Laird

Smart Technology. Delivered.™

Elastomeric EMI Shielding

SOLUTIONS

www.lairdtech.com

Smart Technology. Delivered.™

ABOUT **LAIRD**

Laird designs and manufactures customized, performance-critical products for wireless and other advanced electronics applications.

The company is a global market leader in the design and supply of electromagnetic interference (EMI) shielding, thermal management products, mechanical actuation systems, signal integrity components, and wireless antennae solutions, as well as radio frequency (RF) modules and systems.

Laird is the world leader in the design and manufacture of customized, performance-critical products for wireless and other advanced electronics applications. Laird partners with its customers to customize product solutions for applications in many industries including:

- Network Equipment
- Handsets
- Telecommunications
- Data Transfer & Information Technology
- Computers
- Automotive Electronics
- Aerospace
- Defense
- Medical Equipment
- Consumer Electronics
- Industrial

Laird offers its customers unique product solutions, dedication to research and development, as well as a seamless network of manufacturing and customer support facilities across the globe.

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All parts listed in this catalog are lead free and RoHS compliant.

This catalog contains a limited selection of Laird products. Refer to www.lairdtech.com for other products not included in this catalog.

INTRODUCTION

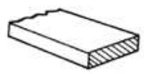
From concept to compliance, over 30 years of elastomer experience

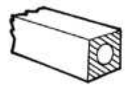
Electrically conductive elastomers provide environmental sealing, and excellent mechanical and electromagnetic shielding properties. They are ideal for applications that demand both environmental sealing and EMI shielding, and can be used in a wide range of operating temperatures. Laird offers a wide variety of conductive filler materials in extruded, molded die-cut,dispensed form-in-place, printed and coated formats. We are constantly formulating new and custom compounds to provide you with more design options to meet your needs.

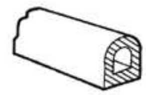
- Extrusion presses produce a multitude of conductive elastomer profiles in different compounds which are used in both military and commercial applications.
- Computerized multi axis form-in-place dispensing machines deposit conductive elastomer compounds onto miniaturized thin wall multi-compartment housing covers.
- Molding of EcE compounds is controlled from design through fabrication, from single cavity prototype to multi-cavity production or compression type molds.

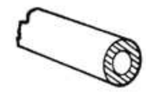
VISUAL PART REFERENCE GUIDE

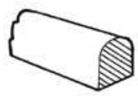
ELECTROSEAL CONDUCTIVE ELASTOMERS

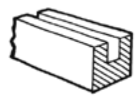

Rectangular Strips

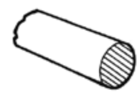

Hollow Rectangular Strips

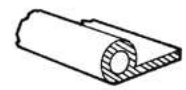

Hollow D-Strips


O-StripTubing

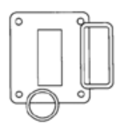

D-Strips


Channel Strips

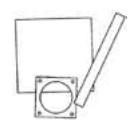

O-Strips


P-Strip Tubing

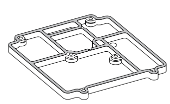
ELECTROSEAL CONDUCTIVE ELASTOMER FABRICATED COMPONENTS



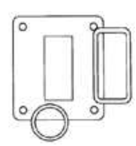
ELECTROMET METAL IMPREGNATED MATERIALS – STRIPS / SHEETS



FORM-IN-PLACE EMI DISPENSED GASKETS



ELECTROCOAT



BOARD TO CHASSIS CONDUCTIVE STAND-OFF

PART NUMBER CROSS REFERENCE

PART NUMBER	DESCRIPTION	PAGE
8550-XXXX-XX	Electrocoat	Page 41
8560-XXXX-XX	Flat Washer Type Gaskets	Page 26
8560-XXXX-XX	Rectangular Waveguide Gaskets	Page 28
8563-XXXX-XX	Molded Emi O-Rings	Pages 24, 25
8563-XXXX-XX	Molded Waveguide Gaskets- Circular “D”	Page 27
8563-XXXX-XX	Molded Waveguide Gaskets- Rectangular “D”	Page 27
8563-XXXX-XX	Molded Waveguide Gaskets- Rectangular “O”	Page 27
8569-0127-XX	Board To Chassis Conductive Stand-Off	Page 35
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	FIP Paste Selection Guide	Page 32

INTRODUCTION TO ELECTRICALLY CONDUCTIVE ELASTOMERS

OVERVIEW

The electrically conductive elastomers are based on dispersed particles in elastomers, oriented wire in solid or sponge elastomers, impregnated wire mesh screens or expanded metals. They provide highly conductive, yet resilient gasketing materials for EMI sealing as well as pressure and environmental sealing.

Conductive elastomers are used for shielding electronic enclosures against electromagnetic interference (EMI). Usually, the shielding system consists of a conductive gasket sandwiched between a metal housing and lid. The primary function of these gaskets is to provide sufficient electrical conductivity across the enclosure/gasket/lid junction to meet grounding and EMI shielding requirements, as well as prevent intrusion of the fluids into the electrical components.

Laird offers conductive elastomers in the following forms:

1. ElectroSeal dispersed filler particles in elastomers
2. ElectroMet oriented wire in solid and sponge elastomers, and impregnated wire mesh and expanded metals

ELECTROSEAL™ GASKET INTRODUCTION

Conductive elastomer gaskets are EMI shielding and sealing devices made from highly conductive, mechanically resilient and conformable vulcanized elastomers. They are available in the following types:

1. Flat gaskets or die-cuts
2. Molded shapes such as O-rings or intricate parts
3. Extruded profiles or strips
4. Vulcanized-to-metal covers or flanges
5. Co-molded or reinforced seals
6. Form-in-place gaskets

When any two flat, but rigid surfaces are brought together, slight surface irregularities on each surface prevent them from meeting completely at all points. These irregularities may be extremely minute, yet may provide a leakage path for gas or liquid under pressure, and for high frequency electromagnetic energy. This problem remains in flange sealing even when very high closure force is applied.

However, when a gasket fabricated of resilient material is installed between the mating surfaces, and even minimal closure pressure is applied, the resilient gasket conforms to the irregularities in both mating surfaces. As a result, all surface imperfections and potential leak paths across the joint area are sealed completely against pneumatic and fluid pressure or penetration by environmental gases. If the gasket is conductive as well as resilient, with conductive matrix distributed throughout its total volume in mesh or particle form, the joint can be additionally sealed against penetration by, or exit of, electromagnetic energy.

DESIGN CONSIDERATIONS

The design requirements of the installation will usually narrow the choice considerably, particularly if the basic geometry of the enclosure is already established, or if military EMI shielding specifications are involved. In addition to choices of size and shape dictated by the enclosing structure and the joint geometry itself, the following four factors greatly influence the suitability of EMI gasket materials: shielding effectiveness, closure force, percent gland fill and compression/deflection.

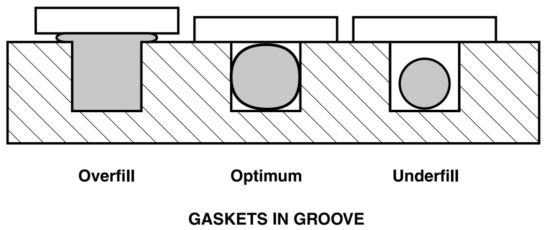
CLOSURE FORCE REQUIREMENTS

Solid conductive elastomer materials such as ElectroSeal stand up better to high closure forces, environmental pressures, and repeated opening and closing of the joint. Unlike sponge elastomers, solid conductive elastomers do not actually compress. They accommodate pressures by changing shape, rather than volume. This is an important difference in flange joint design requirements between the two material types, since additional gland volume must be allowed for the potential expansion of the elastomer under heat and/or pressure. Greater flange strength must often be provided to allow for increased closure force requirements. If low closure force is a consideration, however, the use of hollow extruded profiles such as the ElectroSeal hollow “O” and hollow “D” in conjunction with softer durometer elastomers will dramatically reduce closure force requirements.

PERCENT GLAND FILL (VOLUME/VOID RATIO)

Design of an elastomeric O-ring gland, or groove and contacting surfaces which make up the seal assembly, is as important as percent gland fill. For most static seal applications, it is necessary to calculate the area of the seal and the gland it will occupy, to determine whether the latter is large enough to receive the ring. Always try to avoid designs that stretch the elastomer more than 5%. If the seal element is stretched or compressed more than one or two percent, calculation based on the volume should be used unless volume swell is a factor. Irrespective of whether the calculations are based on volumes or cross-sectional areas, it is important to compare the largest possible seal cross-sectional area with the smallest gland, taking all tolerances into consideration. Never allow groove and seal tolerances to create an “overfilled” groove condition. Sufficient volume must be provided within the groove area to provide for a 90% to 95% gland fill. Figure 1 shows underfilled, overfilled, and optimum filled grooves.

FIGURE 1. GROOVE FILL LEVELS



GUIDELINES FOR GROOVE DIMENSIONS:

As a general rule we recommend a gland fill of 85% – 95% for optimum shielding effectiveness. However, for critical applications that require both shielding and environmental sealing, a 95% gland fill is suggested. For applications that require special design, please contact Laird applications engineering staff.

Recommended groove dimensions are provided on pages 18-19 for the solid D and solid O extruded profiles.

COMPRESSION/DEFLECTION

Compression/deflection data provide the engineer or designer with a qualitative comparison of the deformability of different profiles of conductive elastomers. Deflection is defined as the change in the cross-sectional height of a gasket under compressive load and is a function of material hardness and profile. The recommended deflection ranges of various conductive elastomer profiles are shown in Table 1. In no case however, should the amount of actual deflection be less than 10% for ElectroSeal materials. Remember that the minimum unevenness of the mating flanges must be taken into consideration in determining the original (uncompressed) and installed (compressed) height of the seal. Note that wall thickness of hollow profiles has a major effect on deflection

TABLE 1.
RECOMMENDED DEFLECTION FOR ELECTROSEAL PROFILES

CROSS SECTION SHAPE	DEFLECTION
Flat Strip	5-10 Percent
Solid O	20-25 Percent
Solid D	15-20 Percent
Hollow O	20-50 Percent
Hollow D	25-50 Percent
Hollow P	25-50 Percent
Interference Fit	15-25 Percent

Note: Selection of a proper profile has a bearing on the design and the performance of an EMI gasket.

INTRODUCTION TO ELECTRICALLY CONDUCTIVE ELASTOMERS

SERVICE LIFE

Three fundamental factors are involved when considering the service life of an EMI gasket:

1. The presence of detrimental chemicals and fluids, ozone aging and temperature extremes.
2. The number of times the joint will be opened and closed during the projected operating life of the equipment.
3. Potential exposure to inadvertent damage during initial installation and future maintenance.

ENVIRONMENTAL CONSIDERATIONS

Proper material selection for effective EMI shielding depends on the total environmental envelope within which the seal/shield will be expected to function. The material selection process should begin with a careful analysis of the following major environmental conditions:

- Temperature
- Aging/Shelf Life
- Pressure/Vacuum
- Fluid Compatibility
- Galvanic Compatibility

TEMPERATURE

Temperature, though seemingly elementary, is often the most misunderstood and exaggerated of all sealing environment parameters; hence, it is all too often over-specified.

Low Temperature

Low temperature induced changes in the elastomer properties are generally physical in nature. As the temperature decreases below allowable limits, the elastomeric properties are lost and the material becomes very hard and brittle. Duration of the effects of low temperature exposure is not significant and the original properties are regained upon resumption of moderate temperatures.

High Temperature

High temperatures also affect the properties of elastomers in the same way as the low temperatures. As the temperature begins to rise, the elastomer will soften, lowering its extrusion resistance. Tensile strength and modulus also decrease under high temperatures, and elongation is increased. But these initial changes reverse if exposure to high temperatures is brief. Changes due to prolonged high temperature exposure are chemical in nature rather than physical, and are not reversible.

The temperature capabilities of various ElectroSeal elastomers are shown in Table 2.

TABLE 2.
TEMPERATURE CAPABILITIES OF PRINCIPAL ELECTROSEAL ELASTOMERS

ELASTOMER TYPE	LOW TEMPERATURE	UPPER TEMPERATURE
EPDM	-58°F (-50°C)	257°F (125°C)
Silicone	-49°F (-45°C)	392°F (200°C)
Fluorosilicone	-67°F (-55°C)	347°F (175°C)

AGING/SHELF LIFE

Another major factor in the selection of any elastomer destined for sealing/shielding service is time, or more properly, seal life. The expected life of a seal may involve only a few seconds in the case of some highly specialized seals used in solid propellant rocket casings, to as much as 10 to 20 years and beyond in the case of seals used in deep-space vehicles.

Deterioration with time or aging relates to the type of polymer and storage conditions. Exposure may cause deterioration of elastomers whether installed or in storage. Resistance to deterioration in storage varies greatly between the elastomers. Military Handbook 695 (MIL-HDBK-695) divides synthetic elastomers in the following groups according to age resistance as shown in Table 3.

TABLE 3.
AGE RESISTANCE OF PRINCIPAL ELECTROSEAL ELASTOMERS

BASE POLYMER	ASTM DESIGNATION	SHELF LIFE (YEARS)
Ethylene Propylene Diene Monomer	EPDM	5 to 10 Years
Silicone MQ, VMQ,	PVMQ	Up to 20 Years
Fluorosilicone	FVMQ	Up to 20 Years

PRESSURE VACUUM

Conductive elastomer seals are rarely used for high-pressure systems, with the exception of waveguide seals. Pressure has a bearing on the choice of material and hardness. Low durometer materials are used for low pressure applications, whereas high pressure may require a combination of material hardness and design.

Outgassing and/or sublimation in a high vacuum system can cause seal shrinkage (loss of volume), resulting in a possible loss of sealing ability. When properly designed and confined, an O-ring, molded shape, or a molded-to-the-cover plate seal can provide adequate environmental sealing as well as EMI shielding for vacuum (to 1 x 10-6 Torr) applications.

FLUID COMPATIBILITY

The primary function of elastomeric EMI seals is to provide sufficient electrical conductivity across the enclosure/port/flange junction, while at the same time provide at least minimal environmental sealing capability. Consideration must be given to the basic compatibility between the elastomer seal/shield element and any fluids with which it may come in prolonged contact. Table 4 lists the general reaction to common fluid media for the polymer types commonly used in ElectroSeal conductive elastomers. Note that any proposed conductive material and design should be thoroughly tested by the user under all possible conditions prior to production.

The complex chemistry involved in the combination of the polymer and metallic fillers in conductive elastomers makes it imperative that such tests be conducted to determine suitability for use with a given fluid.

**TABLE 4.
RESISTANCE OF PRINCIPAL ELECTROSEAL ELASTOMERS TO FLUIDS**

FLUID	SILICONE	FLUOROSILICONE	EPDM
Impermeability to Gases	Poor	Fair	Good
Ozone and Ultraviolet	Excellent	Excellent	Excellent
ASTM 1 Oil	Fair	Good	Don't use
Hydraulic Fluids (Organic)	Fair	Good	Don't use
Hydraulic Fluids (Phosphate ester)	Fair	Fair	Excellent
Hydrocarbon Fuels	Don't use	Good	Don't use
Dilute Acids	Fair	Good	Good
Concentrated Acids	Don't use	Don't use	Fair/ Good
Dilute Bases	Fair	Good	Excellent
Concentrated Bases	Don't use	Don't use	Good
Esters/Ketones	Don't use	Don't use	Excellent
DS (Decontaminating Fluid)	Poor	Poor	Good
STB (Decontaminating Fluid)	Good	Good	Good
Low Temperature	Excellent	Excellent	Excellent
High Temperature	Excellent	Good	Good
Compression Set	Good	Good	Good
Radiation Resistance	Good	Poor	Good

GALVANIC COMPATIBILITY

Compatibility between the gasket and the mating flanges is another area which must be given proper attention when designing a gasket for sealing/shielding. This problem can be minimized by various means, the simplest and most effective of which is proper gasket and flange design. This must be coupled with the judicious selection of a gasket material compatible with the mating surfaces. A large difference in corrosion potential between the mating surface and the conductive elastomer and the presence of a conductive electrolyte, such as salt water or a humid environment, will accelerate galvanic corrosion.

Under dry conditions, such as the typical office environment, there will be little danger of galvanic corrosion. However, when the gasket is exposed to high humidity or salt-water environments, galvanic corrosion will occur between dissimilar metals. The likelihood of galvanic corrosion increases as the potential difference between the mating surface and the elastomer increases. The charts on pages 47-48 indicate which mating surfaces and elastomer combinations minimize the corrosion potential. In addition, the less permeable elastomers, such as EPDM and fluorosilicone, limit galvanic corrosion by restricting the access of the electrolyte to the conductive fillers in the gasket. For further details on galvanic corrosion of elastomeric materials, see pages 43-48.

INTRODUCTION TO ELECTRICALLY CONDUCTIVE ELASTOMERS

MATERIAL SELECTION GUIDE

Laird offers a series of products to meet a wide range of customer requirements for military and commercial applications. The classifications of the most common materials are based on cost and specific applications and are outlined in Table 5.

TABLE 5

PARAMETER	TEST METHOD										
ECE Name		ECE93	ECE72	ECE92	ECE115	ECE125	ECE85A	ECE116	ECE126	ECE118	ECE88
MIL-DTL-83528C Material Type					**Type M**			**Type B**	**Type D**	**Type A**	
Filler		Ni/C	Ni/C	Ni/C	Ag/Glass	Ag/Glass	Ag/Glass	Ag/Al	Ag/Al	Ag/Cu	Ag/Cu
Elastomer		Silicone	Silicone	Fluorosilicone	Silicone	Fluorosilicone	Silicone	Silicone	Fuorosilicone	Silicone	Fluorosilicone
Color		Black	Gray	Dark Gray	Tan	Tan	Tan	Tan	Tan	Tan	Tan
Electrical Properties											
Volume Resistivity, Ω cm, max	MIL-DTL-83528C para 4.5.10	0.1	0.1	0.1	0.006	0.01	0.004	0.008	0.01	0.004	0.01
Shielding Eff, 10 GHz, dB, min	MIL-DTL-83528C para 4.5.12	100	100	100	100	90	100	100	100	120	110
Physical Properties											
Density, g/cm3 (±0.25)	ASTM D792	1.9	2.3	2.2	1.9	2	2	2	2	3.3	4.1
Hardness, Shore A (±7)	ASTM D2240	55	75	75	65	75	70	65	70	70	75
Tensile Strength, psi, min	ASTM D412	150	280	150	200	200	200	200	200	450	180
Elongation	ASTM D412	100-300%	150%	60-250%	100-300%	60-200%	60%	100-300%	60-260%	100-300%	100-300%
Tear Strength, ppi, min	ASTM D624, die C	30	55	40	30	30	30	30	35	55	30
Compression Set, max	ASTM D395	30%	30%	30%	30%	30%		32%	30%	32%	35%
Compression / Deflection, %, min	ASTM D575	8	8	5	3.5	3		3.5	3.5	3.5	3.5
Max Oper. Temp., °C	MIL-DTL-83528C para 4.5.15	160	160	160	160	160	150	160	160	125	125
Min. Oper. Temp., °C	ASTM D1329	-55	-55	-55	-55	-50	-45	-55	-55	-55	-55
Flame Retardance	UL 94	HB	V0	-	V0	V0	-	V0	V0	V0	-
Fluid Immersion[1]	MIL-DTL-83528C para 4.5.17	N/S	-	SUR	N/S	SUR	-	-	SUR	-	SUR
Electrical Stability											
After Heat Aging, Ω cm, max	MIL-DTL-83528C para 4.5.15	0.2	-	0.2	0.015	-	-	0.01	0.015	0.01	0.015
After Break, Ω cm, max	MIL-DTL-83528C para 4.5.9	0.2	-	0.2	0.009	-	-	0.015	0.015	0.008	0.015
During Vibration, Ω cm, max	MIL-DTL-83528C para 4.5.13	0.2	-	0.2	0.009	-	-	0.015	0.015	0.006	0.015
After Exposure to EMP, Ω cm, max	MIL-DTL-83528C para 4.5.16	0.1	-	0.1	0.015	-	-	0.01	0.015	0.01	0.015
Manufacturing Processes											
Molded sheet / diecut parts		x	x	x	x	x	x	x	x	x	x
Molded shapes / O-rings		x	x	x	x	x	x	x	x	x	x
Extruded profiles		x	x	x	x	x		x	x	x	x

Notes:
N/S = Not Survivable
SUR = Survivable

INTRODUCTION TO ELECTRICALLY CONDUCTIVE ELASTOMERS

PARAMETER									
EcE Name	ECE82	ECE83	ECE84	ECE90	ECE87	ECE13	ECE95	ECE96	ECE89
MIL-DTL-83528C Material Type	**Type E**	**Type J**							
Filler	Ag	Ag	Ag/Ni	Ag/Ni	C	C	Ni/C	Ag/Al	Ag/Al
Elastomer	Silicone	Silicone	Silicone	Fluorosilicone	Silicone	EPDM	EPDM	EPDM	Fluorosilicone
Color	Beige	Beige	Tan	Tan	Black	Black	Black	Tan	Blue
Electrical Properties									
Volume Resistivity, Ω cm, max	0.002	0.01	0.005	0.005	5	30	0.15	0.01	0.012
Shielding Eff, 10 GHz, dB, min	120	80	100	100	30	30	70	90	100
Physical Properties									
Density, g/cm3 (±0.25)	3.5	1.8	4	4.1	1.3	1.2	2.2	2.2	2.2
Hardness, Shore A (±7)	65	45	75	75	75	80	80	80	70
Tensile Strength, psi, min	300	150	200	300	700	2000	200	200	180
Elongation	100-300%	50-250%	100-300%	100-300%	100-300%	100-400%	70-260%	70-260%	60-260%
Tear Strength, ppi, min	50	20	30	50	50	100	60	60	30
Compression Set, max	45%	35%	32%	25%	45%	30%	40%	50%	30%
Compression / Deflection, %, min	2.5	8	3.5	3	3.5	3	3	3	3.5
Max Oper. Temp., °C	160	160	125	160	160	125	125	125	160
Min. Oper. Temp., °C	-55	-55	-55	-50	-55	-40	-40	-40	-55
Flame Retardance	-	-	-	-	-	-	-	-	-
Fluid Immersion[1]	N/S	N/S	N/S	SUR	N/S	N/S	N/S	N/S	SUR
Electrical Stability									
After Heat Aging, Ω cm, max	0.01	0.015	0.01	0.01	7	40	-	-	0.015
After Break, Ω cm, max	0.01	0.02	0.01	0.01	7	-	-	-	0.015
During Vibration, Ω cm, max	0.01	0.015	0.01	0.01	-	-	-	-	0.015
After Exposure to EMP, Ω cm, max	0.01	0.015	0.01	0.01	-	-	-	-	0.015
Manufacturing Processes									
Molded sheet / diecut parts	x	x	x	x	x	x	x	x	x
Molded shapes / O-rings	x	x	x	x	x	x	x	x	x
Extruded profiles	x	x	x	x		x	x	x	x

INTRODUCTION TO ELECTRICALLY CONDUCTIVE ELASTOMERS

EMI GASKET MOUNTING TECHNIQUES

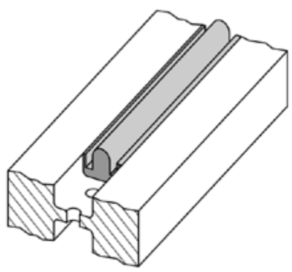
Common EMI gasket mounting techniques are:

POSITIONING IN A GROOVE

This is a highly recommended method if a suitable groove can be provided at a relatively low cost. Placing the EMI gasket in such a groove provides several advantages:

a. metal-to-metal contact of mating flange surfaces provides a compression stop and prevents overcompression of the gasket material;
b. is cost-effective by reducing assembly time;
c. best overall seal for EMI, EMP, salt fog, NBC, and fluids by providing metal-to-metal flange contact and reducing exposure of the seal element to attack by outside elements.

FIGURE 2



INTERFERENCE FIT APPLICATIONS

Allow 0.005 in. (0,1 mm) to 0.100 in. (2,5 mm) interference for part to hold and eliminate the need for adhesive. Groove depth should be set to ensure that the channel is not over-filled.

WATER TIGHT APPLICATIONS

Fill channel with as much material as possible, taking tolerances into account. Use caution to avoid overfill conditions.

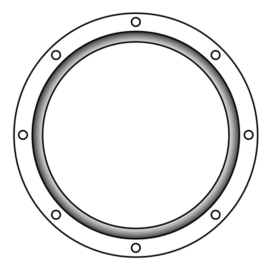
BONDING WITH ADHESIVES

The EMI gasket may be attached to one of the mating flanges by the application of pressure sensitive or permanent adhesives. A suitable conductive adhesive is always preferable over a nonconductive adhesive for mounting EMI gaskets as they can provide adequate electrical contact between the EMI gasket and the mounting surface.

BOLT-THROUGH HOLES

This is a common and inexpensive way to hold an EMI gasket in position. Locator bolt holes can be accommodated in the tab or in rectangular flat gaskets as shown in Figure 3.

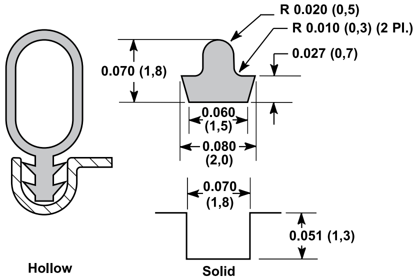
FIGURE 3



INTERFERENCE FIT

For applications such as face seals or where the gasket must be retained in the groove during assembly, interference fit is an excellent and inexpensive choice. The gasket is simply held in the groove or against a shoulder by mechanical friction as shown in Figure 4.

FIGURE 4

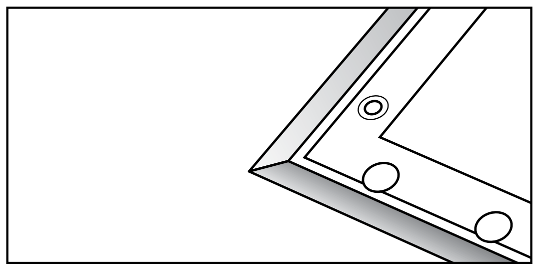


VULCANIZED MOUNTING

In this case, the seal element is vulcanized directly to the metal flange or cover under heat and pressure. The vulcanized to the-metal mounting offers a homogeneous one-piece gasket with superior conductivity between the gasket and the metal.

Laird provides EMI seals bonded to covers and retainers. Such devices may have the conductive element bonded in a groove or vulcanized to the edge of a thin sheet metal retainer. Figure 5 shows a vulcanized mounted and frame mounted gasket.

FIGURE 5



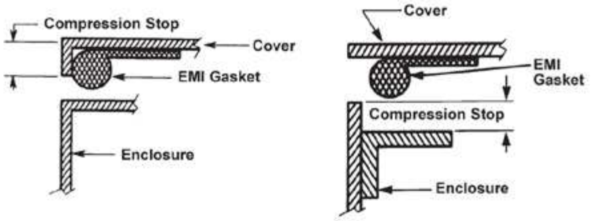
FRICTION, ABRASION AND IMPACT CONSIDERATIONS

The physical positioning of EMI gaskets in an environment where friction, abrasion and impact are possible needs special consideration. EMI gaskets in such an environment should be positioned so that they receive little or no sliding or side-to-side motion when being compressed. Examples of common attachments for access door gaskets are shown in Figure 6.

MOUNTING TIPS

Care should be taken to avoid excess handling of conductive elastomers, including excessive stretching, bending or exposure to grease.

FIGURE 6 COVER WITH COMPRESSION STOP



ELECTROSEAL CONDUCTIVE ELASTOMER MATERIAL

ELECTROSEAL™ CONDUCTIVE ELASTOMER EMI SHIELDING

Laird electrically conductive elastomer products are ideal for both military and commercial applications requiring both environmental sealing and EMI shielding. Compounds can be supplied in molded or extruded shapes, sheet stock, custom extruded, or die-cut shapes to meet a wide variety of applications.

Our conductive extrusions offer a wide choice of profiles to fit a large range of applications. The cross-sections shown on the following pages are offered as standard. Custom dies can be built to accommodate your specific design.

- Available in a wide variety of conductive filler materials
- Shielding effectiveness up to 120 dB at 10 GHz

SHEET MATERIAL

Table 1 lists thicknesses and sizes for our molded sheet material, while Table 2, pages 10-11, shows the compounds available for all of our conductive silicone elastomers.

HOW TO SPECIFY ECE

Decide on molded sheet stock or extruded shapes. Select the desired configuration and dimensions from Table 1 (for sheet stock) or Figures 1–8 (for extruded shapes). Select the desired material from Table 2. Insert material number from Table 2, |pages 14–17, in place of the letters XX in the Laird part number.

Example

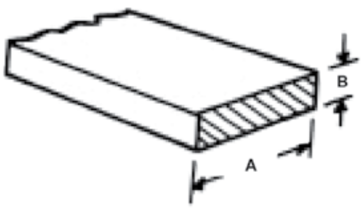
1. From Figure 1, on page 18, for a rectangular strip measuring 0.500 in. (12,7 mm) x 0.075 in. (1,9 mm), part number is 8861-0130-XX.
2. From Table 2, on page 16, for silver-nickel filler, material number is 84.
3. Ordering part number is 8861-0130-84.*

Note: Rectangular and D-shaped extrusions can be supplied with pressure sensitive adhesive tape.

THICKNESS	10 X 10 SHEET	10 X 15 SHEET	15 X 20 SHEET	18 X 18 SHEET
0.020 (0,5)	8860-0020-100-XX	8860-0020-150-XX	8860-0020-300-XX	N/A
0.032 (0,8)	8860-0032-100-XX	8860-0032-150-XX	8860-0032-300-XX	8860-0032-324-XX
0.045 (1,1)	8860-0045-100-XX	8860-0045-150-XX	8860-0045-300-XX	8860-0045-324-XX
0.062 (1,5)	8860-0062-100-XX	8860-0062-150-XX	8860-0062-300-XX	8860-0062-324-XX
0.093 (2,3)	8860-0093-100-XX	8860-0093-150-XX	8860-0093-300-XX	8860-0093-324-XX
0.100 (2,5)	8860-0100-100-XX	8860-0100-150-XX	8860-0100-300-XX	8860-0100-324-XX
0.125 (3,2)	8860-0125-100-XX	8860-0125-150-XX	8860-0125-300-XX	8860-0125-324-XX

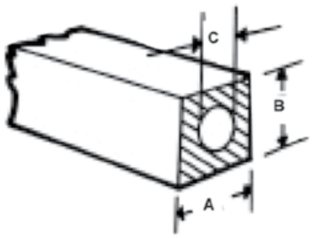
EXTRUSIONS GUIDE

Rectangular Strips



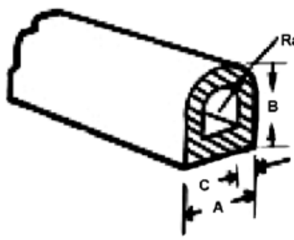
MIL-DTL-85328 PART NUMBER	PART NUMBER	NOMINAL DIMENSIONS INCH(MM)	
		A	B
M83528/009X001	8861-0100	0.063 (1,6)	0.042 (1,1)
	8861-0179	0.079 (2,0)	0.039 (1,0)
	8861-0181	0.079 (2,0)	0.059 (1,5)
M83528/009X002	8861-0105	0.095 (2,4)	0.062 (1,6)
M83528/009X003	8861-0110	0.120 (3,0)	0.075 (1,9)
M83528/009X004	8861-0115	0.125 (3,2)	0.062 (1,6)
M83528/009X005	8861-0120	0.156 (4,0)	0.062 (1,6)
	8861-0121	0.187 (4,8)	0.125 (3,2)
	8861-0167	0.188 (4,8)	0.062 (1,6)
	8861-0193	0.189 (4,8)	0.189 (4,8)
M83528/002X006	8861-0125	0.250 (6,4)	0.062 (1,6)
	8861-0173	0.250 (6,4)	0.125 (3,2)
	8861-0174	0.250 (6,4)	0.188 (4,8)
	8861-0136	0.250 (6,4)	0.200 (5,1)
	8861-0175	0.252 (6,4)	0.031 (0,8)
	8861-0183	0.378 (9,6)	0.063 (1,6)
	8861-0172	0.500 (12,7)	0.020 (0,5)
	8861-0131	0.500 (12,7)	0.042 (1,1)
	8861-0182	0.500 (12,7)	0.059 (1,5)
M83528/009X007	8861-0130	0.500 (12,7)	0.075 (1,9)
	8861-0188	0.500 (12,7)	0.094 (2,4)
M83528/009X008	8861-0135	0.500 (12,7)	0.125 (3,2)
M83528/009X009	8861-0140	0.500 (12,7)	0.188 (4,8)
	8861-0142	0.750 (19,1)	0.040 (1,0)
	8861-0141	0.750 (19,1)	0.042 (1,1)
M83528/009X010	8861-0145	0.750 (19,1)	0.062 (1,6)
	8861-0184	0.827 (21,0)	0.071 (1,8)
	8861-0189	0.827 (21,0)	0.094 (2,4)
M83528/009X011	8861-0150	0.880 (22,4)	0.062 (1,6)
	8861-0103	0.984 (25,0)	0.043 (1,1)
	8861-0169	1.00 (25,4)	0.062 (1,6)
	8861-0192	1.00 (25,4)	0.126 (3,2)
M83528/009X012	8861-0155	1.00 (25,4)	0.250 (6,4)
M83528/009X013	8861-0160	1.18 (30,0)	0.062 (1,6)

Hollow Rectangular Strips

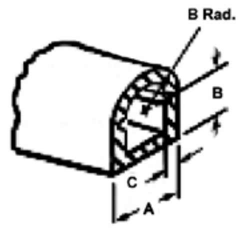


PART NUMBER	NOMINAL DIMENSIONS INCH(MM)		
	A	B	C
8862-0112	0.125 (3,2)	0.125 (3,2)	0.078 (2,0)
8862-0113	0.200 (5,1)	0.130 (3,3)	0.090 (2,3)
8862-0114	0.250 (6,4)	0.250 (6,4)	0.156 (4,0)
8862-0100	0.330 (8,4)	0.305 (7,7)	0.125 (3,2)
8862-0105	0.375 (9,5)	0.375 (9,5)	0.188 (4,8)

Hollow D-Strips



View A

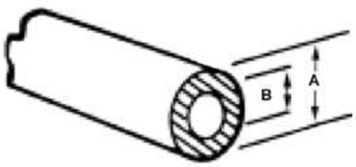


View B

MIL-DTL-83528 PART NUMBER	PART NUMBER	DIMENSIONS INCH(MM)				
		A	B	RAD	C	VIEW
	8866-0135	0.093 (2,4)	0.093 (2,4)	0.046 (1,2)	0.027 (0,7)	A
	8866-0160	0.098 (2,5)	0.098 (2,5)	0.049 (1,2)	0.020 (0,5)	A
	8866-0130	0.100 (2,5)	0.094 (2,4)	0.050 (1,3)	0.025 (0,6)	A
	8866-0162	0.109 (2,8)	0.125 (3,2)	0.054 (1,4)	0.024 (0,6)	A
M83528/007X001	8866-0100	0.156 (4,0)	0.156 (4,0)	0.078 (2,0)	0.045 (1,1)	A
	8866-0111	0.156 (4,0)	0.156 (4,0)	0.078 (2,0)	0.027 (0,7)	A
	8866-0103	0.158 (4,0)	0.240 (6,1)	0.079 (2,0)	0.040 (1,0)	A
	8866-0136	0.160 (4,1)	0.120 (3,0)	0.080 (2,0)	0.025 (0,6)	A
M83528/007X002	8866-0105	0.187 (4,8)	0.187 (4,8)	0.093 (2,4)	0.050 (1,3)	A
	8866-0131	0.250 (6,4)	0.145 (3,7)	0.125 (3,2)	0.030 (0,8)	A
	8866-0050	0.250 (6,4)	0.250 (6,4)	0.125 (3,2)	0.050 (1,3)	B
M83528/007X007	8866-0110	0.250 (6,4)	0.250 (6,4)	0.125 (3,2)	0.065 (1,7)	A
M83528/007X005	8866-0120	0.312 (7,9)	0.312 (7,9)	0.112 (2,8)	0.062 (1,6)	A
M83528/007X004	8866-0116	0.312 (7,9)	0.312 (7,9)	0.156 (4,0)	0.062 (1,6)	B
	8866-0127	0.325 (8,3)	0.575 (14,6)	0.287 (7,3)	0.080 (2,0)	A
	8866-0168	0.358 (9,1)	0.374 (9,5)	0.179 (4,5)	0.039 (1,0)	A
	8866-0166	0.374 (9,5)	0.252 (6,4)	0.187 (4,8)	0.039 (1,0)	A
	8866-0134	0.375 (9,5)	0.250 (6,4)	0.090 (2,3)	0.050 (1,3)	B
	8866-0137	0.375 (9,5)	0.250 (6,4)	0.187 (4,8)	0.032 (0,8)	A
	8866-0169	0.421 (10,7)	0.427 (10,8)	0.210 (5,3)	0.039 (1,0)	A
	8866-0126	0.480 (12,2)	0.335 (8,5)	0.240 (6,1)	0.035 (0,9)	A
M83528/007X006	8866-0125	0.487 (12,4)	0.324 (8,2)	0.244 (6,2)	0.062 (1,6)	A
	8866-0148	0.488 (12,4)	0.312 (7,9)	0.244 (6,2)	0.055 (1,4)	A
	8866-0139	0.488 (12,4)	0.324 (8,2)	0.244 (6,2)	0.063 (1,6)	A
	8866-0129	0.500 (12,7)	0.312 (7,9)	0.250 (6,4)	0.050 (1,3)	A
	8866-0155	0.625 (15,9)	0.400 (10,2)	0.312 (7,9)	0.057 (1,4)	A

EXTRUSIONS GUIDE

O-Strip Tubing

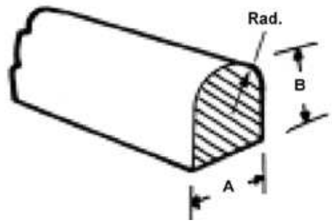


MIL-DTL-85328 PART NUMBER	PART NUMBER	NOMINAL DIMENSIONS INCH(MM)	
		A	B
	8864-0136	0.085 (2,2)	0.035 (0,9)
	8864-0060	0.085 (2,2)	0.040 (1,0)
	8864-0173	0.085 (2,2)	0.050 (1,3)
	8864-0156	0.090 (2,3)	0.040 (1,0)
	8864-0161	0.090 (2,3)	0.045 (1,1)
	8864-0090	0.090 (2,3)	0.050 (1,3)
M83528/011X007	8864-0095	0.103 (2,6)	0.040 (1,0)
	8864-0142	0.103 (2,6)	0.050 (1,3)
	8864-0172	0.110 (2,8)	0.062 (1,6)
	8864-0153	0.115 (2,9)	0.062 (1,6)
M83528/011X001	8864-0100	0.125 (3,2)	0.045 (1,1)
M83528/011X006	8864-0101	0.125 (3,2)	0.062 (1,6)
	8864-0102	0.130 (3,3)	0.062 (1,6)
	8864-0104	0.145 (3,7)	0.070 (1,8)
	8864-0171	0.149 (3,8)	0.125 (3,2)
M83528/011X002	8864-0105	0.156 (4,0)	0.050 (1,3)
	8864-0163	0.156 (4,0)	0.062 (1,6)
	8864-0139	0.168 (4,3)	0.069 (1,8)
	8864-0162	0.177 (4,5)	0.092 (2,3)

MIL-DTL-85328 PART NUMBER	PART NUMBER	NOMINAL DIMENSIONS INCH(MM)	
		A	B
M83528/011X008	8864-0143	0.177 (4,5)	0.079 (2,0)
	8864-0168	0.188 (4,8)	0.120 (3,0)
	8864-0147	0.216 (5,5)	0.125 (3,2)
	8864-0167	0.228 (5,8)	0.169 (4,3)
M83528/011X003	8864-0110	0.250 (6,4)	0.125 (3,2)
	8864-0160	0.312 (7,9)	0.188 (4,8)
M83528/011X004	8864-0120	0.312 (7,9)	0.192 (4,9)
	8864-0144	0.330 (8,4)	0.250 (6,4)
	8864-0050	0.375 (9,5)	0.235 (6,0)
M83528/011X005	8864-0125	0.375 (9,5)	0.250 (6,4)
	8864-0127	0.400 (10,2)	0.200 (5,1)
	8864-0170	0.422 (10,7)	0.319 (8,1)
	8864-0166	0.490 (12,4)	0.414 (10,5)
	8864-0135	0.513 (13,0)	0.438 (11,1)
	8864-0055	0.550 (14,0)	0.447 (11,4)
	8864-0159	0.623 (15,8)	0.366 (9,3)
	8864-0053	0.630 (16,0)	0.375 (9,5)

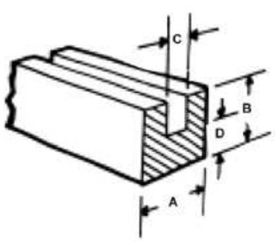
	8864-010462	0.146 (3.7)	0.091 (2.3)
	8864-3714	0.146 (3.7)	0.055 (1.4)
	8864-0103	0.138 (3.5)	0.071 (1.8)
	8864-0091	0.094 (2.4)	0.059 (1.5)
	8864-3515	0.138 (3.5)	0.059 (1.5)
	8864-2618	0.102 (2.6)	0.071 (1.8)
	8864-3824	0.150 (3.8)	0.094 (2.4)
	8864-0137	0.094 (2.4)	0.035 (0.9)
	8864-0141	0.126 (3.2)	0.087 (2.2)
	8864-0231	0.071 (1.8)	0.039 (1)
	8864-0180	0.063 (1.6)	0.039 (1)
	8864-3715	0.146 (3.7)	0.059 (1.5)

D-Strips



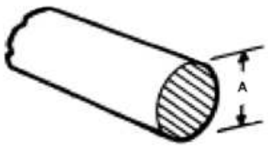
MIL-DTL-83528 PART NUMBER	PART NUMBER	DIMENSIONS INCH(MM)			RECOMMENDED GROOVE DIMENSIONS (±0.002)	
		A	B	RAD	WIDTH	DEPTH
	8865-0100	0.055 (1,4)	0.064 (1,6)	0.031 (0,8)	0.067 (1,7)	0.053 (1,3)
MB83528/003X001	8865-0105	0.062 (1,6)	0.068 (1,7)	0.031 (0,8)	0.074 (1,9)	0.057 (1,4)
MB83528/003X005	8865-0120	0.062 (1,6)	0.100 (2,5)	0.031 (0,8)	0.076 (1,9)	0.084 (2,1)
MB83528/003X010	8865-0140	0.075 (1,9)	0.178 (4,5)	0.089 (2,3)	0.093 (2,4)	0.150 (3,8)
MB83528/003X004	8865-0116	0.093 (2,4)	0.093 (2,4)	0.047 (1,2)	0.109 (2,8)	0.077 (2,0)
MB83528/003X002	8865-0110	0.094 (2,4)	0.078 (2,0)	0.047 (1,2)	0.109 (2,8)	0.065 (1,7)
MB83528/003X008	8865-0135	0.118 (3,0)	0.156 (4,0)	0.059 (1,5)	0.140 (3,6)	0.131 (3,3)
MB83528/003X007	8865-0130	0.122 (3,1)	0.135 (3,4)	0.061 (1,5)	0.141 (3,6)	0.113 (2,9)
MB83528/003X006	8865-0125	0.150 (3,8)	0.110 (2,8)	0.075 (1,9)	0.165 (4,2)	0.092 (2,3)
MB83528/003X003	8865-0115	0.178 (4,5)	0.089 (2,3)	0.039 (1,0)	0.182 (4,3)	0.074 (1,9)
MB83528/003X011	8865-0144	0.188 (4,8)	0.188 (4,8)	0.094 (2,4)	0.220 (5,6)	0.160 (4,1)
MB83528/003X012	8865-0145	0.250 (6,4)	0.250 (6,4)	0.125 (3,2)	0.286 (7,3)	0.212 (5,4)

Channel Strips



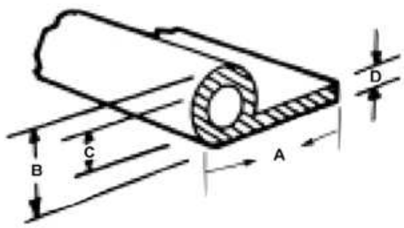
MIL-DTL-83528 PART NUMBER	PART NUMBER	DIMENSIONS INCH(MM)			
		A	B	C	D
M83528/010X001	8868-0100	0.100 (2,5)	0.100 (2,5)	0.034 (0,9)	0.033 (0,8)
	8868-0055	0.114 (2,9)	0.082 (2,1)	0.030 (0,8)	0.026 (0,7)
M83528/010X002	8868-0105	0.126 (3,2)	0.110 (2,8)	0.025 (0,6)	0.050 (1,3)
M83528/010X003	8868-0056	0.156 (4,0)	0.114 (2,9)	0.030 (0,8)	0.062 (1,6)
M83528/010X004	8868-0115	0.156 (4,0)	0.156 (4,0)	0.062 (1,6)	0.047 (1,2)
	8868-0067	0.175 (4,4)	0.500 (12,7)	0.047 (1,2)	0.075 (1,9)
M83528/010X005	8868-0120	0.175 (4,4)	0.156 (4,0)	0.047 (1,2)	0.075 (1,9)
	8868-0081	0.189 (4,8)	0.189 (4,8)	0.063 (1,6)	0.063 (1,6)
	8868-0084	0.250 (6,4)	0.250 (6,4)	0.062 (1,6)	0.062 (1,6)
	8868-0085	0.252 (6,4)	0.252 (6,4)	0.126 (3,2)	0.063 (1,6)
M83528/010X006	8868-0125	0.327 (8,3)	0.235 (6,0)	0.062 (1,6)	0.115 (2,9)
	8868-0070	0.395 (1,0)	0.120 (3,0)	0.275 (7,0)	0.060 (1,5)
	8868-0075	0.530 (13,5)	0.130 (3,3)	0.390 (9,9)	0.060 (1,5)

O-Strips



MIL-DTL-85328 PART NUMBER	PART NUMBER	DIMENSIONS INCH(MM)	RECOMMENDED GROOVE DIMENSIONS (±0.002)	
		A	WIDTH	HEIGHT
	8863-0184	0.032 (0,8)	0.036 (0,9)	0.026 (0,7)
M83528/001X001	8863-0100	0.040 (1,0)	0.045 (1,1)	0.032 (0,8)
M83528/001X002	8863-0105	0.053 (1,3)	0.059 (1,5)	0.042 (1,1)
M83528/001X003	8863-0110	0.062 (1,6)	0.066 (1,7)	0.050 (1,3)
M83528/001X004	8863-0115	0.070 (1,8)	0.076 (1,9)	0.056 (1,4)
M83528/001X005	8863-0120	0.080 (2,0)	0.086 (2,2)	0.064 (1,6)
M83528/001X006	8863-0125	0.093 (2,4)	0.100 (2,5)	0.074 (1,9)
	8863-0196	0.098 (2,5)	0.105 (2,7)	0.078 (2,0)
M83528/001X007	8863-0130	0.103 (2,6)	0.110 (2,8)	0.082 (2,1)
	8863-0135	0.112 (2,8)	0.119 (3,0)	0.089 (2,3)
M83528/001X008	8863-0140	0.119 (3,0)	0.126 (3,2)	0.095 (2,4)
M83528/001X009	8863-0145	0.125 (3,2)	0.133 (3,4)	0.100 (2,5)
	8863-0150	0.130 (3,3)	0.137 (3,5)	0.104 (2,6)
M83528/001X010	8863-0160	0.139 (3,5)	0.147 (3,7)	0.111 (2,8)
	8863-0165	0.150 (3,8)	0.158 (4,0)	0.120 (3,0)
	8863-0170	0.160 (4,1)	0.168 (4,3)	0.128 (3,3)
	8863-0197	0.186 (4,7)	0.197 (5,0)	0.149 (3,8)
M83528/001X011	8863-0183	0.188 (4,8)	0.200 (5,1)	0.150 (3,8)
	8863-0198	0.194 (4,9)	0.209 (5,3)	0.156 (4,0)
	8863-0199	0.197 (5,0)	0.210 (5,3)	0.158 (4,0)
M83528/001X0012	8863-0175	0.216 (5,5)	0.229 (5,8)	0.173 (4,4)
M83528/001X013	8863-0180	0.250 (6,4)	0.267 (6,8)	0.200 (5,1)
	8863-0200	0.256 (6,5)	0.274 (7,0)	0.205 (5,2)
	8863-0201	0.312 (7,9)	0.337 (8,6)	0.250 (6,4)
	8863-0202	0.374 (9,5)	0.400 (10,2)	0.300 (7,6)

P-Strips



MIL-DTL-83528 PART NUMBER	PART NUMBER	DIMENSIONS INCH(MM)			
		A	B	C	D
	8867-0136	0.275 (7,0)	0.140 (3,6)	0.085 (2,2)	0.030 (0,8)
	8867-0147	0.290 (7,4)	0.095 (2,4)	0.062 (1,6)	0.025 (0,6)
	8867-0128	0.415 (10,5)	0.200 (5,1)	0.060 (1,5)	0.062 (1,6)
	8867-0141	0.425 (10,8)	0.250 (6,4)	0.151 (3,8)	0.050 (1,3)
M83528/008X007	8867-0101	0.475 (12,1)	0.200 (5,1)	0.080 (2,0)	0.062 (1,6)
	8867-0127	0.500 (12,7)	0.200 (5,1)	0.076 (1,9)	0.062 (1,6)
M83528/008X002	8867-0105	0.500 (12,7)	0.250 (6,4)	0.125 (3,2)	0.062 (1,6)
	8867-0126	0.600 (15,2)	0.250 (6,4)	0.125 (3,2)	0.062 (1,6)
M83528/008X004	8867-0102	0.640 (16,3)	0.208 (5,3)	0.080 (2,0)	0.072 (1,8)
	8867-0158	0.752 (19,1)	0.252 (6,4)	0.189 (4,8)	0.063 (1,6)
	8867-0165	0.752 (19,1)	0.437 (11,1)	0.347 (8,8)	0.060 (1,5)
M83528/008X006	8867-0130	0.780 (19,8)	0.360 (9,1)	0.255 (6,5)	0.070 (1,8)
M83528/008X001	8867-0100	0.850 (21,6)	0.200 (5,1)	0.080 (2,0)	0.062 (1,6)
	8867-0166	0.874 (22,2)	0.500 (12,7)	0.400 (10,2)	0.065 (1,7)
M83528/008X005	8867-0125	0.875 (22,2)	0.312 (7,9)	0.187 (4,8)	0.062 (1,6)

GEMINI™ COEXTRUSIONS

MULTI-EXTRUSION, BI-FUNCTIONAL ELASTOMER GASKET

Laird' Gemini™ product line is a high-performance gasket solution that combines a reliable environmental silicone elastomer seal with an electrically conductive elastomer. Conductive particle filler results in a product with lower material cost and an improved environmental seal against water, moisture, dust and mildly corrosive atmospheric conditions due to smog.

Our conductive extrusions offer a wide choice of profiles to fit a large range of applications. The cross-sections shown on the following pages are offered as standard. Custom dies can be built to accommodate your specific design.

FEATURES

- Combines the strength of silicone rubber with Laird' proprietary conductive elastomer EMI shielding materials and knowledge
- Improved environmental seal
- Improved EMI performance over lifetime
- Cost-effective
- Available in both standard and custom profiles
- Ability to use finite element analysis to design the best custom gasket for your application

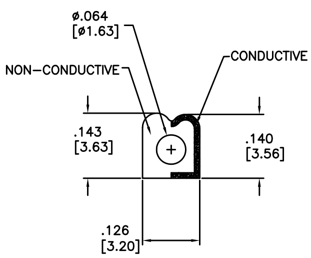
MARKETS

- Wireless infrastructure
- Remote radio units
- Telecom cabinets
- Radar
- IT cabinets
- All electronic cabinets or electronic chassis that require both an environmental seal and EMI shielding

		TYPICAL COEXTRUISON GASKET DESIGN						
		NONCONDUCTIVE ELASTOMER			CONDUCTIVE ELASTOMER			
PARAMETER	TEST METHOD	NCE220	NCE251	NCE250	ECE72	ECE93	ECE116	ECE115
Polymer matrix		Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone
Filler					Ni/Graphite	Ni/graphite	Ag/Al	Ag/Glass
Color	Visual Inspection	Blue	Grey	Orange	Grey	Black	Tan	Tan
Hardness, Shore A	ASTM D2240	70	45	60	75	65	65	65
Density, g/cm3	ASTM D792	1.2	1.2	1.2	2.3	1.9	2	1.9
Tensile strength, psi, min.	ASTM D412	400	700	800	280	150	200	200
Elongation to break	ASTM D412	100-300%	100-300%	100-300%	150%	100-300%	100-301%	100-302%
Tear Strength, ppi, min.	ASTM D624, die C	30	60	60	50	30	30	30
Compression set, %, max.	ASTM D395	35%	10%	10%	30%	30%	32%	30%
Working Temperature								
Maximum, oC	"MIL-DTL-83528C (4.5.15)"	160	160	160	160	160	160	160
Minimum, oC	ASTM D1329	-55	-55	-55	-55	-55	-55	-55
Flame Retardance	UL94	NA	V0	V0	V0	HB	V0	V0

GEMINI COEXTRUSIONS

M



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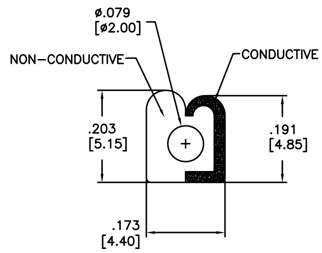

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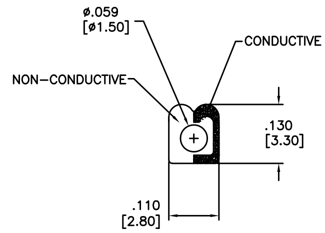

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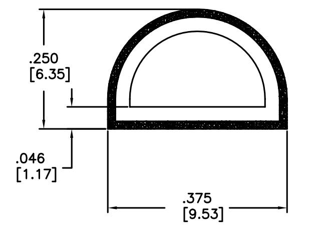

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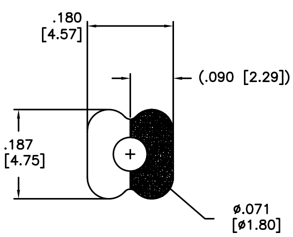
DD



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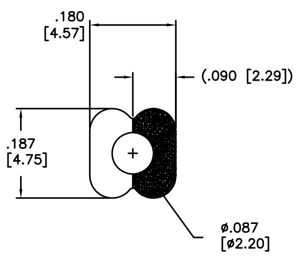

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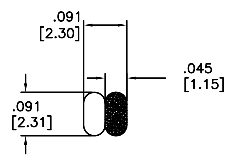

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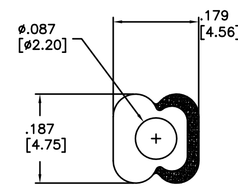


8898 0003 XX A

FABRICATED COMPONENTS GUIDE

OVERVIEW

Laird provides a full line of fabricated conductive elastomers. These products are offered in a wide range of materials to meet your particular application. In addition to the standard components shown, Laird can supply molded and vulcanized EcE gaskets to meet custom configurations required to package electronic components in either cast or sheet metal enclosures.

MOLDED O-RINGS

O-rings, when installed in a groove design that allows 10%–20% compression and 80%–95% gland fill, will provide both an EMI and moisture seal. Custom tools can be fabricated for prototypes and production quantities when diameters are larger than 2.000 in. (50,8 mm). Round strips can also be vulcanized to create O-rings to include parts with diameters larger than 3.000 in. (76,2 mm). Consult Laird sales department for sizes not shown in this catalog.

FLAT WASHERS

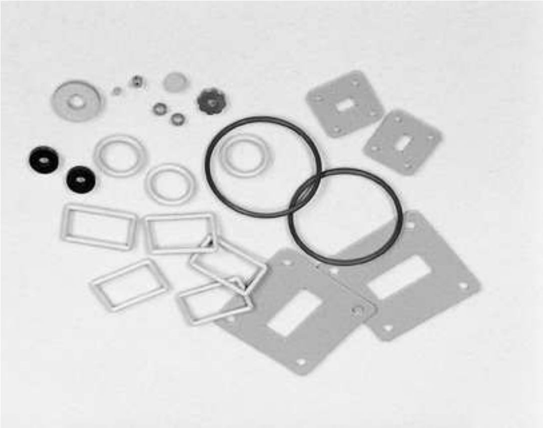
Table 3 shows some of the standard sizes of washers that can be die-cut from sheet material. Besides the circular shape, intricate shapes can be designed and die-cut to meet custom requirements.

MOLDED D-RINGS

Tables 4, 5 and 6 show standard sizes of molded rings. These components, as in the O-rings above, can be supplied spliced and vulcanized to dimensions in excess of two inches I.D.

FLAT WAVEGUIDE GASKETS

The die-cut gaskets shown in Tables 7 and 8 are designed to provide effective EMI shielding and pressure sealing for choke cover and contact flanges. Gaskets shown in this table can be supplied from the sheet materials shown in Table A.



SHEET MATERIAL

Table A lists thicknesses and sizes for our molded sheet material, while Table 2, pages 14–17, shows the compounds available for all of our conductive silicone elastomers.

HOW TO SPECIFY

1. Determine the standard Laird part number from Tables 1–8 on page 14 based upon configuration.