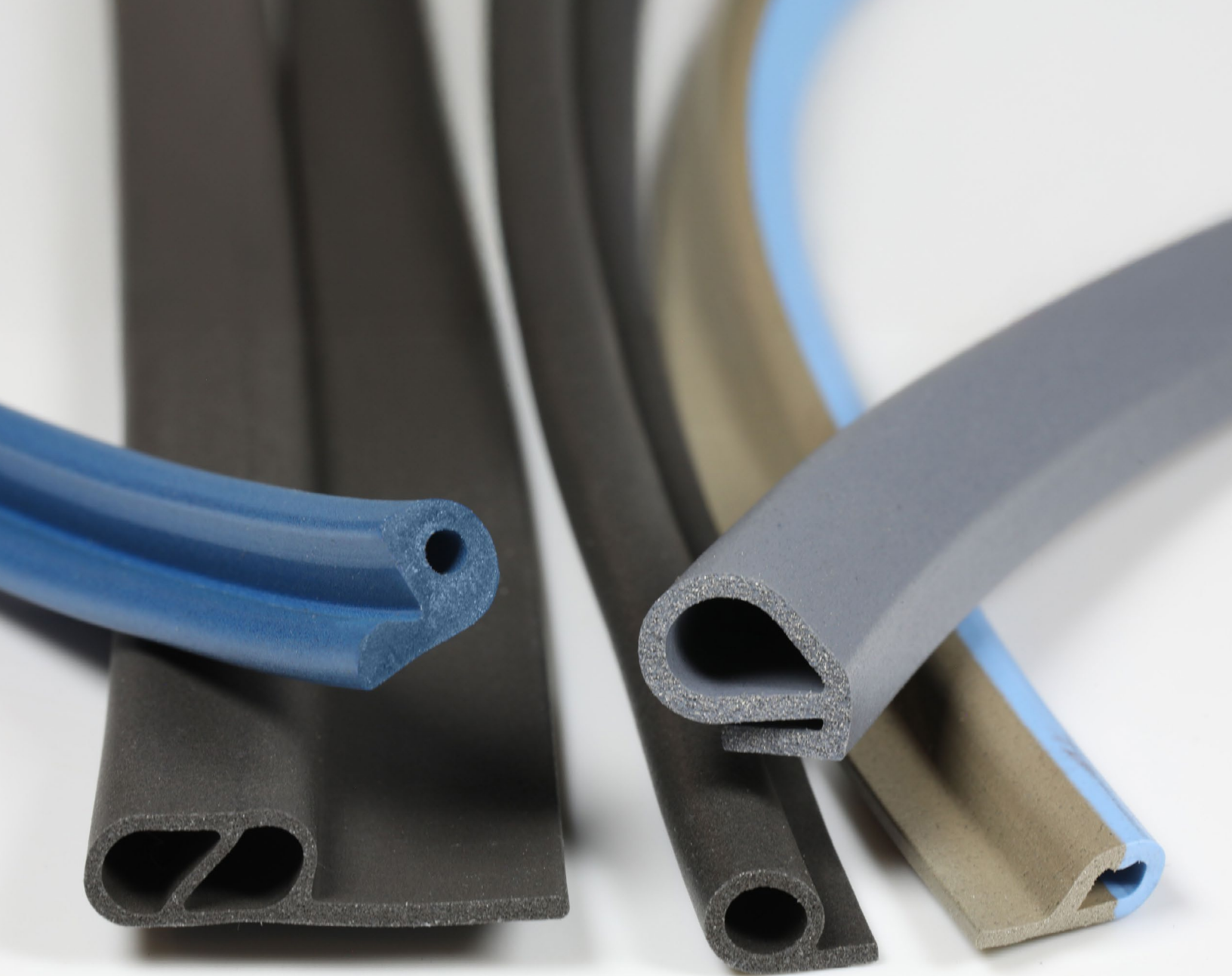




CONDUCTIVE ELASTOMER SELECTION GUIDE

Molded and Extruded EMI Gasket Materials

CONDUCTIVE ELASTOMER MATERIALS

Conductive Elastomer Selection Guide

Selecting the right CHO-SEAL conductive elastomer gasket starts with two key choices:

1. **BINDER:** sets the baseline for temperature capability, fluid resistance, and chemical compatibility
2. **CONDUCTIVE FILLER:** drives shielding effectiveness, conductivity, corrosion resistance, operating temperature and cost.

This guide summarizes our most common binder and filler options—highlighting the practical trade-offs—so you can quickly narrow in on the best material system for your application's environment, performance needs, and budget.

Binder	Why to Select	Why NOT to Select
Silicone	• Best General-Purpose Option • Broad Operating Temperature • Excellent Weather Resistance • Lower Cost	• Lower Chemical Resistance, Swelling Occurs
Fluorosilicone	• Increased Chemical Resistance Beyond Silicones	• Narrower Operating Temperature Range • Higher Cost
EPDM	• Special Chemical Resistance (Nuclear/Bio/Chemical Washdown, Super Tropical Bleach) • Excellent Steam and Humidity Resistance	• Most Narrow Operating Temperature • Niche Application Uses

Filler	Why to Select	Why NOT to Select
Nickel Aluminum	• Excellent Corrosion Resistance Against Al • Excellent Shielding • Lower Cost	• Lower Conductivity • Not Ideal for Grounding or Lightning Strike
Silver Aluminum	• Excellent Conductivity & Very Good Shielding • Very Good Corrosion Resistance, Against Al • Anti-Microbial Properties • Max Operating Temperature of 160°C	• Higher Cost
Nickle Graphite	• Very Good Shielding • Lower Cost • Max Operating Temperature of 150°C	• Lower Conductivity • Fair Corrosion Resistance Against Al
Silver Copper	• Excellent Conductivity & Shielding • Best for Molding Complex/Small Shapes • Anti-Microbial Properties	• Poor Corrosion Resistance Against Al • Higher Cost

CORE MATERIALS

Conductive Elastomer Materials

The selected binder and conductive filler together determine the appropriate CHO-SEAL product, as outlined in the table below.

Material	Ni/Al	Ag/Al	Passivated Ag/Al	Ni/C	Ag/Cu	
Silicone	6502	1285	-	S6305	1215	1273
Fluorosilicone	6503	1287	1298	L6303	1217	
EPDM	6460	-	-	6452	-	

* Green = MIL-DTL-83528 Qualified

MIL-DTL-83528 is a commonly referenced U.S. military specification that addresses conductive elastomer gaskets intended for EMI and EMP shielding applications.

It is a series of tests designed to prove materials' performance and reliability, as it provides a widely recognized framework for specifying conductive elastomer gasket materials with defined electrical, environmental, and quality performance expectations.

Materials are categorized as "Types" that differentiate performance based on binder system and conductive filler families.

Manufacturers receive material approval for listing on Military Qualified parts list (QPL).

	MIL-DTL-83528	CHO-SEAL
Core	Type A	1215
	Type B	1285
	Type C	1217
	Type D	1287
	Type D	1298
Specialty	Type E	1224
	Type F	1221
	Type G	1239
	Type J	1401
	Type K	1212
	Type M	1350



Table 6: Material Guidelines - Military and Commercial

		CHO-SEAL 6502	CHO-SEAL 6503	CHO-SEAL 1298	CHO-SEAL 1285	CHO-SEAL 1287	CHO-SEAL 1215	Test Procedure (Type of Test)
Physical	Molded (M) or Extruded (E)	M/E	M/E	M/E	M/E	M/E	M/E	--
	Conductive Filler	Ni/Al	Ni/Al	Passivated Ag/Al	Ag/Al	Ag/Al	Ag/Cu	--
	Elastomer Binder	Silicone	Fluorosilicone	Fluorosilicone	Silicone	Fluorosilicone	Silicone	--
	Type (Ref. MIL-DTL-83528)	Not Applicable	Not Applicable	Type D	Type B	Type D	Type A	--
	Volume Resistivity, ohm-cm, max., as supplied without pressure sensitive adhesive	0.150	0.250	Not Applicable	Not Applicable	Not Applicable	Not Applicable	CEPS-0002 ^c (Q/C)
		Not Applicable	Not Applicable	0.012	0.008	0.012	0.004	MIL-DTL-83528 (Q/C)
	Hardness, Shore A	68 ± 10	72 ± 10	70 ± 7	65 ± 7	70 ± 7	65 ± 7	ASTM D2240 (Q/C)
	Specific Gravity	1.85 ± 0.25	2.05 ± 0.25	2.00 ± 0.25	2.00 ± 0.25	2.00 ± 0.25	3.50 ± 0.45	ASTM D792 (Q/C)
	Tensile Strength, psi (MPa), min.	150 (1.03)	150 (1.03)	180 (1.24)	200 (1.38)	180 (1.24)	200 (1.38)	ASTM D412 (Q/C)
	Elongation, % min. or % min./max.	100 min	50 min	60/260	100/300	60/260	100/300	ASTM D412 (Q/C)
	Tear Strength, lb/in. (kN/m), min.	40 (7.00)	35 (6.13)	35 (6.13)	30 (5.25)	35 (6.13)	40 (7.00) / 25 (4.38)	ASTM D624 (Q)
	Compression Set, 70 hrs at 100°C, % max. ^(A)	30	30	30	32	30	32	ASTM D395, Method B (Q)
Thermal	Low Temperature Flex TR10, °C, min.	-55	-55	-55	-65	-55	-65	ASTM D1329 (Q)
	Maximum Continuous Use Temperature, °C ^(B)	125	125	160/200	160/200	160/200	125	--
	Thermal Conductivity, W/m-K (Typical) 300 psi (2.07 MPa)	1.0	0.9	1.2	2.2	Not Tested	2.1	ASTM D5470
Electrical	Shielding Effectiveness, dB, min. ^(F)	Method 2	Method 2	Method 2	Method 2	Method 2	Method 2	Method 1: CHO-TP08 ^c (Q) Method 2: MIL-DTL-83528 Para. 4.5.12 (Q) Method 3: CHO-TP09 ^c (Q)
	200 kHz (H Field)	Not Tested	Not Tested	55	60	55	70	
	100 MHz (E Field)	127	127	110	115	110	120	
	500 MHz (E Field)	115	117	100	110	100	120	
	2 GHz (Plane Wave)	116	116	95	105	95	120	
	10 GHz (Plane Wave)	127	127	90	100	90	120	
	40 GHz (Plane Wave)	Not Tested		75	Not Tested	75	90	
	Electrical Stability, ohm-cm, max.	0.200 ^(H)		Not Applicable	Not Applicable	Not Applicable	Not Applicable	CEPS-0002 ^c (Q)
		Heat Aging		Not Applicable	Not Applicable	0.015	0.010	MIL-DTL-83528 Para. 4.5.15 (Q/C)
		Resistance During Vibration		Not Applicable	Not Applicable	0.015	0.012	MIL-DTL-83528 Para. 4.5.13 (Q)
		Resistance After Vibration		Not Applicable	Not Applicable	0.012	0.008	MIL-DTL-83528 Para. 4.5.13 (Q)
Regulatory	Post Tensile Set Volume Resistivity	Not Applicable	Not Applicable	0.015	0.015	0.015	0.008	MIL-DTL-83528 Para. 4.5.9 (Q/C)
	EMP Survivability, kA per in. perimeter	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	MIL-DTL-83528 Para. 4.5.16 (Q)
	RoHS Compliant	Yes	Yes	Yes	Yes	Yes	Yes	--
	UL 94 Flammability Rating	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested	UL 94
	Outgassing, % TML (% CVCM)	0.62 (0.14)	0.52 (0.04)	0.12 (0.02)	0.12 (0.05)	0.63 (0.03)	0.39 (0.08)	ASTM E595

Note A: Compression set is expressed as a percentage of deflection per ASTM D395 Method B, at 25% deflection. To determine percent recovery, subtract 0.25 of the stated compression set value from 100%. For example, in the case of 30% compression set, recovery is 92.5%.

Note B: Where two values are shown, the first represents max. operating temp. for conformance to MIL-DTL-83528 [which requires Group A life testing at 1.25 times max. operating temp.] and the second value represents the practical limit for exposure up to 1000 hrs. (compressed between flanges 7-10%). Single values conform to both definitions.

Note C: Copies of CEPS-0002, CHO-TP08 and CHO-TP09 are available from Chomerics. Contact Applications Engineering.

Note D: Heat aging condition: 100°C for 48 hrs.

Note E: Heat aging condition: 150°C for 48 hrs.

Note F: It may not be inferred that the same level of shielding effectiveness provided by a gasket material tested in the fixture per MIL-DTL-83528 Para. 4.5.12 would be provided in an actual equipment flange, since many mechanical factors of the flange design (tolerances, stiffness, fastener location and size, etc.) could lower or enhance shielding effectiveness. This procedure provides data applicable only to the test fixture design of MIL-DTL-83528, but which is useful for making comparisons between different gasket materials. The 40 GHz test data for all materials uses TP08 test method.

Note G: Heat aging condition: 200 °C for 48 hours

Note H: Heat aging condition: 125 °C for 1000 hours

Table 6: Material Guidelines - Military and Commercial

		CHO-SEAL 1217	CHO-SEAL S6305	CHO-SEAL L6303	CHO-SEAL 1273	CHO-SEAL 6452	CHO-SEAL 6460	Test Procedure (Type of Test)
Physical	Molded (M) or Extruded (E)	M/E	M/E	M/E	M/E	E	M	--
	Conductive Filler	Ag/Cu	Ni/C	Ni/C	Ag/Cu	Ni/C	Ni/Al+Ni/C	--
	Elastomer Binder	Fluorosilicone	Silicone	Fluorosilicone	Silicone	EPDM	EPDM	--
	Type (Ref. MIL-DTL-83528)	Type C	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	--
	Volume Resistivity, ohm-cm, max., as supplied without pressure sensitive adhesive	Not Applicable	0.100	0.100	0.004	Not Applicable	Not Applicable	CEPS-0002 ^c (Q/C)
		0.010	Not Applicable	Not Applicable	Not Applicable	0.500	0.600	MIL-DTL-83528 (Q/C)
	Hardness, Shore A	75 ± 7	65 ± 10	65 ± 10	65 ± 8	70 ± 10	65 ± 7	ASTM D2240 (Q/C)
	Specific Gravity	4.00 ± 0.50	2.00 ± 0.25	2.20 ± 0.25	3.70 ± 0.25	1.95 ± 0.25	1.80 ± 0.25	ASTM D792 (Q/C)
	Tensile Strength, psi (MPa), min.	180 (1.24)	200 (1.38)	150 (1.03)	175 (1.21)	200 (1.38)	200 (1.38)	ASTM D412 (Q/C)
	Elongation, % min. or % min./max.	100/300	100	60	75	200	200	ASTM D412 (Q/C)
	Tear Strength, lb/in. (kN/m), min.	35 (6.13)	50 (8.75)	35 (6.13)	Not Tested	55 (9.63)	50 (8.75)	ASTM D624 (Q)
Thermal	Compression Set, 70 hrs at 100°C, % max. ^(A)	35	30	25	32	35	30	ASTM D395, Method B (Q)
	Low Temperature Flex TR10, °C, min.	-55	-45	-45	-65	-50	-50	ASTM D1329 (Q)
	Maximum Continuous Use Temperature, °C ^(B)	125	150	150	125	100	100	--
Electrical	Thermal Conductivity, W/m-K (Typical) 300 psi (2.07 MPa)	Not Tested	0.8	0.8	Not Tested	Not Tested	Not Tested	ASTM D5470
	Shielding Effectiveness, dB, min. ^(F)	Method 2	Method 1	Method 1	Method 1	Method 3	Method 2	Method 1: CHO-TP08 ^c (Q)
	200 kHz (H Field)	70	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested	
	100 MHz (E Field)	120	100	100	100	75	110	
	500 MHz (E Field)	120	100	100	100	100	120	Method 2: MIL-DTL-83528 Para. 4.5.12 (Q)
	2 GHz (Plane Wave)	115	100	100	100	105	105	
	10 GHz (Plane Wave)	110	100	100	100	85	100	Method 3: CHO-TP09 ^c (Q)
	40 GHz (Plane Wave)	Not Tested	75	Not Tested	Not Tested	Not Tested	Not Tested	
	Electrical Stability, ohm-cm, max.	Not Applicable	0.250 ^a	0.250 ^a	0.010	Not Applicable	Not Applicable	CEPS-0002 ^c (Q)
		Heat Aging	0.015	Not Applicable	Not Applicable	0.350	2.500 ^d	MIL-DTL-83528 Para. 4.5.15 (Q/C)
		Resistance During Vibration	0.010	Not Applicable	Not Applicable	Not Applicable	Not Applicable	MIL-DTL-83528 Para. 4.5.13 (Q)
		Resistance After Vibration	0.015	Not Applicable	Not Applicable	Not Applicable	Not Applicable	MIL-DTL-83528 Para. 4.5.13 (Q)
		Post Tensile Set Volume Resistivity	0.015	Not Applicable	Not Applicable	Not Applicable	Not Applicable	MIL-DTL-83528 Para. 4.5.9 (Q/C)
Regulatory	EMP Survivability, kA per in. perimeter	>0.9	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	MIL-DTL-83528 Para. 4.5.16 (Q)
	RoHS Compliant	Yes	Yes	Yes	Yes	Yes	Yes	--
	UL 94 Flammability Rating	Not Tested	V-0	Not Tested	V-0	Not Tested	Not Tested	UL 94
	Outgassing, % TML (% CVCM)	0.45 (0.01)	0.15 (0.09)	--	--	--	--	ASTM E595

Note A: Compression set is expressed as a percentage of deflection per ASTM D395 Method B, at 25% deflection. To determine percent recovery, subtract 0.25 of the stated compression set value from 100%. For example, in the case of 30% compression set, recovery is 92.5%.

Note B: Where two values are shown, the first represents max. operating temp. for conformance to MIL-DTL-83528 [which requires Group A life testing at 1.25 times max. operating temp.] and the second value represents the practical limit for exposure up to 1000 hrs. (compressed between flanges 7-10%). Single values conform to both definitions.

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Note G: Heat aging condition: 200 °C for 48 hours

Note H: Heat aging condition: 125 °C for 1000 hours

CHO-SEAL TYPICAL FORM FACTORS

Conductive Elastomer Selection Guide

Conductive elastomers are available in several form factors to meet the performance, design, and assembly needs of different applications, with extruded and molded configurations serving as the two primary forms. Whether the requirement is for EMI shielding, environmental sealing, or a combination of both, these materials can be supplied in shapes that accommodate varying enclosure geometries, gap conditions, and installation methods. This flexibility allows engineers to select a solution that best fits the electrical, mechanical, and manufacturing demands of their design.

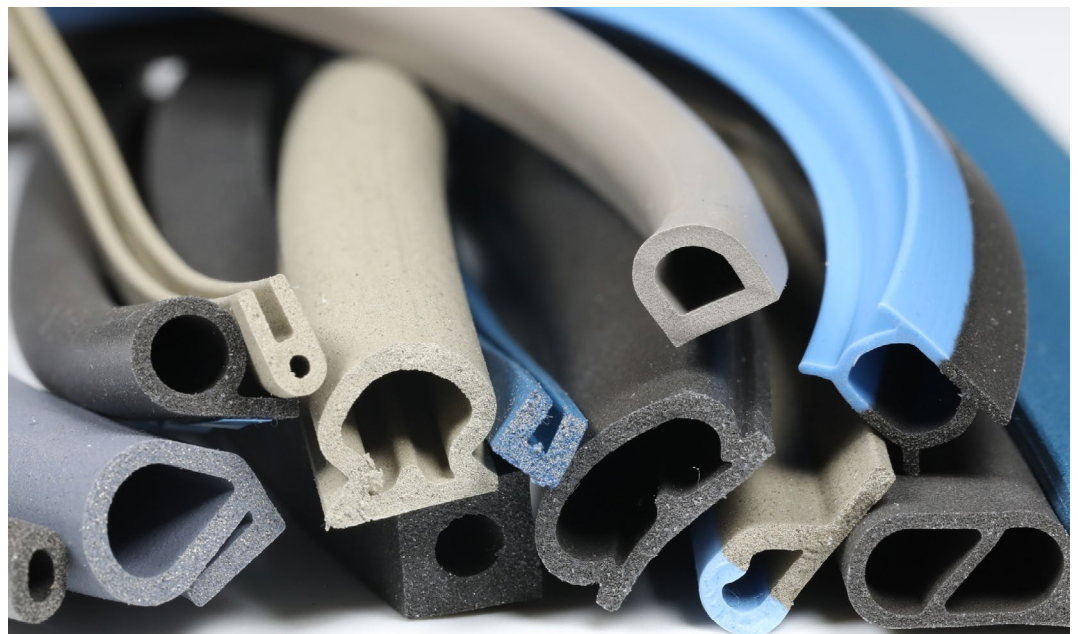


MOLDED

- Sheet Stock
- Custom Cut Gaskets
- Compression Molding
- Injection Molding
- Overmolding
- Waveguide gaskets
- Connector flange gaskets
- Jam nut seals
- Interfacial seals
- Grommets
- Reinforced solutions

EXTRUDED

- Bulk Cord
- Custom Profiles
- Spiced Gaskets
- Precision Washers
- Co-Extrusions



Parker Chomerics Capabilities

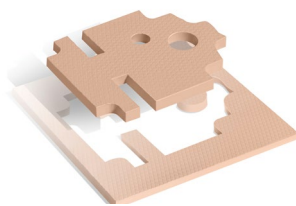
Thermal Interface Materials



Thermally Conductive Gap Filler Gels

Highly conformable, high performance fully cured single-component dispensable gap filler ideal for high volume automated dispense processes.

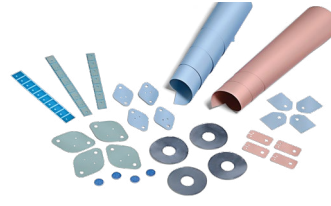
Typical Applications: Telematics, ECU's, EPAS, batteries



Thermally Conductive Gap Filler Pads

Low modulus thermally conductive gap pads offer ease of use, excellent thermal properties and highest conformability for low to moderate clamping force applications.

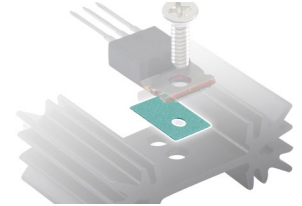
Typical Applications: A/V systems, ACC, braking, battery ECU's



Thermal Insulators

Available in several forms, these materials are designed for use where the highest possible thermal, dielectric and mechanical properties are required.

Typical Applications: Power train, lighting, braking, sensors, ECU's



Phase Change Materials

Designed to minimize the thermal resistance between power dissipating electronic components and heat sinks, provide superior long term reliability performance.

Typical Applications: ABS, braking, wipers, transmissions, batteries

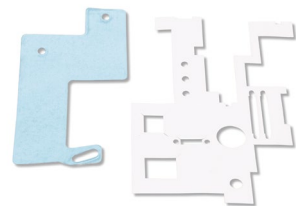
EMI Shielding & Grounding



Fabric Over Foam Gaskets

SOFT-SHIELD® EMI gasketing products bring new flexibility to shielding decisions. They offer material choices, performance levels, configurations and attachment methods.

Typical Applications: Telematics, ITE, Medical, Commercial



Laminates and Grounding Products

Mechanical, electrical and processing properties plus economy for commercial applications.

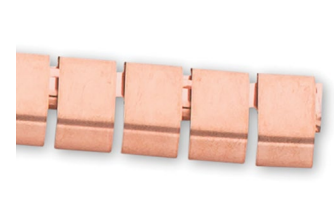
Typical Applications: EMI Shields, Ground Planes, Ground Straps, ESD Shields



Wire and Expanded Metal Gasketing

Metal-based gaskets solutions for Electromagnetic Interference (EMI) and Electromagnetic Pulse (EMP) shielding as well as lightning strike protection.

Typical Applications: Connectors, Cabinets, Military

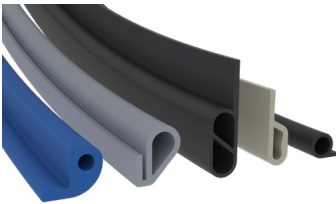


Beryllium Copper and Stainless Steel Gaskets

Beryllium-copper (BeCu) and stainless steel EMI gaskets (SPRING-LINE®) combine high levels of shielding effectiveness with a broad deflection range and low closure force properties.

Typical Applications: Cabinets, Enclosures, Commercial, Military

EMI Shielding Gaskets

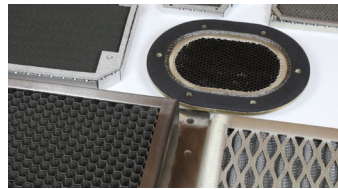


Elastomers

CHO-SEAL electrically conductive elastomer gaskets are the superior choice for corrosion resistance, environmental sealing, and cost-effective EMI shielding.

Typical Applications: EMI/RFI shielding, component and module caulking and sealing, ITE, medical

EMI Shielding Air Vents

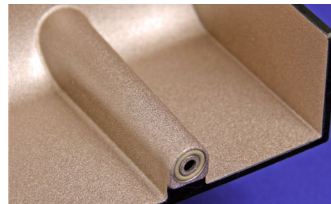


Air Ventilation Panels

Our custom-engineered EMI vent solutions are designed to meet the toughest electromagnetic compatibility (EMC) and environmental requirements.

Typical Applications: Data Centers, Military

Conductive Compounds



Specialty Materials

Offering a wide variety of adhesives, caulks, sealants and coatings.

Typical Applications: EMI/RFI Shielding, Component And Module Caulking And Sealing, ITE, Medical

Conductive Plastics



Conductive Plastics

Blend of thermoplastic and conductive fillers that provides world class shielding effectiveness and requires no machining, plating, painting or other added processing steps.

Typical Applications: ACC, Sensors, Batteries

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- Hudson, NH, USA
- Fairport, NY, USA
- Monterrey, Mexico
- High Wycombe, UK
- Frépillon, France
- Sadska, Czech Republic
- Kuala Lumpur, Malaysia
- Chennai, India
- Shanghai, China
- Shenzhen, China