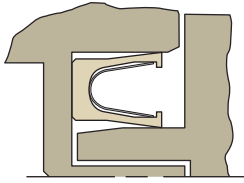


This section is filled with real-world applications for which Parker has designed a successful solution. The following solutions illustrate the wide capability of PTFE sealing in various applications.

FlexiSeal™ Applications



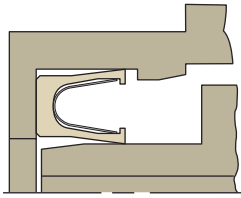
Robotic Arm — Wafer Press

Motion:	Oscillatory
Rotation:	60°
Speed:	16 sfpm
Pressure:	0.5 Torr – 14.5 psi
Temperature:	68 to 77 °F
Media:	Vacuum/Atmosphere
Life:	2,500,000 cycles
Breakaway Friction:	2 in/oz max. (Repeatable)
Allowable Leakage:	Zero
Dynamic Surface:	4 R _a Electrolysis Nickel/Aluminum 70 R _c
Static Surface:	16 R _a Electrolysis Nickel/Aluminum 70 R _c
Spring Material:	301 Stainless Steel (Cantilever)
Jacket Material:	Ekonol Filled PTFE (Aromatic Polyester Filled PTFE)

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**FlexiSeal™ Applications
(Continued)**

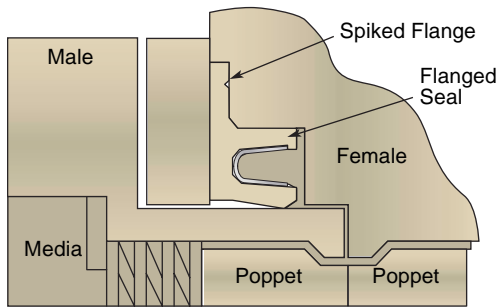
B



Plasma Generator

Motion:	Reciprocating (Rod)
Stroke:	0.040 – 0.080"
Frequency:	90 cycles/hr.
Pressure:	20 MTorr – 14.7 psi
Temperature:	70 to 150 °F
Media:	Vacuum/Atmosphere
Life:	750,000 Cycles
Breakaway Friction:	Repeatable
Allowable Leakage:	Zero
Dynamic Surface:	4 R _a Sapphire or Quartz Tube
Static Surface:	16 R _a Aluminum
Spring Material:	301 Stainless Steel (Cantilever)
Jacket Material:	UHMWPE

UHMWPE FlexiSeal for this semiconductor application is best suited for the cleanliness demands and vacuum requirements.



Liquid Oxygen Quick Disconnect

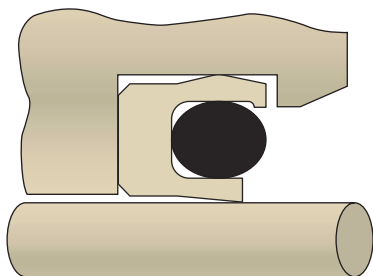
Motion:	Reciprocating (Rod)
Stroke:	0.500"
Frequency:	1 – 50 cycles/day
Pressure:	0 – 60 psi
Temperature:	-320 to +120 °F
Media:	Liquid Oxygen
Dynamic Friction:	5 lbs. Force max.
Allowable Leakage:	Zero
Spring Material:	301 Stainless Steel (Cantilever)
Jacket Material:	Virgin PTFE

- Quick Coupling to transfer and refill LOX home and portable units.
- Flanged spiked for sealability and to prevent seal shrinkage during thermal cycling.

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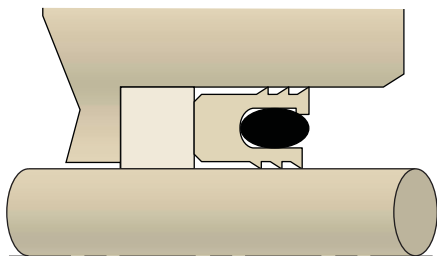


FlexiSeal™ Applications (Continued)



Biomedical Liquid Handling Systems

Motion:	Reciprocating (Rod)
Stroke:	0 – 0.500"
Frequency:	60 Hz
Pressure:	Vacuum
Temperature:	50 to 100 °F
Media:	Dimethyl Sulfoxide
Life:	500,000 Cycles
Breakaway Friction:	Repeatable
Allowable Leakage:	Zero
Dynamic Surface:	4 R _a 303 Stainless Steel (Plunger) 20 R _c
Static Surface:	Chem Film (Yellow) Aluminum
Energizer Material:	Fluorocarbon
Jacket Material:	Virgin PTFE



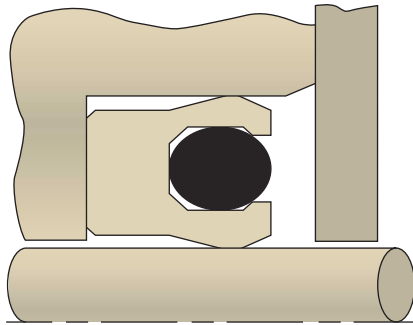
Liquid Dispensing Cylinder

Motion:	Reciprocating (Rod)
Stroke:	2.000 – 4.000"
Frequency:	1 – 4 cycles/min.
Pressure:	200 – 3000 psi
Temperature:	-60 to +180 °F
Media:	Epoxy, Adhesives and Catalysts
Life:	1,000,000 Cycles
Allowable Leakage:	Zero
Dynamic Surface:	8 – 16 R _a Steel (Chrome) 60 – 65 R _c
Static Surface:	32 R _a Aluminum
Energizer Material:	EPDM
Jacket Material:	UHMWPE

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FlexiSeal™ Applications (Continued)

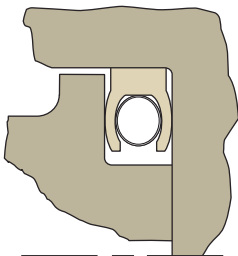
B



High Pressure Washers — Axial Pump

Motion:	Reciprocating (Rod)
Stroke:	0.250"
Frequency:	3,450 cycles/min.
Speed:	1,725 sfpm
Pressure:	0 – 3,000 psi
Temperature:	35 to 160 °F
Media:	Water
Life:	2,000 – 8,000 Hrs.
Allowable Leakage:	2 drops/Hr.
Dynamic Surface:	6 – 10 R _a (55 – 60 R _c) 440C Stainless Steel
Static Surface:	120 R _a Brass
Jacket Material:	Carbon Fiber Filled PTFE
O-Ring Material:	Nitrile

A commercial power washer manufacturer was seeking high pressure seal which would meet 8000 hour requirement. Elastomer energized FlexiSeal provided a best-value solution. Carbon fiber-filled provided the life requirement in this non-lubricated environment.



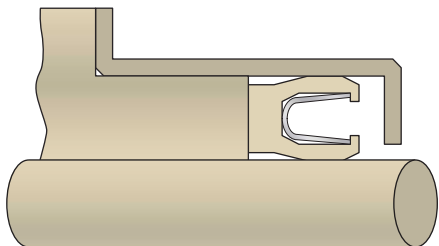
Gas Turbine Gear Box and Bearing Compartment Static Seals

Motion:	Static Face Seal
Pressure:	$\Delta P = -30$ to 200 psi
Temperature:	65 to 400 °F
Media:	MIL-L-23699, MIL-L-7808 or Oil/Air Mixture
Life:	5,000 Hrs.
Allowable Leakage:	Zero
Static Surface:	32 R _a Titanium and 63 R _a Nickel Alloy
Jacket Material:	Virgin PTFE
Spring Material:	Tempered Elgiloy® (Helical)

Aerospace engine manufacturers utilize high temperature FlexiSeals where standard O-ring compounds fail to meet the required temperature ranges and life requirements. Excellent compatibility is achieved with use of virgin PTFE.

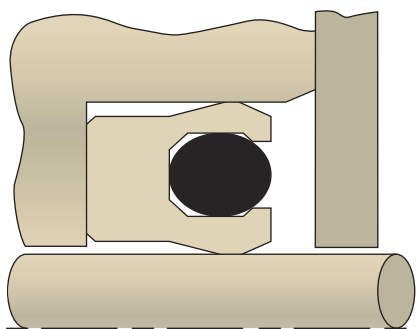
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FlexiSeal™ Applications (Continued)



Tank Cleaners

Motion:	Rotates on ID and OD
RPM:	20 – 40
Pressure:	50 – 1000 psi
Temperature:	32 to 220 °F
Media:	Water/Detergents, Solvents, Abrasive Compounds
Speed:	2.7 sfpm
Allowable Leakage:	Zero
Dynamic Surface:	16 R _a 17 – 4PH HT (Shaft) 45 R _c 32 R _a 316 Stainless Steel (Bore) 28 R _c
Static Surface:	32 R _a 316 Stainless Steel
Spring Material:	Elgiloy (Cantilever)
Jacket Material:	PPS/Carbon Fiber Filled PTFE
Bearing Material:	Carbon Fiber Filled PPS



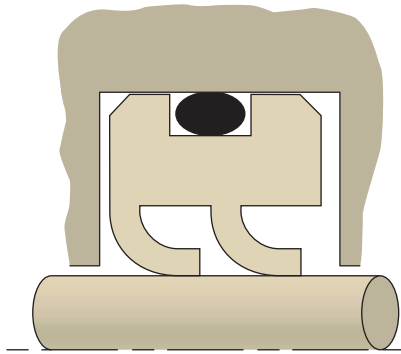
Carpet Steam Cleaner — Pump

Motion:	Rotary Shaft
RPM:	13,000
Speed:	425 sfpm
Pressure:	20" Hg Vacuum to 10 psi
Temperature:	70 to 100 °F
Media:	Exposure to Cleaning Solutions
Friction:	Low (Continuous Dry Run)
Life:	300 – 500 Hrs.
Allowable Leakage:	Zero (Air)
Dynamic Surface:	10 – 30 R _a 303 Stainless Steel (Shaft) 20 R _c
Static Surface:	32 R _a Plastic Housing
Jacket Material:	Carbon Fiber Filled PTFE
O-Ring Material:	Nitrile

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FlexiLip™ Applications

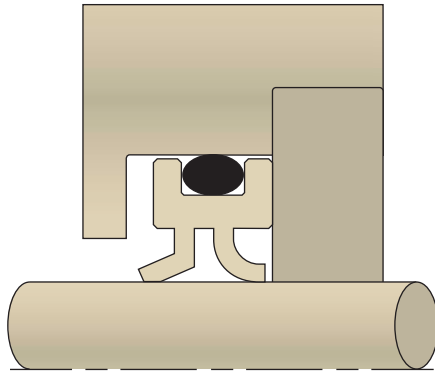
B



Air Conditioning Compressors

Motion:	Rotary Shaft
Rotation:	CW
RPM:	1725 – 1850
Pressure:	20 – 300 psi
Temperature:	32 to 325 °F
Media:	R12, R22, R500, R502, R134, R404A, R410A
Speed:	260 sfpm
Life:	15,000 Hrs.
Allowable Leakage:	Zero
Seal Material:	Pigmented Virgin PTFE

The LDN FlexiLip profile is often selected for use as a compressor shaft seal. The seal material meets compatibility testing with all refrigerants in conjunction with high-speed, long life application requirements. Meets EPA zero leakage requirements.

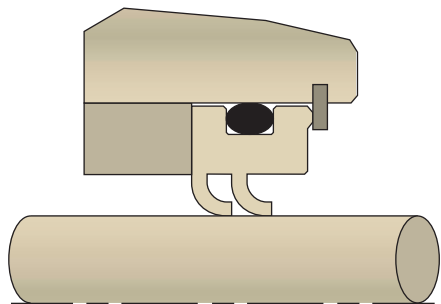


Transportation — Supercharger

Motion:	Rotary Shaft
RPM:	14,000 max.
Pressure:	19 – 25 in vacuum, 10 – 12 psi boost
Temperature:	220 °F
Media:	Sealed In — Synthetic Oil, GL5, 75W Sealed Out — Atmosphere
Velocity:	3100 sfpm
Allowable Leakage:	None
Dynamic Surface:	Case Hardened Steel, 16 R _a 60 R _c
Static Surface:	Cast Aluminum, 32 R _a
Seal Materials:	Glass/Moly Filled PTFE with Fluorocarbon O-Ring

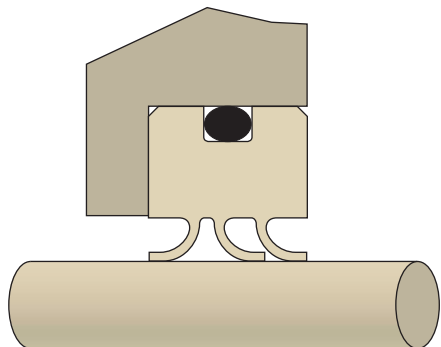
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FlexiLip™ Applications (Continued)



Transportation — Universal Joint

Motion:	Rotary — Oscillating
RPM:	250 – 500
Temperature:	Ambient
Media:	Sealed In — Grease Sealed Out — Dust
Velocity:	150 – 300 sfpm
Allowable Leakage:	None
Dynamic Surface:	4140, 10 – 20 R _a 50 R _c
Static Surface:	4140, 10 – 20 R _a 50 R _c
Seal Material:	Graphite Filled PTFE with Fluorocarbon O-Ring



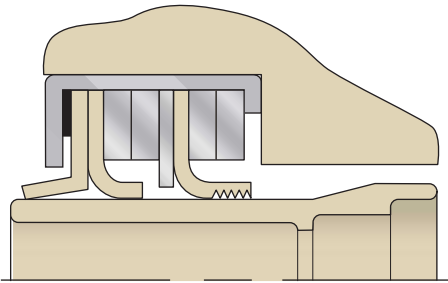
Industrial — Gearbox

Motion:	Rotary Shaft
Rotation:	CW/CCW (Bi-directional)
RPM:	200 – 1800
Pressure:	5 psi
Temperature:	Ambient
Media:	Sealed In — Gear Oil Sealed Out — Water Washdown
Velocity:	110 – 1020 sfpm
Allowable Leakage:	None
Dynamic Surface:	440 Stainless Steel, 10 – 20 R _a 15 R _c
Static Surface:	Cast Iron, 63 R _a
Seal Materials:	Proprietary Filled PTFE with Fluorocarbon O-Ring

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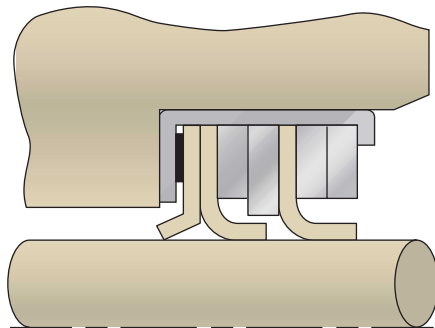
FlexiCase™ Applications

B



Stationary and Portable Air Compressors

Motion:	Rotary Shaft
Rotation:	CW/CCW (Bi-directional)
RPM:	1780 – 3600
Speed:	1650 sfpm
Pressure:	30 – 175 psi
Vacuum:	28 Hg
Temperature:	-40 to +250 °F
Media:	Silicone/Polyglycol, Diester, Hydrocarbon SHC Lube Oils
Life:	15,000 Hrs.
Allowable Leakage:	Zero
Shaft Surface:	16 – 20 R _a Steel 30 – 36 R _c
Seal Material:	Carbon Fiber Filled PTFE
Case Material:	S.A.E. 1008/1020 CRS



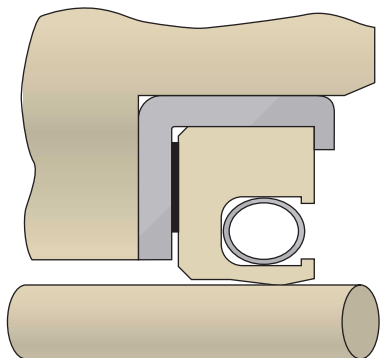
Hydraulic Gear Pumps and Motors

Motion:	Rotary Shaft
Rotation:	CW/CCW (Bi-directional)
RPM:	1750 – 3000
Pressure:	100 – 250 psi
Temperature:	-30 to +250 °F
Media:	S.A.E. 10W Hydraulic Oil
Speed:	612 spfm
Life:	500 – 1000 Hrs.
Allowable Leakage:	1 drop/Hr.
Dynamic Surface:	12 R _a Hardened Steel 58 – 62 R _c
Static Surface:	32 R _a Cast Iron or Aluminum
Seal Material:	Carbon/Graphite Filled PTFE
Case Material:	S.A.E. 1008/1020 CRS

A gear pump manufacturer looking for increasing longevity selected CHE profile FlexiCase featuring redundant sealing lips and wiper/scrapper. Seal material provided increased wear resistance to achieve 1000 hour requirement.

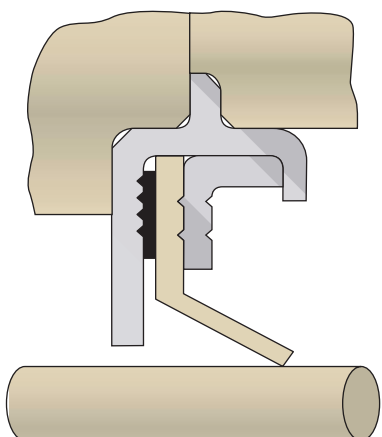
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FlexiCase™ Applications (Continued)



Freon Recovery System — Compressor

Motion:	Rotary Shaft
Rotation:	CW
RPM:	1725 – 1850
Pressure:	20 – 300 psi
Temperature:	32 to 325 °F
Media:	R12, R22, R500, R502, R134, R404A, R410A
Speed:	250 sfpm
Life:	1,000 – 1,500 Hrs.
Allowable Leakage:	Zero
Dynamic Surface:	8 R _a Tool Steel 58 – 62 R _c
Static Surface:	16 R _a Aluminum
Seal Material:	Glass/Moly Filled PTFE
Case Material:	304 Stainless Steel

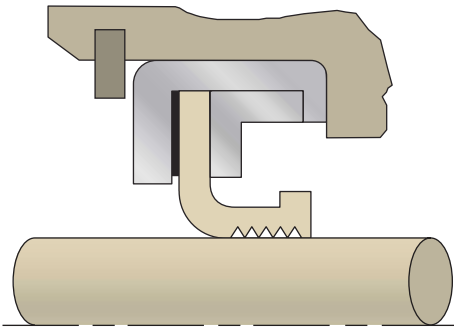


Gas Turbine — Engine Sump

Motion:	Rotary Shaft
RPM:	8,000 – 8,700
Speed:	14,300 – 15,500 sfpm
PV:	77,400
Pressure:	0 – 5 psi
Temperature:	-65 to +250 °F
Media:	MIL-L-23699/MIL-L-7808/Hot Air
Leakage:	Zero (Static)
Dynamic Surface:	20 R _a Chromium Carbide 60 – 70 R _c
Static Surface:	125 R _a Type III Anodized Aluminum
Life:	10,000 Hrs.
Seal Lip Material:	Carbon/Graphite Filled PTFE
Cases:	Inner/Outer — Aluminum AMS 4016/4150
Gasket:	Fluorocarbon

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**FlexiCase™ Applications
(Continued)**



Gas Turbine — Scavenge Pump Line

Motion:	Rotary Shaft
RPM:	8,000
Speed:	1,450 sfpm
Pressure:	45 psi
PV:	65,250
Temperature:	-65 to +425 °F
Media:	MIL-L-23699/MIL-L-7808/Hot Air
Leakage:	Zero
Dynamic Surface:	16 R _a Type III Anodized Aluminum
Static Surface:	60 – 70 R _c
Life:	10,000 Hrs.
Seal Lip Material:	Carbon Fiber Filled PTFE, Uni-directional Hydro Lip
Cases:	Inner/Outer — 304 Stainless Steel
Gasket:	Fluorocarbon

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