

Rotary Seal Design Guide

Catalog EPS 5350/USA



ROTARY SEALS



WARNING:

Failure, improper selection or improper use of the products and/or systems described herein or related items can cause death, personal injury or property damage.

For safe and trouble-free use of these products, it is important that you read and follow the Parker Seal Group Product Safety Guide. This Safety Guide can be referenced and downloaded free of charge at www.parkerseals.com and can be ordered, without charge, as Parker Publication No. PSG 5004 by calling 1-800-C-PARKER.

This document, along with other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors, provides product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the products or systems in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through his or her own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met. The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

OFFER OF SALE

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance are governed by the provisions stated on the separate page of this document entitled "Offer of Sale."

©2006 Parker Hannifin Corporation

Rotary Seal Design Guide Table of Contents

Introduction

1

Engineering

2

Materials

3

Product Offering

4

Clipper® Oil Seals

5

Parker Oil Seals

6

Shaft Sleeves

7

See Appendices A through J for:

- Design Action Request Form
- Rotary Lip Seal Inch Size
- Rotary Lip Seal Metric Sizes
- Solid to Split Seal Calculator Inch & Metric
- Sleeve & V-Seal Sizes
- ProTech™ Sizes Inch & Metric
- Conversions — Size/Speed/Temp.
- Chemical Compatibility
- Interchange
- Other Parker EPS Products

ProTech™ Bearing Isolators

8

FlexiLip™

9

FlexiCase™

10

FlexiSeal® Rotary

11

V-Seals and Excluders

12



Parker Hannifin Corporation

EPS Division

Toll Free: (800) 233-3900

www.parkerseals.com

Rotary Seal Design Guide Appendix

A Design Action Request Form

B Rotary Lip Seal Inch Sizes

C Rotary Lip Seal Metric Sizes

D Solid to Split Seal Calculator Inch & Metric

E Sleeve & V-Seal Sizes

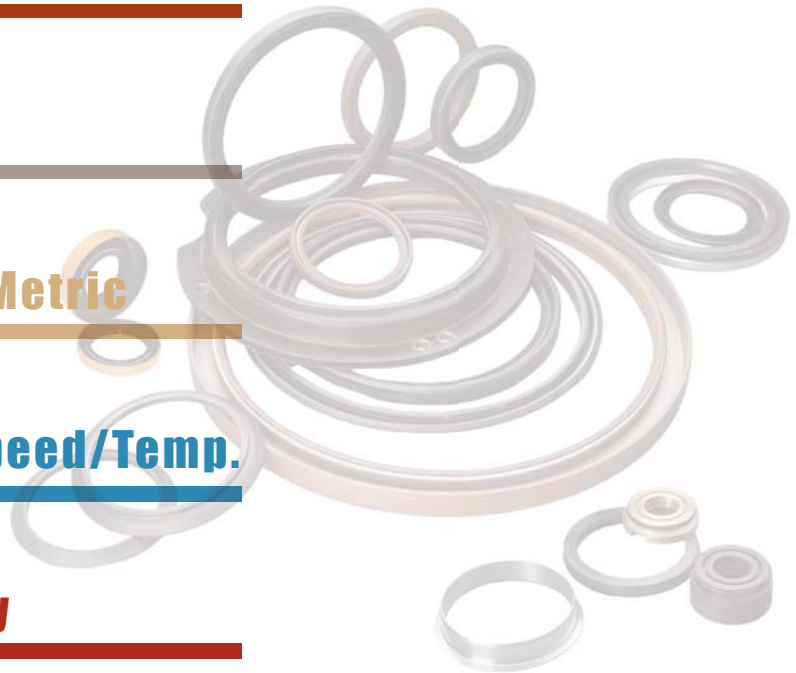
F ProTech™ Sizes Inch & Metric

G Conversions — Size/Speed/Temp.

H Chemical Compatibility

I Interchange

J Other Parker EPS Products




Parker Hannifin Corporation
EPS Division
Toll Free: (800) 233-3900

www.parkerseals.com

Introduction

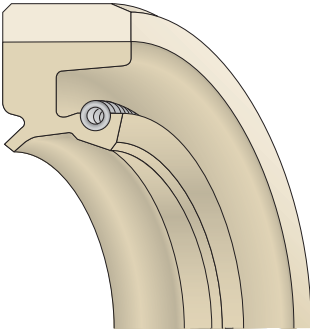
Catalog EPS 5350/USA



The completeness of Parker's product line allows us to provide the optimal design for any rotating application.

Parker's Rotary Sealing Solutions Program provides the most complete coverage in the industry of shaft seals for rotating applications, for both OEM and MRO requirements. The completeness of the product line allows Parker to provide the optimal design for any given application. Parker is more than just product. A complete solutions package has been created by supplementing the broadest range of products with full engineering support, strict quality standards, direct factory field support, R&D and premier customer service. At Parker EPS, seals are not an add-on to our business, seals are our only business.

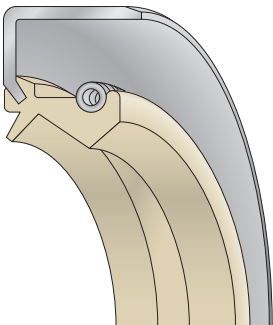
Clipper® Oil Seal



The **Clipper Oil Seal** is the anchor of the rotary seal product line. The Clipper design features an integrally molded rubber fiber outer case and an elastomeric seal lip. The unique, nonmetallic construction will not rust or corrode and forms a gasket-type seal between the equipment housing and the seal outside diameter (OD). With a wide range of profiles and material options, Clipper seals are available for shaft diameters from 0.250" (6.35 mm) to over 65" (1651 mm).

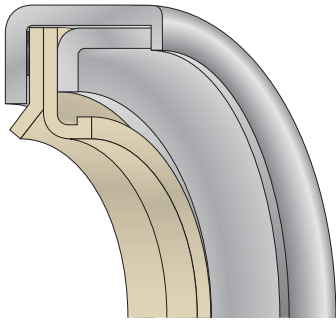
Clipper Split Seals are known worldwide for being the easiest split seal to install because they do not require a coverplate to keep them in the housing. The robust, composite OD provides the best retention of any split seal on the market. Replacing failed seals in the field with Clipper Split Seals saves on downtime and lost production expenses. To make replacement even easier, specify Clipper solid seals as the OEM solid seal. When cutting a metallic seal is required for in-field replacement, there is the possibility of metal shavings entering the bearing. The non-metallic design of the Clipper seal eliminates this possibility.

Parker Oil Seal



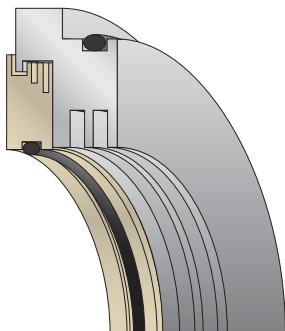
Parker Oil Seals provide additional coverage and include the common metal OD construction for inch requirements and rubber covered OD construction for metric requirements. Single lip and double lip profiles are available as well as over 100 special profiles for applications with unique operating conditions. The typical size range is for shaft diameters from 0.200" (5 mm) to 10" (254 mm).

03/28/06



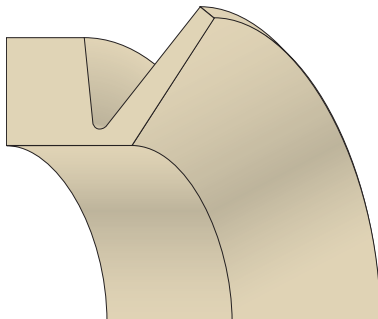
FlexiLip™, FlexiCase™ and FlexiSeal®

FlexiLip, FlexiCase and FlexiSeal PTFE seals extend the Parker application range by providing coverage where operating conditions exceed the capabilities of elastomeric lip materials. Conditions such as high speed and high pressure, and requirements for chemical resistance and low torque are easily accommodated by one of our 50 standard profiles. The typical size range is for shaft diameters from 0.125" (3 mm) to 16" (406 mm).



ProTech™ Bearing Isolators

ProTech bearing isolators further complement Parker's solutions program by offering an answer for applications where improving the mean time between failure (MTBF) is critical. The ProTech family relies on true non-contact labyrinth seal technology to provide 100% exclusion of contaminants and 100% retention of bearing lubrication for the life of the bearing. Fourteen standard profiles are available to allow for ease of retrofitting most equipment. Typical size range is for shaft diameters from 0.492" (12.5 mm) to 38" (965 mm). ProTech has also been independently tested to IEEE IP55, IP56, IP66 and IP69k.



Quick Sleeve™, Wear Sleeve and V-Seals

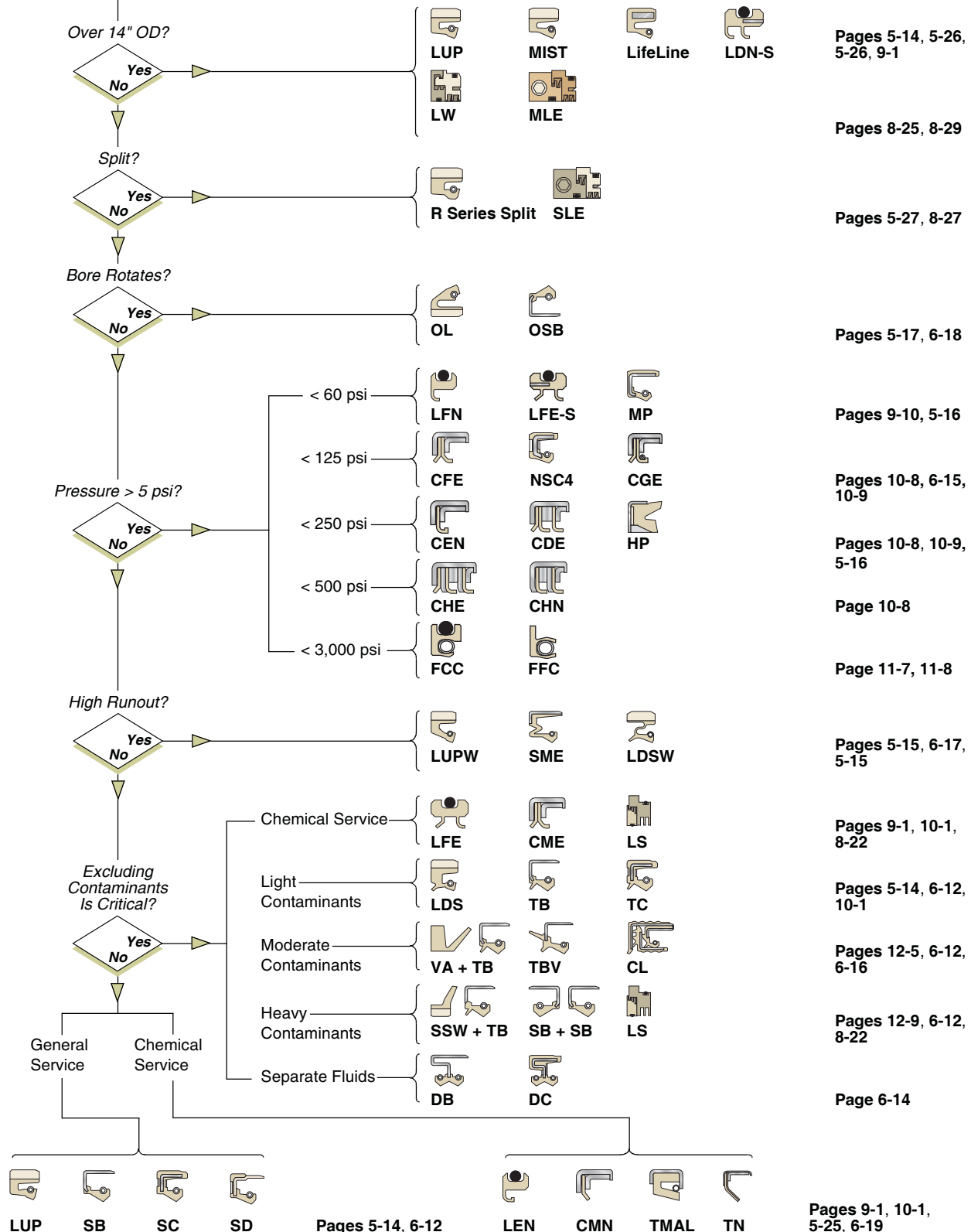
Quick Sleeves, Wear Sleeves and V-Seals are auxiliary components that provide additional convenience to the Parker Sealing Solutions Program. Quick Sleeve shaft repair sleeves and Wear Sleeves are economical, convenient solutions to create proper shaft surfaces. V-Seals can be added as a slinger type seal to protect the primary seal or used as a primary seal to exclude dirt in grease applications.

03/28/06

Seal Decision Tree

Oil Retention, Shaft Speed under 3,000 fpm (15 m/s)

Note: Intended for use as a general design guide only.



































































03/28/06

Clipper Oil Seal and Parker Oil Seal Profiles

 Style A	 Style E	 Style L	 Style S	 BDC	 BDV	 BSC	 BSV
 CAP	 CB	 CH	 CL	 Clipper Sliptite	 DA	 DB	 DC
 DC4	 DL	 DS	 DM	 H	 HP	 KA	 KAP
 KB	 KBJ	 KBP	 KC	 KC8	 KCJ	 KG	 KM
 LDS	 LDSF	 LDSW	 LifeLine	 LPD	 LPD Spring Retainer	 LPDW	 LUP
 LUPW	 MP	 MIST	 NSC1	 NSC3	 NSC4	 NTC1	 NTC3
 NTC4	 OKA	 OKB	 OKC	 OKM	 OL	 OSA	 OSB
 OSC	 OSM	 OTA	 OTB	 OTM	 OTC	 OUA	 OUB
 OUC	 OUM	 OVA	 OVB	 OVC	 OVM	 P	 RPD
 RPDT	 RUP	 RUPW	 SA	 SAE	 SAP	 SB	 SBF
 SBJ	 SBP	 SC	 SCE	 SCF	 SCJ	 SD	 SD2
 SEC	 SEM	 SDS	 SG	 SM	 SME	 SS	 SSW

03/28/06















Clipper Oil Seal and Parker Oil Seal Profiles (Continued)

 STLUP	 STLUP w/Buttons	 ST MIST	 ST MIST w/Buttons	 SXA	 SXB	 SXC	 TA
 TAP	 TB	 TBF	 TBH2	 TBH4	 TBJ	 TBP	 TBV
 TBY2	 TBY3	 TC	 TC8	 TC12	 TCF	 TCJ	 TCV
 TCK	 TC9	 TD	 TD6	 TDN3	 TEA	 TEC	 TEM
 TG	 TG13	 TM	 TMAL	 TMAS	 TN	 TSS	 UA
 UB	 UC	 VA	 VAP	 VB	 VB1	 VB3	 VB4
 VB6	 VBJ	 VBP	 VC	 VCJ	 VG	 VM	 VM1
 VM2	 W	 WPC	 WPK	 WPR	 **L	 **R	 **W

Shaft Seal Profiles

 Quick Sleeve	 Wear Sleeve — Flanged	 Wear Sleeve — Non-flanged
--	---	---



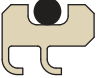







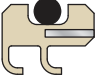


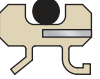




















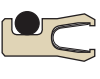


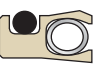





ProTech Bearing Isolator Profiles

 LS	 LN	 WD	 FS	 FN	 SB	 LB
 LM	 LD	 LW/LX	 SL	 ML	 MN	 SM

**Hydrodynamic lip pattern.
L = CCW shaft rotation
R = CW shaft rotation
W = Bi-directional shaft rotation

03/28/06

FlexiLip, FlexiCase and FlexiSeal Rotary Profiles

 <i>LFN-N</i>	 <i>LEN-N</i>	 <i>LDN-N</i>	 <i>LMN-N</i>	 <i>LFE-N</i>	 <i>LEE-N</i>	 <i>LDE-N</i>	 <i>LGN-N</i>
 <i>LFN-S</i>	 <i>LEN-S</i>	 <i>LDN-S</i>	 <i>LMN-S</i>	 <i>LFE-S</i>	 <i>LEE-S</i>	 <i>LDE-S</i>	 <i>LGN-S</i>
 <i>CFN</i>	 <i>CFE</i>	 <i>CMN</i>	 <i>CME</i>	 <i>CEN</i>	 <i>CEE</i>	 <i>CDN</i>	 <i>CDE</i>
 <i>CGN</i>	 <i>CGE</i>	 <i>CJN</i>	 <i>CJE</i>	 <i>CHN</i>	 <i>CHE</i>	 <i>FCC-V</i>	 <i>FCS-V</i>
 <i>FCC-C</i>	 <i>FCS-C</i>	 <i>FHC-V</i>	 <i>FHS-V</i>	 <i>FHC-C</i>	 <i>FHS-C</i>	 <i>FFC-V</i>	 <i>FFS-V</i>
 <i>FFC-C</i>	 <i>FFS-C</i>	 <i>FFN-H</i>					

For additional information on all profiles, see the Product Offering in **Section 4**.

Engineering Excellence

Engineering support is another feature of the Parker Sealing Solutions Program. Every product group is fully supported by Parker's internal engineering staff. As the leader in seal design engineering, Parker designs sealing solutions for new applications, modifies designs to improve performance and troubleshoots problem applications in addition to designing like replacements.

Quality Commitment

Quality commitment is a feature of the Parker Sealing Solutions Program that we take very seriously. Quality was built around the tough requirements of MIL-I-45208A and MIL-STD-45662 and refined for certification for ISO-9001 and AS-9100. All manufacturing plants are either ISO-9001 or QS-9000 certified to assure consistent quality.

Customer Support

Field Service is provided by over 90 direct factory representatives to keep customers up to date on the latest technologies and provide a wide range of on-site services.

Worldwide and local support is just a phone call away. Your local Parker sales representative provides a single point of contact for local sealing support. Our established worldwide network of over 300 distributor and service center locations, including global sales and engineering, means you can always get quality products when and where you need them. It also means that sound advice from Parker sealing experts is never far away.

Research & Development efforts are continuous and ensure the latest in sealing technology design and materials are available. Testing capabilities allow seal performance to be verified prior to a customer launch of a new product.

Premier Customer Service is a key component of the Parker package. Electronic ordering systems such as EDI and PHconnect make placing and tracking orders easy. For personal contact, our fully trained staff of customer service representatives are only a phone call away at 1-800-233-3900.

Parker Sealing Solutions is a complete program, not just product.

Packaging

Traditional non-fluoroelastomer Clipper Oil Seals are packaged in the blue box.



Fluoroelastomer Clipper Oil Seals are packaged in the brown box.

Parker Oil Seals are packaged in the gold box.



*Parker Oil Seals with
Parkote™ bore sealant*

03/28/06

Applications**Rotary Seals for Steel & Paper Industry**

- Backup Rolls
- Mill Stands
- Felt Rolls
- King & Queen Rolls

Rotary Seals for Heavy Equipment

- Mining
- Construction
- HD Reducers

Rotary Seals for Power Generation

- Turbines
- Blowers
- Pumps
- Motors
- Bearings

Rotary Seals for Industrial Equipment

- Reducers
- Gearboxes
- Pumps
- Motors
- Bearings

PTFE Seals for High Performance

- Centrifuges
- Pumps
- Gearboxes
- Mixers
- Instrumentation
- Semiconductor
- Medical Equipment

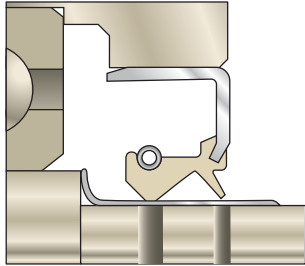
Bearing Isolators for Industry

- ANSI Pumps
- Electric Motors
- Split Pillow Blocks
- Turbines
- Gearboxes

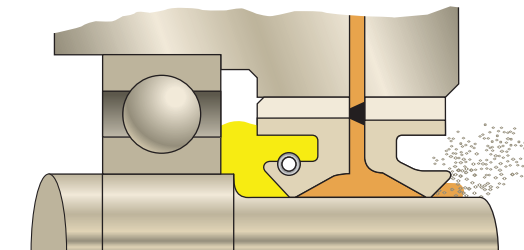
03/28/06

Sealing Systems

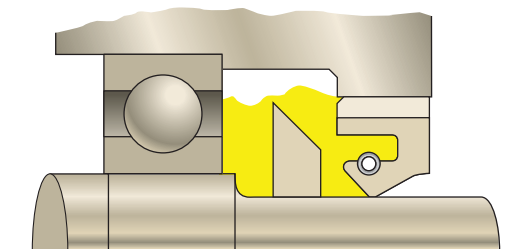
The completeness of Parker's rotary seal offering allows customers to improve performance by utilizing a sealing system. This approach uses multiple sealing products when requirements exceed the capability of a single seal. Some of the more common systems are pictured below.



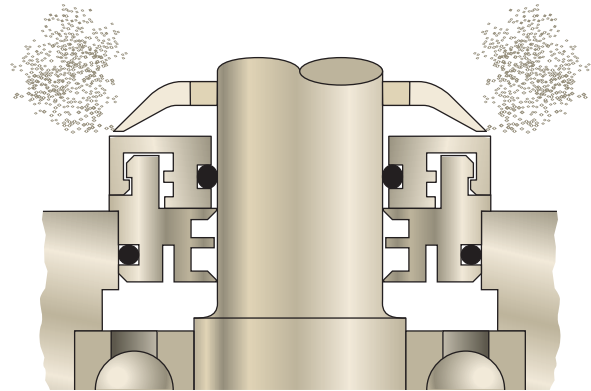
System incorporating lip seal and a shaft repair sleeve



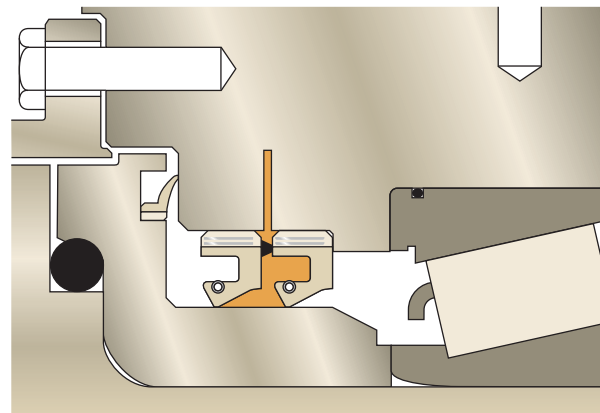
System incorporating two seals back-to-back with grease purge for improved contaminant exclusion and oil retention



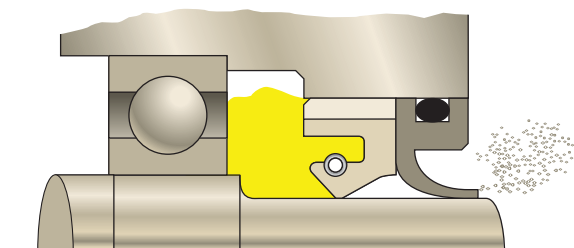
Standard lip seal with internal DS slinger to protect lip from lubricant surge



System incorporating SSW slinger and ProTech bearing isolator for optimal exclusion on vertical up application

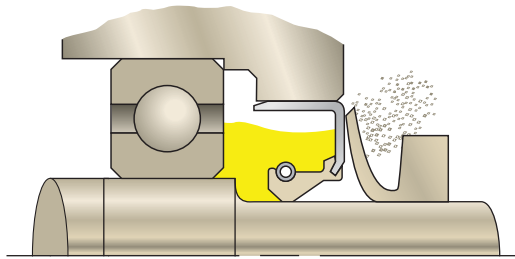


System incorporating two lip seals with grease purge and SSW slinger for maximum exclusion

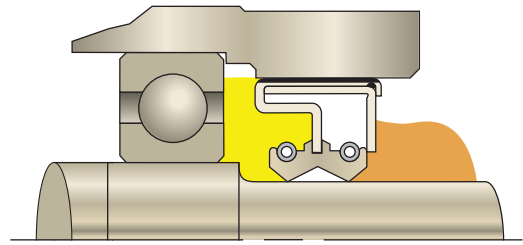


Elastomeric lip seal for oil retention with PTFE lip seal for exclusion

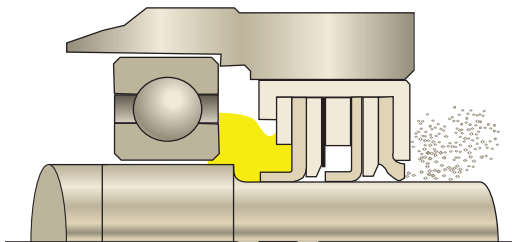
03/28/06



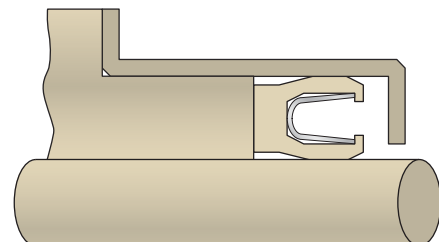
V-Seal used to protect primary oil seal from excessive contamination



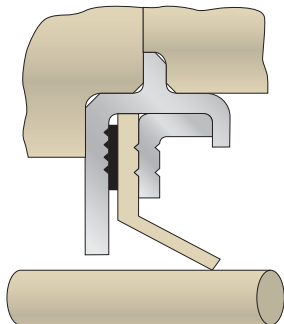
Opposed dual spring-loaded lips for separation of two fluids



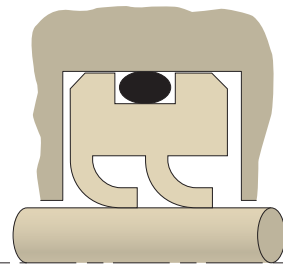
Multi-lip FlexiCase design for sealing high pressure and excluding dust



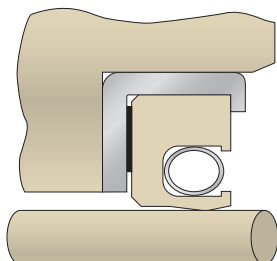
FlexiSeal used in tank cleaner slow speed, 1000 psi



FlexiCase in gas turbine engine sump for high speed, 15,000 sfpm



FlexiLip in air conditioning compressor 260 sfpm, 20 - 300 psi



FlexiCase in refrigerant recovery system, 300 psi

03/28/06