MESH STRIP

with Elastomer Core EMI Gasketing

MESH STRIP gaskets with elastomer core are cost effective, resilient, highly conductive, knitted wire over an elastomer core used to provide electromagnetic interference (EMI) shielding, electromagnetic pulse (EMP) shielding and electrical grounding at the joints and seams of a variety of enclosure applications.

The presence of an elastomer core improves compression set characteristics as compared to traditional all-mesh gasket offerings. This results in higher performance over a longer lifespan, reducing replacement costs and other factors associated with the total cost of gasket ownership.

To reduce application design time, tooling charges and lead time, MESH STRIP with elastomer core gaskets are produced in a variety of standard cross sectional geometries, wire mesh alloys and elastomer choices to meet a wide array of performance criteria. For unique application requirements, custom materials and profile geometries are available upon request.

To ensure quick and easy integration into any manufacturing environment, without the need for additional capital expenditures, material can be provided in spooled, cut-to-length, or spliced gasket forms and attached utilizing adhesive spot-bonding or riveting.

Features:

- Monel, Ferrex* and aluminium are standard alloy choices, with customs available upon request
- Standard elastomer choices are sponge or solid silicone or solid neoprene, with custom elastomers available upon request
- Rectangular, round and round with fin are standard cross sectional geometries, with customs available upon request
- High metal content
- Knit construction
- Multiple gasket form-factors and installation options
- Foreign object debris (FOD) free version available upon request

* Ferrex is Parker Chomerics tradename or tin-plated, copper-clad steel wire per ASTM B-520, ASTM (QQ-W-343) tin-plated, 2-3% by weight; ASTM B-227 copper-cladding 30-40% by weight; SAE 1010 steel wire, balance by weight and is the same as Tecknit Su/Cu/Fe which it replaces.

Benefits:

- Various metal alloy offerings allow for optimized performance variables such as galvanic corrosion, EMI / EMP attenuation, electrical conductivity and temperature range
- Various elastomer offerings allow for optimized performance variables such as compression set, compressive force versus deflection, fluid resistance, temperature range and durability
- Numerous standard geometric offerings ensure easy gasket integration into existing applications, thereby eliminating the need for redesign
- High metal content gaskets are highly durable, making them an excellent choice for applications with cut-through or tear resistance requirements
- Knitted wire construction results in a light-weight product offering for applications with weight restriction requirements.
- Multiple gasket form factors and attachment methods allow for easy incorporation into existing manufacturing installation environments without the need for capital expenditures
- Encapsulated ends ensure the elimination of foreign object debris and associated rework costs

Application Design Information:

Parker Chomerics MESH STRIP with Elastomer Core gaskets are used to provide EMI/EMP shielding for a variety of applications. Various design variables should be considered when making a product selection to ensure optimal performance. These variables are expanded upon in the following text to assist in the design process.

Material Type - Wire

MESH STRIP with elastomer core gasketing is offered in monel, Ferrex and aluminium alloys as standard offerings, with custom materials being available upon request. When making a material selection, a number of variables should be taken into consideration depending on the specific application. These criteria include; electrical performance for EMI/EMP shielding or current carrying requirements, galvanic compatibility between the gasket and mating surfaces, overall material durability and temperature thresholds. Electrical and galvanic performance are the predominant driving forces behind the material selection process and will therefore be focused on in the following text.

MESH STRIP gasketing can provide greater than 60 dB of shielding across a broad range of frequencies, though specific alloys perform better at specific frequencies. Depending on deflection percent, electrical resistance of less than .5 milliohms is also attainable for lightning grounding applications. For applications where electrical performance is the primary concern, it is recommended to evaluate materials in the following order; monel, Ferrex and aluminium.

To avoid long-term corrosion rework costs, the galvanic compatibility between the mating surfaces of the application with the gasket material of choice should be evaluated. For applications where corrosion mitigation against an aluminium substrate is the primary concern, it is recommended that aluminium MESH STRIP be utilized, though electrical performance and physical durability will be sacrificed.

In summary, monel is the material of choice for applications with moderate shielding and galvanic concerns. Ferrex, though good at low-frequency shielding, should be avoided in applications where galvanic corrosion is a concern mated to aluminium.

Lastly, aluminium gives great galvanic compatibility against aluminium housings, but has moderate shielding capabilities and material durability limitations.

Material Type - Elastomer

MESH STRIP with elastomer core gasketing is offered with sponge or solid silicone or solid neoprene, with custom elastomers available upon request. When making a material selection, similar to wire selection, a number of variables should be taken into consideration. These criteria include; compression characteristics, fluid resistance, overall material durability and temperature thresholds.

Sponge elastomer materials are typically utilized in applications where low compression force is necessary. This is usually because of the following two reasons; a lack of fasteners causes little force to be generated at the interface of the gasket and the substrate, resulting in the inability to deflect solid elastomer gasketing, or the mating substrate is thin and therefore has a tendency to bow when force is exerted on it.

Solid elastomer materials are typically utilized in applications where robust sealing characteristics are necessary.

Generally, neoprene is a good selection in applications where physical durability for things such as tensile strength, abrasion resistance and tear resistance. Silicone is recommended in applications where extreme temperature requirements, elongation or compression set are major design drivers. Fluid resistance characteristics should also be evaluated on a case by case basis.

Mounting

There are two main gasket attachment methods to be considered during the design process. Either open area mounting or incorporating the gasket within a groove are options. Groove incorporation is considered a more conservative selection due to gasket retention and the ability to obtain more exact gasket compression and better shielding due to metal to metal contact between the cover and the flange. For open area mounting, it is recommended to RTV spot bond or rivet the material to hold it in place. Pressure sensitive adhesive is not available with knit mesh products.

Rectangular and round profiles are typically recommended for groove applications.

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Grooves are recommended to be rectangular with the height being the primary concern.

It is recommended to target gasket compression of 35 +/- 15% when taking into consideration maximum material condition (MMC) and least material condition (LMC) of both the gasket and the groove. As a general rule, the nominal width of the groove should have a target value that results in the groove being 80 - 90% filled when the gasket is deflected to the aforementioned amount.

Round with fin profiles are typically recommended for open area mounting applications. The flat area associated with this profile type allows for easy attachment to a substrate. Gasket compression should be targeted in a similar manner to that of a grooved design. Open area mounting, however, relies more heavily on the compressive forces generated by the fasteners incorporated into the design versus the compression tendencies of the specific gasket profile selected.

Geometric Profile

For MESH STRIP with elastomer core products, round, rectangular and round with fin are standard profiles. After the aforementioned mounting criteria are evaluated, the final decision regarding the geometric gasket profile to be incorporated into the design is related to size.

Gasket size selection is a balance between available space in the application, the force available for gasket deflection and the tolerances associated with the application.

The larger the gasket, the less effect tolerance variations have on gasket deflection percentage. This will mitigate gasket under or over-deflection. Under-deflection will result is decreased electrical performance. Over-deflection will result in permanent gasket deformation and compromised gasket integrity.

Recognizing that larger gaskets incur higher price points, both for material and the associated machining necessary in the application, smaller profiles are typically more appealing to customers. Due to this, it is recommended to carefully consider tolerance swings and the affects they will have on the overall performance of the assembly.

See Table 3 for Chomerics standard tolerances.

Substrate Surface Preparation

Acknowledging that most applications have a substrate surface treatment interfacing with MESH STRIP with elastomer core gasketing, there are a few variables to evaluate.

First, the surface finish must allow for electrical contact between the gasket and the substrate. If electric contact is not ensured, gasket performance will be substantially reduced.

Therefore, non-conductive surface treatments are not recommended unless masking of the gasket flange area is possible.

Though non-conductive, chemical conversion coatings are commonly used in conjunction with MESH STRIP gaskets. Whenever possible, MIL-DTL-5541 Class 3 is recommended.

This thinner surface treatment ensures gasket "bite-through" to the electrically conductive substrate beneath the finish. Class 1A is thicker and therefore harder to obtain the same level of electrical continuity to that of Class 3.

Any form of electrically conductive plating can be utilized.

Fastener Spacing

Fastener spacing recommendations are a highly variable situation with many things to be taken into consideration. As a general rule, spacing should range between 2.5 and 3.5 inches. In applications where either extreme forces or thin flange thickness may be present, flange deformation can occur. This deformation limits gasket compression at the mid-point between fasteners. As such, fasterner spacing should be reduced to 1.5 to 2.5 inches.

Foreign Object Debris (FOD)

Because of the knit wire composition of MESH STRIP with elastomer core gasketing and the cutting operation associated with this material, FOD is a potential concern. To mitigate this risk, Chomerics gives the option of terminated ends. In post-cutting operations, a silicone encapsulant is applied to the gasket ends. This silicone binds any loose debris. Other encapsulant materials are available to meet your specific application needs such as temperature and fluid resistance.

Weather Sealing

MESH STRIP with elastomer core gasketing does not provide a water seal. These gaskets are specifically designed for electrical properties only. For applications requiring wire mesh weather sealing performance, please refer to the Chomerics COMBO GASKET data sheet.

Metal EMI MESH STRIP® with Elastomer Core - Product Information

Table 1 - Material Specifications

STANDARD MATERIAL SPECIFICATIONS							
	ELASTOMERS				METALS		
Gasketing Types	Silicone*		Neoprene*		Aluminium	Ferrex	Monel
	Solid	Closed Cell Sponge	Solid	Closed Cell Sponge			
MESH STRIP® (elastomer core)	A-A-59588 Class 2B Grade 40**	AMS-3195	Mil-R-6855 Class II, Grade 40	MIL-R-6130 Type II, Grade A, Condition Medium	Alloy 5056 AMS-4182	***	QQ-N-281 AMS-4730
Nominal Wire Diameter	-	-	-	-	.005 in (0.127mm)	.0045 in (0.114mm)	.0045 in (0.114mm)

* Temperature Ranges:
Silicone, solid, A-A-59588, Class 2B, Grade 40. –70° to +500°F (–57° to 260°C).
Silicone, sponge, AMS-3195, –80° to +400°F (–62° to +204°C).
Neoprene, solid, MIL-R-6855, Class II, Grade 40, –45° to +220°F (–43° to +104°C). AMS-3222, –40° to + 255°F (–40° to +107C°).
Neoprene, sponge, MIL-R-6130, Type II, Grade A, –30° to +150°F (–34° to +65°C), meets UL 94HF-1 rating.
** Max tensile strength is 75,000 PSI
***Ferrex is Parker Chomerics tradename for tin-plated, copper-clad steel wire per ASTM B-520, ASTM (QQ-W-343) tin-plated, 2-3% by weight; ASTM B-227 copper-cladding 30-40% by weight; SAE 1010 steel wire, balance by weight.

Table 2 - Typical Shielding Effectiveness

Materials	H-FIELD 100 kHz	E-FIELD 10 MHz	PLANE WAVE	
			1 GHz	10GHz
dB		dB	dB	dB
Aluminium	60	130	90	80
Ferrex	80+	130+	105	95
Monel	60+	130	90	80

Table 3 - MESH STRIP with Elastomer Core Tolerances

Rectangular Strips inches (mm)	
Up to 0.125; +0.031, -0.015 (Up to 3.18: +0.79, -0.038)	
Over 0.125 to 0.375; ±0.031 (3.18 to 9.53: ±0.79)	
Over 0.375 to 0.750; ±0.062 (9.53 to 19.05: ±1.57)	
Round Strips inches (mm)	**Overall Width Round Single-Fin** inches (mm)
Up to 0.500; ±0.031, dia. (Up to 1.27: ±0.79, dia.)	Up to 1.00; ±0.062, (Up to 25.40: ±1.57)
Over 0.500; ±0.047, dia. (Over 1.27: ±1.19)	Over 1.00; ±0.120, (Over 25.40: ±3.05)

Note: These dimensions and tolerances refer to the elastomer core. Outside dimensions or diameters, including mesh covers, will be approximately 0.031 in. (0.79 mm) greater. Wall thickness of standard hollow cores is 0.040 in. (1.02 mm)

ORDERING PROCEDURE

Continuous Length Gaskets – Order by part numbers listed in Tables 4 through 8 by replacing **'X'** with **1** for Monel, **2** for aluminium or **4** for Ferrex and then specify total length required per part.

Note: Elastomer Core MESH STRIP gasketing is not easily joined into single-piece gaskets. For this reason, gasketing should be factory fabricated to customer specifications.

Custom Fabricated Gaskets – Specify the standard material to be used to manufacture the part by referencing the part numbers listed in Tables 4 through 8. Submit a fully dimensioned drawing of the required gasket, referencing any splice locations or terminated ends (when applicable). For design assistance please contact Parker Chomerics Applications Engineering Department.

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Metal EMI MESH STRIP® with Elastomer Core - Available Profiles

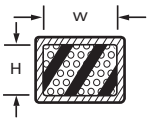

Table 4

RECTANGULAR CROSS SECTIONS/SPONGE CORE inches (mm)			
Height*	Width*	Part Number	
		Neoprene Sponge	Silicone Sponge
0.125 (3.18)	0.125 (3.18)	01-040X-1845	01-050X-0319
0.125 (3.18)	0.156 (3.96)	01-040X-1518	01-050X-0666
0.125 (3.18)	0.188 (4.78)	01-040X-1846	01-050X-1320
0.125 (3.18)	0.250 (6.35)	01-040X-1847	01-050X-1853
0.188 (4.78)	0.188 (4.78)	01-040X-1848	01-050X-1854
0.250 (6.35)	0.250 (6.35)	01-040X-1564	01-050X-1855
0.250 (6.35)	0.375 (9.53)	01-040X-0888	01-050X-1856
0.250 (6.35)	0.500 (12.70)	01-040X-1849	01-050X-1857
0.375 (9.53)	0.500 (12.70)	01-040X-0328	01-050X-1858
0.375 (9.53)	0.625 (15.88)	01-040X-1850	01-050X-1859
0.500 (12.70)	0.500 (12.70)	01-040X-1851	01-050X-1860
0.500 (12.70)	0.750 (19.05)	01-040X-1852	01-050X-1861

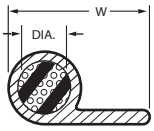

Table 5

ROUND with FIN CROSS SECTIONS/SPONGE CORE inches (mm)			
Diameter*	Width Overall	Part Number	
		Neoprene Sponge	Silicone Sponge
0.125 (3.18)	0.500 (12.70)	01-040X-1862	01-050X-0690
0.125 (3.18)	0.625 (15.88)	01-040X-1863	01-050X-1877
0.125 (3.18)	0.750 (19.05)	01-040X-1864	01-050X-1878
0.188 (4.78)	0.500 (12.70)	01-040X-0630	01-050X-1879
0.188 (4.78)	0.625 (15.88)	01-040X-1865	01-050X-1880
0.188 (4.78)	0.750 (19.05)	01-040X-1866	01-050X-1881
0.250 (6.35)	0.625 (15.88)	01-040X-0819	01-050X-1882
0.250 (6.35)	0.750 (19.05)	01-040X-1867	01-050X-1883
0.250 (6.35)	1.000 (25.40)	01-040X-1868	01-050X-1884
0.500 (12.70)	1.000 (25.40)	01-040X-1869	01-050X-1885
0.625 (15.88)	1.375 (34.93)	01-040X-1870	01-050X-0734

* These dimensions and tolerances refer to the elastomer core. Outside dimensions or diameters, including mesh covers, will be approximately 0.031 in. (0.79 mm) greater. Wall thickness of standard hollow cores is 0.040 in. (1.02 mm)

Table 6

ROUND CROSS SECTIONS/SPONGE CORE inches (mm)		
Diameter*	Part Number	
	Neoprene Sponge	Silicone Sponge
0.062 (1.57)	01-040X-1890**	01-050X-1890**
0.125 (3.18)	01-040X-0541	01-050X-1891
0.188 (4.78)	01-040X-0571	01-050X-1892
0.250 (6.35)	01-040X-0627	01-050X-1893
0.312 (7.92)	01-040X-0626	01-050X-1894
0.375 (9.53)	01-040X-1886	01-050X-1895
0.437 (11.11)	01-040X-0747	01-050X-1896
0.500 (12.70)	01-040X-0845	01-050X-1897
0.750 (19.05)	01-040X-0633	01-050X-1898

**This size has only one mesh layer.

Table 7

ROUND CROSS SECTIONS/ HOLLOW SOLID SILICONE CORE inches (mm)	
Diameter*	Part Number
0.188 (4.78)	01-050X-6044
0.250 (6.35)	01-050X-6045
0.375 (9.53)	01-050X-6112
0.500 (12.50)	01-050X-6115

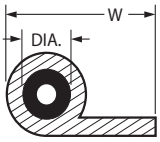

Table 8

SINGLE ROUND with FIN/ HOLLOW SOLID SILICONE CORE inches (mm)		
Diameter*	Width Overall	Part Number
0.188 (4.78)	0.500 (12.50)	01-050X-6105
0.250 (6.35)	0.625 (15.88)	01-050X-6110
0.375 (9.53)	0.750 (19.05)	01-050X-6113
0.500 (12.50)	1.000 (25.40)	01-050X-6114