GETELEC

We protect your electronics

OUR SOLUTIONS FOR TRANSPORT INDUSTRY

www.getelec.com

INTRODUCTION

Combining more than 50 years of experience in EMC shielding, heat dissipation and environmental sealing solutions, GETELEC teams design and manufacture innovative solutions dedicated to the transport industry.

The complexity of this sector requires specific knowledge of the various types of infrastructure, both for rolling stock and for railway signalling. Today, the transport sector represents a strategic activity where each player tries to strengthen itself.

GETELEC provides a Research and Development team which, thanks to daily technological monitoring, designs new microwave shielding, thermal dissipation and environmental sealing solutions that meet the requirements of the EN 45545-2 standard.

EMBEDDED SYSTEMS

On-board systems in rail transport are numerous and indispensable. Often faced with problems related to corrosion, humidity and electromagnetic compatibility.

GETELEC develops conductive mixtures to guarantee an EMC shielding adapted to your environment as well as specific solutions for heat dissipation.

ROLLING STOCK

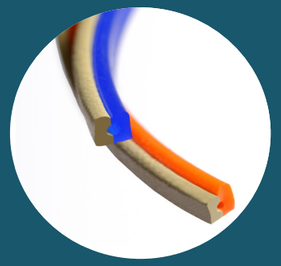
Rolling stock is exposed to harsh environments that present design challenges to engineers.

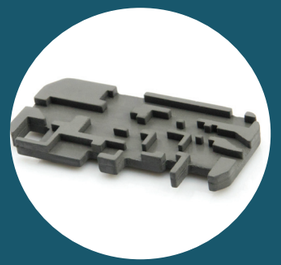
By enriching its range of conductive mixtures and environmental sealing elastomers, GETELEC is able to help the market players

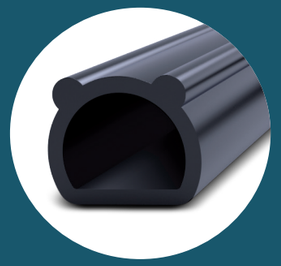
SIGNALLING

The regulation of rail traffic is ensured by signalling systems controlled by power electronics located throughout the CBTC network.

The flow of information generated by these systems must not be impeded by electromagnetic interference. The use of an EMC shielding seal is necessary to ensure proper operation of the systems.







RANGE OF PRODUITS

EMC CONDUCTIVE SILICONE GASKETS

GETELEC develops its own conductive mixes that meet the requirements of standards MIL G 83528, MIL STD 285, GAM EG-13 and EN 455-45-2. Our EMC experts are at your disposal to help you define your projects. All these seals are available as moulded seals, cut flat seals, extruded seals and overmoulded seals.

Shielding efficiency from 80 dB to 140 dB (Frequencies 20 MHz – 10 GHz)

ANTI-CORROSION BI-MATERIAL EMC GASKETS

Bi-material seals are an effective solution to the corrosion problems encountered when using conductive seals in contact with various electrolytic agents, salt spray or acidic media. Composed of a conductive silicone and an environmental sealing silicone, all combined into a single seal by a co-extrusion principle, they are a net benefit in terms of space in your equipment.

Volume resistivity from 0.016 Ω.cm to 2.7 Ω.cm
Shielding efficiency from 80 dB to 140 dB (Frequencies 20 MHz - 10GHz)

MICROWAVE ABSORBERS

The range of microwave absorbers consists of flexible silicone materials filled with magnetic particles. These materials provide excellent performance over given frequency bands, with attenuation of more than 20 dB of the incident wave.

Our laboratory has developed several formulations composed of rigid Epoxy-type microwave absorbers, flexible microwave absorbers made with silicone or foams of different thicknesses.

Absorption natural frequency range from 1 GHz to 40 GHz.

THERMALLY CONDUCTIVE PADS

Positioned between the power component and the cooler, thermal pads are designed to optimize the heat dissipation and thus reduce the thermal resistance of your equipment.

Our comprehensive range consists of ultra-flexible thermal pad, thermally conductive electrical insulators and electrically and thermally conductive silicones.

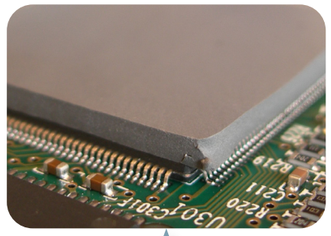
The thermal conductivity of our products is between 1 and 8.5 W/m.K.

ENVIRONMENTAL SEALING SILICONE

GETELEC formulates its own silicone mixes. This mastery allows us to define the ideal material according to your equipment and your specifications, in order to offer you a tailor-made insulating solution adapted to your needs.

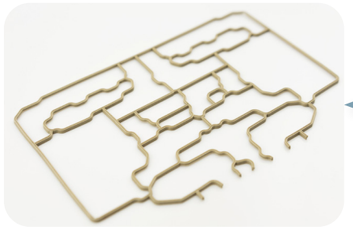
The use of specific silicone grades allows us to offer a complete range of silicones, fluorosilicones, foams and EPDM products available in **hardness ratings between 20 and 90 Shore A.**

APPLICATIONS FOR TRANSPORT INDUSTRY



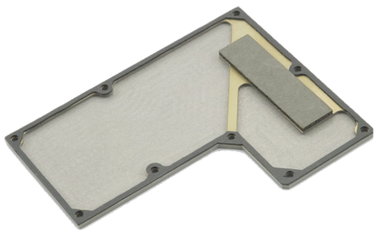
Thermal pad for heat dissipation

Thermal conductivity : 8.5W/m.K



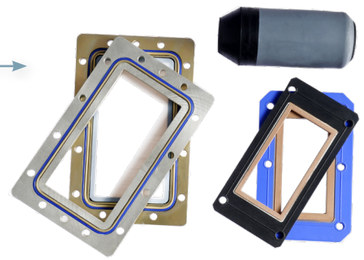
EMI Shielding gasket for electronic module

Conductive silicone filled silver-plated Aluminum : Attenuation up to 140 dB



Environmental sealing gasket molded on mechanical for signalling beacon

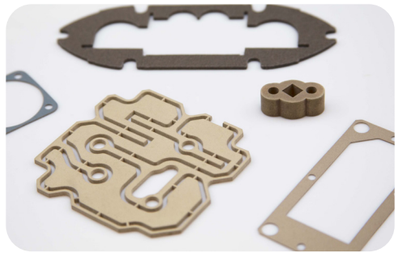
Anti-corrosion conductive silicone gaskets for waveguide flange (EMI Shielding)



EMC CONDUCTIVE SILICONE GASKETS

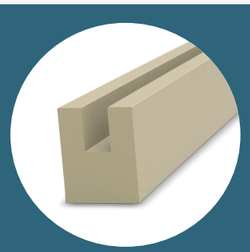
Our conductive elastomers are developed in every respect by our chemical engineers. From the selection of raw materials to the final transformation, they create specific formulations for each request and master all the development processes and procedures.

This mastery allows us to define the ideal material according to your equipment and your specifications, in order to offer you a bespoke conductive solution adapted to your needs.

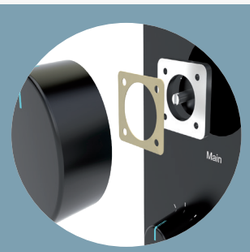


Properties	Standards	GT 1000	GT 5000	GT 3100	BL 10000
Type MIL G 83528		K	B		
Elastomer		Silicone	Silicone	Silicone	Silicone
Conductive filler		Silver-plated copper	Silver-plated aluminum	Nickel graphite	Carbon
Volume resistivity Ω.cm	MIL G 83528	< 0.005	< 0.0054	< 0.10	2.7
Hardness Shore A	ASTM D 2240	82	65	65	70
Density g/cm^3	ASTM D 792 Method A	3.40	1.90	2	1.22
Elongation at break (Mpa)	ASTM D 412 Method A C	2.80	1.89	1.37	4.41
Residual deformation after compression 70 hours at 100°C (%)	ASTM D 395 Method B	17.50	17.30	40	18
Working temperature (°C)		-55 °C to +125°C	-55 °C to +160°C	-55 °C to +160°C	-55 °C to +125°C
Shielding performance 20 MHz 100 MHz 500 MHz 2 GHz 10 GHz		 130 dB 140 dB 120 dB 120 dB 120 dB	 128 dB 137 dB 133 dB 122 dB 104 dB	 100 dB 100 dB 100 dB 100 dB 100 dB	 60 dB 105 dB 105 dB 105 dB 105 dB

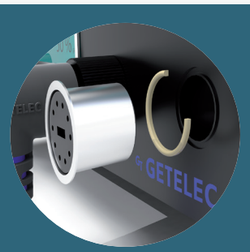
AVAILABLE FORMATS :



Extruded

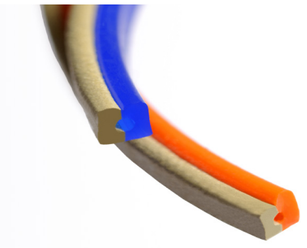


Cut



Molded

ANTI-CORROSION BI-MATERIAL EMC GASKETS



Bi-material EMC seals are an effective solution to the corrosion problems encountered when using conductive seals in contact with various electrolytic agents, salt spray and other acidic media. Our solutions are based on a bi-material seal consisting of a conductive part and an insulating part, combined into a single seal by means of a co-extrusion principle.

By separating the microwave shielding function from the environmental sealing function, the seal is more resistant to extreme environments, while the life of a single-material seal would be shorter.

Properties	Standards	GT 1040	GT 1060	GT 5040	GT 5060
Elastomer		Silicone	Silicone	Silicone	Silicone
Conductive filler		Silver-plated copper		Silver-plated aluminum	
Volume resistivity Ω.cm	MIL G 83528	< 0.005		< 0.0054	
Hardness Shore A ± 7	ASTM D 2240	82		65	
Density g/cm^3	ASTM D 7992 Method A	3.40		1.90	
Break resistance (Mpa)	ASTM D 412 Method AC	2.20		1.89	
Tear strength (Kg/cm)	ASTM D 624 Method C	13.70		8.60	
Residual deformation after compression 70 hours at 100°C (%)	ASTM D 395 Method B	17.50		17.30	
Shielding performance 20 MHz 100 MHz 500 MHz 2 GHz 10 GHz		 130 dB 140 dB 120 dB 120 dB 120 dB		 128 dB 137 dB 133 dB 122 dB 104 dB	
Working temperature (°C)		-55°C to +125°C		-55°C to+160°C	
Environmental sealing silicone part					
Density g/cm^3	ASTM D 792	1.10	1.27	1.10	1.27
Hardness shore A ± 7	ASTM D 2240	40	60	40	60
Tensile strength Psi Mpa	ASTM D 412	 1000 6.80	 950 6.55	 1000 6.80	 950 6.55
Elongation (%)	ASTM D 412	500	300	500	300
Residual deformation after compression 70 hours at 100°C (%)	ASTM D 395 Method B	30	33	30	33

All these products are available in fluorinated version on request.

AVAILABLE FORMATS :

Extruded

Molded

Cut

MICROWAVE ABSORBERS

Flexible silicone microwave absorbers :

Our GT602 range of microwave absorbers have narrow-band performance but also high power-density performance (>1 W/cm2) allowing them to be positioned on high-power antennas or equipment.The homogeneity of the mixture is ensured by a complex system developed by Getelec

Our entire product range is available in sheet form or custom cut pieces.

Attenuation Guide

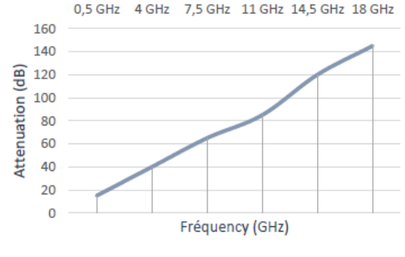
Attenuation	Percentage absorption
- 5 dB	68.38 %
-10 dB	90.00 %
-15 dB	96.84 %
-20 dB	99.00 %
-40 dB	99.99 %

Getelec reference material	Thickness (mm)	Resonance frequency
GT 602 R90	4.5	1 GHz
GT 602 R90	3.2	2 GHz
GT 602 R90	2.4	3 GHz
GT 602 R90	2.2	4 GHz
GT 602 R88	2	5 GHz
GT 602 R85	2	6 GHz
GT 602 R85	1.8	7 GHz
GT 602 R85	1.6	8 GHz
GT 602 R85	1.5	9 GHz
GT 602 R85	1.3	10 GHz
GT 602 R74	1.7	11 GHz
GT 602 R71	1.6	12 GHz
GT 602 R71	1.5	13 GHz
GT 602 R71	1.45	14 GHz
GT 602 R71	1.4	15 GHz
GT 602 R71	1.3	16 GHz
GT 602 R65	1.2	17 GHz
GT 602 R65	1.15	18 GHz
GT 602 R64	1.1	24 GHz
GT 602 R63	0.95	28 GHz
GT 602 R62	1.1	35 GHz

Sheets or finished parts are available with or without adhesive on request.

Rigid microwave absorbers | Epoxy

Properties	Standards	GT 502
Material		Epoxy
Hardness shore D	ASTM D 2240	95
Density g/cm3	ASTM D 792 Method A	4.57
Tensile strength Mpa	NF EN ISO 527-1	56
Elongation at break %	NF EN ISO 527-1	2.4
Working temperature °C		-180 °C to+ 200°C



THERMALLY CONDUCTIVE PADS

Our range of thermal pad includes highly conductive products ideal for applications requiring high thermal conductivity. The specific formulations developed by our laboratory give these silicone elastomers exceptional thermal conductivity.

Thanks to their great flexibility and ease of installation, they adapt to the surface irregularities between the power component and the cooler, thus promoting heat dissipation and protecting your equipment.

Thermal conductivity	Hardness Shore 00	Thickness mm	Flame retardant	RoHs	Working temperature (°C)	Density g/cm3	Elongation %	Thermal conductivity W/m.k	Dielectric strength kV/mm	Breakdown voltage kV/mm	Volume resistivity Ω.m	Dielectric constant @1Mhz	Dissipation factor @1MHz
Standards	**ASTM D2240**		**UL 94**			**ASTM D792**	**ASTM D412**	**ASTM D 7984 Modified transient plane source(MTPS)**	**ASTM D149**	**ASTM D149**	**ASTM D257**	**ASTM D150**	**ASTM D150**
1 W/m.K	40 ± 5	0.5 to 20 mm	V0	Yes	-60°C to +200°C	2.6	< 200	1 ± 0.1	11	17	10^{13}	4	0.006
	45 ± 5							1.3 ± 0.1	5	18			
	60 ± 5						200	1 ± 0.1	11	17			
	75 ± 5												
	85 ± 5												
2 W/m.K	40 ± 5	0.5 to 20 mm	V0	Yes	-45 °C to +200°C	2.7	< 100	2 ± 0.1	14	17	10^{12}	4.2	0.005
	50 ± 5					2.75		2.5 ± 0.1	18	16			
	60 ± 5					2.7	100	2 ± 0.1	14	17			
	75 ± 5												
	85 ± 5												
3 W/m.K	35 ± 5	0.5 to 20 mm	V0	Yes	-40°C to + 200 °C	2.9	< 100	3 ± 0.1	11	15	10^{11}	5.5	0.005
	40 ± 5												
	50 ± 5					2.95		3.5 ± 0.1					
	60 ± 5					2.9	100	3 ± 0.1					
	75 ± 5												
	85 ± 5												
4 W/m.K	40 ± 5	0.5 to 20 mm	V0	Yes	-40°C to + 200 °C	3.09	< 100	4 ± 0.1	16	18	10^{11}	7	0.008
	60 ± 5						100						
	75 ± 5												
	85 ± 5												
5 W/m.K	40 ± 5	0.5 to 20 mm	V0	Yes	-40°C to +200°C	3.12	< 50	5 ± 0.1	15	18	10^{11}	7.5	0.006
	60 ± 5						50						
	70 ± 5												
	85 ± 5												
6 W/m.K	40 ± 5	0.8 to 20 mm	V0	Yes	-40°C to +200°C	3.23	< 50	6 ± 0.1	14	17	10^{11}	8.1	0.007
	55 ± 5						50						
	75 ± 5												
	85 ± 5												
7.5 W/m.K	35 (-5 +20)	0.8 to 20 mm	V0	Yes	-40°C to +200°C	3.23	< 40	7.5 ± 0.1	10	16	10^{11}	7.9	0.013
	60 (-5 +20)												
8 W/m.K	65 ± 5	1 to 20 mm	V0	Yes	-40°C to 200°C	3.3	< 30	8 ± 0.1	8	14	10^{11}	7	0.02
	80 ± 5	1.5 to 10 mm	V0	Yes	-40 °C to +150°C	3.02	> 20	8.6 ± 0.1	11	17	10^{11}	8.1	0.014

ENVIRONMENTAL SEALING SILICONE

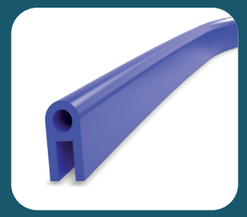
Using specific silicone grades, forming the basis of our formulations, has allowed us to develop two main product families: Fluorinated silicones and non-fluorinated silicones, within our complete range of environmental sealing silicones.

Fluorosilicone : FVMQ type (ASTM D1418), these elastomers offer excellent resistance to solvents, fuels, organic oils and silicone oils, while maintaining their mechanical properties over a wide range of temperatures (-60°C to + 230°C).

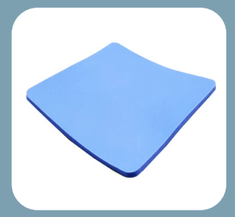
Silicone : Of the VMQ type (ASTM D 1418), these elastomers allow the production of molded parts, extruded, flat seals cut or adhesively vulcanized. They retain their mechanical properties over a wide range of temperatures (-73°C to + 232°C).

Properties	Standards	GT 20	GT 40	GT 47	GT 50	GT 57	GT 60	GT 67	GT 70	GT 77
Elastomer		Silicone	Silicone	Fluoro-silicone	Silicone	Fluoro-silicone	Silicone	Fluoro-silicone	Silicone	Fluoro-silicone
Hardness shore A ±5	ASTM D 2240	25	40	40	50	50	60	60	70	70
Specific mass at 25°C (g/cm3)	ASTM D 792	1.10	1.10	1.43	1.19	1.44	1.27	1.46	1.35	1.48
Tensile strength PSI MPa	ASTM D 412	870 6	1000 6.80	1250 8.60	980 6.75	1200 8.45	950 6.55	1200 8.30	1000 6.89	1250 8.60
Elongation (%)	ASTM D 412	950	500	400	380	350	300	300	180	300
Residual deformation after 22 hours at 177°C (%)	ASTM D 395 Method B	20	30	20	32	25	33	25	34	25

AVAILABLE FORMATS :



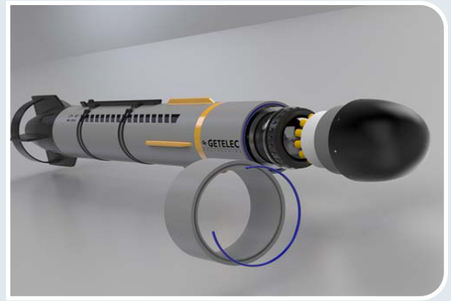
Extruded



Cut

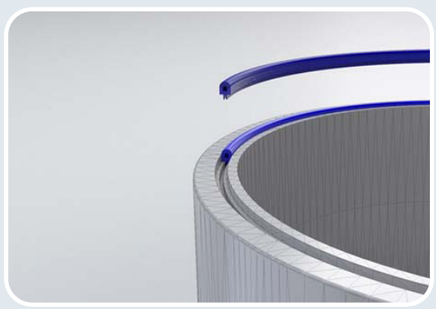
Molded

TECHNICAL SEALING EXPERTISE



Requirements analysis

Our engineers help you to specify the product and develop a diagnostic, based on your requirements. Wether it is an extruded seal or a technical moulded item, our experts will use their know-how to guide you through design and production.



R&D : Formulation and processing

Our in-house control of elastomer formulations enables us to provide our customers with bespoke solutions, maintenaining great responsiveness to customer requirements. Thanks to our team of chemical engineers and extensive range of machinery, we are very flexible, able to find the right choice of materials and process to meet your technical requirements.

Tooling design

Our technical team determines and designs tools adapted to your projects. This in-house expertise allows us to offer your a turnkey solution, and support you throughout the duration of your project.

THEY TRUSTED US :

ALSTOM

SIEMENS

THALES

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MADE IN FRANCE