

# Functions & applications

## BLUESIL™ PASTES & GREASES

	FUNCTION	APPLICATION	Pastes				Resin
			Paste 4	Paste B431	Paste 90	Paste 340	Resin 991
POTTING	Removable	Electronic devices protection	❖	❖	❖		
	Heat transfer	Resistors, Heat emitting components, ...				❖	
SEALING	Removable	Electronic boxes	❖	❖	❖		
CONFORMAL COATING	Protection	PCB coating					❖



## CONFORMAL COATING

Remarkable spreadability associated with excellent thermal stability of Bluesil™ Silicone resins make them excellent candidates for protection of printed circuit boards and electronics components. Outstanding resistance to climatic and ageing agents also ensure long term protection efficiency.

## CAF® & BLUESIL™

FUNCTION	EXAMPLES OF APPLICATION	BLUESIL™ ESA					CAF®			
		RTV-2 PA					RTV-1 PC			
		ESA 7230 A & B	ESA 7233 A & B	ESA 7244 A & B	ESA 7250 A & B	ESA 7252 A & B	ESA 6024 A & B	CAF® 530	CAF® 2 fluid	CAF® ox 2000
POTTING	Standard (including fire resistant)	CPU (*)			❖	❖	❖			
		PCB (**)			❖	❖	❖			
		Actuator			❖	❖	❖			
		Sensor			❖	❖	❖			
	Vibration damping	CPU, Sensors, ...			❖	❖	❖			❖
	Optically clear	LED and lighting devices			❖					
	Heat transfer	Resistors, Heat emitting components, ...				❖				
ENCAPSULATION	Standard (including fire resistant)	Electronic components	❖	❖	❖		❖	❖	❖	
		Circuit and terminal protection	❖	❖	❖		❖	❖	❖	
		Connectors	❖	❖	❖		❖	❖	❖	
		Soldered connections	❖	❖	❖		❖	❖	❖	
SEALING & BONDING	Standard (including fire resistant)	Fixture of PCB	❖				❖			
		Antivibrating dots on PCB					❖			
		Electronic boxes sealing plastics/metal	❖		❖		❖			
		Lighting devices (Head Lamps, etc ...)					❖			

(\*) CPU = Central Processing Unit

(\*\*) PCB = Printed Circuit Board

(\*\*\*) LED = Light-Emitting Diode

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# Silicones Solutions for On Board Electronics

Silicone materials ensure that electrical and sensitive electronic components work in a safe and reliable way. They are used in automotive, aerospace, consumer electronics, solar, lighting with a wide variety of functions: protection against environment, bonding and sealing. Bluestar Silicones propose a range of specific products for conformal coating, potting, encapsulating, sealing, bonding and thermal conduction.



## POTTING & ENCAPSULATING

Bluestar Silicones offers a broad range of silicone rubbers and gels within the range of CAF® RTV-1 and Bluesil™ ESA RTV-2, which are recommended in electronic applications to ensure mechanical and environmental protection. Their acceptance is due to several factors including their excellent dielectric properties, mechanical strength, damping properties, moisture resistance, excellent adhesion properties, flame resistance or optical clarity.

## SEALING & BONDING

Silicone materials are widely used in electronic applications for bonding components and sealing against environmental contaminants as they can maintain their physical and electrical properties over a wide range of temperature, moisture and other harsh environments. Bluestar Silicones offers a range of silicone adhesives with CAF® RTV-1 and Bluesil™ ESA RTV-2 which provide self-adhesion to many metals, ceramic, glass and plastics. These solutions are excellent candidates for assembly applications on or near to sensitive electrical and electronic components as they do not release any corrosive by products.

## BENEFITS BLUESIL™ ESA

- ◆ Excellent deep-section cure with no released by-products
- ◆ Primerless system designed to bond to most plastics and metals
- ◆ Wide temperature stability range
- ◆ Reversion resistance
- ◆ Corrosion resistance
- ◆ Excellent dielectric properties
- ◆ Certain grades with thermal conductivity
- ◆ Wide range of hardnesses, from gels to 55 Shore A.

		RTV-2 PA				
		ESA 7230 A&B	ESA 7233 A&B	ESA 7244 A&B	ESA 7250 A&B	ESA 7252 A&B
<b>PROCESS</b>	<b>Main characteristics</b>	High adhesion metal & plastics	UL 94 V0 (3mm), high thermal stability	High adhesion metal & plastics, FV1 (3mm)	Optically clear, UL 94 HB (1mm)	UL 94 V0 (3.4mm); good thermal conductivity
	<b>Color</b>	Translucent	Red	Blue	Transparent	Black
	<b>Specific gravity at 25°C<sup>(1)</sup></b>	1.0	1.1	1.25	1.02	1.4
	<b>Viscosity (mPa.s)<sup>(2)</sup></b>	40,000	20,000	60,000	4,000	6,000
	<b>Ratio</b>	10:1	1:1	1:1	10:1	1:1
	<b>Pot-life</b>	16h	20 days	16h	4h	90min
	<b>Cure temperature</b>	1min 150°C	1h 150°C	1min 150°C	1h 150°C	5min 150°C
	<b>Extrusion (g/min)<sup>(3)</sup></b>	nc	nc	nc	nc	nc
	<b>Skin formation time (min)<sup>(4)</sup></b>	nc	nc	nc	nc	nc
	<b>Cured thickness after 24 h (mm)<sup>(4)</sup></b>	nc	nc	nc	nc	nc
<b>MECHANICAL PROPERTIES</b>	<b>Shore A hardness for 6 mm thick section (points)<sup>(5)</sup></b>	31	35	50	52	48
	<b>Penetration (1/10mm)<sup>(6)</sup></b>	nc	nc	nc	nc	nc
	<b>Tensile strength (MPa)<sup>(6)</sup></b>	3.2	5	5.5	6.2	2.3
	<b>Tear strength (kN/m)<sup>(7)</sup></b>	8	10	16	4	5
	<b>Adhesion</b>	100% CF metal, plastics, glass	100% CF glass	100% CF metal, plastics, glass	100% CF glass	100% CF glass
<b>DIELECTRIC PROPERTIES</b>	<b>Dielectric strength (kV/mm)<sup>(9)</sup></b>	19	20	19	20	18
	<b>Dielectric constant @ 1kHz<sup>(10)</sup></b>	2.7	3.3	2.9	2.7	3.2
	<b>Power factor @ 1kHz<sup>(10)</sup></b>	1 E-3	1 E-3	3 E-3	1 E-3	5 E-3
	<b>Volume resistivity (Ω.cm)<sup>(11)</sup></b>	1 E+15	1 E+15	1.5 E+15	1 E+15	8 E+13
<b>THERMAL PROPERTIES</b>	<b>Thermal conductivity @ 25°C (W/m.K)</b>	0.17	0.2	0.4	0.16	0.42
	<b>Minimum service temperature (°C)</b>	-60	-60	-60	-70	-60
	<b>Maximum service temperature in continu, 1,000 h (°C)</b>	180	250	180	180	180
	<b>Maximum service temperature in pic, 72 h (°C)</b>	200	300	200	200	200
<b>FLAME RETARDANCY</b>	<b>UL 94</b>	HB	V0 Equivalent	V1 Equivalent	HB	V0
<b>STORAGE</b>	<b>Shelf life from the production date (months)</b>	12	12	12	24	20

(1) ISO R 1183, DIN 53479, NM 703; (2) Brookfield NF T 76105, ASTM D 445; (3) NM 495 A 3 mm / 3 bars; (4) Temp 23°C, relative humidity 50%; (5) ISO R 868, DIN 53505, ASTM D 2240, BS 903 (A7), NF T 46003, NM 471; (6) ISO R 37 (H2), DIN 53504, ASTM D 412, BS 903 (A2), NF T 46002 (H2), NM 470; (7) ASTM D 624 éprouvette A, NM 492; (8) DIN ISO 2137 (150g hollow cone); (9) NFC 26225, ASTM D 419, IEC 60 243; (10) NFC 26230, ASTM D 150, IEC 60 250; (11) NFC 26215, ASTM D 257, IEC 60 093; nc: non concerned

## OPTICALLY CLEAR POTTING

High transparency in the UV-visible wavelength associated with outstanding optical stability make Bluesil™ ESA 7250 A&B an excellent candidate for encapsulation of a variety of LED (Light Emitting Diodes) device designs. It's optical clarity and stable properties upon exposure to heat and moisture make Bluesil™ ESA 7250 A&B an excellent choice for LED applications.



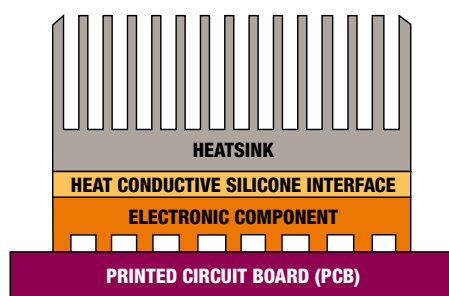
	CAF®		
Gel PA	RTV-1 PC		
ESA 6024 A&B	CAF® 530	CAF® 2 fluide	CAF® ox 2000
Self-adhesive, high damping, low extractables, low viscosity	High adhesion metal & plastics, thixotropic, non corrosive	Self-levelling, self-adhesive gel type	Self-levelling, self-adhesive,
Blue	White, black, grey	Translucent	Translucent
0.97	1.3	1.0	0.97
1,300	nc	30,000	10,000
1:1	nc	nc	nc
90min	nc	nc	nc
24h 23°C	nc	nc	nc
nc	130	nc	nc
nc	15	12	60
nc	3.5	3	5.2
-	34	18	0
300	nc	nc	nc
-	3.3	0.7	0.64
-	15	1.8	-
Tacky	100% CF metal, plastics, glass	100% CF metal, plastics, glass	Tacky
23	19	20	23
2.8	3.0	2.9	2.8
1 E-3	4 E-3	1 E-3	1 E-3
1 E+15	2 E+15	1 E+15	1 E+15
-	0.3	0.2	-
-40	-60	-50	-55
150	150	150	150
180	185	250	180
HB pending	HB	HB	HB Equivalent
24	12	10	10

## THERMAL CONDUCTION

Electronic components are generating more and more heat. Miniaturization is increasing the need for extracting this heat outside of the electronic device.

Bluestar Silicones offer a range of Bluesil™ ESA RTV-2 elastomers and Bluesil™ Pastes providing:

- ◆ High heat conductivity;
- ◆ Very high heat stability;
- ◆ Exceptional resistance to ageing factors: UV rays, ozone, corona effect, salt fog in hot and wet conditions;
- ◆ Excellent fire resistance, low smoke emissions, non toxicity of residues.



BLUESIL™ PASTE & RESINS	Pastes				Resin
	Paste 4	Paste B431	Paste 90	Paste 340	Resin 991
<b>Main characteristics</b>	Water repellency	Fluid potting	Potting	Thermal conductive	Conformal coating
<b>Color</b>	Tranluscent to whitish	Tranluscent to whitish	Tranluscent to whitish	White	Pale straw yellow
<b>Specific gravity at 25°C</b>	1.0	1.1	1.0	2.2	1.03
<b>Worked penetration (mm/10) <sup>(1)</sup></b>	260	360	330	280	Viscosity: 175 mm <sup>2</sup> /s
<b>Rested penetration (mm/10) <sup>(1)</sup></b>	200	-	320	270	Dry matter content: 50%
<b>Exudation (%) <sup>(2)</sup></b>	<6	-	<1	<1.5	nc
<b>Evaporation (%) <sup>(2)</sup></b>	<2	<3	<1	<1.5	nc
<b>Drip point (°C) <sup>(3)</sup></b>	-	-	>250	-	nc
<b>Service temperatures (°C)</b>	-40 to +200	-60 to +200	-50 to +200	-40 to +200	-20 to +200 *
<b>Thermal conductivity @ 25°C (W/mK)</b>	0.21	0.25	-	0.52	nc
<b>Dielectric strength (kV/mm) <sup>(4)</sup></b>	20	20	-	15	80
<b>Dielectric constant @ 1kHz <sup>(5)</sup></b>	2.6	2.6	-	3.5	2.7 (100Hz)
<b>Power factor @ 1kHz <sup>(5)</sup></b>	5 E-4	2 E-3	-	5 E-3	1 E-3 (100Hz)
<b>Volume resistivity (Ω.cm) <sup>(6)</sup></b>	1 E13	1 E13	-	1 E13	1 E14
<b>STORAGE Shelf life from the production date (months)</b>	36	36	36	18	12

(1) NF T 6012, ASTM D 217, DIN 51804; (2) after 24h at 200°C; (3) ASTM D 566; (4) NF C 26225 - ASTM D 419 - IEC 60 243; (5) NF C 26230 - ASTM D 150 - IEC 60 250; (6) NF C 26215 - ASTM D 257 - IEC 60 093; \* these values are given for information; for others range of temperature we recommend to realize some preliminary tests