



**Installation of eArc PV Panels on
Trapezoidal, Corrugated &
Klip-Lok Roof Sheetings Using
Tonsan 1527 Silicone Adhesive
Engineering Certificate**

For: Sunman Energy
Level 9, 153 Walker Street
North Sydney
NSW , 2060



Job No.: 12040
Date: 02/02/2023

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Author Signature		Approver Signature	
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02 February 2023

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Installation of eArc PV Panels on Trapezoidal, Corrugated & Klip-Lok Roof Sheetings Using Tonsan 1527 Silicone Adhesive Engineering Certificate

Gamcorp (Melbourne) Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of eArc PV System installation using **Tonsan 1527** structural silicone adhesive atop Trapezoidal, Corrugated & Klip-Lok roof sheetings within Australia. The assessment has been completed based on system information and silicone adhesive test reports provided by Sunman Energy.

For building dimensions definition, please see **Figure 1**.
For roof zones definition, please see **Figure 2**.
For recommended glue lines pattern, please refer to **Figure 3a & 3b**.
For fixings requirements, please refer to **Appendix 1 & 2**.

We find the installation of eArc PV Panels on Trapezoidal, Corrugated & Klip-Lok roof sheetings to be structurally adequate and compliant with all relevant Australian standards listed below for the proposed solar installation, provided the conditions listed within this certificate are adhered to:

- Loading to:
 - AS/NZS1170.0:2002 – Structural design actions, Part 0: General principles;
 - AS/NZS1170.1:2002 (R2016) – Structural design actions, Part 1: Permanent, imposed and other actions;
 - AS/NZS1170.2:2021 – Structural design actions, Part 2: Wind actions;
- Site details:
 - Wind region **A(0-5), B(1-2), C & D**
 - Wind terrain category **2 & 3**
 - Wind average recurrence interval **200 years**
- Building details:
 - Maximum average building height **20 m**
 - Building aspect ratio **eArc panels attached to enclosed building with aspect ratios h/d ≤0.5 and h/b ≤0.5, see Figure 1**
 - Aerodynamic shape factor (Cfig) **-2.7, this is based on the worst case scenario (corner zone) obtained from Table 5.3(A) & Table 5.6 of AS/NZS1170.2:2021**

- Trapezoidal & Corrugated roof sheeting colors

Surfmist
Shale Grey
Windspray
Woodland Grey
Monument
Pale Eucalypt
Ironstone
Dune
Zincalume

- Fixing requirements of Tonsan 1527 glue:

Roof sheeting type	Glue width (mm)	Max. Glue lines spacing (mm)	Max. panels overhang (mm)	Min. number of glue lines per panel	Installation Condition
Trapezoidal & Corrugated	See Appendix 1	500	50	3 lines for portrait 5 lines for landscape orientations see Figures 2a & 2b	Within whole roof area
Klip-Lok 700 & 406	See Appendix 2	500	50		

- eArc PV panels to be installed flushed to roof sheeting
- Tonsan 1527 silicone adhesive to be applied in accordance with the adhesive technical data sheet
- Installation of eArc PV panels to be done in accordance with the Sunman’s installation manual
- The certification **excludes** assessment of roof structure and PV panels

NOTES:

- **The installation eArc PV Panels is assessed based on the capacity of Tonsan 1527 high strength structural silicone adhesive, not the roof structure and PV panel.**
- **The tensile strength of Tonsan 1527 is obtained from ARL report no: MWMAL-101-005-LT, dated 13 August 2020 & Tonsan 1527 Technical Data Sheet, dated December 2013. The tests were carried out on the samples with a thickness of 1.6-2.1mm at room temperature. It is assumed that Tonsan 1527 will be applied with similar conditions on site.**
- **The tensile strength of Tonsan 1527 is obtained from ARL report no: MWMAL-101-004-LT draft, dated 16 June 2020 & Tonsan 1527 Technical Data Sheet, dated December 2013. The tests were carried out on the samples with a thickness of 0.5mm at room temperature. It is assumed that Tonsan 1527 will be applied with similar conditions on site.**
- **It has been advised by ARL, that the curvature at the top of roof sheeting rib does not reduce the strength of Tonsan 1527. Therefore the minimum width of Tonsan 1527 was proposed on general case roof.**
- **The assessment has been based on the test results of 5-day curing time of Tonsan 1527. The test results of 1-day curing time have not been considered in our assessment. The risks associated with lower strength gained within 5 days after installation shall be managed by Sunman as per our agreement.**
- **If any of the above conditions cannot be met, the structural engineer must be notified immediately.**

Construction is to be carried out strictly in accordance with the instruction manual. This work was designed by **Humam Sami** in accordance with the provisions of Australian Building Regulations and in accordance with sound, widely accepted engineering principles. Should you need to clarify anything please contact the designer. This certificate is only valid till 02/02/2025. Gamcorp should be contacted for future validation. Contact Gamcorp for customised system or if the site conditions are not covered by this certificate.

Yours faithfully,
Gamcorp (Melbourne) Pty Ltd



L. Van Spaandonk

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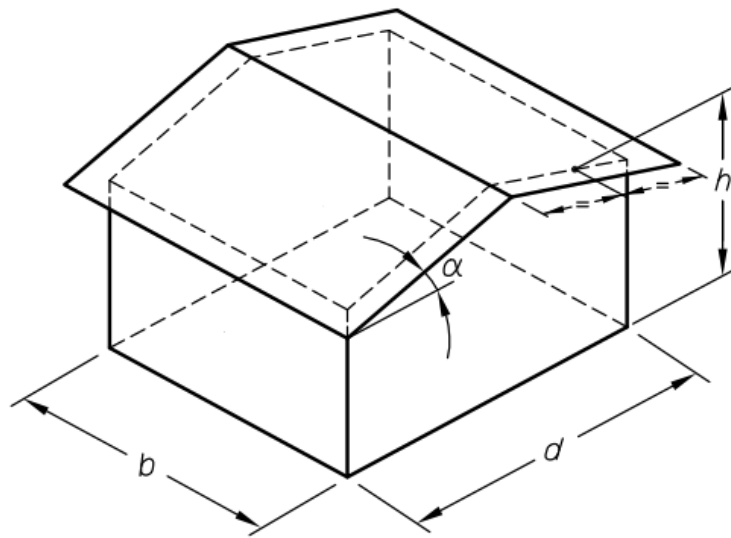


Figure 1 - Building Dimensions Definition

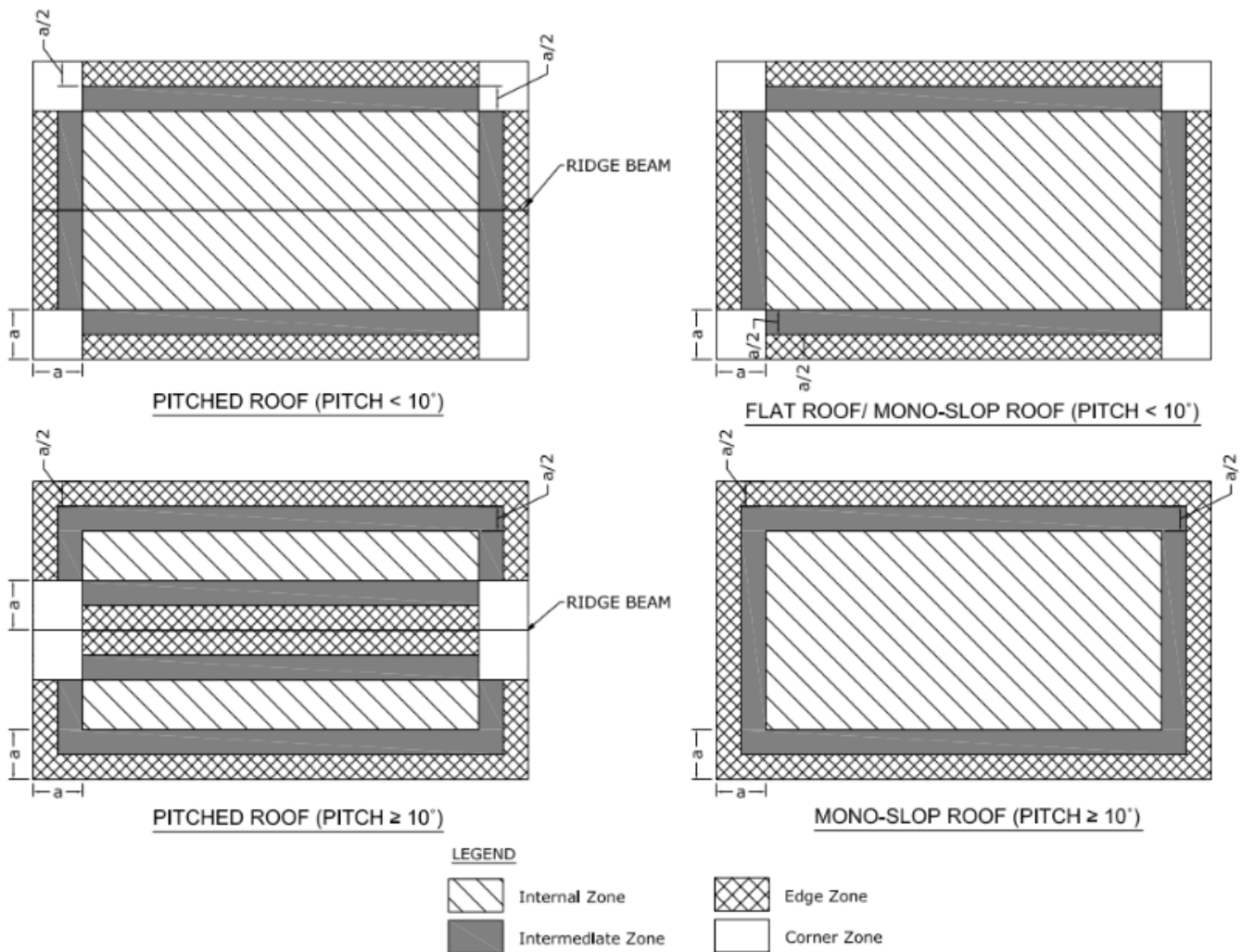


Figure 2 - Roof Zones Definition

In Figure 2, the value of dimension "a" is the minimum of 0.2b or 0.2d, if (h/b) or $(h/d) \geq 0.2$; or 2h if both (h/b) and $(h/d) < 0.2$ (b & d are building dimensions and h is average roof height, see Figure 1)



Figure 3a - Recommended Glue Lines Pattern - Portrait Installation

Note: glue bonding lines shall be distributed as evenly as possible across the width of the panel

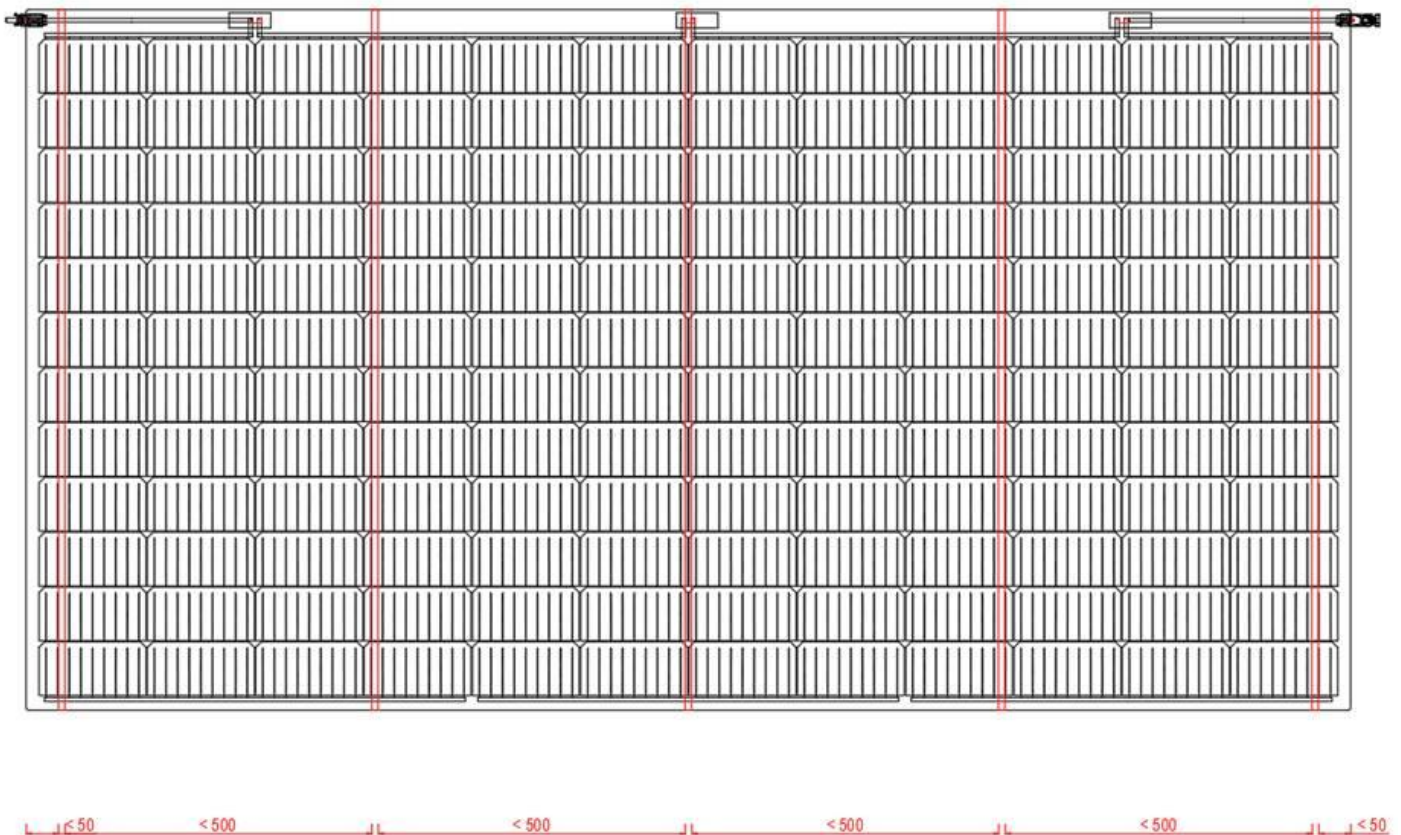


Figure 3b - Recommended Glue Lines Pattern - Landscape Installation

Note: glue bonding lines shall be distributed as evenly as possible across the length of the panel

APPENDIX 1 - Fixing Requirements Between PV Panels & Trapezoidal/Corrugated Roof Sheatings Using Tonsan 1527 Silicone Adhesive

Wind Region	Fixing Req.	Building Height – h (m)															
		h ≤ 5			5 < h ≤ 10			10 < h ≤ 15			15 < h ≤ 20						
		Int*	Intm*	Edge	Corner	Int*	Intm*	Edge	Corner	Int*	Intm*	Edge	Corner	Int*	Intm*	Edge	Corner
A	GW*	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	GS*	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	PO*	50															
	PO*	50															
B1	GW*	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	GS*	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	PO*	50															
	PO*	50															
B2	GW*	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	GS*	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	PO*	50															
	PO*	50															
C	GW*	8	8	8	8	8	8	8	8	8	8	8	10	8	8	8	10
	GS*	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	PO*	50															
	PO*	50															
D	GW*	8	8	8	10	8	8	8	10	8	8	8	10	8	8	10	10
	GS*	500	500	500	500	500	500	500	470	500	500	500	430	500	500	500	400
	PO*	50															
	PO*	50															

Notes:

- **GW:** stands for glue width in (mm)
- **GS:** stands for glue spacing in (mm)
- **PO:** stands for panel overhang in (mm)

- **Int:** stands for internal roof zone
- **Intm:** stands for intermediate roof zone

APPENDIX 2 - Fixing Requirements Between PV Panels & Klip-Lok 700/406 Roof Sheetings Using Tonsan 1527 Silicone Adhesive

Wind Region	Fixing Req.	Building Height – h (m)													
		h ≤ 5			5 < h ≤ 10			10 < h ≤ 15			15 < h ≤ 20				
		Int*	Intm*	Edge	Int*	Intm*	Edge	Int*	Intm*	Edge	Int*	Intm*	Edge	Corner	
A	GW*	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	GS*	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	PO*	50													
B1	GW*	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	GS*	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	PO*	50													
B2	GW*	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	GS*	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	PO*	50													
C	GW*	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	GS*	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	PO*	50													
D	GW*	8	8	8	8	8	8	8	10	8	8	8	10	8	10
	GS*	500	500	500	500	500	500	500	500	500	500	500	500	500	470
	PO*	50													

Notes:

- **GW:** stands for glue width in (mm)
- **GS:** stands for glue spacing in (mm)
- **PO:** stands for panel overhang in (mm)
- **Int:** stands for internal roof zone
- **Intm:** stands for intermediate roof zone