aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Sealing Solutions for Aerospace

Parker Prädifa

ENGINEERING YOUR SUCCESS.

Sealing Solutions for Aerospace

The equipment that moves today's industry is more reliable and highly-engineered than ever before. That's why Parker develops and manufactures engineered sealing solutions – technologically advanced sealing devices and materials that can keep pace with aggressive chemicals, high temperatures and high and low pressures.

Our sealing products have our unique combination of experience and innovation built right in, and we're able to supply them quickly and cost effectively to fit virtually any application you can think of.

Sealing Environment

- **Aggressive chemicals, including hydraulic fluids, jet fuels, engine lubricants, and solvents/degreasers**
- **Elastomer temperatures to 320 °C (608 °F)**
- **Metal seal temperatures to 1,093 °C (2,000 °F)**
- **High and low pressures ranging from 20,000 psi to vacuum**
- **High frequency oscillations**
- **Dynamic, static and rotary applications**
- **Thrust, propulsion and g-forces**
- **Weightlessness**
- **The continual threat of fire and explosion**

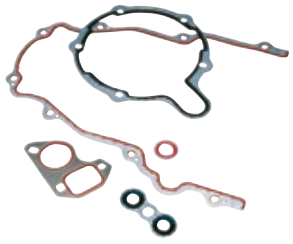
Market Environment

- **Super-smart computers ushering in new age of manned and unmanned flight**
- **Supersized jumbo commercial jets will trade speed for size**
- **On board computers will obsolete radar and spur a system integrating airlines, pilots and ground control**
- **New generations of jet engines will power continuous flight in excess of 18 hours**
- **Continued development of advanced composites for weight reduction and improved fuel economy**
- **Higher demands on safety, comfort and service life**
- **Outsourcing partnerships, collaborative networks key to structured cost cutting**
- **Continued push for flexible, lean manufacturing**
- **Intensifying globalization of customers, manufacturing and supply**

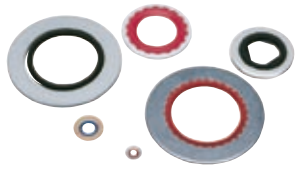
Around the corner or around the globe, Parker is there with engineered solutions to tough sealing problems.

Aerospace Product Overview

Gask-O-Seals
Gask-O-Seals are very reliable elastomer bonded-to-metal or plastic sealing devices intended for applications requiring extreme reliability, longevity and durability. The elastomer is molded directly in place within the groove or grooves of a metal or plastic retainer.



Integral Seals
The integral seal design bonds the elastomer sealing element to thin metal or engineered plastic retainer plates, allowing for a very complex sealing geometry, ease of assembly and reliable service in a single seal element.



Fastener & Fitting Seals
Fastener and fitting seals provide reliable static sealing for screws, bolts, tube fitting and other fasteners. Available designs are Stat-O-Seals for sealing under the heads of bolts, ThredSeals for sealing around the tread roots of any threaded fastener and Lock-O-Seals for sealing tube fitting bosses.

PTFE FlexiSeals
Our full line of spring energized PTFE lip seals are used on rod, piston, face and rotary sealing applications. FlexiSeals are typically used in areas where elastomeric seals cannot meet the frictional, temperature, or chemical resistance requirements of the application.

Dynamic Metal Seals
Parker's dynamic metals seals offer a design option for critical low duty-cycle, all metal sealing in mission critical applications. Frequently selected for high pressure/high-temperature (HPHT) service, these seals excel under extreme environments.

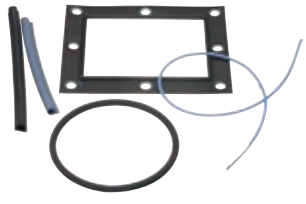
Ultra-High-Temperature Metallic Seals
In the never-ending search for higher efficiency and reduced emissions, jet engines and gas turbines are now running hotter than ever. Parker's resilient turbine seals offer robust ultra-high-temperature sealing solutions for compressor, combustion chamber and power turbine stages.

Metal Seals and Gaskets
Parker provides metal seals in a wide range of base metals and plating finishes, available as metal jacketed gaskets, corrugated gaskets and flat gaskets in a wide range of sizes and shapes. Metal seals are ideal for high-temperature, high-vacuum, broad chemical resistance and low extractable applications.

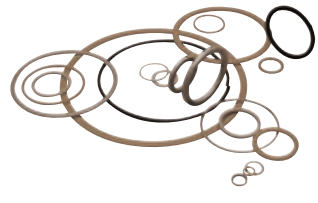
PTFE FlexiLip and FlexiCase Rotary Seals
FlexiLip high-speed PTFE lip seals are designed for rotary applications. The filled PTFE sealing element, available in single, dual and triple sealing lip designs, provides chemical compatibility, a wide temperature range and high speed capability.

O-Rings
O-rings are available in all AS568 inch sizes and a wide range of metric sizes (DIN 3771, ISO 3601 and JIS B2401) as well as custom sizes. O-rings can be molded in a wide range of elastomer compounds ranging from basic nitrile to perfluorinated materials called Parofluor ULTRA.

Custom Molded or Machined Shapes
Custom molded or machined seals are available in a virtually infinite range of shapes and cross sections. Parker designs and manufactures engineered elastomeric shapes, both homogeneous and inserted, for sealing systems and isolation applications.



ParFab™ Extruded Profiles / Spliced Products
Parker offers a wide variety of standard extruded profiles in many configurations. ParFab parts can be fabricated into low closure force seals, large diameter O-rings, non-standard O-rings and custom profiles.



Backup Rings
Parker backup rings offer simple solutions to safely increase system pressure or solve an existing seal extrusion problem. Standard profiles are available in a variety of materials to complement virtually any Parker rod or piston profile.

Aerospace Seal Compounds

O-Rings	Molded Shapes	Extruded Seals	FlexiLip / FlexiSeal	Backup Rings	Composite Seals	Metal Seals	Material	Material Specification	Temperature Range (°C)	Temperature Range (°F)	Hardness (Shore A)	Comments
Acrylonitrile-Butadiene (Nitrile, Buna-N) – NBR												
X					X		N406-60	MIL-R-6855 Class 1 Grade 60	-40 / +107	-40 / +225	60	
X					X		NM506-65	AMS 7271	-57 / +82	-70 / +180	65	AS3578 part numbers
X	X(1)				X		N0602-70	AMS-P-5315	-57 / +82	-70 / +180	70	MS29512 & MS29513 part numbers
X					X		47-071	AMS-R-7362	-51 / +82	-60 / +180	70	MS29561 & NAS617 part numbers
X							N0287-70	AMS 7272	-37 / +121	-35 / +250	70	AS3551 part numbers
X		X			X		N0674-70	MIL-G-21569 Class 1	-34 / +121	-30 / +250	70	General purpose applications
X		X(2)			X		N0304-75	MIL-P-25732	-54 / +121	-65 / +250	75	MS28775 part numbers
X	X(1)	X(2)			X		N0756-75	AMS-R-83461	-54 / +135	-65 / +275	75	M83461 part numbers
X		X(2)					N0507-90	MIL-P-5510	-54 / +82	-65 / +180	90	MS28778 part numbers
Ethylene Propylene Rubber – EPDM, EPM, EP, EPR												
X		X			X		E0515-80	NAS 1613 Rev 2, MIL-P-82744 (inactive)	-57 / +121	-70 / +250	80	NAS1611-xxx & NAS1612-xx part numbers
X					X		E1267-80	NAS 1613 Rev 5	-57 / +121	-70 / +250	80	NAS1611-xxxA & NAS1612-xxA part numbers
X	X	X					E0962-90	None	-51 / +121	-60 / +250	90	Suitable for steam up to 260 °C
Chloroprene Rubber (Neoprene) – CR												
		X					CB251-50	MIL-R-3065 SC410	-40 / +121	-40 / +250	50	
		X					C7025-80	MIL-R-6855 Class 2, Grade 80	-40 / +121	-40 / +250	80	
Butyl Rubber (Butyl) – IIR												
X					X		B0318-70	AMS 3238	-59 / +121	-75 / +250	70	Low gas permeation
X	X				X		B0612-70	None	-59 / +121	-75 / +250	70	Low compression set, low water vapor permeation
Fluorosilicone – FVMQ												
X	X						LM158-60	MIL-DTL-25988 Type 1 & Type 2, Class 1 Grade 60, AMS 3325	-73 / +177	-100 / +350	60	M25988/3 part numbers
		X					L7230-60	MIL-DTL-25988 Type 2 Class 1 Grade 60	-73 / +177	-100 / +350	60	
		X					LM571-60	MIL-DTL-25988 Type 2 Class 1 Grade 60	-73 / +177	-100 / +350	60	
					X		L1830-60	MIL-DTL-25988 Type 1 & Type 2, Class 1 Grade 60	-73 / +177	-100 / +350	60	
					X		1287	MIL-DTL-83528 Type D	-55 / +160	-67 / +320	70	Conductive for EMI shielding
X	X						LM159-70	MIL-DTL-25998 Type 1 & Type 2, Class 1 Grade 70	-73 / +177	-100 / +350	70	M25988/1 part numbers
		X					L7232-70	MIL-DTL-25988 Type 2 Class 1 Grade 70	-73 / +177	-100 / +350	70	
		X					L7891-70	MIL-DTL-25988 Type 2 Class 1 Grade 70	-73 / +177	-100 / +350	70	
		X					LM252-70	MIL-DTL-25988 Type 2 Class 1 Grade 70	-73 / +177	-100 / +350	70	
X							L1077-75	MIL-DTL-25988 Type 1 Class 3 Grade 75	-73 / +177	-100 / +350	75	M25988/2 part numbers
X	X						LM160-80	MIL-DTL-25988 Type 1 & Type 2, Class 1 Grade 80	-68 / +177	-90 / +350	80	M25988/4 part numbers
X							L1186-80	None	-68 / +177	-90 / +350	80	PTFE modified for improved tear strength
		X					L7235-80	MIL-DTL-25988 Type 2 Class 1 Grade 80	-73 / +177	-100 / +350	80	
Silicone – VMQ, PVMQ												
		X					S7469-50	AMS 3302	-51 / +204	-60 / +400	50	
		X					S7435-50	A-A-59588, Class 1a, 1b, Grade 50	-51 / +204	-60 / +400	50	
		X					S7429-60	AMS 3303J	-51 / +204	-60 / +400	60	
X					X		S0383-70	AMS 3337, A-A-59588 Class 1a, Grade70	-115 / +204	-175 / +400	70	Extreme low temperature silicone
X	X				X		S0455-70	None	-54 / +260	-65 / +500	70	Extreme high temperature silicone
X	X				X		S0604-70	AMS 3304, AMS 3357, MIL-G-21569 Class 2, A-A-59588 Class 2a, 2b, Grade 70	-54 / +232	-65 / +450	70	AS3582 part numbers
X					X		S1224-70	AMS 3304, AMS 3357, MIL-G-21569 Class 2, A-A-59588 Class 2a, 2b, Grade 70	-54 / +232	-65 / +450	70	AS3582 part numbers
		X					S7416-70	AMS 3304 Rev. G	-51 / +204	-60 / +400	70	
X					X		S0355-75	AMS 7267	-51 / +232	-60 / +450	75	MS9385 & MS9386 part numbers
Fluorocarbon – FKM, FPM												
X	X	X			X		VM835-75	AMS-R-83485	-40 / +204	-40 / +400	75	M83485 part numbers
X	X(1)	X(2)			X		V1164-75	AMS 7276, AMS 3216	-26 / +204	-15 / +400	75	AS3208 & AS3209 part numbers
X							V1226-75	AMS 7276	-26 / +204	-15 / +400	75	AS3208 & AS3209 part numbers – dark brown color
X	X				X		V1289-75	AMS spec in draft	-46 / +204	-50 / +400	75	-40 Tg Fluorocarbon
X		X					V0747-75	MIL-R-83248 Type 1 Class 1	-26 / +204	-15 / +400	75	M83248/1 part numbers
		X					V7895-75	MIL-R-83248C Type 2 Class 1	-26 / +204	-15 / +400	75	
					X		V720-75	AMS 7276	-26 / +204	-15 / +400	75	
X	X(1)	X(2)		X			V0709-90	AMS 7259, MIL-R-83248 Type 1 Class 2	-26 / +204	-15 / +400	90	AS3581 or M83248/2 part numbers
Perfluoroelastomer – FFKM, FFPM												
X	X						FF200-75	AMS 7257	-15 / +320	+5 / +608	75	Extreme low compression set, low stress relaxation
Polytetrafluoroethylene – PTFE												
			X				0301		-129 / +288	-200 / +550	58(3)	Graphite filled PTFE
			X				0603		-129 / +288	-200 / +550	58(3)	Aromatic polyester filled PTFE
			X				0502		-129 / +288	-200 / +550	60(3)	Carbon fiber filled PTFE
			X				0204		-157 / +302	-250 / +575	60(3)	Fiberglass and MoS2 filled PTFE
			X				0307		-129 / +302	-200 / +575	62(3)	Carbon-graphite filled PTFE
			X				0602		-129 / +302	-200 / +575	62(3)	Carbon and PPS filled PTFE
UltraCOMP™ Series of Engineered Thermoplastic Compounds – PEEK												
			X	X			UltraCOMP CGT		-54 / +260	-65 / +500	85(4)	Carbon/graphite/PTFE filled
			X	X			UltraCOMP HTP		-54 / +249	-65 / +480	100(4)	UltraCOMP
			X	X			UltraCOMP CF		-54 / +260	-65 / +500	104(4)	Carbon fiber filled
Metal												
						X	304 Stainl. Steel	AMS 5511	+427 max	+800 max	N/A	Specification shown is for material in “strip” form
						X	Alloy 718	AMS 5596	+649 max	+1,200 max	N/A	Specification shown is for material in “strip” form
						X	Waspaloy	AMS 5544	+871 max	+1,600 max	N/A	Specification shown is for material in “strip” form
						X	Haynes 25	AMS 5537	+1,093 max	+2,000 max	N/A	Specification shown is for material in “strip” form

(1) Pending QPL approval
(2) Extruded seals made from this compound meet the requirements of, but are not QPL listed
(3) Hardness Shore D per ASTM D2240
(4) Hardness Rockwell M per ASTM D785

Note: Composite seals include Gask-O-Seals, Integral Seals, Fastener and Fitting Seals

Additional materials are available for unique applications.

Product Innovation

Today's sealing challenges demand innovative solutions, and nobody knows innovation better than Parker. Drawing from over six decades of engineering, material formulation and manufacturing experience, we continually develop new products and material formulations for your evolving sealing needs.

Application Engineering

Our team of application engineers can help you find the most reliable, cost-effective sealing solution for your application. These engineers are experts, combining decades of experience in real-world sealing with a full complement of technology-driven design tools.

Advanced Computer Simulation

Utilizing advanced non-linear Finite Element Analysis (FEA) software our engineers can perform extremely accurate virtual simulations of performance based on actual physical test data. These simulations eliminate the need for multiple iterations of costly prototype tooling, and dramatically reduce development lead times. They also ensure first-time selection of the best material and geometry for your application.

Quality Initiatives

Quality isn't just a buzzword at Parker. It's a culture, based on employee empowerment and continuous improvement. Our manufacturing facilities are registered to ISO 9001, AS 9100, AS 7115, ISO 14001, and we're constantly striving to improve customer satisfaction and product quality through the implementation of:

- **Six Sigma methodology**
- **Lean manufacturing**
- **TQM methodology**
- **Feasibility studies**
- **Kaizen events**

Worldwide — Where You Need Us

Around the corner or around the globe, Parker is there with engineered solutions to tough sealing problems. Your local Parker aerospace/military market specialist provides a single point of contact for local sealing support. And our worldwide headquarters is the hub of an established worldwide network of over 300 distributor and service center locations. This network – and the global sales and engineering support it provides – means you can always get quality products when and where you need them. It also means that sound advice from a Parker sealing expert is never far away.

SGE 08 EN · 07/2015

Parker Hannifin GmbH
Engineered Materials Group Europe
Arnold-Jäger-Str. 1
74321 Bietigheim-Bissingen · Germany
Tel.: +49 (0) 7142 351-0
Fax: +49 (0) 7142 351-432
E-mail: seal-europe@parker.com
www.parker.com/praedifa