

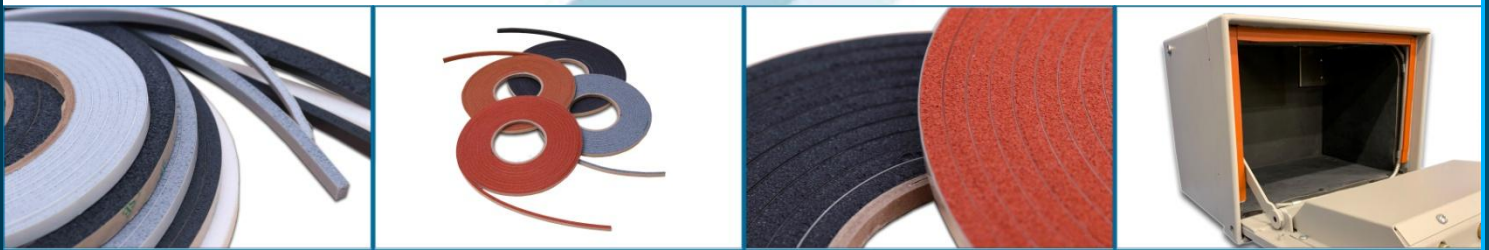


STOCKWELL ELASTOMERICS

MANUFACTURING SOLUTIONS THROUGH ENGINEERED MATERIALS

White Paper

Gasket Tape – Silicone Sponge and Silicone Foam for Long Term Sealing Performance



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Executive Summary

Electrical equipment deployed in a range of environments often needs long-term protection that requires a sealing solution to last for years. Some housing designs may be effectively protected by an adhesive backed roll or strip of cellular gasket material. However, many of the commercially available gasket materials may fail to seal after aging in challenging environmental conditions. The types of sealing applications served by gasket tape include outdoor LED lighting fixtures, kiosks for charging stations, airflow management and ventilation systems, outdoor enclosures for telecommunications and many other ruggedized portable devices.



Gasket Tape for Enclosure

This brief on **Gasket Tape – Silicone Sponge and Silicone Foam for Long Term Sealing Performance** discusses options within the silicone product family that will last and perform for the entire anticipated life of the electrical equipment including those installed in outdoor conditions in the harshest environments.

More details can be found on the [Gasket Tape page](#) of the Stockwell Elastomerics' website. A convenient [request form](#) can be used to ask for a complimentary touch brochure with tactile samples and small sample rolls.

What is Gasket Tape?

Gasket tape is Stockwell Elastomerics' family of silicone sponge and sponge gasket materials provided with pressure sensitive adhesive backings – and slit to a specified width for easy to install gaskets. Gasket tape is typically installed on enclosures to protect against air, dust and weather intrusion. Standard thicknesses ranging from .032" to .500" and silicone foam and sponge types are pre-manufactured with adhesive backings – and ready for fast turn slitting to width.



Assorted Gasket Tapes

Why Use Silicone Rubber for Gasket Tape?

[Silicone rubber](#) has the combined properties of resilience, high temperature stability, and general inertness, unavailable in any other elastomer. Silicones are generally unaffected by extended



exposure to outdoor temperature extremes, and are resistant to aging and degradation from sunlight and ozone.

Long Term Compression Set Resistance of Silicone Foam and Silicone Sponge

Properly designed silicone foam and silicone sponge gasket tape can effectively seal out wind driven rain and dust – helping the designer meet NEMA enclosure and IP specifications. Unlike most organic elastomers such as EPDM and neoprene, silicone maintains its resiliency over a broad temperature range and resists taking a permanent compression set.

Flame Retardant Properties of Silicone Rubber

Silicone foam and several closed cell silicone sponge products are formulated to be flame retardant to the UL 94V-0, UL 94HF1 and UL 94HB certifications

Should Silicone Foam or Closed Cell Silicone Sponge Gasket Tape Be Specified?

Generally, if the need for moisture, fluid and weather sealing exceeds flame rating requirements, closed cell silicone sponge is suggested. If meeting UL 94V-0 flame rating is more critical, then a silicone foam is recommended. Here are some product characteristics to differentiate these two product families.

Silicone Foam Products

Silicone foam products are manufactured from platinum-cured liquid silicone rubber. The raw compound is expanded and dispensed on a continuous casting line and heat cured in an oven. The expansion process is controlled to create a range of products having different densities, softness/firmness and cell structures. Silicone foam materials typically have a smooth skin on one or both sides due to the casting process. Low density open cell silicone foams are widely used for cushioning, dust sealing or light water sealing. Higher density closed cell silicone foams can be used for outdoor enclosure gaskets and wash-down gaskets when the proper deflection is designed in. Expanded silicone foam products have a firmness range from "Ultra Soft" to "Extra Firm", allowing engineers to select the best product for their application.

Key Benefits of Silicone Foam

- **Wide operating temperature** – silicone foam has a temperature range of -67°F to 392°F (-55°C to 200°C).
- **Water sealing** – the closed cell products offer good water sealing with relatively low compressive forces.
- **Dust sealing** – open cell and closed cell products can be used for sealing out dust with low compressive forces.



- **Compression set resistance** – silicone foam offers excellent compression set resistance (ability to rebound to original thickness).
- **UV and ozone resistance** – silicone products have excellent UV and ozone resistance due in part to their inorganic backbone. This provides long term performance.
- **UL gasketing** – most silicone foam products carried by Stockwell Elastomerics are UL 94 flame rated and UL 50 and UL 50E rated for gasketing

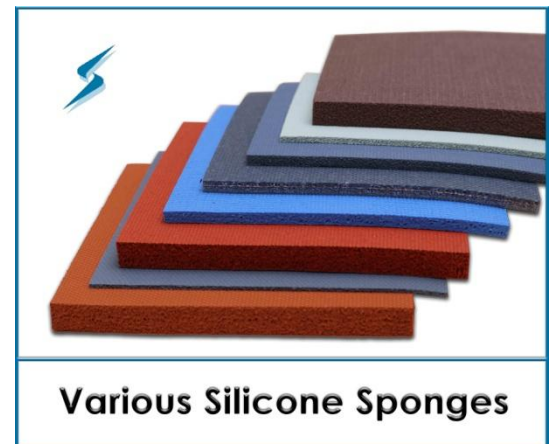
Table 1 - Silicone Foams Commonly Used in Gasket Tape

Product	Grade	Force Deflection*	Compression Set**	Standard Color(s)	Thickness Range	Comments and Features
BF2000	Ultra Soft	0.5 to 1.5	5	Black	.125" to .500"	Softest, UL 94V-0 Flame Rated
F12	Very Soft	2 to 5	5	Gray	.062" to .750"	Textured Finish One Side, UL 94V-0
BF1000	Very Soft	1 to 5	5	White and Gray	.062" to .500"	Smooth Both Sides, UL 94V-0
HT870	Soft	2 to 7	5	Black	.062" to .250"	Open Cell, Smooth Surface, UL 94V-0
HT800	Medium	6 to 14	5	Gray and Black	.032" to .500"	Closed Cell When Deflected, UL 94V-0

* Compression Force-Deflection, PSI (Compressed 25% at 73°F) per ASTM D 1056
 ** Compression Set, % (Compressed 50% for 22 hours at 212°F) per ASTM D 1056

Closed Cell Silicone Sponge Products

[Silicone sponge](#) is derived from a thin sheet of uncured silicone gum that is chemically blown or expanded while curing in a high temperature press or rotocure. Silicone sponge products are considered to be fully closed cell, meaning the cells are non-interconnecting, therefore they do not allow water to wick through. Silicone sponges are tougher and have better tear resistance than silicone foams. Silicone sponge often provides better water sealing in heavy wash-down applications as compared to silicone foam. [Expanded closed cell silicone sponge](#) materials offer many of performance benefits of solid silicone in a softer and more compliant form.



Key Benefits of Closed Cell Silicone Sponge

- **Wide operating temperature** – Silicone sponge has a temperature range of -100°F to 500°F (-73°C to 260°C).
- **Water sealing** – the closed cell structure allows for good water sealing with relatively low compressive forces. UL 50 and UL 50E grades are available.
- **Compression set resistance** – Silicone offers excellent compression set resistance (ability to rebound to original thickness), especially at higher temperatures, compared to most rubber material. Low compression-set silicone sponges are available for even better performance than general purpose grades.
- **UV and ozone resistance** – Silicone products have excellent UV and ozone resistance due in part to their inorganic backbone. This provides long term performance.
- **Rugged** – When silicone is required, silicone sponge parts offer better toughness as compared to silicone foam products.
- **Outdoor gasketing** – Considering all the above benefits, silicone sponge is a good material choice for outdoor environments, from the Arctic to the desert.

Table 2 - Closed Cell Silicone Sponges Commonly Used in Gasket Tape

Product	Grade	Force Deflection*	Compression Set**	Standard Color(s)	Thickness Range	Comments and Features
R10480-S	Soft	2 to 7	5	Red and Black	.093" to .250"	UL 50E, Softest Closed Cell Sponge
R10470-M	Medium	6 to 14	25	Orange and Black	.032" to .250"	General Purpose, High Temperature
R10400-M	Medium	6 to 14	5	Blue / Gray	.062" to .250"	UL 94V-0 Flame Rated
R10450-M	Medium	6 to 14	25	Gray	.062" to .188"	Fiberglass Reinforced

* Compression Force-Deflection, PSI (Compressed 25% at 73°F) per ASTM D 1056
 ** Compression Set, % (Compressed 50% for 22 hours at 212°F) per ASTM D 1056

Types of Adhesive Backings Available

Silicone foam and silicone sponge gasket tapes are available with acrylic or silicone polymer [adhesive backings](#).

Acrylic adhesives have higher peel strength properties than silicone adhesives. However, silicone adhesives generally perform better in extreme low temperatures and in temperatures in excess of 350°F. Acrylic adhesives have a longer shelf life (up to 2 years) than silicone pressure sensitive adhesives (6 months).

The structure of the adhesive is an important consideration. Gasket tapes are provided with either a film supported adhesive backing or an unsupported transfer film adhesive backing.

Film supported adhesive contains a thin plastic film within the adhesive structure to provide dimensional stability. This helps a technician apply the gasket tape without stretching the product. However, film supported adhesives are difficult to apply in a curvature as the PET or polyimide film will not stretch. Further, the film can prevent complete wetting out of the adhesive face on rough surfaces.

Unsupported transfer film adhesives do not have the dimensional stability – meaning they can be stretched when removing the adhesive release liner and applying the gasket tape onto the surface. However, with brief training an assembly technician can learn to use these versatile adhesives. Unsupported acrylic transfer film adhesives are typically stronger with higher adhesion levels than film supported adhesives. They can be installed with curves to make a rounded corner on an enclosure gasket. Unsupported transfer film adhesives also wet-out for better bonding to rough surfaces.

Most gasket tapes are provided with acrylic adhesives. Acrylic adhesives are versatile, perform well from -40°F to 300°F, have longer shelf life to allow for holding finished product longer and generally cost less than silicone adhesives. Acrylic adhesives need at least 6 hours to wet out and cross-link. The bond strength improves with time.

Silicone adhesives are rated to perform in extreme cold (-100°F) and high heat (+450°F). However, the adhesion strength is relatively low, and the shelf life of these adhesives is short; this can create issues with lower bonding performance or situations where 75% of shelf life must be retained.

The first silicone sponge gasket tape style product on the market had a silicone polymer adhesive. This product is Strip-N-Stick® 100S of the CHR Brand – which is still available today. This is an unsupported silicone transfer film adhesive. The adhesion values are low and the shelf life is less than 6 months – even when stored in optimal storage conditions. (CHR was acquired by Saint-Gobain Performance Plastics who currently manufactures the Strip-N-Stick® family of products.)

DP-1001 film supported silicone adhesive was developed for high temperature gasket tape requirements where higher adhesion strength and non-stretch dimensional stability is a benefit. The polyimide film support is capable of performing in very high temperatures. The film support



also prevents the adhesive from migrating into the silicone gasket material, which extends the adhesive shelf life.

Important note: All surfaces should be cleaned, dry and dust free before applying gasket tape.

Table 3 - Pressure Sensitive Adhesives Commonly Used for Gasket Tape

Product	Type	Structure	Adhesion	Temp Range	Thickness	Comments and Features
256M	Acrylic	Film Support	70 oz / inch	-40°F to 200°F	.005"	High Tack, Non-Stretch in Application
9485 / 9675	Acrylic	Transfer	150 oz / inch	-40°F to 300°F	.005"	3M High Performance Bonding
9490LE	Acrylic	Film Support	140 oz / inch	-40°F to 225°F	.007"	LSE Adhesive for Powder Coat Surfaces
DP1001	Silicone	Film Support	58 oz / inch	-100°F to 450°F	.005"	Polyimide (Amber) Film, High Temperature

Acrylic adhesives require approximately 12 hours of dwell time to attain full bonding strength.

Silicone adhesives require up to 24 hours to attain full bonding and may appear to have little initial tack.

Standard Gasket Tape Products

Standard gasket tape products are available in pre-manufactured 'Master Rolls' in standard lengths for slitting into specified widths, and supplied on a 3" diameter inner core. Stockwell Elastomerics will slit per order in any quantity – slit rolls of gasket tape are typically supplied in a few days.

There are currently 6 standard product types offered by Stockwell Elastomerics. Of these standard gasket tape products, HT-800 gasket tape and Strip-N-Stick 200A are most often specified.



Silicone Foam Gasket Tapes

Table 4 - Standard Gasket Tape Products from Pre-Manufactured Rolls

Product	Thicknesses	Length	Sponge or Foam	Cell Structure	Adhesive	Comments and Features
SNS 100S	.062 to .188"	15 or 30ft	R10470-M	Closed cell sponge	Silicone Transfer	Legacy product, 90 Day Shelf Life
SNS 200A	.062 to .250"	15 or 30ft	R10470-M	Closed cell sponge	Acrylic Transfer	High Adhesion, Up to 300°F Continuous
SNS 300AR	.062 to .188"	15 or 30ft	R10450-M	Closed cell sponge	Acrylic Transfer	Fiberglass Reinforced, High Adhesion
480S-GT	.125 to .250"	15 or 20ft	R10480-S	Closed cell sponge	Acrylic Transfer	High Adhesion, Meets UL 50E
400FR GT	.062 to .250"	15 or 30ft	R10400-M	Closed cell sponge	Acrylic Transfer	UL 94V-0 Flame Rated Sponge
HT-800 GT	.032 to .500"	10 to 30ft	HT-800	Closed cell foam	Acrylic Supported	UL 94V-0 Foam, Most Often Specified
SNS 512	.125 to .250"	15 or 30ft	F12	Open cell foam	Acrylic Supported	UL 94V-0 Foam, Low Density

Custom Gasket Tapes Are Also Readily Available

Frequently designers may need a certain roll length to improve their installation yield. In some cases, the enclosure design may require a particular silicone sponge or silicone foam product thickness that Stockwell Elastomerics does not carry as a standard gasket tape. In other cases there may be a requirement for an adhesive backing with a particular property, such as a low surface energy adhesive with a film support for bonding to a powder coat finish or treated plastic surface. In such cases, custom gasket tapes can be the solution.

For custom gasket tape, one of the silicone foams or silicone sponges is chosen, along with a preferred thickness, combined with an adhesive backing. Stockwell Elastomerics can assist with the selection process by providing strips or swatches of silicone foam or sponge with adhesive for test bonding.



Gasket Tapes Detail

When ordering custom gasket tape, Stockwell Elastomerics requires that the quantity ordered consumes the usable 34” width of a master roll. Therefore, if the requirement called for a 1.0” wide roll, quantities must be ordered in multiples of 34 to consume all of the laminated master roll.

Conclusion

The advances in silicone rubber gasket materials over the recent years by Rogers Corporation and Saint-Gobain provide the outdoor enclosure designer with more options for long term sealing reliability. Silicone foam is available in a wide range of densities and thicknesses. Closed cell silicone sponges have been developed and qualified to meet UL 94V-0 and the UL 50E recompression test – increasing the options for the designer.

Stockwell Elastomerics has refined its capabilities to laminate a range of high performance acrylic and silicone polymer adhesives onto cellular silicone products to provide gaskets for demanding application solutions. When the enclosure design permits the use of a gasket tape, Stockwell Elastomerics can tailor a foam, sponge and adhesive combination slit into a custom width and length that makes the most efficient use of the material – making this high performance product family affordable in most applications.

Request a Gasket Tape Touch Brochure and Gasket Tape Sample Rolls

[Request a complimentary touch brochure with tactile samples and small sample rolls](#) via a convenient form.

The [Gasket Tape page](#) of the Stockwell Elastomerics' website is a rich source of additional information about the variety of gasket tapes, including materials and applications. More technical information can be accessed via the [Gasket Tape Data Sheets page](#).



About Stockwell Elastomerics, Inc.

Stockwell Elastomerics, Inc. is a leading manufacturer of custom silicone rubber and elastomeric gaskets, pads and components for demanding technical design requirements. Stockwell Elastomerics' core competence is the fabrication and molding of silicone rubber and similar high performance elastomers. On-site production capabilities include adhesive lamination, slitting, die cutting, water jet cutting, flash cutting and custom molding of silicone rubber. Stockwell Elastomerics is ISO 9001:2015 registered. The Stockwell Elastomerics website is at: <https://www.stockwell.com/>.

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