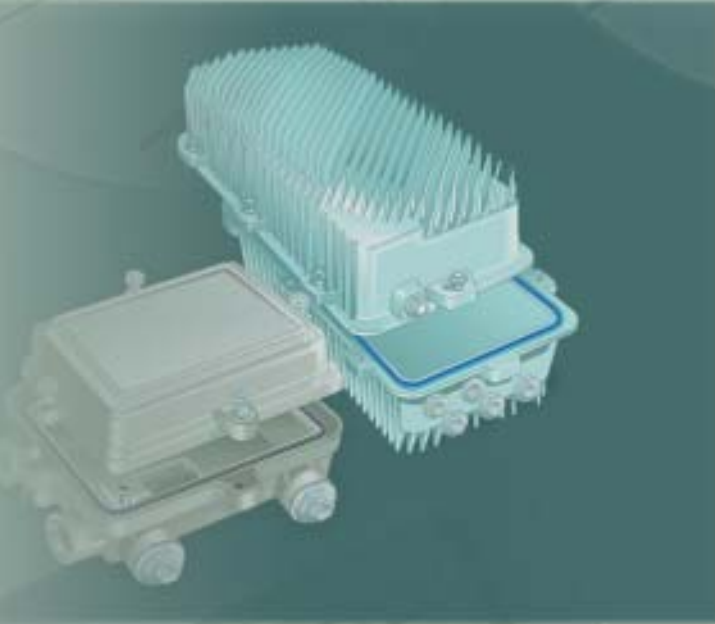




Sealing Solutions for Communications Equipment

Catalog TSD 5425-USA



*ISO 9001 / QS 9000
Certified*

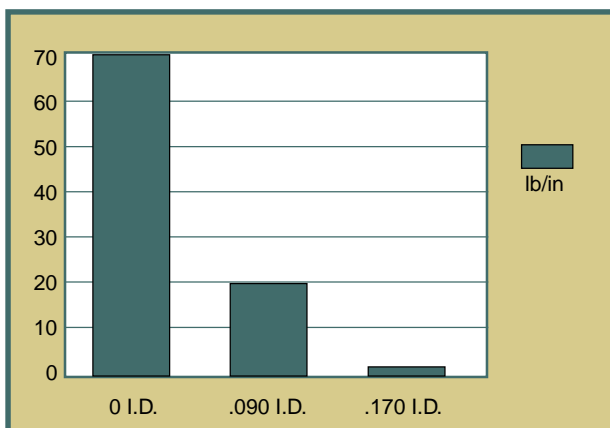


Communications sealing applications present many unique challenges. Environmental sealing is not as simple as just keeping water out of an enclosure. Due to varying environmental conditions, chemical reactions between the environment and the enclosure must also be considered. Harsh environmental conditions such as corrosive coastal air or flooding make sealing sensitive electronic components of prime importance. The long life expectancy of equipment also mandates that premium sealing grade elastomers be used.

Mechanical Design

Seals are often required to compensate for large manufacturing variances in the dimensions and flatness of enclosures. Dense (non-foam) hollow extrusions perform well in these situations because of their ability to accommodate larger cross sectional squeeze percentages without incurring large reaction forces or overfilling the gland. Depending on the configuration of the seal and sealing surfaces, a hollow seal can function when being squeezed to 50% of its original height. The chart below shows the dramatic effect wall thickness has on closure force.

Required Closure Force for Varying Inner Diameters



0.250" (6.35mm) OD, 70 durometer Silicone, 30% Squeeze



TechSeal's hollow extrusions provide an ideal sealing solution for communications enclosures and equipment.

The low closure force properties of a hollow spliced seal allow it to be used in areas where a solid dense seal cannot perform. Enclosures manufactured from plastic or thin metal tend to warp or crack when subjected to large seal loads. Fasteners and hinges used to hold the enclosure shut may also be excessively stressed by seal closure loads. Die cast enclosures can have large tolerance stack-ups or porosity in the groove which is often difficult to seal. A hollow spliced ring in these applications will solve most tolerance stack-up and porosity problems because of its ability to be compressed more than solid cross-sections and better conform to imperfections of the groove.

Friction Fit

Another key advantage of dense hollow spliced seals is that they can be designed to self retain or "friction fit" in a seal gland. The void of dense material created by the hollow core allows the outer diameter of the seal to be larger than the width of the seal gland without overfill. An example of a friction fit is illustrated on the Finite Element Analysis (FEA) plot to the right. Figure A illustrates a hollow cross-section in its uncompressed state while retained within the gland. Figure B simulates the seal in a fully compressed state.

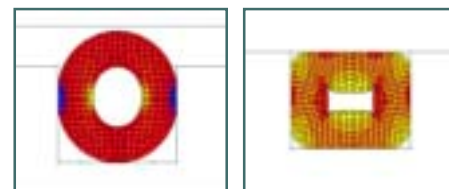


Figure A

Figure B

Special Considerations: Often communications equipment must be sealed from environmental conditions and shielded against electromagnetic interference. In such cases Parker can provide a "dual seal" solution, with TechSeal's hot vulcanized spliced gasket as the outer environmental seal and a Parker Chomerics Division seal inboard to provide the required level of shielding. The dual seal approach is becoming more common as electronic enclosures are placed in more severe environments. For information on Parker's line of EMI shielding products, contact the Chomerics Division at (781) 939-4850.

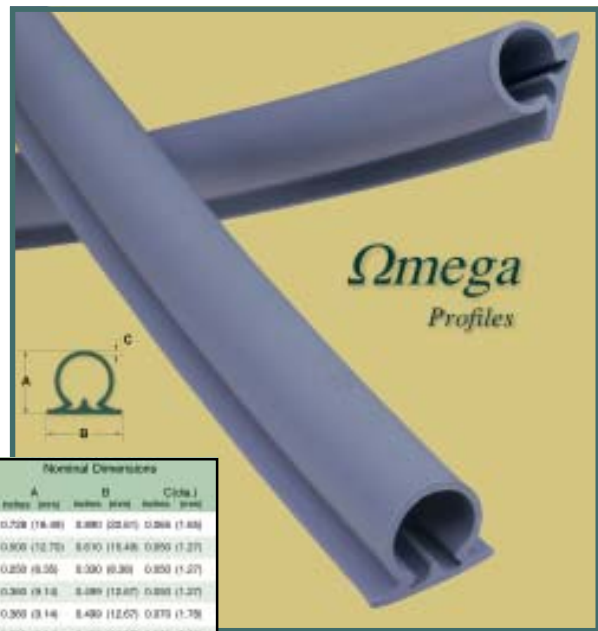
Sealing Solutions for Communications Equipment

The flexibility of TechSeal's extrusion process allows for the manufacture of an almost infinite number of custom profiles to solve unique applications. TechSeal's Omega profile (shown at right) has proven to be an excellent solution for flat panel sealing (non-grooved applications). The unique shape allows for ultra low closure forces and optimum adhesion with Pressure Sensitive Adhesive (PSA). Tooling is already available for the many Omega profiles. Other Omega shapes can be manufactured with minimal tooling charges.

Extruded and Spliced Products

TechSeal's extruded and spliced products utilize a hot vulcanization process to produce spliced rings and custom gaskets from either standard or custom cross-sectional profiles in a variety of compounds.

Hollow Spliced O-rings and profiles: TechSeal's hollow spliced rings and profiles offer a low closure force alternative to solid O-rings, and are available in hollow cross-sections starting from 0.040" (1.02mm) to 1.00" (25.40mm) with O-ring inside diameters from 1.500" (38.1mm) depending on cross-section. Hollow spliced rings are used in applications such as lids and doors that require the seal to stay in the groove (friction fit), while not overfilling the gland or warping and bending the enclosure lid or door.



Solid Spliced O-rings and profiles: TechSeal's solid spliced rings and profiles offer a low cost alternative to large diameter profiles that cannot be molded or non-standard solid O-rings and other extruded profiles. Solid spliced rings and profiles are available with inside diameters starting at 1.500" (38.1mm), depending on cross-section, in cross-sections from 0.28" (0.7mm) up to 1.00" (25.40mm).

Pressure Sensitive Adhesive: Most TechSeal standard and custom profiles with a flat surface greater than 0.125" (3.18mm) are available with pressure sensitive adhesive to allow for installation on flat panels without the need for a groove.

For additional information on TechSeal spliced products ask for "TechSeal Design Guide for ParFab Products" catalog 5420B-USA.

Finite Element Analysis: Finite Element Analysis (FEA) has been widely used to solve problems in heat transfer, fluids and stress analysis. Over the last several years, nonlinear FEA has been used by Parker to aid in seal design. When used as a design tool, FEA can significantly reduce the time and cost it takes to transform a concept to a functioning physical component. FEA can provide the designer with valuable characteristics such as the deformed shape of the seal, resulting load or closure force, gland fill, and the stress distribution.

Materials

Silicones: Silicone polymers are the materials of choice for environmental applications. Resistance to flammability, ozone, heat age, tensile, elongation and compression set make silicone capable of sealing over the long functional lives of communications equipment. TechSeal's sealing grade formulations (99% pure polymer) allow for maximum long life performance when compared with highly filled formulations or sponge.

Other Materials: Parker manufactures other materials for environmental sealing including EPDM, Nitrile, Butyl, Fluorosilicone, Fluorocarbon and Neoprene. Please contact TechSeal's Application Engineering Department for more details.

UL Listed Materials:

UL 94 V-0 is defined as the vertical burn rate in millimeters per minute with a defined thickness. **HB** is defined as the linear burn rate in millimeters per minute. TechSeal offers four different UL 94 approved flame-retardant materials. TechSeal's highest performing material, S7395-60, is UL 94 V-0 approved at a thickness of 0.031" (.79mm) and greater, and UL 94 HB approved at a thickness of 0.011" (.27mm) and greater.

UL 50 Gaskets are subject to temperature, tensile and elongation with no visible deterioration of the material. TechSeal's S7395-60 material meets this specification.

UL 157 Materials must meet UL requirements for tensile, durometer, elongation on original and after heat aging 168 hours @ 100°C (212°F) while retaining 60% of the original physical properties. The material is also exposed to 100 mPa ozone 70hrs @ 40°C +/-1 (104°F +/-3.6) without signs of visual cracking. TechSeal's S7395-60, S7426-60 and S7442-40 materials meet this specification.

UL 497 Materials must meet UL requirements for tensile, elongation, heat age, and ozone resistance of 100 mPa ozone 70hrs @ 40°C +/-1 (104°F +/-3.6) without signs of visual cracking. TechSeal's S7426-60 material meets this specification.

Compound	Polymer	Color	UL 94V-0	UL 94HB	UL 157	UL 497	UL 50
S7395-60	Silicone	Grey	> 0.031 thk	> 0.011 thk	Yes		Yes
S7416-70	Silicone	Rust		> 0.058 thk			
S7310-70	Silicone	Green		> 0.058 thk			
S7426-60	Silicone	Rust			Yes	Yes	
S7442-40	Silicone	Rust					

This table outlines TechSeal's UL approvals. In addition to UL approved materials, we have a vast compound offering of various colors and hardness.



Ozone Resistance: TechSeal's S7395-60, S7426-60 and S7442-40 materials have been tested to show resistance to ozone in accordance with the UL 157/UL 497 specification. To meet these requirements, the materials are subjected to testing which exposes them to 100 mPa ozone 70hrs @ 40°C +/-1 (104°F +/-3.6) without signs of visual cracking.

Fungus Resistance: TechSeal offers three compounds that have been tested in accordance with ASTM G 21-96, "Resistance of Synthetic Polymeric Materials to Fungi." On the TechSeal compounds SJ584-60 and S7426-60 no growth was observed on any of the tested specimens, while S7395-60 had traces of growth.

Compound	Polymer	Color	ASTM Rating	Observed Growth
SJ584-60	Silicone	Grey	0	No Growth
S7426-60	Silicone	Rust	0	No Growth
S7395-60	Silicone	Grey	1	Traces of Growth (less than 10%)

Chemical Resistance: Environmental seals may be exposed to a variety of chemicals and temperatures while sealing outdoor enclosures and boxes. Chemical resistance varies by polymer family. Please contact TechSeal's Application Engineering Department for specific information.

Features Advantages Benefits

- Superior hot vulcanization technology
- Interference fit designs
- Hollow cross-sections good replacements for foam or sponge (better compression set resistance)
- Low cost option for non-standard static face or radial seal O-Rings
- Pressure sensitive adhesive available
- Durometers from 40 Shore A to 50 Shore D
- Sealing grade materials for long term sealing solutions
- Standard ID/OD parts with no tooling costs
- Application engineering assistance
- Finite Element Analysis (FEA) assisted design
- Parts fabricated without any flash or parting lines
- Outside diameters from .030" to 19.000"
- Maximum sealing surface contact area can be obtained due to flat smooth surfaces with no "hourglassing" on the sides
- Precision tolerances
- ISO 9001 and QS-9000 compliant

Extruded & Precision Cut

These parts have been manufactured for a large variety of high volume applications for over 35 years. Our unique process for producing precision extruded and cut static seals provides customers tremendous latitude in design flexibility, and eliminates tooling charges for any ID/OD combination from .030" to 19.000" outside diameters. TechSeal uses only "sealing grade" material formulations with the highest possible percentage of polymer for the most effective long-term sealing solutions.



Extruded and cut products are usually supplied as ID/OD tubing type cross-sections, but can also be supplied in a variety of different cross-sections such as square, rectangular and triangular. Custom cross-sections are also available.

ParFab™ Extruded Profiles



These profiles are typically used for fabrication into spliced rings, 4-corner spliced picture frame gaskets or custom parts cut to specific lengths. They can be supplied in bulk footage with or without pressure sensitive adhesive (PSA). TechSeal offers a wide variety of standard extruded profiles in many configurations, such as: solid & hollow-O, solid & hollow-D, U-channel, rectangular, solid & hollow square and hollow-dart configurations.

ParFab™ Spliced/Fabricated Parts

These parts are manufactured utilizing a hot vulcanization process to produce spliced rings and custom gaskets from either "standard" or "custom" cross-sectional profiles. They offer an ideal, cost-effective sealing solution for many applications. ParFab parts can be fabricated into low-closure force seals, large diameter profiles that cannot be molded, or hollow o-rings, non-standard solid o-rings, and other extruded profiles with spliced inside diameters larger than 1.500."



For additional information about Parker's sealing products for communication applications, contact the TechSeal Division at (864) 573-7332.

TOTAL inPHorm

Take the guesswork out of seal design and material selection – ask for a copy of Parker's **Total inPHorm™** seal design and material selection software. Total inPHorm boasts many enhanced features, including an expanded media compatibility section and custom sizing capabilities that allow the user to design application-specific glands and seals. The software automatically cross-references thousands of part numbers, and recommends materials based on the requirements of SAE, MIL and many other standards. With a few mouse clicks, Total inPHorm takes the seal designer from concept to completion. In addition to the popular static face sealing package, Total inPHorm contains four other standalone packages for hydraulic and pneumatic sealing applications, o-rings, standard composite sealing products and EMI shielding and thermal management products. For more information, or to order a free copy of Total inPHorm, call



1-800-C-PARKER.



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