



Electronic Silicones Technologies

Choose your technology according to your needs

Potting
and Encapsulation



RTV-2 RANGE
BLUESIL™ ESA (gels and
elastomers)

Sealing
and Bonding



**RTV-1 / RTV-2
RANGE**
CAF™ / BLUESIL™ ESA
and RTFoam

Thermal
Management



RTV-2 RANGE
BLUESIL™ ESA, RTFoam

Protection By Potting & Encapsulation

Do you know the difference between potting and encapsulation?

Potting is the process of partially or completely filling or embedding an enclosure with silicone for the purpose of providing resistance to shock and vibration, as well as creating a seal against moisture, solvents, and corrosive agents. Potting silicones are also used to aid with electrical insulation, flame retardancy and heat dissipation.

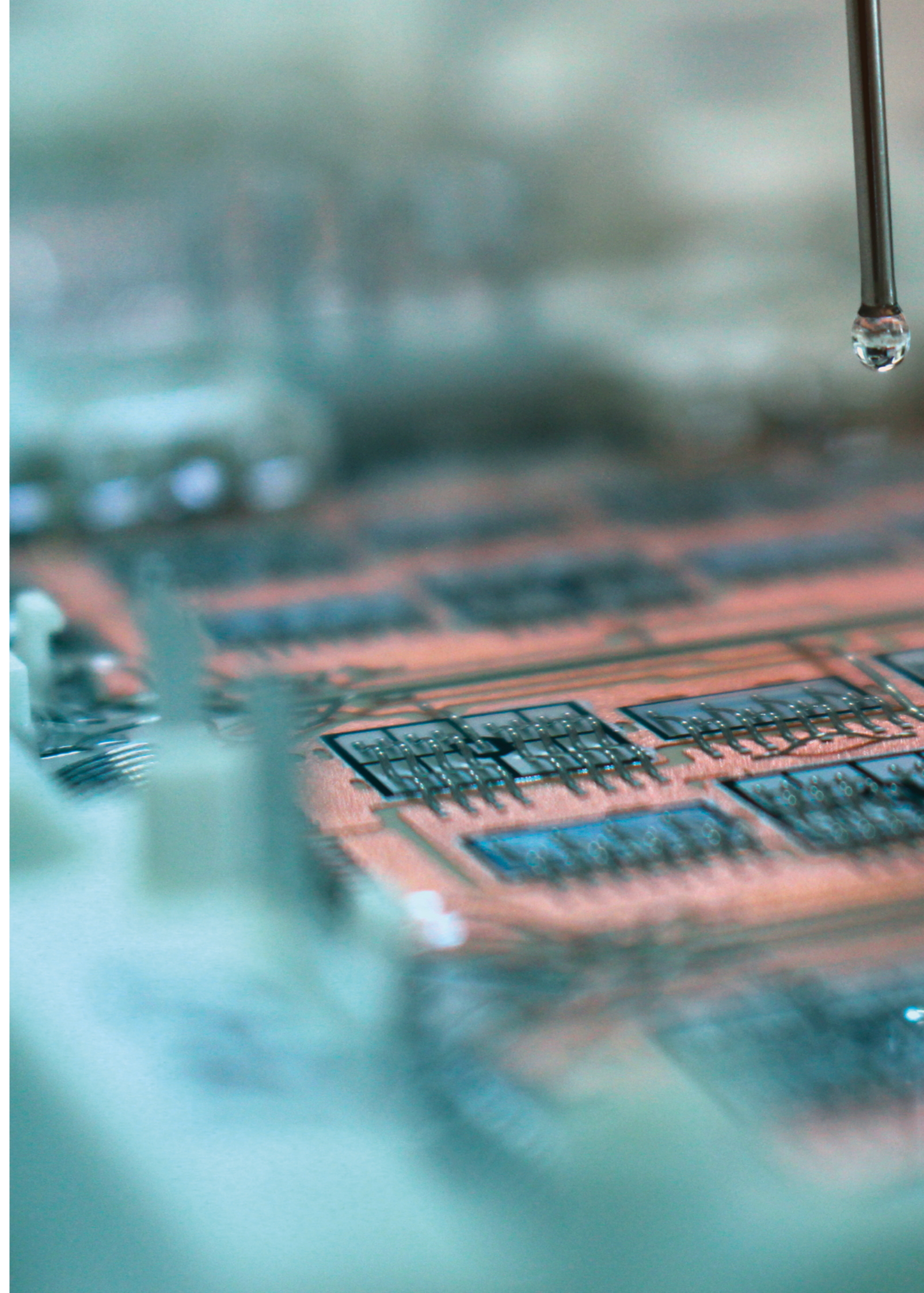
Encapsulation is a process similar to Potting. With encapsulation instead of filling a cavity like during the potting process, the electronic assembly is impregnated inside silicone. The purpose of encapsulation is to create a protective “shell” around the assembly.

Encapsulation provides resistance to shock and vibration, as well as creating a seal against moisture, solvents, and corrosive agents. Encapsulation is also used to aid with electrical insulation, flame retardancy and heat dissipation.

There is a growing need to protect sensitive components against environmental factors, such as dust and moisture, as well as fluids, heat, and fire exposure. Silicones are the materials of choice for potting and encapsulating sensitive electronics like sensors, actuators, central processing units (CPUs), printed circuit board (PCB), as they are the first line of defense against outside aggression.

Thanks to their good wetting capabilities, silicones minimize air pockets and help your electronic device resist to corrosion.

Determining which solution is best for your application will be based on operating and environmental conditions, material physical properties, and processing needs.



BLUESIL™ ESA Gels Performances

Products	Application	Description	Color	Ratio	Viscosity (mPa.s)	Penetration (1/10mm)	Pot life	Curing conditions	Thermal conductivity (W/m.K)	Max service Temperature (°C)	Shelf life	Dielectric Strength (IEC 60243), kV/mm,	Dielectric constant at 1 kHz (IEC 60250)	Dielectric dissipation factor at 1 kHz (IEC 60250)	Volume resistivity (IEC 60093), .cm
ESA 6000 HT A/B	Potting	Thermal resistance, Low tack	Clear	1:1	1 300	50 Sh00	50 min	90 min @80°C	0.15	225	12 months	-	8.8	3.0x10 ⁻⁰⁴	7.60x10 ⁺¹⁴
ESA 6001 HT A/B	Potting	Thermal resistance, Low tack, Low ionic	Clear	1:1	1 200	45 Sh00	90 min	90 min @80°C	0.15	225	12 months	-	8.8	3.0x10 ⁻⁰⁴	7.60x10 ⁺¹⁴
ESA 6009 A/B	Potting	High tack, quick curing, high dampening	Light purple	1:1	2 000	70	15 min	1h @ 23°C	0.15	TBD	6 months	18	2.8	1.1x10 ⁻⁰³	1.00x10 ⁺¹⁵
ESA 6010 A/B	Potting	Inherent tack, high viscosity	Clear	1:1	60 000	170	120 min	60 min @120°C	0.18	-	12 months	-	-	-	-
ESA 6016 A/B	Potting	Inherent tack, high damping, low extractibles	Clear	1:1	460	130	> 6h	24h @23°C or 60min @70°C	0.19	150	12 months	9.9	2.23	2.4x10 ⁻⁰⁴	5.24x10 ⁺¹⁴
ESA 6018 A/B	Potting	Inherent tack, high damping, low extractibles	Clear	1:1	530	150	> 3h	24h @23°C or 60min @70°C	0.15	180	12 months	23	2.8	1.0x10 ⁻⁰³	1.00x10 ⁺¹⁵
ESA 6025 A/B	Potting	High tack, high damping, low extractibles	Blue	1:1	1 250	260	20 min	4h @23°C or 90min @80°C	0.15	150	12 months	23	2.8	5.0x10 ⁻⁰⁴	1.00x10 ⁺¹⁶
ESA 6100 A/B	Potting	low viscosity, tacky	Clear	1:1	450	255	24h	30 min @80°C	0.15	150	12 months	-	-	-	-
ESA 6110 A/B	Potting	optically clear, shock absorption, tacky	Optically clear	1:1	1 200	250	50 min	3h @23°C	0.15	150	12 months	23	2.8	1.0x10 ⁻⁰³	1.00x10 ⁺¹⁵
ESA 6110 QC A/B	Potting	Optically clear, shock absorption, tacky	Optically clear	1:1	1 200	250	5 min	30 min @23°C	0.15	-	12 months	23	2.8	1.0x10 ⁻⁰³	1.00x10 ⁺¹⁵
ESA 6111 A/B	Potting	Low viscosity, high damp, tacky	Clear	1:1	600	240	16h	30 min @80°C	0.15	150	12 months	23	2.6	1.8x10 ⁻⁰³	1.00x10 ⁺¹⁵
ESA 6111 QC A/B	Potting	Low viscosity, high damp, tacky	Clear	1:1	600	240	6h	35 min @70°C	0.15	150	12 months	23	2.6	1.8x10 ⁻⁰³	1.00x10 ⁺¹⁵
ESA 6118 A/B	Potting	Low viscosity, thermal resistance	Clear	1:1	640	147	-	60 min @70°C	0.15	200	12 months	25	2.5	3.0x10 ⁻⁰³	1.00x10 ⁺¹⁵
ESA 6120 QC A/B	Potting	Low viscosity, thermal resistance	Clear	1:1	200	270	20 min	30 min @120°C	0.15	175	12 months	23	2.8	1.0x10 ⁻⁰³	1.00x10 ⁺¹⁵

BLUESIL™ ESA Elastomers Performances.

Products	Application	Description	Color	Ratio	Mixed viscosity (mPa.s)	Shore A Hardness	Tensile strength (Mpa)	Elongation at break (%)	Pot life	Curing conditions	Thermal conductivity (W/m.K)	Max service Temperature (°C)	Shelf life	Dielectric Strength (IEC 60243), kV/mm,	Dielectric constant at 1 kHz (IEC 60250)	Dielectric dissipation factor at 1 kHz (IEC 60250)	Volume resistivity (IEC 60093), .cm
ESA 7221 A/B	Potting	High stretchable	Transparent	1:1	4 000	20	5.0	650	50 min	1h @80°C	0.20	-	12 months	-	-	-	-
ESA 7222 A/B	Potting	NVH potting	Dark grey	1:1	5 000	22	3.5	400	3 min	10 min @80°C	0.23	200	12 months	18	3	0.009	1.10x10 ⁺¹⁵
ESA 7242 A/B	Potting	UL94 V0	Dark grey	1:1	3 000	50	2.9	140	60 min	10 min @80°C	0.42	250	12 months	18.6	3,05 @100KHz	0,004 @100KHz	8.24x10 ⁺¹⁴
ESA 7242 QC A/B	Potting	UL94 V0, quick curing	Black	1:1	3 000	53	2.5	135	3.5 min	15min @100°C	0.42	250	12 months	16.5	2,95 @100KHz	0,001 @100KHz	7.10x10 ⁺¹⁴
ESA 7250 A/B	Potting	Optically clear, UL94 HB	Optically clear	10:1	4 000	52	6.2	115	4h	1h @150°C	0.16	200	24 months	20	2.7	0.003	1.10x10 ⁺¹⁵
ESA 7255 50 A/B	Potting	Optically clear, adhesion on plastic, metal	Transparent	10:1	2 000	30	2.5	200	8h	1h @150°C	0.16	200	12 months	20	-	-	-
ESA 7256 A/B	Potting	Clear, low temperature curing	Clear to Light Straw	10:1	4 150	40	6.9	119	3h	35 min @100°C	0.16	200	12 months	20.3	2,72 @100KHz	0,0009 @100KHz	1.03x10 ⁺¹⁶
ESA 7258 A/B	Potting	High durometer	Dark grey	1:1	1 250	65	2.7	44	5h	35 min @100°C	0.42	200	12 months	18.4	3,17 @100KHz	0,002 @100KHz	7.42x10 ⁺¹⁴

Mixed viscosity is not reported on TDS due to cure speed -I changed this visc to an average of A/B, as it is a much closer match to 7242

Elkem silicones offers a broad range of silicones elastomers within the range of Bluesil ESA RTV-2, gels and foams 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, fire resistance or optically clear.

In such cases, silicones can provide optical clarity and light transmittance this is why they perfectly fit in optoelectronic applications.

In potting for battery packs for example, there is a need to keep the heat around the cell to avoid the propagation and the thermal runaway to other cells: with RT Foams range you will find thermal insulation solutions. The same function, thermal insulation, can be used for sensor application

BLUESIL™ ESA RTV-2 & gels Applications

Products	Junction box	IGBT	Sensors	CPU	PCB	Connectors	availability AM /AP/EMEA*
ESA 6000 HT A/B		■					Yes
ESA 6001 HT A/B		■					on request
ESA 6009 A/B	■				■		on request** for EMEA
ESA 6010 A/B	■		■	■			on request** for AP
ESA 6016 A/B	■		■	■		■	on request** for AP/EMEA
ESA 6018 A/B	■		■	■		■	on request** for AM/AP
ESA 6025 A/B	■		■	■		■	on request** for AM/AP
ESA 6100 A/B							on request** for AM/EMEA
ESA 6110 A/B	■		■				on request** for AM/AP
ESA 6110 QC A/B			■				on request** for AM/AP
ESA 6111 A/B	■					■	on request** for AM/EMEA
ESA 6111 QC A/B	■					■	on request** for AM/EMEA
ESA 6118 A/B		■					on request** for AM/EMEA
ESA 6120 QC A/B	■		■				on request** for AM
ESA 7221 A/B	■			■		■	on request** for AM/AP
ESA 7222 A/B	■		■	■	■	■	on request** for AM/EMEA
ESA 7242 A/B	■		■	■		■	on request** for AP
ESA 7242 QC A/B	■		■	■		■	on request** for AP
ESA 7250 A/B	■				■		Yes
ESA 7255 50 A/B	■				■		on request **for AM
ESA 7256 A/B	■				■	■	on request** for AP/EMEA
ESA 7258 A/B	■		■	■		■	on request** for AP/EMEA

* AM = Americas; AP= Asia Pacific; EMEA = Europe middle-East Africa
 ** need to be validated by the region

BLUESIL™ RTFoam Performances

Products	Application	Description	Color	Ratio	Viscosity (mPa.s)	Density	Pot life	Curing conditions	Thermal conductivity (W/m.K)	Max service Temperature (°C)
RTF 3210 A/B	Potting	Thermal insulation	Beige	1:1	A: 6000 B: 2500	0.13	1 min	2 hours @ RT	0.1	275°C
RTF 3230 A/B	Interstitial fill	Thermal insulation	White	1:1	A: 17 000 B: 15 000	0.30	3 min	10 min @ RT	0.1	TBD
RTF 3242 A/B	Potting	Flowable foam, V0 on 10 mm thick	Dark grey	1:1	A: 15 000 B: 15 000	0.25	2-8 min	15 to 30 min @ RT	0.1	250°C
RTF 3244 A/B	FIPFG-gasketing	Thixotropic, RT curing, V0 on 10 mm thick	Black	1:1	A: 20 000 B: 10 000	0.25	1-3 min	10 to 30 min @ RT	0.1	275°C
RTF 3250 A/B	Interstitial fill	Thermal insulation	White	1:1	A: 1350 B: 1400	0.63	4-5 min @RT	10 to 30 min @ RT	0.1	TBD

BLUESIL™ RTFoam Applications

Products	frame sealing / gasketing	assembly PCU, ECU	insulation	potting	filling groove or cavity	availability AM /AP/EMEA*
RTF 3210 A/B			■			on request** for AM/EMEA
RTF 3230 A/B						on request** for AP/EMEA
RTF 3242 A/B				■	■	on request** for AM/AP
RTF 3244 A/B	■	■				Yes
RTF 3250 A/B			■			on request** for AM/EMEA

Protection by Sealing and 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.

Elkem 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.

Gasketing & sealing:

- **CIPG** (cured in place gasket) with 2K silicones elastomers and/or adhesives: CAF Axad range
- **FiPG** (formed in place gasket) with 1K silicones glues: CAF range
- **FIPFG** (Formed In Place Foam Gasket) in Silicones foams, can provide alternatives gasketing for sealing electrical cabinet, as an example, and electronic devices. In addition, these low-density materials do not impact the weight

Both of these materials provide excellent thermal resistance and fire resistance, in addition to low compression set



Bonding

- After curing, CAF, Bluesil ESA adhesives are transformed in a flexible bonding which absorbs significant differential dilatation between two substrates.
- High bonding performance on various substrate.

BLUESIL™ ESA & CAF™ Applications

Products	ECU housing	Connector sealing	PTC or Sheath heater	Vibration damping	adhesive potting	availability AM /AP/EMEA*
CAF 2 Fluid					■	on request** for AM/AP
CAF 520	■			■		Yes
CAF 530	■			■		Yes
CAF 7					■	on request** for AM/AP
ESA 7230 A/B		■			■	on request** for AP
ESA 7231 A/B		■	■		■	on request** for AM/AP
ESA 7241 A/B		■	■		■	on request** for AP
ESA 7244 A/B		■	■		■	Yes
ESA 8352 A/B	■	■				Yes

* AM = Americas; AP= Asia Pacific; EMEA = Europe middle-East Africa
 ** need to be validated by the region

BLUESIL™ ESA & CAF™ Performances

	Products	Application	Description	Color	Ratio	Viscosity (mPa.s)	Shore A Hardness	Tensile strength (Mpa)	Elongation at break (%)	Pot life	Curing conditions	Thermal conductivity (W/m.K)	Max service Temperature (°C)	Shelf life	Dielectric Strength (IEC 60243), kV/mm,	Dielectric constant at 1 kHz (IEC 60250)	Dielectric dissipation factor at 1 kHz (IEC 60250)	Volume resistivity (IEC 60093), .cm
CAF	CAF 2 Fluid	Adhesive potting	Neutral flowable, self-adhesive	Translucent	1 component	30 000	18	0.7	250	12 min	16h for 2mm RT	0.20	250	10 months	-	-	-	-
	CAF 520	Adhesive sealing	Neutral alcoxy curing, thixotropic, primerless	Trans, White	1 component	Thixotropic	15	1.1	500	7 min	7h for 2mm RT	0.30	150	12 months	-	-	-	-
	CAF 530	Adhesive sealing	Neutral alcoxy curing, thixotropic, primerless	Black, White	1 component	Thixotropic	34	3.5	450	15 min	8h for 2mm RT	0.30	185	12 months	-	-	-	-
	CAF 7	Adhesive potting	Acetoxy flowable, adhesive	Translucent	1 component	7 000	19	0.8	220	5 min	4h for 2mm RT	0.20	225	18 months	19	5.9	1,3x10 ⁻³	6,6x10 ¹⁵
CAF AXAD	CAF 33 Axad	Adhesive sealing	Activated acetoxy curing	Black	9:1	Thixotropic	25	2.4	500	3-5 min	90 min RT	0.20	250	18 months	20	3.2	3x10 ⁻³	3x10 ¹⁵
RTV2	ESA 7230 A/B	Adhesive	Transparent, adhesion	Translucent	10:1	40 000	31	3.2	260	>16h	10 min @ 150°C	0.17	200	12 months	19	2.7	0.001	1x10 ¹⁵
	ESA 7231 A/B	Adhesive	Adhesion metal, plastic, silk screening	Trans	10:1	36 000	38	6.0	400	>16h	10 min @ 90°C	0.25	200	11 months	-	-	-	-
	ESA 7241 A/B	Adhesive	Adhesion metal, plastic, silk screening	Ivory	1:1	60 000	52	5.5	200	>16h	10 min @ 150°C	0.34	200	12 months	19	2,9 @100KHz	0.003	1,5x10 ¹⁵
	ESA 7244 A/B	Adhesive	Adhesion metal, plastic, silk screening	Blue	1:1	60 000	50	5.5	200	>16h	10 min @ 150°C	0.34	200	12 months	19	2,9 @100KHz	0.003	1,5x10 ¹⁵
	ESA 8352 A/B	Adhesive sealing	Room temperature self adhesive	Black	10:1	90 000	50	2.5	200	12 min	RT	0.34	220	12 months	-	-	-	-

Protection by Thermal Management

Certain properties of silicone systems can be engineered to address specific application requirements. For instance, although silicones are natural thermal insulators, they can be modified to be thermally conductive using fillers.

Thermal management is a major challenge in the electronic industry as components are smaller and smaller. The need to dissipate the heat from electronic components is more important to improve the reliability of the electronic devices.

To dissipate heat in high power applications, Elkem Silicones provides a wide range of thermal interface materials (TIMs) with several technologies: thermally conductive silicone adhesives, gap filler and potting materials to improve the heat transfer.

Thermally conductive grades can be used to bond microprocessors, LED (light emitting diode) arrays, and other heat generating components to heat sinks, ensuring an efficient path for heat transfer. Because silicones' properties remain stable when subjected to high temperatures, they can withstand the heat that is characteristic of many operating environments.

Elkem silicones offers also a range of BLUESIL™ ESA RTV-2 elastomers and BLUESIL™ pastes providing high heat conductivity with high heat stability.

BLUESIL™ ESA Thermal Conductive Materials Performances

Products	Application	Description	Color	Ratio	Viscosity (mPa.s)	Shore A Hardness	Thermal conductivity (W/m.K)	Density	availability AM/AP/ EMEA*
ESA 6733 A/B	Gap filler	Gap filler	Blue	1:1	A: 80 000 B: 90 000	47	2.8	-	on request** for AM / AP
ESA 7263 A/B	Potting	Flowable thermoconductive product	Grey/ White	1:1	A: 4000 B: 2500	40	1.0	1.71	on request** for EMEA / AP
ESA 7712 A/B	Potting	Adapted viscosity material	Grey	1:1	A: 15 000 B: 15 000	31	1.58	2.58	on request** for EMEA / AP
ESA 7721 A/B	Adhesive	Self - Adhesive on several substrates	Blue	1:1	A: 580 000 B: 310 000	69	1.00	-	on request** for AM / AP

* AM = Americas; AP= Asia Pacific; EMEA = Europe middle-East Africa
** need to be validated by the region

BLUESIL™ ESA Thermal Conductive Materials Applications

Products	Bonding	Heat dissipation	Power control unit	Convertor, inverter	Electric motor	Electronic control unit
ESA 6733 A/B		■	■	■		
ESA 7263 A/B		■			■	
ESA 7712 A/B		■			■	
ESA 7721 A/B	■	■	■	■		■

BLUESIL™ ETG Pastes Performances

Properties	Test method	ETG 100	ETG 150	ETG 200	ETG 250	ETG 300
Density	GB/T 531 (g/cm ³)	2.5-3.0	2.5-3.0	2.8-3.2	3.0-3.5	3-3.5
Thermal conductivity	Hot Disc ISO22007 W/(m.K)	0.8-1.2	1.3-1.7	1.8-2.2	2-2.5	2.7-3.2
Oil bleeding	200°, 24h	≤ 0.2%	≤ 0.2%	≤ 0.2%	≤ 0.2%	< =0.2%
Evaporation	200°, 24h	≤ 0.5%	≤ 0.5%	≤ 0.5%	≤ 0.5%	≤ 0.5%
Thermal resistance	°Ccm ² /W	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
Volatile content	200°C, 24h	≤ 1%	≤ 1%	≤ 1%	≤ 1%	≤ 1%
Dynamical viscosity	Haake Pa.s	35-45	50-60	55-65	80-105	90-130

Designers and manufacturers from many industries are facing new challenges as they develop next-generation products while working to fulfill evolving industrial needs.

With a broad portfolio of electronics materials and global technical expertise, Elkem silicones is ready to deliver on today's needs and collaborate with you on tomorrow's challenges. Together we can help you achieve faster processing, higher purity, higher conductivity and more sustainable solutions across the entire electronics value chain.

For detailed commercial contacts please visit our website: elkem.com

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