

TECHNICAL SPECIFICATION

Conductive Elastomer Molded Gaskets



This category of items is in continuous evolution. The raw material from which it is made is the first component that must be analyzed in function of its application characteristics; it must fulfil the compromise between its compliance to the electromagnetic shielding and the mechanically operational purposes required.

The characteristics that define the choice of materials are:

- IP 65/66/67 sealing grade;
- minimum and maximum temperature;
- type of assembly: the compressibility of the material and its elastic recovery;
- number of pieces to be produced;
- the consequent choice of tools and equipment;
- the need for a sample for shielding trials;
- UL 94 fire resistance;
- EMP and Tempest requirements.

Electrically conductive gaskets profiles are composed of two components:

- Elastomer Binder
- Conductive filler

They can be manufactured in polymer base silicone, EPDM or fluorosilicone for resistance to oils, gasoline, etc...

Applications

Conductive silicone gaskets are utilized to obtain a combination of electromagnetic shielding and IP environmental sealing, also in critical situations.

Materials according to MIL-G-83528 for use in military and industrial field.

Provision

- Sheets;
- O-Rings;
- Flat gaskets cut with a CNC controlled machine according to client design;
- Gaskets molded according to client design.

1. Elastomer binder

Different type of elastomers can be use depending on the gasket application.

ELASTOMER BINDER		
Silicone	Fluorosilicone	EPDM
Excellent high and low temperature properties. Fair physical properties	Resistant to oils and solvents of fluorinated rubber. Good for special applications where general resistance to oxidizing chemicals, aromatic and chlorinated solvent bases are required	Excellent resistance to ozone and oxygen. The EPDM rubbers provide optimum performance to the action of oxidizing agents, both under static and dynamic conditions. Excellent resistance to aging due to weather conditions.

The following table illustrates the qualitative assessment of fluid resistance towards various fluids for silicone, fluorosilicone and EPDM.

Typical Elastomer Fluid Resistance			
Fluid	Silicone	Fluorosilicone	EPDM
High Temperature	Excellent	Good	Fair
Low Temp	Excellent	Excellent	Excellent
ASTM 1 Oil	Fair/Good	Good	Poor
Hydraulic Fluids (Phosphate Ester)	Poor	Poor	Poor
Hydrocarbon Fuels	Poor	Good	Excellent
Ozone, Weather	Good	Good	Good
STB (NBC Decontamination Fluid)	Poor	Fair/Good	Good
Dilute Acids	Fair	Good	Good

2. Conductive filler

According to the required shielding performances and the environmental conditions is possible to choose between different types of conductive filler:

- Pure Silver
- Silver-plated aluminum
- Silver-plated copper
- Silver-plated glass
- Nickel-plated graphite
- Carbon

FILLER	PROPERTIES
Pure Silver	Highest shielding effectiveness and conductivity performances. Comparatively higher cost.
Silver-plated aluminum	Good EMP resistance. The best conductive filler in terms of galvanic corrosion compatibility with aluminium alloy components/enclosures. Also very good high temperature performance.
Silver-plated copper	Superior performance in non-corrosive environments. Excellent conductivity, good current handling for EMP type events
Silver-plated glass	Moderate performance in non-corrosive environments; no corrosion or fluid resistance; General purpose, good high temperature performance
Nickel-plated graphite	Comparatively low cost, excellent high temperature resistance, very good electrical/shielding performance – particularly on surfaces with good electrical conductivity (e.g. stainless steel, zinc, heavy chromate finishes) Good performance in corrosive environments, optimal stability for long time. Available version with conductive reinforced fabric reinforced format Solemi composite NIC65: Superior Strength-Compared to alternative EMI/RFI shielding and sealing materials, Silver Like Conductivity (without silver pricing volatility and cost concerns).Produced only for flat gaskets;
Carbon	High tensile strength; no corrosion or fluid resistance. Low cost.

TYPICAL SHIELDING EFFECTIVENESS (dB)						
FREQUENCY	TEST METHOD	Silver Aluminum	Silver Aluminum-QPL	Silver Glass	Silver Copper	Nickel Graphite
100 KHz (H)	SAE ARP 1705	133		55	123	89
100 MHz (E)	MIL G 83528 B	125	131	95	130	125
400 MHz (E)	MIL G 83528 B	125	135	95	125	126
2 GHz (Plane Wave)	MIL G 83528 B	116	123	95	124	116
10 GHz (Plane Wave)	MIL G 83528 B	110	118	95	107	116

These are typical values, to know the specific values of the compounds mentioned in par. 5, please contact directly our technical department

3. Environmental Compatibility

FILLER TYPE	ENCLOSURE MATERIAL										
	Aluminium alloys	Magnesium Alloys	Stainless Steel	Copper Alloys	Cadmium plating	Tin Plating	Nickel Plating	Chromium plating	Silver Plating	Zinc Plated Galvanized Steel	Titanium
Pure Silver	×	×	●	●	×	□	●	●	●	×	●
Silver Aluminium	□	□	●	●	□	□	□	●	●	□	□
Silver Copper	×	×	●	●	×	×	□	●	●	×	●
Silver Glass	×	×	●	●	×	□	●	●	●	×	●
Nickel Graphite	□	□	●	●	□	●	●	●	●	□	●

- : Good
- : Satisfactory
- ×: Not Recommended

4. Standard dimensions for flat gaskets

For the products supplied in sheet, or flat gaskets cut with a CNC controlled machine according to client design, the following table includes the standard dimension.

SHEET SIZE (mm)	TOLERANCES (mm)	Area (cm ²)	TOLERANCES (%)	THICKNESS (mm)	TOLERANCES (mm)
160 x 160	+ 0 - 10	256	+0 – 13%	0.5	+ / - 0.1
270 x 330	+ 0 - 10	891	+0 – 7%	0.5	+ / - 0.1
340 x 280	+ 0 - 10	952	+0 – 7%	0.8	+ / - 0.2
340 x 280	+ 0 - 10	952	+0 – 7%	1	+/- 0.2
300 x 250	+ 0 - 10	750	+0 – 7%	1.57	+ / - 0.2
500x450	+ 0 - 10	2250	+0 – 7%	2	+ / - 0.2
300 x 300	+ 0 - 10	900	+0 – 7%	2.3	+ / - 0.2
310 x 310	+ 0 - 10	961	+0 – 7%	2.3	+ / - 0.2
500 x 450	+ 0 - 10	2250	+0 – 5%	3	+/- 0.25
350 x 350	+ 0 - 10	1225	+0 – 5%	3.6	+ / - 0.25
500 x 450	+ 0 - 10	2250	+0 – 5%	4	+/- 0.25
500 x 450	+ 0 - 10	2250	+0 – 5%	5	+/- 0.25

5. Elastomer Characteristics

Codice	Elastomer binder	Conductive filler	Color	Hardness (Shore A) +/-5 ASTM D2240	Specific Gravity (g/cm ³) +/-0,30 ASTM D792	Max Volume Resistivity (Ohm-cm) ASTM D991	Min Elongation (%) ASTM D412	Min Tensile PSI (PSI) ASTM D412	Min Tear B ppi (PPi) ASTM D624	Operating Temperature Range (°C)	Flammability rating
SOLEMI-AG60	Silicone	Silver	Tan	60,0	3,00	0,006	200,0	200,0	30,0	-60+220	N/A
SOLEMI-AG65	Silicone	Silver	Tan	65,0	3,00	0,006	200,0	200,0	30,0	-60+220	N/A
SOLEMI-AGAL65-MIL	Silicone	Silver Aluminium	Tan	65,0	2,05	0,001	100,0	200,0	30,0	-60+220	N/A
SOLEMI-AGAL65	Silicone	Silver Aluminium	Blue	65,0	2,00	0,008	100,0	150,0	30,0	-60+220	N/A
SOLEMI-AGAL65-C	Silicone	Silver Aluminium	Blue	65,0	2,05	0,008	100,0	150,0	30,0	-60+220	N/A
SOLEMI-AGAL40	Silicone	Silver Aluminium	Tan	40,0	1,90	0,010	300,0	200,0	30,0	-60+220	N/A
SOLEMI-AGAL40F	Fluorosilicone	Silver Aluminium	Tan	40,0	2,20	0,012	100,0	150,0	30,0	-60+220	N/A
SOLEMI-AGAL60F	Fluorosilicone	Silver Aluminium	Tan	60,0	2,12	0,012	100,0	150,0	30,0	-60+220	N/A
SOLEMI-AGAL70F-C	Fluorosilicone	Silver Aluminium	Tan	70,0	2,10	0,015	60,0	180,0	30,0	-60+220	N/A
SOLEMI-AGAL70F	Fluorosilicone	Silver Aluminium	Tan/Dark Blue	70,0	2,10	0,008	60,0	180,0	35,0	-60+220	N/A
SOLEMI-AGAL75F	Fluorosilicone	Silver Aluminium	Tan/Dark Blue	75,0	2,40	0,008	60,0	180,0	35,0	-60+220	N/A
SOLEMI-AGCU45	Silicone	Silver Copper	Tan	45,0	3,00	0,007	100,0	150,0	30,0	-60+220	N/A
SOLEMI-AGCU65	Silicone	Silver Copper	Tan	65,0	3,30	0,008	100,0	200,0	25,0	-60+220	N/A
SOLEMI-AGCU80	Silicone	Silver Copper	Tan	80,0	2,30	0,005	200,0	100,0	30,0	-55+160	N/A
SOLEMI-AGCU60F	Fluorosilicone	Silver Copper	Tan	60,0	3,30	0,008	200,0	100,0	30,0	-60+220	N/A
SOLEMI-AGGL40	Silicone	Silver Glass	Tan	40,0	1,80	0,050	100,0	150,0	30,0	-60+220	N/A

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SOLEMI-AGGL55	Silicone	Silver Glass	Tan	55,0	1,87	0,010	100,0	150,0	30,0	-60+220	N/A
SOLEMI-AGGL65	Silicone	Silver Glass	Tan	65,0	1,80	0,010	100,0	200,0	30,0	-60+220	N/A
SOLEMI-AGGL70	Silicone	Silver Glass	Tan	70,0	1,90	0,015	200,0	200,0	30,0	-60+220	N/A
SOLEMI-AGGL50F LC	Fluorosilicone	Silver Glass	Tan	50,0	2,03	0,050	100,0	150,0	30,0	-60+220	N/A
SOLEMI-AGGL50F	Fluorosilicone	Silver Glass	Tan	50,0	2,03	0,010	100,0	150,0	30,0	-60+220	N/A
SOLEMI-AGGL70F	Fluorosilicone	Silver Glass	Tan	70,0	2,10	0,010	150,0	150,0	30,0	-60+220	N/A
SOLEMI-NIC40	Silicone	Nickel Graphite	Gray	40,0	1,85	0,100	250,0	150,0	25,0	-60+220	N/A
SOLEMI-NIC50	Silicone	Nickel Graphite	Gray	50,0	1,90	0,100	200,0	150,0	25,0	-55+160	N/A
SOLEMI-NIC50UL	Silicone	Nickel Graphite	Gray	50,0	2,00	0,100	200,0	150,0	50,0	-50+200	UL 94-V0
SOLEMI-NIC60UL	Silicone	Nickel Graphite	Gray	60,0	2,00	0,100	100,0	150,0	50,0	-60+220	UL 94-V0
SOLEMI-NIC60	Silicone	Nickel Graphite	Gray	60,0	2,08	0,100	100,0	150,0	50,0	-60+220	N/A
SOLEMI-NIC45F	Fluorosilicone	Nickel Graphite	Dark Gray	45,0	2,30	0,100	200,0	100,0	25,0	-60+220	0,0
SOLEMI-NIC50F	Fluorosilicone	Nickel Graphite	Dark Gray	50,0	2,13	0,100	200,0	100,0	25,0	-60+220	N/A
SOLEMI-NIC65F	Fluorosilicone	Nickel Graphite	Dark Gray	65,0	2,20	0,100	180,0	200,0	35,0	-55+200	N/A
SOLEMI-NIC80F	Fluorosilicone	Nickel Graphite	Dark Gray	80,0	2,37	0,100	100,0	200,0	50,0	-60+220	N/A
SOLEMI-NIC75EPDM	EPDM	Nickel Graphite	Black	75,0	1,50	0,100	200,0	150,0	70,0	-45+150	N/A
SOLEMI-CARBON60	Silicone	Carbon	Black	60,0	1,13	10,000	200,0	400,0	70,0	-55+160	N/A
SOLEMI-CARBON70	Silicone	Carbon	Black	70,0	1,20	5,000	150,0	400,0	40,0	-55+160	N/A

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