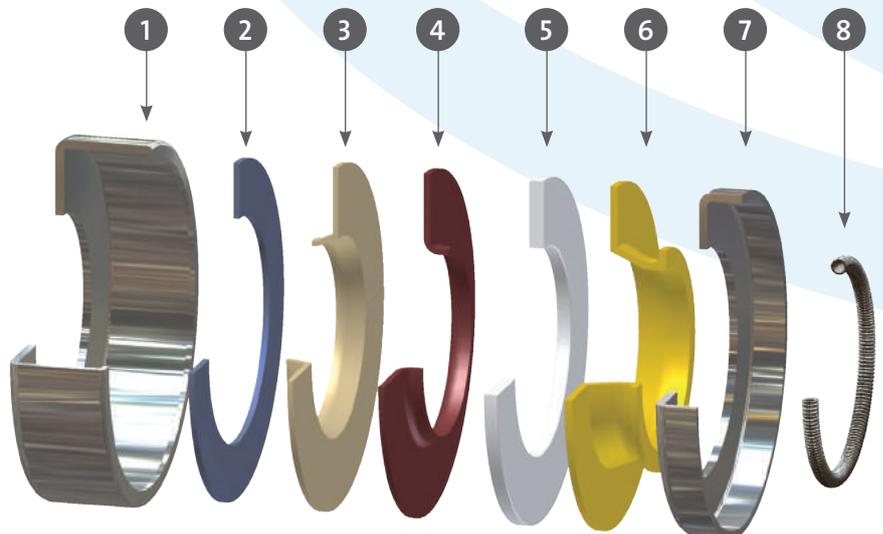
- › Excellent chemical resistance
- › Low friction (leads to long life)
- › Capable of surface speeds in excess of 35 m/s
- › Capable of handling wide temperature ranges: -53°C to 232°C
- › High pressure in excess of 35 BAR
- › Has extended seal life in dry or abrasive media
- › Unlimited shelf life
- › 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

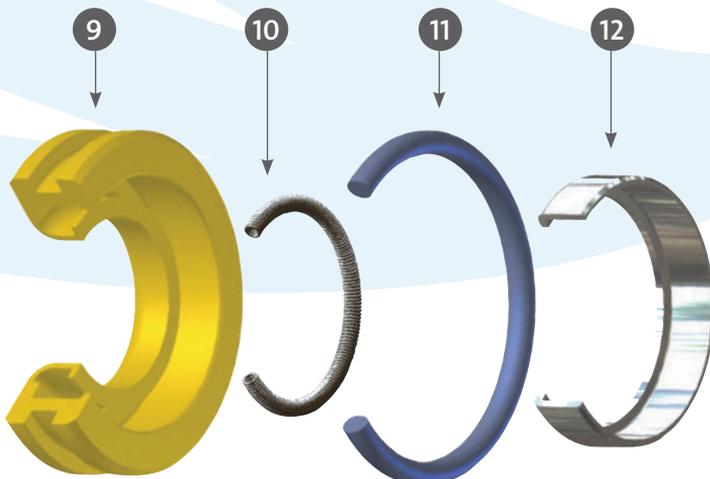
Our DynaLip® seals offer similar performance to our OmniLip™ seals in that they possess excellent chemical resistance and handle high pressure and temperatures. Based on our experience through the years, we have been able to assist our customers in determining when a DynaLip® seal would be more effective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

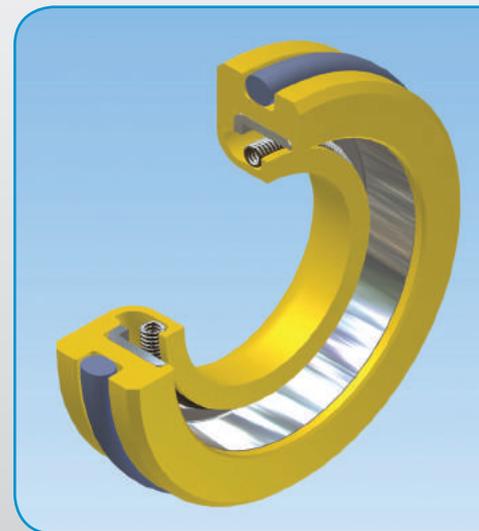
Due to the simple but still powerful design of our DynaLip® seals, they are much more economical and cost less in smaller quantities. Saint-Gobain Seals recommends that DynaLip® seals are retained in the gland as shown on page 26.

Features/Benefits

- › Excellent chemical resistance
- › Low friction
- › Capable of surface speeds in excess of 35 m/s
- › Works to temperature extremes: -29°C to 160°C
- › Handles pressure up to of 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, 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: -53°C to 232°C
- › Functions well under high pressure in excess of 34 BAR
- › Withstands high speed in excess of 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:	13 to 51 mm
Typical Surface Velocity:	10 to 20 m/s
Typical Pressure:	0 to 1.7 BAR
Typical Temperature:	-53°C to 177°C
Media:	Turbine Oils, all types



- 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

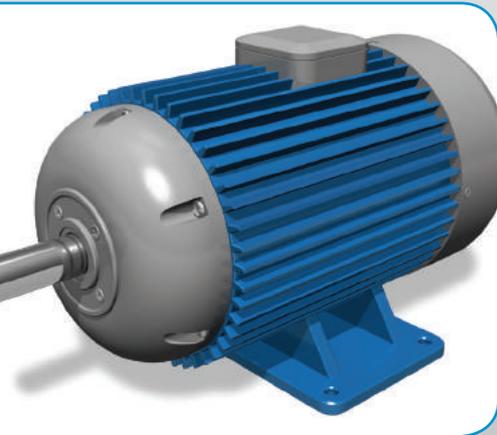
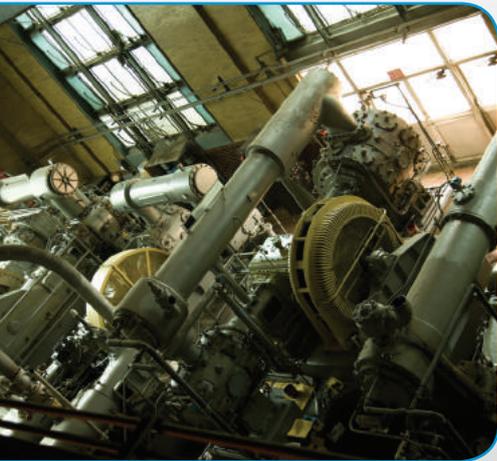


Product:	OmniLip™
Typical Shaft Speed:	Intermittent
Typical Shaft Size Range:	13 to 127 mm
Typical Surface Velocity:	Intermittent
Typical Pressure:	0 to 1 BAR
Typical Temperature:	-53°C to 121°C
Media:	Rainwater, De-icing Fluids, Dust, Greases and Oils



- 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 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: -53°C to 232°C
- › Functions well under high pressure in excess of 34 BAR
- › Withstands high speed in excess of 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:	10 to 19 mm
Typical Surface Velocity:	0.3 to 3 m/s
Typical Pressure:	0 to 27 BAR
Typical Temperature:	-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



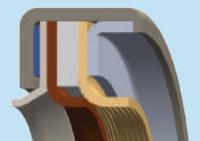
Application: Screw Compressor

Product:	OmniLip™
Typical Shaft Speed:	1,000 to 6,000 RPM
Typical Shaft Size Range:	38 to 127 mm
Typical Surface Velocity:	2 to 40 m/s
Typical Pressure:	Vacuum to 27 BAR
Typical Temperature:	-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: -53°C to 232°C
- › High pressure in excess of 8 BAR
- › High speed in excess of 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 SCIENCES

Application: Pharmaceutical Mixer

Product:	OmniLip™/DynaLip®
Typical Shaft Speed:	25 to 350 RPM
Typical Shaft Size Range:	38 to 190 mm
Typical Surface Velocity:	0.05 to 18 m/s
Typical Pressure:	0 to 1.7 BAR
Typical Temperature:	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:	19 to 102 mm
Typical Surface Velocity:	2.5 to 10 m/s
Typical Pressure:	1 to 9 BAR
Typical Temperature:	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 Manoeuvre 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: -53°C to 232°C
- › Capable of surface speeds in excess of 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 34 BAR

Successful Automotive Applications

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



Case Studies

OMNILIP™ AUTOMOTIVE

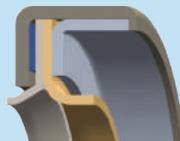
Application: Turbocharger

Product:	OmniLip™
Typical Shaft Speed:	4,000 to 36,000 RPM
Typical Shaft Size Range:	13 to 38 mm
Typical Surface Velocity:	2.5 to 71 m/s
Typical Pressure:	0 to 1.7 BAR
Typical Temperature:	-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



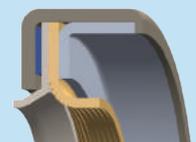
Application: Supercharger/Blower

Product:	OmniLip™
Typical Shaft Speed:	4,000 to 14,000 RPM
Typical Shaft Size Range:	13 to 64 mm
Typical Surface Velocity:	2.7 to 36 m/s
Typical Pressure:	Vacuum to 1.7 BAR
Typical Temperature:	-40°C to 177°C
Media:	Oil and Air



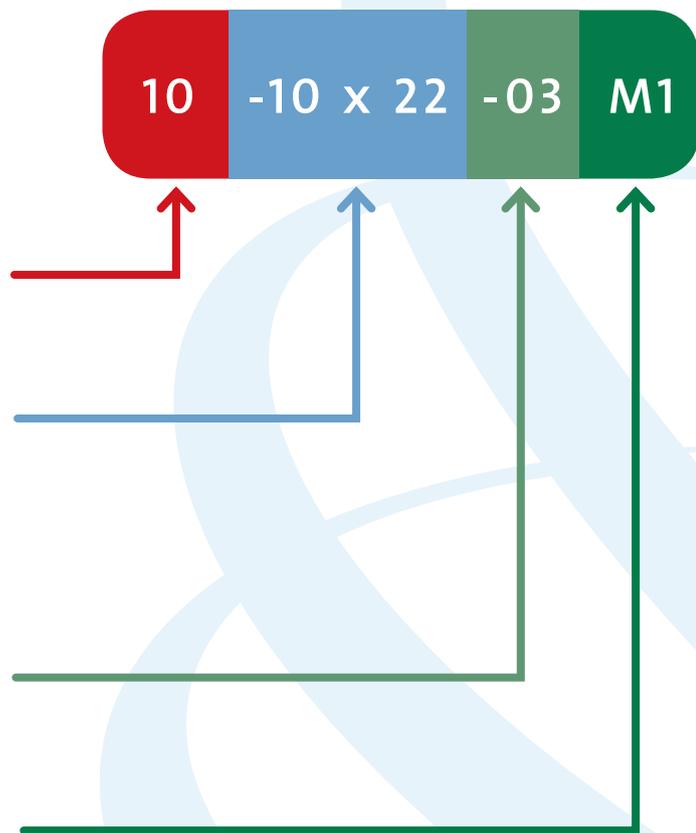
Our Added Value

- 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

(see pages 18-19)

Gland Dimensions

(see pages 20-21)

For Type 68, 78, 69 and 79,
add groove width (68-79X90X10-10XX)

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

For standard part numbers, secondary and/or dust lip is always Fluoroloy® A16.

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 at +32 3458 2669 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).
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 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).
N6	Fluoroloy® A41 (Black Color)	Extreme wear resistance for high speed applications with extreme heat development. Very good for applications with oil. Requires a hardened shaft surface of 55 HRC.

Metal Case or Support Ring Materials

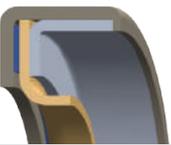
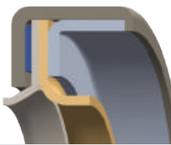
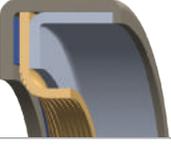
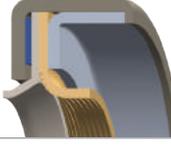
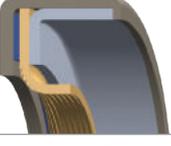
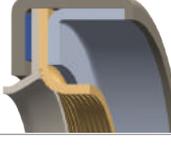
M1	Low-Carbon Steel	Used for outer case, inner case and washers. Low cost. Limited corrosion resistance. Recommended for cast iron or steel seal housings.
M2	Aluminum Alloy	Lightweight material used for outer case, inner case and washers. Low cost. Limited corrosion resistance. Recommended for aluminum 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

$$PV = (\text{Media Pressure in MPa} \times \text{Surface Velocity in m/s})$$

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 25 m/s in lubricated media and pressures to 0.7 MPa. Maximum PV 2.60 lubricated, PV 1.30 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 30 m/s. They should not be used for pressures greater than 0.1 MPa. 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 30 m/s, but are not recommended for pressures greater than 0.2 MPa. 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 2.60 lubricated, PV 1.30 non-lubricated. Typical applications are dust/dirt excluders, spindle and conveyer 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 10 m/s and pressures to 0.7 MPa. Maximum PV 2.60 lubricated, PV 1.30 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 3.5 MPa lubricating media, speeds up to 20 m/s. Maximum PV 10.50 lubricated, PV 1.75 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 25 m/s and pressures up to 1.5 MPa. Maximum PV 7.00 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>

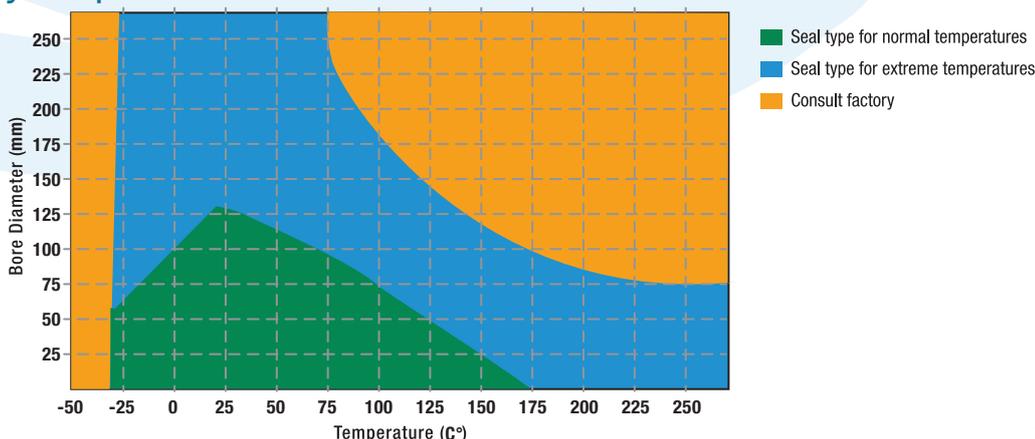
DynaLip® Standard Seal Types

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	
 <p>Series 13</p>	 <p>Series 14</p>	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 25 m/s in lubricated media and pressures to 0.5 MPa. Maximum PV 2.60 lubricated, PV 1.30 non-lubricated. Typical applications are gearboxes and environmental seals.
 <p>Series 23</p>	 <p>Series 24</p>	Series 23 and 24 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.
 <p>Series 53</p>	 <p>Series 54</p>	Series 53 and 54 offer low torque and long life. They can be used at shaft speeds up to 30 m/s. They are not recommended for pressures greater than 0.2 MPa. 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 2.60 lubricated, PV 1.30 non-lubricated. Typical applications are dust/dirt excluders, spindle and conveyor seals.
 <p>Series 63</p>	 <p>Series 64</p>	Series 63 and 64 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 10 m/s and pressures to 0.5 MPa. Maximum PV 2.60 lubricated, PV 1.30 non-lubricated. Typical applications are mixers, gearboxes and augers.
 <p>Series 73</p>		Series 73 is designed for pressure up to 0.9 MPa in lubricating media, speeds up to 20 m/s in lubricating media. Maximum PV 7.00 lubricated, PV 1.75 non-lubricated. Typical applications are hydraulic motors, pumps, hydrostatic transmissions and other high pressure hydraulic equipment.
 <p>Series 68</p>	 <p>Series 78</p>	Series 68 and 78 are designed for higher pressure and low speed applications where better tightness is required. The U-spring ensures positive load on the sealing lip. Temperature changes are better compensated. Standard spring material is Elgiloy®. The OD O-Ring energizer is an FKM material.
 <p>Series 69</p>	 <p>Series 79</p>	Series 69 and 79 are silicon-filled 68 and 78 designs, for food applications and those applications where solidification of the medium could interfere with the spring function. Standard silicon filling is red, the spring is made of Elgiloy®.

DynaLip® Selection Chart



Gland Dimensions

Nom. Shaft Dim.	Nom. Bore B Dim.	Seal Width W Dim.
8	22	7
	24	
	26	
9	22	7
	24	
	26	
10	22	7
	24	
	26	
11	22	7
	26	
12	24	7
	28	
	30	
14	28	7
	30	
	35	
15	26	7
	30	
	32	
	35	
16	28	7
	30	
	32	
	35	
17	28	7
	30	
	32	
	35	
	40	
18	30	7
	32	
	35	
	40	
20	32	7
	35	
	40	
	47	
22	35	7
	40	
	47	

Nom. Shaft Dim.	Nom. Bore B Dim.	Seal Width W Dim.
24	35	7
	37	
	40	
	47	
25	40	7
	42	
	47	
	52	
	52	
26	37	7
	42	
	47	
28	40	7
	47	
	52	
	52	
30	40	7
	42	
	47	
	52	
	52	
32	62	8
	45	
	47	
	52	
35	47	7
	50	
	52	
	62	
36	47	7
	50	
	52	
	62	
	62	
38	52	7
	55	
	62	
40	52	8
	55	
	60	
	62	
	72	
42	55	8
	60	
	62	
	62	
	72	

Gland Dimensions

Nom. Shaft Dim.	Nom. Bore B Dim.	Seal Width W Dim.	
45	60	8	
	62		
	65		
	72		
48	62	8	
	65		
	72		
50	65	8	
	68		
	72		
	80		
52	68	8	
	72		
55	70	8	
	72		
	80		
	85		10
56	70	8	
	72		
	80		
	85		10
58	72	8	
	80		
60	75	8	
	80		
	85		10
	90		10
62	80	8	
	85		10
	90		10
63	85	10	
	90		
65	85	10	
	90		
	100		
68	90	10	
	100		
70	90	10	
	100		
72	95	10	
	100		
75	95	10	
	100		

Nom. Shaft Dim.	Nom. Bore B Dim.	Seal Width W Dim.
78	100	10
80	100	10
	110	12
85	110	12
	120	
90	110	12
	120	
95	120	12
	125	
100	120	12
	125	
	130	
105	130	12
	140	
110	130	12
	140	
115	140	12
	150	
120	150	12
	160	
125	150	12
	160	
130	160	12
	170	
135	170	15
140	170	15
145	175	15
150	180	15
160	190	15
170	200	15
180	210	15
190	220	15
200	230	15

The shaft and bore diameters are based on the standard DIN 3760. Saint-Gobain Seals can manufacture non-standard sizes also. Please contact our Technical Support team at +32 3-458-2828.

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 for methods used to measure lead angle or for additional information.

Recommended Shaft Surface Finish

Shaft Hardness Rockwell Hardness "HRC"	Recommended Shaft Surface Finish (Ra)
20	0.2 to 0.8
35	0.2 to 0.7
50	0.2 to 0.6
62	0.2 to 0.4
72 or greater (hard coatings)	0.1 to 0.2 (consult technical support)

Recommended Minimum Shaft Hardness

Sealing Environment	2.5 m/s	5 m/s	10 m/s	15 m/s	20/35 m/s
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*				
Abrasive Service	52 HRC	62 HRC	62 HRC	62 HRC	62 HRC

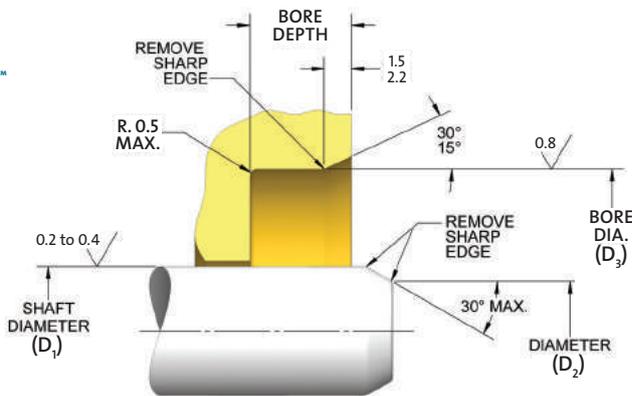
m/s = Shaft surface velocity

HRC = Hardness measured using the Rockwell C Scale

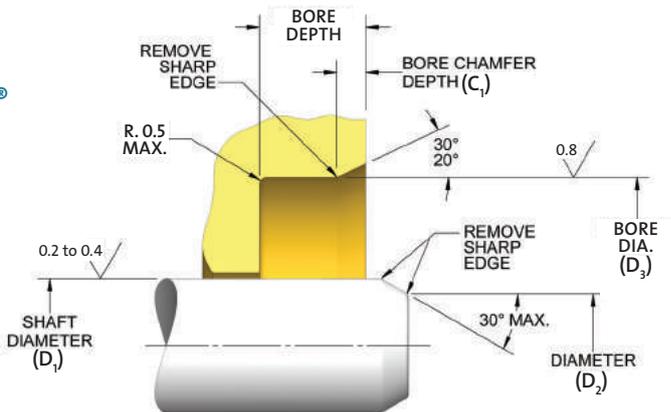
* Recommended maximum hardness for water service. Stainless steel materials may be required to prevent corrosion.

Hardware Design

OmniLip™



DynaLip®



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 0.8 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.

Bore and Shaft Recommendations

Shaft Lead-In Chamfer

D_1	$D_1 - D_2$
Up to 10	1.5 MIN.
11 to 20	2.0 MIN.
21 to 30	2.5 MIN.
31 to 40	3.0 MIN.
41 to 50	3.5 MIN.
51 to 70	4.0 MIN.
71 to 100	4.5 MIN.
101 to 130	5.0 MIN.
131 to 180	6.0 MIN.
181 to 210	6.5 MIN.

Bore Lead-In Chamfer (DynaLip® Only)

Bore Diameter Sizes	Bore Chamfer C_1
Up to 100	1.5/2.0
100 to 200	2.1/2.5

Bore Tolerance (H8)

Bore Diameter D_3	Bore Tolerance
3-6	+ 0.018
6-10	+ 0.022
10-18	+ 0.027
18-30	+ 0.033
30-50	+ 0.039
50-80	+ 0.046
80-120	+ 0.054
120-180	+ 0.063
180-250	+ 0.072
250-315	+ 0.081

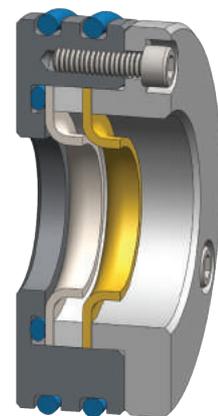
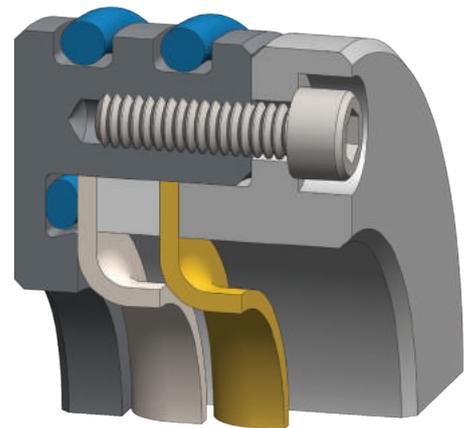
Shaft Tolerance (h11)

Shaft Diameter D_1	Shaft Tolerance
3-6	- 0.075
6-10	- 0.090
10-18	- 0.110
18-30	- 0.130
30-50	- 0.160
50-80	- 0.190
80-120	- 0.220
120-180	- 0.250
180-250	- 0.290
250-315	- 0.320



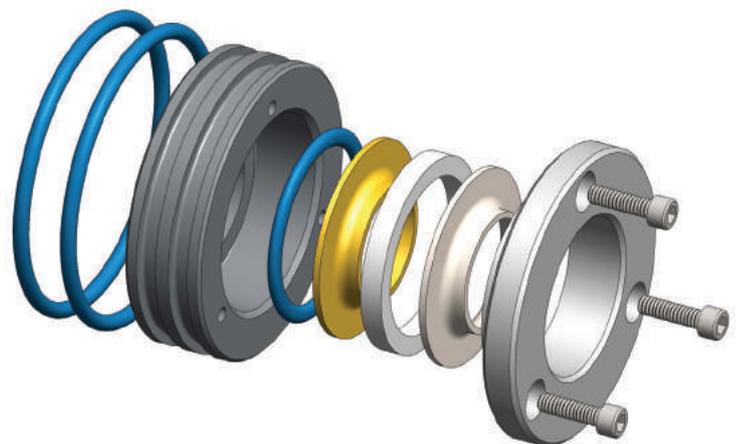
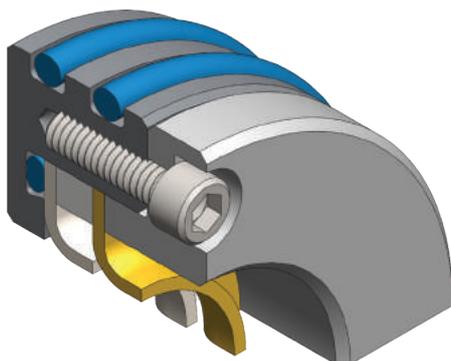
Rebuildable Lip Seal

With its patented-design rebuildable seal, Saint-Gobain Seals 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: -58°C to 232°C
- › Surface speeds in excess of 35 m/s
- › Vacuum to 34 BAR pressure differentiation
- › Broad chemical resistance PTFE
- › Extended life in abrasive media or dry running
- › Custom designs available



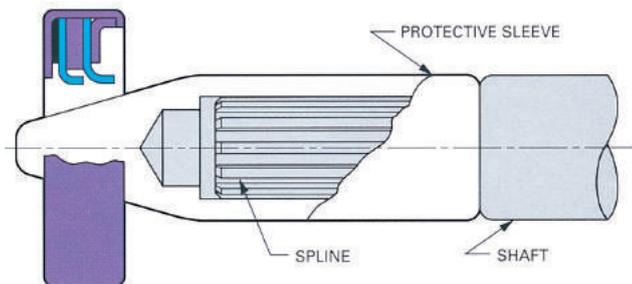
Lip Seal Installation

Seal Installation

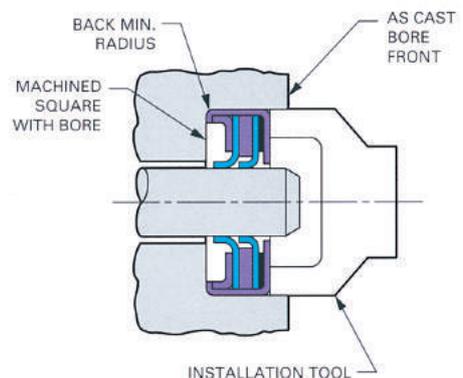
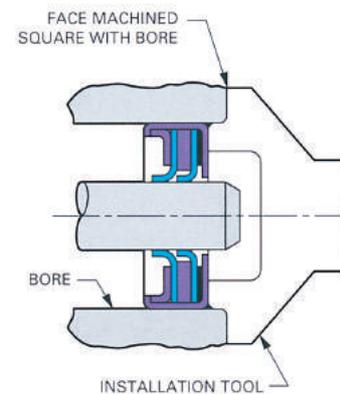
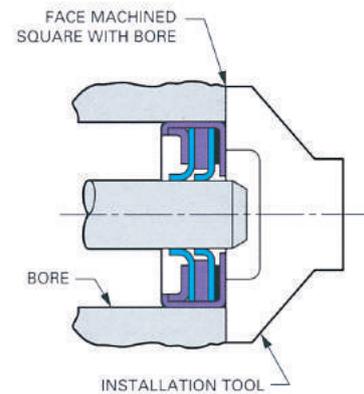
Care must be taken not to damage the sealing lip during the installation of the shaft through the seal. It is much easier to install the seal if the shaft enters the seal from the atmosphere side. If this is not possible, or if the seal must be installed on a shaft which has a keyway or splines, please 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.

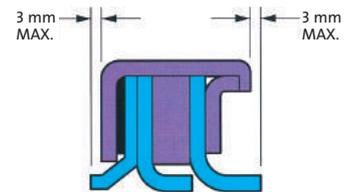


Press Fit Tools

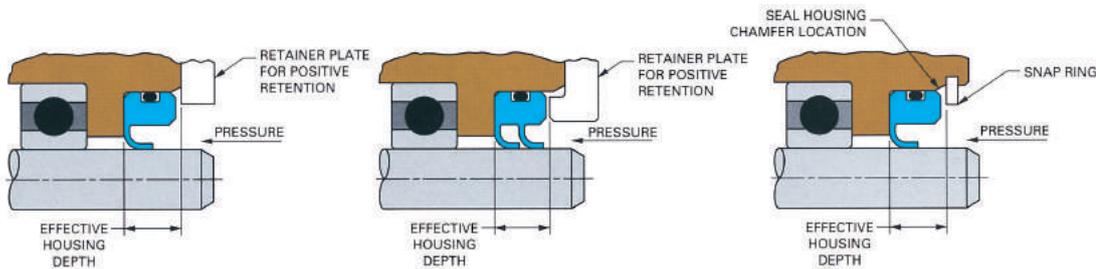


Hardware Variations and Non-Standard Lip Seal Configurations

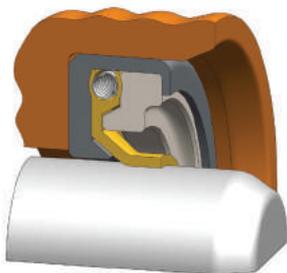
Sealing Lip Extension: OmniLip™ seals, incorporating two sealing lips or a dust excluder, may have seal lip extensions as shown. This must be considered when designing a seal gland.



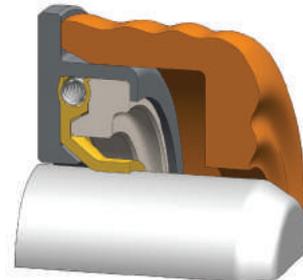
Hardware Variations



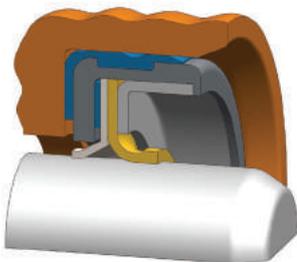
Non-Standard Lip Seal Configurations



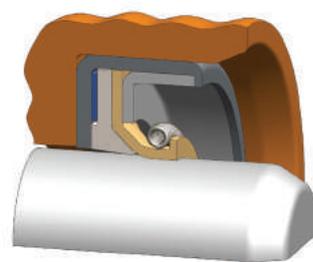
- Metallic spring energizer used for static sealing of internal seal components.
- For extreme temperature applications.



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

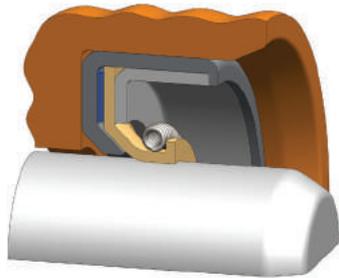


- Elastomer coating on the seal outside diameter.
- The elastomer coating protects the housing bore while providing tight sealing between the seal outside diameter and the customer's housing bore.

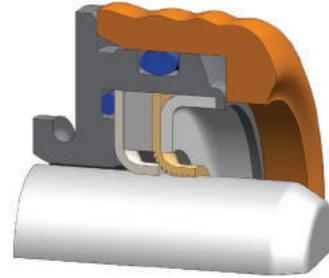


- High pressure seal design configured for extreme pressures and temperatures.

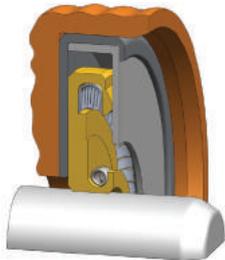
Non-Standard Lip Seal Configurations



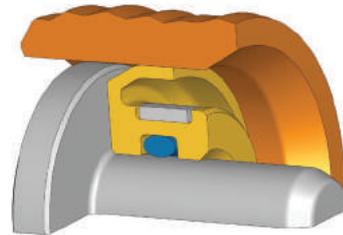
- High pressure seal design configured for extreme pressures and temperatures.



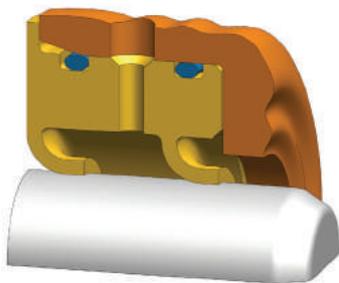
- Seal extraction feature for ease of seal removal.
- Elastomer O-Ring on seal outside diameter for tight static sealing.
- Seal flange for positive seal positioning.



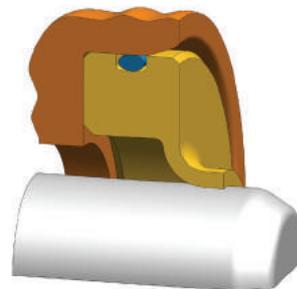
- Patented rotary shaft seal designed for extreme shaft runout.
- Seal wear occurs inside of the seal components, preventing shaft surface wear.



- 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 _____ Fax _____
Project name _____

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 Saint-Gobain Seals to design Supply

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

Saint-Gobain Seals
Fax: +32 3458 2669

Email: sealsmarketing@saint-gobain.com

Product Line and Market Summary

As a business unit under Saint-Gobain Performance Plastics' Engineered Components division, Saint-Gobain Seals not only offers the rotary lip seals that you see in this product handbook, but a wide range of other innovative sealing and polymer solutions.

Our main family of products includes:

- › OmniSeal® (Spring-Energized Seals)
- › OmniLip™ (PTFE Rotary Shaft Seals)
- › OmniFlex™ (Fluoroelastomer Seals)
- › Rulon® (High-Performance Fluoropolymer Compounds)
- › Meldin® 7000 (Thermoset Polyimide Materials)
- › Meldin® HT (High-Performance Thermoplastic Materials)

Other products in our portfolio include Fluoroloy® (high-performance custom-formulated compounds), cup seals, hydraulic seals, metal boss seals, v-packings, piston rings, Marathon® (valves and vacuum pump diaphragms), Transband® (PTFE creepage band), custom parts, polymer bearings and stock shapes.



Product Line and Market Summary

The majority of the seals and polymer components we manufacture are custom designed and matched with the best materials to optimize their performance in various applications and markets, and under the most extreme and critical conditions.

Saint-Gobain Seals products are extensively used in key markets such as Oil & Gas, Automotive, Life Sciences and Aerospace. We have also been instrumental in the Electronics and Industrial industries, providing energy-efficient and environmentally friendly designs. Our solutions reflect our business model, which focuses on co-development relationships and engineer-to-engineer direct collaboration. More than 93% of our products are custom engineered to the customer's application. Please feel free to contact us at sealsmarketing@saint-gobain.com to request one of our handbooks or brochures, or if you have any questions. Our global team is happy to assist you with your sealing and polymer needs.



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



Manufacturing and sales locations

- | | | | |
|--|---|---|---|
|  7301 Orangewood Ave.
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Phone: +1-800-544-0080 |  386 Metacom Avenue
Bristol, RI USA 02809
Phone: +1-401-253-2000 |  Am Nordkanal 37
47877 Willich, Germany
Phone: +49 2154-600 |  Heiveldekens 22
2550 Kontich, Belgium
Phone: +32 3-458-2828 |
|  Industria Aeroespacial 3601
Parque Industrial Saltillo-Ramos
Ramos Arizpe, Coahuila, Mexico 25900
Phone: +52-844- 866-1200 |  120 Jardim Sao Matheus
Vinhedo, Brazil 13280-000
Phone: +55 19-2127-8521 |  45-46 Avda Ebro Pol El Sequero
26150 Agoncillo, La Rioja, Spain
Phone: +34 94-14-86-035 |  ul. Norton 1
62-600 Kolo, Poland
Phone: +48 63-26-17-281 |
|  1468 Kun Yang Road
Minhang Development Zone
Shanghai, China
Phone: +86 21-5472-1568 |  13th FL., Dongshin Bldg, 141-28
Samsung-Dong, Kangnam-Ku
Seoul, South Korea , 135-090
Phone : +82-2-554-8041 |  10801-5, Haramura
Suwa, Japan 391-0106
Phone: +81 266-79-6400 | |

Sales only locations

- | | | | |
|--|--|--|--|
|  Grindwell Norton Limited
Devanahalli Road
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Phone : +91 80 30978888 |  V.le Colleoni 3
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20864 Agrate Brianza (MI), Italy
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Phone: +66(38) 667 800 - 807 |
|  Fuchu South Building 6F, 1-40 Miyamachi
Fuchu-City, Tokyo, Japan 183-0023
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