CHO-VER SHIELD™ Covers

CHO-VER SHIELD
EMI Shielding Covers with Over-Molded Conductive Elastomer Gasket

CHO-VER SHIELD EMI shielding covers combine a slim-profile metal or metallized plastic substrate with a low-closure force conductive elastomer gasket over-molded directly onto the substrate. These custom configurations provide economical, easily-installed EMI shielding in cellular handsets, PCs and other high-volume production packages where minimal closure force is available.

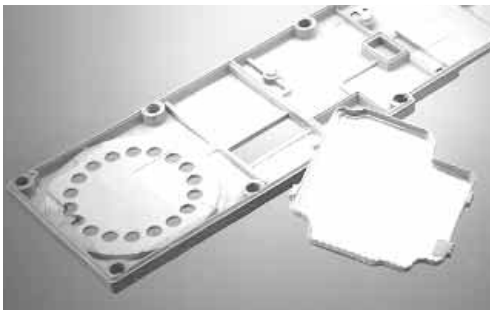
The capability to over-mold a conductive elastomer onto small flanges for consistent, high-quality, high-volume production parts is the result of technology advances pioneered by Chomerics. This capability includes simultaneous molding of the EMI gasket onto opposite sides of the cover.

The over-molded shielding gasket is CHO-SEAL® 1310, a silver-plated-glass filled conductive elastomer, typical properties for which are provided in Table 1, on page 2.

Ideal for High Volume Applications

The CHO-VER SHIELD technology is already providing a highly cost-effective shielding solution in such large-scale production applications as mobile handsets and handheld wireless devices, as well as mobile site equipment, microwave equipment and antennas.

CHO-VER SHIELD covers can be used to shield selected areas of printed circuit boards, eliminating the need to add conductive plating to exterior housing parts of electronic devices. Moreover, CHO-VER SHIELD covers provide an alternative to using solder-mounted metal cans as an EMI shield over components, with the added benefit of easy removal for PCB access during assembly or after testing.



Pins, holes and other locating features are routinely designed into CHO-VER SHIELD EMI covers for fast and precise installation. Both plastic and metal covers can be compartmentalized for shielding internal cross-talk.

Finite element analysis (FEA) is used for the efficient design of gasket cross sections that meet low closure force requirements (see discussion which follows). Interrupted bead gasket designs can lower closure force requirements further, while maintaining the required level of EMI shielding.

Choice of Plastic or Metal

CHO-VER SHIELD covers feature a choice of thermoplastic substrates shown in Table 2, with nickel-copper plating on interior surfaces. Metal CHO-VER SHIELD covers are ordinarily stamped from aluminum, magnesium or stainless steel sheets, as shown in Table 3.

Finite Element Analysis

Chomerics, a division of Parker Hannifin Corporation's Seal Group, is the headquarters of Parker Seal's Elastomer Simulation Group. This unit specializes in elastomer finite element analysis (FEA), using the MARC K6 Series software as a foundation for FEA capability.

Benefits of FEA include:

- Optimizing elastomer gasket designs
- Allowing accurate predictions of alternate design concepts
- Eliminating extensive trial and error prototype evaluation.

Figures 1a & b A typical use of FEA in designing molded gaskets is the evaluation of force and deflection needs for proposed designs. The FEA shown in Figure 1a below predicts the gasket's deflection characteristics and compression requirements. Results are plotted in 1b.

Figure 1a FEA Example of a CHO-VER SHIELD Custom Gasket Profile

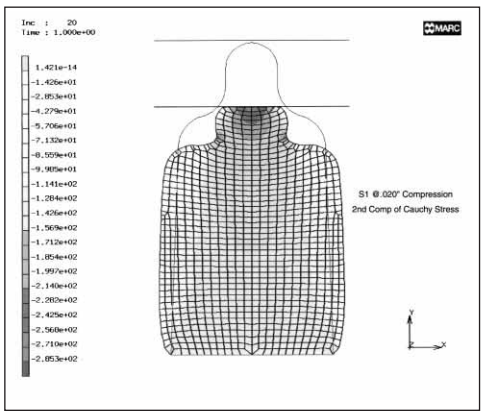


Figure 1b Compression-Deflection Curve Predicted by FEA

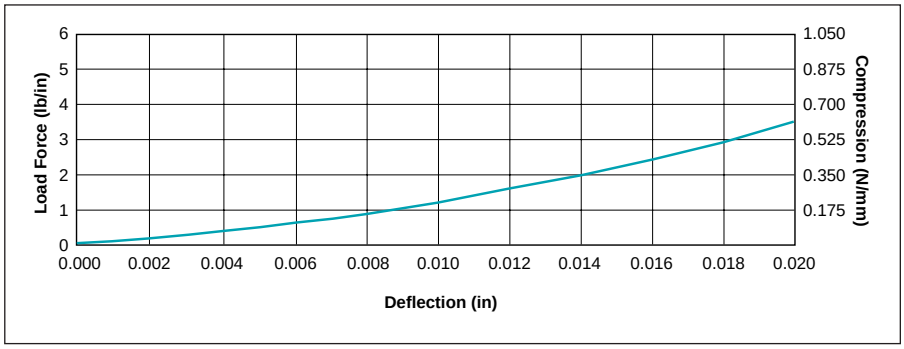


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Table 1

CHO-VER SHIELD COVERS ELASTOMER SPECIFICATIONS		
Property	**Test Procedure**	**CHO-SEAL 1310**
Elastomer Binder	—	Silicone
Conductive Filler	—	Ag/Glass
Volume Resistivity (ohm-cm), max	CEPS-0002*	0.01
Hardness (Shore A)	ASTM 2240	70 ±10
Specific Gravity	ASTM D792	1.8 ±0.25
Tensile Strength, psi, min. (MPa, min)	ASTM D412	200 (1.38)
Elongation, %, min.	ASTM D412	100
Compression Set, 70 hrs. @ 100°C. %, max.	ASTM D395 Method B	35
Shielding Effectiveness 100 MHz (E-Field) 500 MHz (E-Field) 2 GHz (Plane Wave) 10 GHz (Plane Wave)	CHO-TM-TP08*	 100 100 90 80
Volume Resistivity After Heat Aging, ohm-cm, max.	CEPS-0002*	0.01

*Copies of CHO-TM-TP08 (Shielding Effectiveness Test Method for EMI Gaskets) and CEPS-0002 are available from Chomerics

Table 2

TYPICAL PROPERTIES OF THERMOPLASTIC COVERS (without plating)				
Property	**Test Procedure**	**Vectra A130 LCP[1]**	**IXEF 1032 PAA[2]**	**ULTEM 1000 PEI[3]**
Tensile Strength, yield, Type 1, 0.125 inch (3.2 mm), psi (MPa)	ASTM D638	30,000 (207)	40,600 (280)	20,100 (139)
Tensile Elongation, break, Type 1, 0.125 inch (3.2 mm), %	ASTM D638	2.2	1.8	3.0
Flexural Strength, break, 0.125 inch (3.2 mm), psi (MPa)	ASTM D790	37,000 (254)	58,000 (400)	30,000 (207)
Flexural Modulus, 0.125 inch (3.2 mm), psi (MPa)	ASTM D790	2,100,000 (15,000)	3,050,000 (21,000)	900,000 (6,200)
Compression Strength, psi (MPa)	ASTM D695	20,000 (140)	NA	28,700 (198)
Compression Modulus, psi (MPa)	ASTM D695	1,700,000 (12,000)	NA	809,000 (5,575)
Izod Impact, notched, 73°F (23°C), ft-lb/in (J/m)	ASTM D256	2.8 (150)	2.25 (120)	1.6 (85)
HDT, 66 psi (0.45 MPa), 0.250 in., (6.4 mm), unannealed, °F (°C)	ASTM D648	489 (254)	446 (230)	410 (210)
Specific Gravity	ASTM D792	1.61	1.77	1.42
Volume Resistivity, ohm-cm	ASTM D257	10×10^{15}	2.0×10^{15}	70×10^{15}
UL 94V-0 Flame Class Rating, inch (mm)	UL 94	0.018 (0.45)	HB Rated	0.016 (0.40)
Limiting Oxygen Index (LOI), %	ASTM 2863	37	25	50

[1] Celanese AG
[2] Solvay SA
[3] General Electric Co. Note: ULTEM 1000 is used for low quantity prototyping only

Table 3

TYPICAL PROPERTIES OF METAL SUBSTRATES				
Property	**Test Procedure**	**Aluminum Die Casting**	**Thixo-Molded Magnesium**	**Stainless Steel**
Alloy Number		A380.0	AZ91D-F	316L
Tensile Strength, yield, psi (MPa)	0.2% offset	23,055 (159)	21,750 (150)	42,800 (295)
Elongation, %, break	in 50 mm	3.5	3	46
Modulus of Elasticity, ksi (GPa)	in tension	10,295 (71)	6,496 (44.8)	29,000 (200)
Fatigue Strength, psi (MPa)	R.R. Moore Test, 5E+8 cycles	20,010 (138)	14,065 (97)	NA
Shear Modulus, ksi (GPa)	—	3,843 (26.5)	2,465 (17)	NA
Electrical Resistivity, ohm-cm	—	0.0000064	0.000017	0.000000074
Density (g/cc)	—	2.76	1.81	NA

NA = Not Applicable Contact Chomerics regarding alternative metal substrates

Contact Chomerics' Applications Engineering to evaluate CHO-VER SHIELD Covers in your application.