



Polon® PTFE Sealing Solutions & Capabilities

ISO 9001/ QS 9000 / AS 9000
Registered

EPS 5300/USA



Polon® PTFE Sealing Solutions

Parker Seal's Engineered Polymer Systems (EPS) Division - Chicago Operations, (formerly GNP) manufactures a broad range of Polon® PTFE and high-performance plastic seals at our state-of-the-art manufacturing facility northwest of Chicago, Illinois. EPS Chicago provides sealing solutions for the following industries:

- Aerospace
- Chemical Process
- Consumer
- Energy, Oil & Gas
- Fluid Power
- General Industrial
- Medical
- Military
- Semiconductor
- Transportation



Parker EPS produces a wide range of standard and custom seals for static and dynamic applications. Our proprietary Polon® PTFE material blends accommodate a variety of high/low temperature conditions and are chemically compatible with most fluids. Our engineering staff provides sealing solutions for the most demanding or unusual applications. Products range from spring energized U-cups (FlexiSeals™), metal cased (FlexiCase™) and non-cased (FlexiLip™) rotary lip seals, fluid power seals, PFA-encapsulated spring seals (FlexiTube™), custom back up rings, valve seats and non-seal devices.

Polon® PTFE FlexiSeals™

The *FlexiSeal* is a spring-energized U-cup utilizing a variety of jacket profiles, spring types and materials in rod, piston and face seal configurations. FlexiSeals are used where elastomeric seals fail to meet the temperature range, chemical resistance or friction requirements. Jacket profiles are made from Polon® PTFE, and other high performance polymer plastics. Spring types are available in corrosion-resistant metal alloys, including stainless steel, Elgiloy® and Hastelloy®.

FlexiSeal™ seals



Standard FlexiSeals are precision machined to fit inch fractional, metric, MIL-G-5514 and AS4716 glands. Custom sizes and geometries are available from 1/8" to 72" diameters.

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FlexiCase™ Seals

The *FlexiCase* seal is a metal cased rotary lip seal suitable for applications where elastomeric lip seals fail and mechanical seals are too costly. The filled Polon PTFE element provides greater chemical compatibility, wider temperature ranges, higher-pressure capabilities, and longer life than elastomeric lip seals.

FlexiCase seals:

- Can run in dry and abrasive media environments
- Are available in single, dual and triple lip designs
- Are designed to press fit into a groove



FlexiCase™ seals

FlexiLip™ Seals

FlexiLip seals are rotary seals incorporating a deflected lip seal geometry. Anti-rotational devices such as flanges and o-rings are often utilized to prevent the seal from rotating with the shaft. Standard and custom sizes are available with a wide selection of Polon PTFE materials. FlexiLip seals are suitable for sealing corrosive and abrasive media. A wide range of geometries and materials are available depending on the specific application requirements.



FlexiLip™ seals

Rubber-Energized Fluid Power Seals

Parker EPS Division manufactures a complete line of standard rubber-energized fluid power seals for industrial and aerospace applications.

Polon® PTFE profiles include:

- Rod and piston seals
- Rod wipers/exclusion devices
- Custom wipers

Rubber-energized rod and piston seals



Additional fluid power seal designs include:

- Uni-directional rod & piston buffer seals
- Bi-directional rod & piston seals
- Rod and Piston wear strip, wear rings and bearings
- Rotary swivel seals



"S" Series buffer seals

PFA FlexiTube™

Parker's *FlexiTube* seal is a PFA-encapsulated spring seal suitable for sealing under harsh operating conditions such as chemical, environmental and temperature extremes.

Features include:

- Can be ported for pressures exceeding 500psi
- Wide range of standard cross sections available
- Sizes from 3.00" ID and up
- No tooling is required
- Temperature range of -320° to 450°F
- Capable of sealing on 32 to 64µi ra



FlexiTube™ seals

Custom Shapes/General Industry

Custom sealing solutions or non-seal devices can be manufactured to your print specifications or designed with our assistance. Capabilities range from machining low volume special shapes to automatic molding high volume, build-to-print requirements.




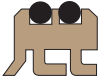
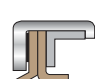

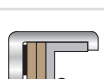





Custom shapes

Spring Energized FlexiSeals™

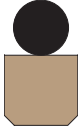



Seal Profile Type	FlexiSeal Series	Pressure Rating (psi)	Temp Range °F	Application
 Standard Cantilever Spring	VS	3,000 psi	-300° to 600°F	Static, reciprocating, dynamic applications above 450°F and rotary service < 300 SFPM. 301 Stainless & Elgiloy® springs.
 Standard Canted Coil Spring	CS	3,000 psi	-300° to 450°F	Reciprocating, dynamic applications below 450°F and rotary service < 300 SFPM. Friction critical applications, misaligned glands. Light, medium, heavy load 302/316 Stainless and Elgiloy springs.
 Standard Helical Spring	HS	3,000 psi	-360° to 600°F	Static rod/piston seals, internal/external face seals and low speed dynamic < 10 SFPM. 17-7PH Stainless & Elgiloy springs.
 Extended Heel Cantilever Spring	VS	10,000 psi	-300° to 600°F	High-pressure static/dynamic applications providing greater extrusion resistance at higher pressure and temperatures. CS and HS springs also available.
 Flanged Cantilever Spring	VS	4,000 psi	-300° to 450°F	Rotary service to 2,500 SFPM depending on temperature and pressure. Axially clamped OD flange (two-piece seal gland) prevents rotation with the shaft and creates a positive static seal surface.
 Flanged Canted Coil Spring	CS	3,000 psi	-300° to 450°F	Rotary service requiring low breakaway and dynamic torque. Speeds to 2,500 SFPM depending on temperature and pressure. Axially clamped OD flange (two-piece seal gland) prevents rotation with the shaft and creates a positive static seal surface.
 O-Ring Cantilever Spring	VS	1,000 psi	-65° to 400°F	Rotary service to 1,000 SFPM depending on temperature and pressure where canned FlexiSeals cannot be used. OD O-ring prevents seal rotation with shaft and creates positive static seal.
 O-Ring Canted Coil Spring	CS	1,000 psi	-65° to 400°F	Rotary service requiring low breakaway and dynamic torque. Speeds up to 1,000 SFPM depending on temperature and pressure where canned FlexiSeals cannot be used. OD O-ring prevents seal rotation with shaft and creates positive static seal.
 Internal/External Face Seals Helical Spring	HS	3,000	-360° to 600°F	Static or slow speed rotary applications requiring sealing between two faces. Standard designs available for both VS and CS series (not shown).

Actual temperature and pressure ratings may be different based on application parameters. Actual testing is the responsibility of the user prior to final profile selection and approval.

Rotary Lip FlexiCase™ and FlexiLip™

Seal Profile Type	Seal Series	Pressure Rating (psi) Operating	Spike	Seal Profile Type	Seal Series	Pressure Rating (psi) Operating	Spike
 FlexiCase. Double lip with excluder. Medium pressure	45	500 psi	1500 psi	 FlexiLip. Double lip with excluder	40	250 psi	1500 psi
 FlexiCase. Single lip with hydrodynamic pattern. Oil seal applications	55	75 psi	200 psi	 FlexiLip. Single lip with excluder	50	75 psi	200 psi
 FlexiCase. Single lip with garter spring. High runout applications	65	75 psi	200 psi	 FlexiLip. Single lip with garter spring. High runout applications	60	75 psi	200 psi
 FlexiCase. Double lip with excluder. Added backup used for elevated pressures	75	750 psi	2500 psi	 FlexiLip for aero-space application	Custom		
 FlexiCase. Single lip with internal FlexiSeal for harsh media compatibility (no rubber gasket)	Custom			 FlexiLip. Double lip design with O-ring, breather port separators	Custom		

Fluid Power Seals

	Seal Profile Type	Seal Series	Pressure Rating (psi)	Temperature Range	Application
	Rod Wipers	E	200 psi	-65° to 400 °F	For positive exclusion of external contaminants as a wiper alone or a wiper with secondary sealing capability to 200 psi. Speeds to 50 SFPM.
	Uni-directional Rod / Piston Buffer Seals	S	3,000 psi	-65° to 400 °F	Inch/metric seal design has a point contact foot print, which provides high unit loading for very low leakage rate. Speeds to 50 SFPM. Used in hydraulics cylinders as buffer seals.
	Bi-directional Rod / Piston Seals	G	3,000 psi	-65° to 400 °F	Inch/metric seal design offers low breakout / running friction and high wear resistance. Used in hydraulic cartridge/spool valves and actuators. Speeds to 50 SFPM.
	Bi-directional Rod / Piston Seals	D	3,000 psi	-65° to 400 °F	Seal design to retrofit standard inch fractional, metric or aerospace O-ring glands. Speeds to 50 SFPM.
	Bi-directional Rod / Piston Rotary Seals	R	3,000 psi	-65° to 400 °F	Inch/metric seal design that offers low breakout and running torque, high wear resistance. Also available in space-saving narrow gland widths. Speeds to 300 SFPM.
	Rod / Piston Wear Strip Wear Ring Bearings	W	3,000 psi	-65° to 450 °F	PTFE and composite bearings which can be cut to size by the factory or machined for your specific size. Bronze filled PTFE is typically used in lubricated, less demanding applications. PTFE impregnated, polyester fabric reinforced composite materials are used in more demanding applications. Carbon/graphite filled PTFE is typically used in pneumatic applications.

PTFE Seals for Automotive Systems

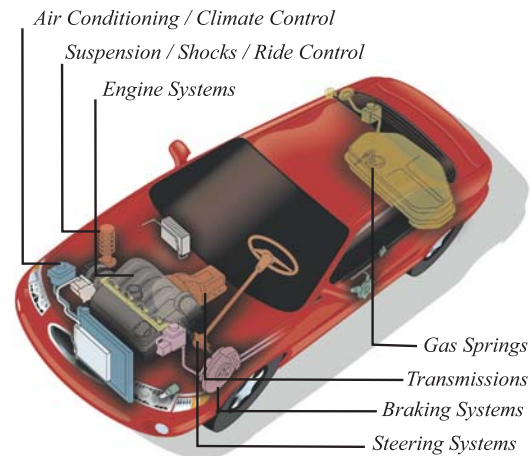
Parker EPS is a leader in the design and manufacture of Polon® PTFE ring seals for both rotating and reciprocating automotive applications. Since 1968, we have continued to lead the industry in the innovation of materials and seal designs for these increasingly demanding applications. Technological advancements in manufacturing and engineering expertise across many industries enable us to continue to introduce cutting-edge Polon® PTFE products and seal designs into the automotive marketplace. To compete in this growing marketplace, automotive component manufacturers need top-quality, competitively priced seals and sealing systems. Customers can always get quality products when and where they need them with manufacturing cells in the US, Mexico and Denmark. Worldwide availability also means that sound advice from Parker sealing experts is never far away.

Custom Shapes and Seals

Parker EPS is equipped to produce high volume, cost effective Polon® PTFE and thermoplastic components of consistent quality and repeatability as well as short run and prototype parts. Various manufacturing methods are available as dictated by your part configuration and quantity requirements. These manufacturing methods include compression billet molding, automatic molding, net shape molding and isostatic molding. Precision machining on multi-axis CNC lathes, hot and cold forming, slicing, and stamping

are some of the support processes available. We have over 30 years experience in the production of custom PTFE seals and components including:

- Ball valve seats
- Piston rings, piston cups
- Custom back-up rings
- Compressor seals
- Gaskets & washers
- Bearings & wear strips
- Insulators
- Grommets
- Bushings & spacers
- Special shapes



Materials

Parker EPS manufactures seals from over 200 PTFE blends and other thermoplastic material compounds with the support of our global supplier network. Additionally, we have in-house PTFE blending and compounding capabilities, allowing us to develop and test "next generation" compounds and produce proprietary blends unique to your application requirements.*

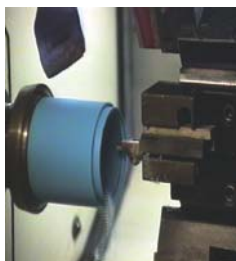
Material Description & Application	Temp. Range (F)	Wear Resistant 1= Low 10 - High	Chemical Compatibility A= Excellent B=Fair C=Limited	Hardware Dynamic Surface Hardness Min. (Rc)
Virgin PTFE. Best for static applications requiring positive sealing. Good in vacuum with low gas permeability. Low particulate generation. Excellent in cryogenics. Can be used in slow, infrequent dynamics. FDA / NSF compliant.	-450° to +425°	1	A	No Min.
Mineral / PTFE. Improved upper temperature and wear over virgin PTFE with very low abrasion to soft surfaces. Intended for light dynamic applications. Ingredients are FDA / NSF compliant and can pass many requirements.	-360° to +550°	4	A	25
Proprietary Carbon fiber / PTFE. Excellent all purpose material. Best for dynamic applications running on moderate to hard surfaces. High wear material with low abrasion.	-360° to +550°	8	A	45
Polymer / PTFE. A dynamic material for softer surfaces and a static material for high temperatures. Excellent wear resistance without abrasion. Not recommended in steam.	-360° to +600°	7	A	35
UHMWPE. Ultra-high molecular weight polyethylene. High wearing plastic for use in abrasive medias. Excellent in water based medias, but restricted chemical and heat resistance. Intended for reciprocating applications, or very slow rotary. FDA / NSF compliant.	-360° to +180°	10	B	30
Carbon / PPS / filled PTFE. Abrasion resistant high wearing material for use on very hard surfaces. Intended for severe service dynamic applications involving high PV values and/or high temperature. Not recommended for use in oxidizing agents or ethers above 200°F.	-360° to +550°	10	A	65
Thermoplastic Elastomer (TPE). Abrasion resistant polyester elastomer with high wear properties. Recommended for reciprocating, very slow rotary and static applications that require extremely low leakage. High pressure capabilities. Excellent in gases and hydraulic fluids.	-65° to +275°	9	C	30
Bronze / PTFE. General purpose material for use on ductile iron, chrome plated steel and hardened steel. For use in most fluids.	-360° to +550°	7	A	45
Pigmented Virgin PTFE. Low friction, medium duty material for use on stainless steel, chrome plated steel, and mild steel. For use in all fluids. Nearly chemically inert.	-450° to +425°	4	A	25
Carbon / Graphite filled PTFE. Wear resistant carbon filler, internally lubricated with graphite filler. Excellent general purpose material often used for rotary applications.	-360° to +550°	9	A	45
Glass / Moly filled PTFE. Excellent wear resistance, internally lubricated with MoS ₂ . Often used for high pressure extrusion resistance or high speed, high pressure rotary.	-360° to +550°	7	A	65

*Actual values may be different based on application parameters including, pressure, temperature and media. Actual testing is the responsibility of the user prior to final material selection and approval.

Capabilities

EPS Division is a recognized leader in PTFE sealing technology. We utilize state of the art systems to provide our customers with quality products and impeccable service, including:

- Design and application engineering
- Custom compound development
- CAD/CAM technology
- Precision machining
- Spring fabrication
- Metal spinning
- EDM capability
- Material test lab
- Functional test lab
- Statistical process control
- Lean manufacturing practices
- Wide range of molding capabilities -- isostatic, compression, automatic
- High volume, long run production capabilities



Precision machining

- Finite Element Analysis (FEA)
FEA is a computer aided simulation program that:
 - Accurately predicts and evaluates product performance in a variety of materials/media prior to manufacture.
 - Provides greater flexibility to explore cost/design options
 - Accelerates speed time to market



FEA plot of FlexiSeal™

- Quality Registrations
Parker EPS Chicago is registered to the following quality standards

- ISO 9001
- QS 9000
- AS 9000



Accredited by the RvA, Dutch Council for Accreditation

Design Action Request Form

Need Help? If you need assistance, please photocopy this page and the facing page. Fill out the required information, and fax it to Parker EPS Division at (847) 783-4301. Utilize the information below and other information in this brochure to determine the dimensions needed. We will contact you to discuss your specific application and make recommendations. If you need help filling out the form, please call EPS Division Applications Engineers at (847) 783-4300.

ENGINEERED POLYMER SYSTEMS DIVISION DESIGN ACTION REQUEST

CHICAGO OPERATIONS
2565 NORTHWEST PARKWAY
ELGIN, IL 60123
PHONE (847) 783-4300
FAX (847) 783-4301

SALT LAKE CITY OPERATIONS
2220 SOUTH 3600 WEST
SALT LAKE CITY, UTAH
PHONE (801) 972-3000
FAX (801) 972-4777

Project # _____
Date Entered _____
Date Required _____
Prepared by _____
Territory Mgr _____
Distributor/Location _____

Referred by _____
Lead # _____ Dist. Sales _____

COMPANY: _____ FAX NUMBER: _____
ADDRESS: _____ P.O. BOX: _____ MAILSTOP: _____
CITY: _____ STATE: _____ ZIP: _____
CONTACT: _____ TITLE: _____ PHONE: _____ EXT: _____
ALT. CONTACT: _____ TITLE: _____ PHONE: _____ EXT: _____
E-MAIL: _____

EQUIPMENT: _____ MODEL: _____
COMPONENTS: _____ PROBLEM: _____
EXISTING SEAL: _____ PROBLEM PARTS INCLUDED: YES NO
PRICE: \$ _____ @ _____ pcs USAGE / YEAR: _____ CUSTOMER P/N: _____
TARGET: \$ _____ @ _____ pcs QUOTE QTY: _____ PROTO QTY: _____
DATE PROTO' REQ'D: _____

PRODUCT TYPE

ROD / SHAFT INTERNAL FACE WIPER VANE
 PISTON EXTERNAL FACE BEARING NON-SEAL

SPECIAL INSPECTION REQUIREMENTS? YES NO

SPECIAL PACKAGING REQUIREMENTS? YES NO

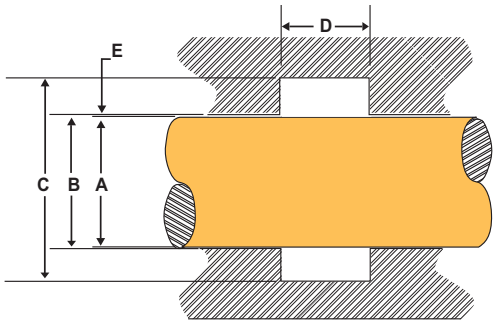
OPERATING PARAMETERS	UNIT (CIRCLE ONE)		MINIMUM	OPERATING	MAXIMUM	MOTION
	°K	°F °C				
TEMPERATURE:	°K	°F °C	_____	_____	_____	<input type="checkbox"/> STATIC
PRESSURE:	PSI	BAR MPA	_____	_____	_____	<input type="checkbox"/> RECIPROCATING
STROKE LENGTH:	INCH	MM	_____	_____	_____	<input type="checkbox"/> ROTARY
CYCLE RATE:	/MIN.	/HR. HZ	_____	_____	_____	<input type="checkbox"/> OSCILLATORY
ROTATION:	DEG.	RAD.	_____	_____	_____	
RPM:			_____	_____	_____	
VELOCITY:	FT/MIN.	MM/MIN.	_____	_____	_____	PRESSURE DIRECTION
VACUUM:	IN. HG	TORR	_____	_____	_____	<input type="checkbox"/> UNIDIRECTIONAL
			_____	_____	_____	<input type="checkbox"/> BI-DIRECTIONAL
DIRECTION OF ROTATION:	<input type="checkbox"/> CLOCKWISE	<input type="checkbox"/> COUNTER CLOCKWISE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

MEDIA TO BE SEALED: _____

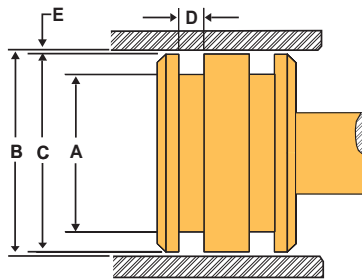
Design Action Request Form

Hardware (check one)

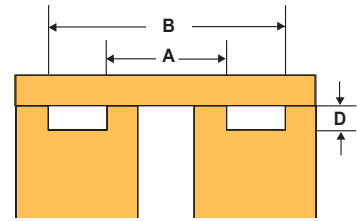
Rod



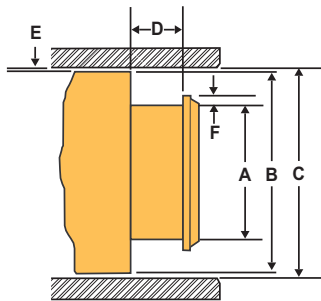
Piston



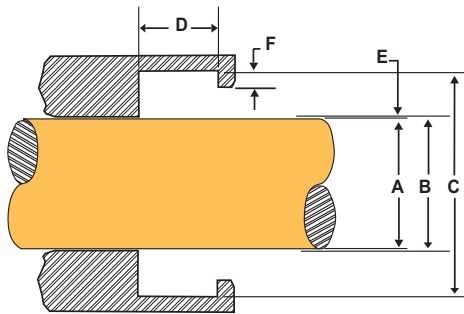
Face Seal



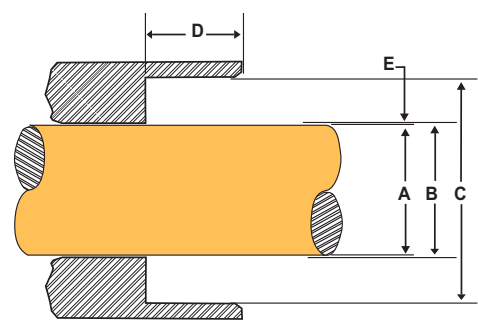
Other Piston



Other Rod



Rotary



HARDWARE SPECIFICATIONS

HARDWARE DRAWINGS INCLUDED WITH DAR YES NO

A DIAMETER	MIN. _____	MAX. _____	HARDNESS _____	FINISH _____	MAT'L _____
B DIAMETER	MIN. _____	MAX. _____	HARDNESS _____	FINISH _____	MAT'L _____
C DIAMETER	MIN. _____	MAX. _____	HARDNESS _____	FINISH _____	MAT'L _____
D GROOVE WIDTH	MIN. _____	MAX. _____	CAN HARDWARE BE CHANGED? <input type="checkbox"/> YES <input type="checkbox"/> NO		
E RADIAL CLEARANCE	MIN. _____	MAX. _____	HOW? _____		
F ROD / PISTON STEP HEIGHT:	MIN. _____	MAX. _____			
RUN OUT (TIR):	MIN. _____	MAX. _____			
ECCENTRICITY:	MIN. _____	MAX. _____			

PERFORMANCE REQUIREMENTS

(CIRCLE ONE)

FRICITION:	LBS	OZ	GMS	BREAKOUT	DYNAMIC
TORQUE:	FT/LB	IN/OZ	GM/CM	BREAKOUT	DYNAMIC
EXPECTED LIFE:	CYC	HRS	YRS		
MAX. LEAKAGE:	DROPS	CC/MIN			
MOST CRITICAL ASPECT:	_____				
CONTAMINATION:	_____				

GLAND TYPE

SPLIT OPEN
 SOLID STEPPED

METRIC

YES
 NO

NOTES:

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Elgin, IL 60123
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Denmark
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*Around the corner or around the
globe, Parker EPS is there with
solutions to tough sealing problems.*



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