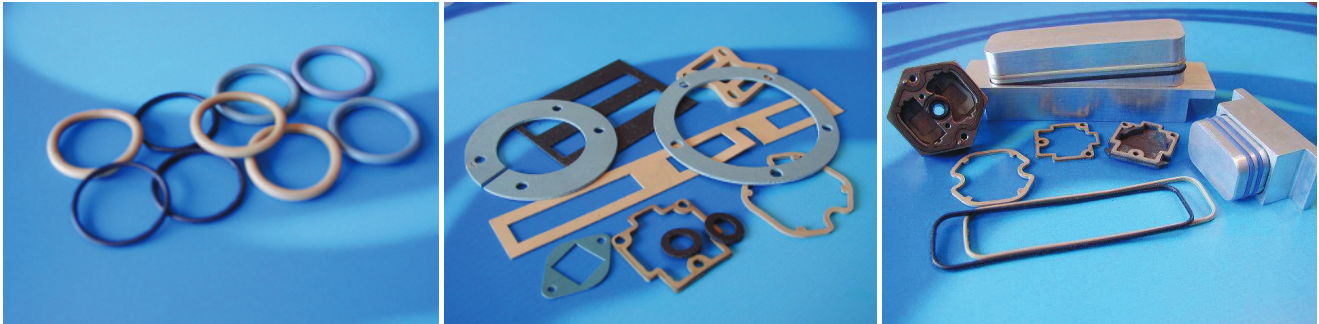


TECHNICAL SPECIFICATION

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/cm3) +/-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 |

Table 1: Elastomer Characteristics