Silicone Solutions

For Sealing and Bonding

Bluestar Silicones has developed an exhaustive range to cover all technical, economical and environmental requirements.

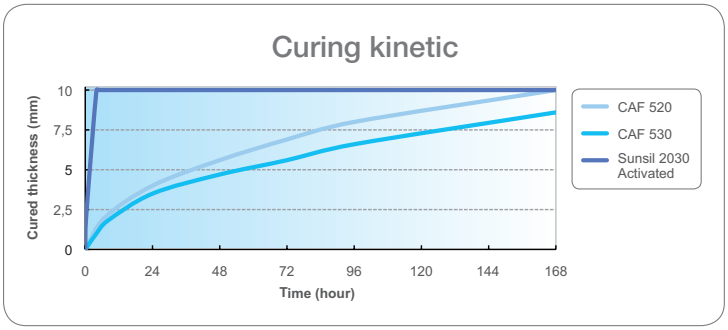
CAF are room temperature vulcanizing (RTV-1) silicone elastomers which cure at room temperature:

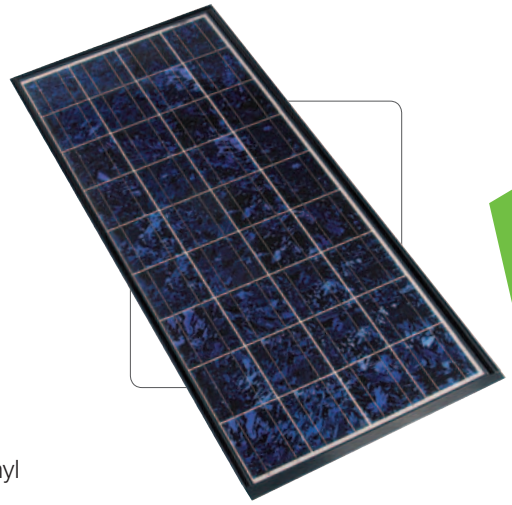
- As soon as the product comes into contact with atmospheric moisture.
- The cure rate increases with temperature and ambient moisture level.

Special grades of RTV-1 have been developed for the Solar Energy market. These CAF products give excellent adhesive properties to several back sheet materials such as PVF (PolyVinyl Fluoride) and PET (PolyEthylene Terephthalate) and composite with PVDF (PolyVinyliDene Fluoride) from several suppliers. This CAF range also provides outstanding adhesion on Junction box material's like PPO (PolyPhenylene Oxide) or PC (PolyCarbonate).

These products maintain good elasticity over a wide temperature range (-50 to 180°C) with excellent weatherability and electrical insulation properties.

Thanks to the quick curing of CAF products, the drying time is reduced to 7-8 hours as a cured thickness of 2mm is obtained after that time at 23°C and 50% relative humidity. This time could be reduced by using SUNSIL 2030 activated.





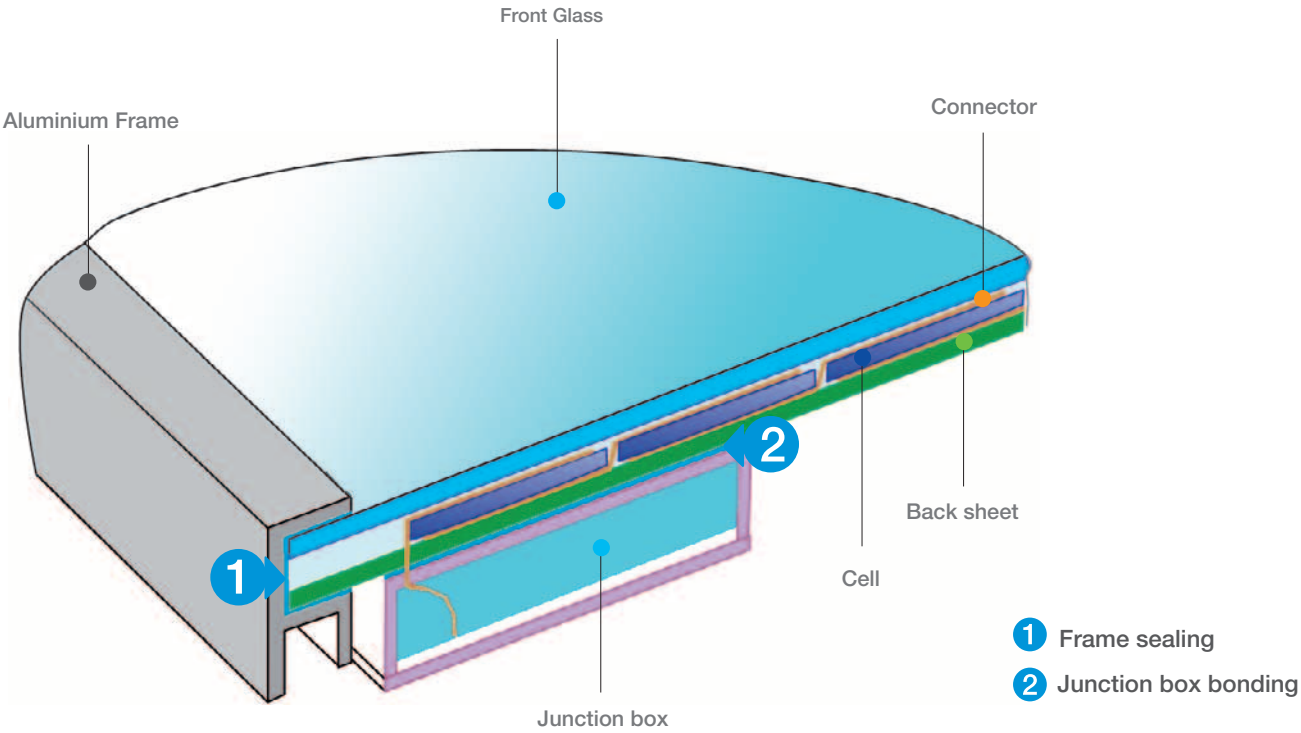
BENEFITS

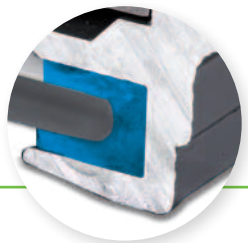
- One component RTV-1, neutral cure
- One component activated with quick curing
- Strong adhesion to PV module including anodized aluminium, glass, PVF, PET, PPO, PC
- Long term weathering performance
- Flexible gasket over a wide range of temperature
- Excellent electrical properties
- UL approvals

Bluestar Silicones. Delivering Your Potential.

BLUESTAR SILICONES

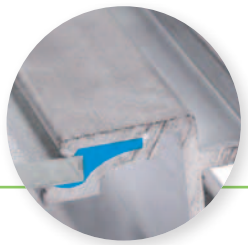
Sealing and bonding applications:





This application requires high performance adhesives which can provide long term bonding, with protection against moisture, environmental ageing, and mechanical stresses. These CAF adhesives withstand and compensate differential thermal dilatations of bonded materials.

The use of CAF adhesives leads to a permanently reliable bonding interface between Junction box and the back sheet.

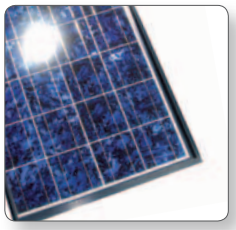


For thermal solar panel, The Sunsil 2030 activated has been developed to give fast adhesion between both front glass & back panel to the aluminium frame with a high thermal resistance up to 250°C.

CAF & SUNSIL range: general properties

		CAF range, 1 component RTV				2 components RTV
		CAF 505	CAF 510	CAF 520	CAF 530	SUNSIL 2030 Activated
	Main characteristics	Non flowing, self-adhesive metal & plastics, neutral	Non flowing, self-adhesive metal & plastics, neutral	Quick curing, self-adhesive metal & plastics, neutral	Quick curing, high mechanical properties, self-adhesion metal & plastics, non corrosive	Quick curing, self-adhesive, high mechanical properties
	Color	Translucent	White, grey, black	Translucent	White, black	White, black
	Specific gravity at 25°C (1)	1.03	1.38	1.02	1.30	1.04 / 1.17 (white)
Processing	Cure type	Alcoxy	Alcoxy	Alcoxy	Alcoxy	Activated acetic
	Flowability (mm) (2)	2	3	3	2	2 / 5
	Extrusion (g/min) (3)	80	30	50	130	-
	Skin formation time (min) (4)	10	10	5 - 8	10	4
	Setting time for a 2 mm thickness (h) (4)	12	15	7	8	-
	Cured thickness after 24 h (mm) (4)	4	3	4	3.5	-
Mechanical properties after 7 days curing	Shore A hardness for 6 mm thick section (points) (5)	17	24	15	34	23
	Tensile strength (MPa) (6)	2	1.4	1.1	3.5	2.2
	Secant modulus for 100% elongation (MPa) (6)	0.35	0.5	0.3	0.9	0.6
	Elongation at break (%) (6)	750	600	550	450	450
	Tear strength (kN/m) (7)	-	-	-	15	6
Adhesion* (8)	Lap shear strength (MPa)	0.9	0.6	0.6	1.2	2.0
	Type of failure CF/AF	CF 100%	CF 100%	CF 100%	CF 100%	CF 100%
Thermal properties	Minimum service temperature (°C)	-50	-60	-60	-60	-65
	Maximum continuous service temperature, 1000 h (°C)	180	180	150	150	180
	Maximum peak service temperature, 72 h (°C)	180	200	150	185	250
Flame retardancy	UL 94	HB	HB equivalent	HB	HB	HB equivalent
Storage	Shelf life from the production date (months)	12	12	12	12	18

(1) ISO R 1183, DIN 53479, NM 703
(2) Boeing S 7502 NM459
(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) Aluminium AG3 specimen, without primer, 1mm thick joint, NM 748
* after 14 days at 23°C 50% relative humidity
CF= cohesive failure, AF= adhesive failure



Functions & Applications

		CAF range, 1 component RTV				2 components RTV
Function	**Examples of Application**	**CAF 505**	**CAF 510**	**CAF 520**	**CAF 530**	**SUNSIL 2030 Activated**
Sealing & Bonding	PV Frame sealing	●	●	●		●
	PV Junction box bonding	●		●	●	
	Sealing & bonding general applications				●	
	Thermal solar panel				●	●

Durability test results

Bluestar Silicones has performed ageing test according to IEC 61215 in order to check the bonding properties of the CAF adhesives on PVF and also on composite PVDF / PET composite materials for 1000 hours at 85°C with 85% relative humidity, which is the damp heat test.

The thermal cycle test is less aggressive for the silicone performances than the damp heat test, as it's only a variation in temperature from - 40°C to + 85°C. Lap shear tests are carried out in order to measure the lap shear strength and the cohesion failure.

Lap shear strength MPa, cohesive failure %:

	PVF		PVDF/PET	
	Initial	**85°C, 85% HR, 1000h**	**Initial**	**85°C, 85% HR, 1000h**
CAF 520	0.70 MPa, 100%	0.60 MPa, 100%	0.65 MPa, 100%	0.63 MPa, 100%
CAF 530	1.20 MPa, 85%	1.08 MPa, 90%	1.10 MPa, 90%	1.05 MPa, 90%

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