

I n s t a l l i n g
SUNLITE™

**Multi-wall Structured Polycarbonate Sheets
for Glazing, Roofing and Cladding**




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This data sheet provides the basic information for working with and installing SUNLITE sheets. Due to their hollow core, prior preparation is needed before the actual installation, with additional care during it. Please read the installation instructions carefully before starting, and follow them meticulously.

I. SUNLITE Product Structures, Dimensions and Weights:

Table 1: Standard Products and Dimensions

Product	Thickness		Weight		Width		Length	
	mm	in.	g/m ²	psf	mm	in.	mm	ft.
Twin wall 	6	0.236	1,300	0.266	980 1050 1220 1250 2100	38.6 41.3 48.0 49.2 82.7	2000-12000	6.56 - 39.34
	8	0.315	1,500	0.307				
	10	0.394	1,700	0.348				
	16	0.630	2,700	0.552				
Triple wall 	8	0.315	1,700	0.348	980 1200	38.6 47.2	2000-7000	6.56 - 22.95
16	0.630	2,700	0.552					
*Structured 	25	0.984	3,500	0.717	980 1200	38.6 47.2	2000-7000	6.56 - 22.95

Notes:

New Products: Other products will be continually added to the SUNLITE product group. Please contact your PALRAM dealer for the latest product listing

Length: Supplied according to customer needs, up to 12.0 m (39.34 ft), longer upon stipulated special demand. standard recommended length up to 7.0 m (23 ft approx.).

*Supply of Structured panels is limited up to 7.0 m only.

II. Chemical Resistance, Compatible Sealants and Adhesives:

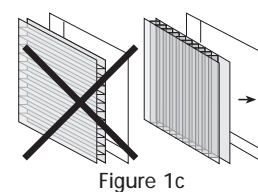
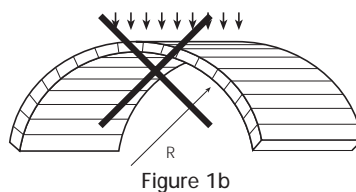
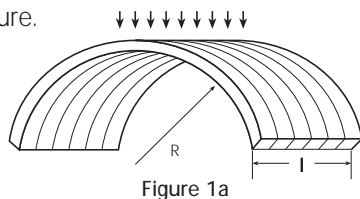
SUNLITE has good resistance to many chemicals. Some chemicals may harm the SUNLITE sheets. Detailed information about them can be found in "PALRAM Industries, Chemical Resistance of Polycarbonate Sheets". Please contact your PALRAM dealer when in doubt about any chemical.

When choosing adhesives or sealants to be used during installation of SUNLITE sheets, please consult PALRAM's brochure "Adhesives and Sealants Compatible with Polycarbonate Sheets".

For use of an adhesive or sealant not on the recommended list, consult with your PALRAM dealer to get his approval. Failure to do so will void any and all warranties.

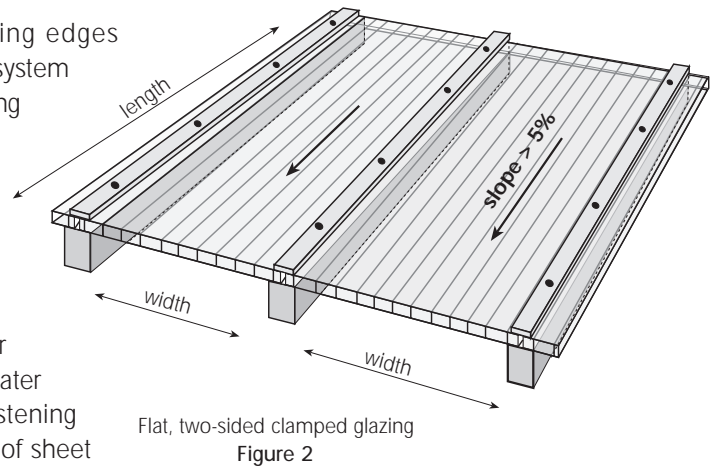
III. Positioning the Sheets:

A. SUNLITE sheets should be installed with the rib channels in the direction of the slope (Fig 2) (flat, sloped glazing), vertical (windows, wall glazing) (1c), or following the direction of the arched rafters (Fig 1a) (vaulted glazing, domes). This position reduces accumulation of dirt inside the sheet and ease gravity drainage of condensation moisture.



B. Sheets should be installed with the adjoining edges connected by a glazing profile suited to the glazing system (two or four-sided clamped glazing or roofing/cladding method) and the choice between wet and dry glazing methods. (Figure 2).

C. For sheets installed in the flat, horizontal position, (roofs, overhead skylights), a minimum slope of 5 percent is imperative, with 10 percent and above preferable. Steeper slopes offer better rainwater drainage and self-cleaning, and lessen the risk of water and dirt infiltration through the connectors and fastening screws. They also help to diminish the visual effect of sheet deflection due to the loads. (Figure 2).



IV. Arching Radius:

SUNLITE sheets may be cold bent, or curved up to their minimum permitted radius, using polycarbonate's natural properties, without need of a thermal process. Curving SUNLITE sheet beyond this minimum permitted radius induces undue stresses and strains in the glazing sheet, causing premature failure and will void the warranty.

Table 2. Permissible Cold Bending Radii for Arched Glazing

Profile	Thickness	Minimal permissible cold bending radius		
	mm	mm	ft.	in.
Twin wall	6	1,050	3.44	41.3
	8	1,400	4.59	55.1
	10	1,750	5.74	68.9
Triple wall	8	1,400	4.59	55.1
	16	2,800	9.18	110.2
Structured	25	4,370	14.3	172.0

V. Wind and Snow Load Calculation

Local building codes and standards in most countries provide details for required design loads, which should be consulted before installation. The information below is provided for general reference

Table 3. Conversion of Wind Velocity Values into Wind (or Static) Pressure

Wind		Moderate	Strong	Storm	Hurricane
Velocity	km/h	20	40-60	80-100	120-140(+)
	m/sec	6	11-17	22-28	33-39
Static pressure	kg/m ²	2	8-17	30-48	68-95
	psf	0.41	1.64-3.48	6.15-9.84	13.93-19.47

Snow Load: Snow load from accumulated snow cannot be disregarded. Both structure and glazing should be suitable for this extra weight.

In snow-bound areas, SUNTUF single wall corrugated polycarbonate glazing is often preferable for roofing purposes. Please consult with your PALRAM distributor.

Indicative snow load: (per 1.0 cm, or 0.4 inch of height-or thickness)

Fresh, fine, fluffy snow	from 0.8 to 1.9 kg/m ² (0.16-0.39 psf)
Wet, watery, compacted snow	from 2.0 to 8.0 kg/m ² (0.41-1.64 psf)

VI. Spacing and Load Calculations for Different Methods of Installation

A. Four Sided Clamp or Frame

This method utilizes comparatively small, separate glazing elements, cut from larger sheets. SUNLITE is put inside a four-sided frame or supporting structures, and clamped on all sides. Clamping is done by plastic, wood or metal clamping profiles, with or without rubber sealing strips, and fasten by nails, screws or bolts to the supporting frame. The frame itself can be made of wood or metal, according to the design.

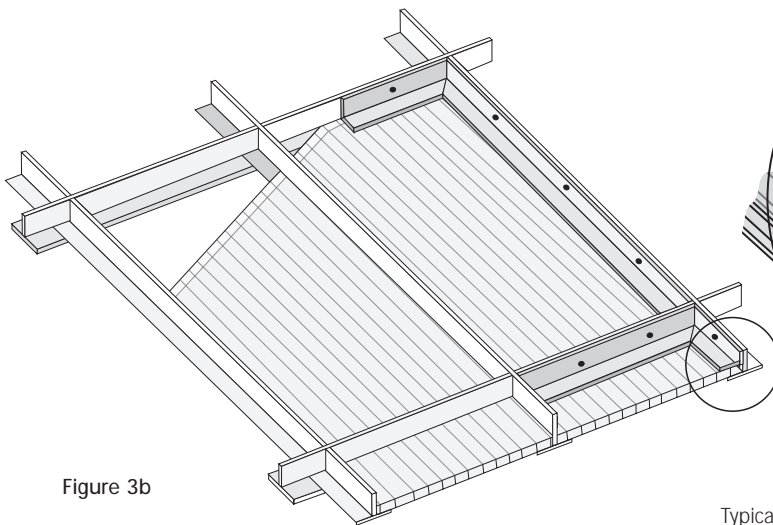


Figure 3b

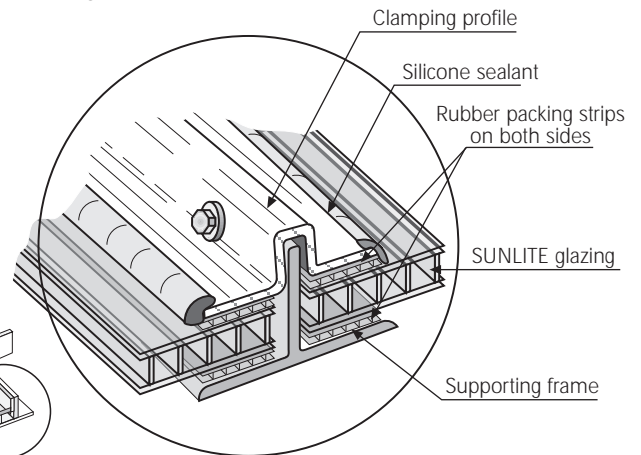


Figure 3a

Typical four sided clamp installaion - "wet" method, steel frame.

1. The load bearing and deflection characteristics of this glazing system are affected by the ratio between the "length" (a) and "width" (b) of the glazing sheet. The center-to-center distance between glazing supports defines the respective parameters. The ratio (a:b) of (1:1), offers the highest load bearing ability with same thickness of glazing sheet. At ratios from 1.00 up to 1.50, there is still a structural advantage to the four sided clamped system. Above this ratio, the structural properties are almost the same as in two sides clamped glazing system.
2. SUNLITE's acceptable deflection rate is 1/20-1/25 (versus 1/100-1/200 in the cases of steel and glass). Even with a bigger deflection there is no real danger of a breakdown, but the thickness chosen should minimize the risk of edge slippage due to excess deflection.

The table on top the next page presents the recommended center-to-center spans, for each type of SUNLITE sheet at various wind or snow loads.

Table 4.
Recommended Distances between Centers of Shorter Spans (width), on 4 Sides Flat Clamped Glazing, under Different Ratios and Loads for Four Sided Clamp or Frame Glazing

SUNLITE Sheet	Wind/snow uniform loads		Distance between centers – shorter span, - according to ratio a:b					
			Ratio 1:1		Ratio 1.5:1		Ratio >1.5:1	
	kg/m ²	psf	mm	in.	mm	in.	mm	in.
Twin wall 6 mm	50	10.25	900	35.43	700	27.56	500	19.70
	80	16.40	700	27.56	500	19.70	350	13.78
	100	20.50	500	19.70	400	15.75	-	-
	120	24.60	400	15.75	300	11.80	-	-
Twin wall 8 mm	50	10.25	1150	45.27	900	35.43	600	23.62
	80	16.40	1000	39.37	700	27.56	480	18.90
	100	20.50	900	35.43	550	21.65	450	17.72
	120	24.60	750	29.53	500	19.70	-	-
Twin wall 10 mm	50	10.25	1250	49.21	1000	39.37	750	29.53
	80	16.40	1200	47.24	750	29.53	550	21.65
	100	20.50	1100	43.30	600	23.62	500	19.68
	120	24.60	950	37.40	520	20.47	450	17.72
Triple wall 8 mm	50	10.25	1200	47.25	950	37.40	650	25.60
	80	16.40	1050	41.34	720	28.35	510	20.08
	100	20.50	950	37.40	560	22.05	470	18.50
	120	24.60	800	31.50	510	20.08	-	-
Triple wall 16 mm	50	10.25	1500	59.05	1200	47.24	1100	43.30
	80	16.40	1300	51.18	1100	43.30	1050	41.34
	100	20.50	1200	47.24	1050	41.34	900	35.43
	120	24.60	1100	43.30	950	37.40	850	33.46
Structured 25 mm (available in width of 980 mm and 1200 mm only)	50	10.25	1200	47.24	1200	47.24	1200	47.24
	80	16.40						
	100	20.50						
	120	24.60						

Notes:

1. The data is based on load tests on typical multi-wall sheets and additional extrapolations.
2. 90% of the highest ratio distances depicted, indicates the recommended span between longitudinal supporting bars or glazing profiles for two sides clamped glazing.
3. Recommended spans are calculated on the basis of a maximum deflection of 1/20 (5%) of sheet's width (in this case crosswise, perpendicular to the rib channels).
4. The glazing sheet may withstand even higher loads without buckling, however, excessive lateral shortening, created by higher deflection, may cause the edges to slip out of their supports.

B. Two-Sided Clamped Glazing:

This is a simpler glazing system to install, requiring no mid-sheet fastening, using long glazing sheets, and held in place by two glazing profiles on both longitudinal edges. It is not as strong, and permitted width is limited (the width direction of a multi-wall sheet is a more vulnerable to loads, span-wise, especially the thinner, square ribbed 6,8 and 10 mm sheets).

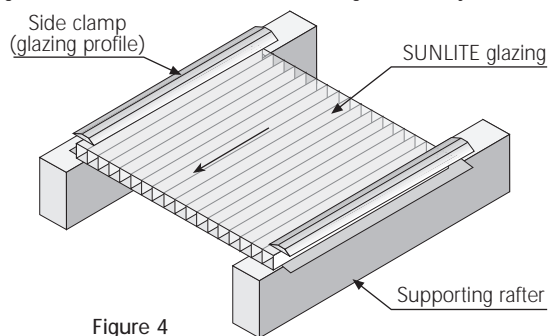


Figure 4
 Flat, two-sided clamped glazing

Table 5. Installation Distance for SUNLITE Sheets Using Two Sided Clamped Glazing

Type of sheet	Twin wall 6 mm		Twin wall 8 mm		Twin wall 10 mm		Triple wall 8 mm		Triple wall 16 mm		Structured 25 mm			
	kg/m ²	psf	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.		
Uniform load	50	10.25	450	17.72	540	21.26	680	26.8	600	23.62	990	40.0	1200	47.25
	80	16.40	315	12.40	430	16.93	500	19.7	470	18.50	940	37.0		
	100	20.50	-	-	405	15.95	450	17.7	425	16.73	810	31.9		
	120	24.60	-	-	-	-	400	15.75	-	-	770	30.3		

C. Two-Sided Clamped Arched Glazing:

1. SUNLITE sheets can be curved into arches within the minimal permitted radius (see paragraph V above), with no damaging effect to mechanical performance. Moreover, internal stresses induced by curving give it extra strength and rigidity in both directions, like pre-stressed concrete elements.

2. Rigidity and the support spans increase as the curve radius is reduced (down to the minimal permitted radius). Shallow curve should be considered to be the same as flat panels, while a deep curve adds significantly to the bridging ability.

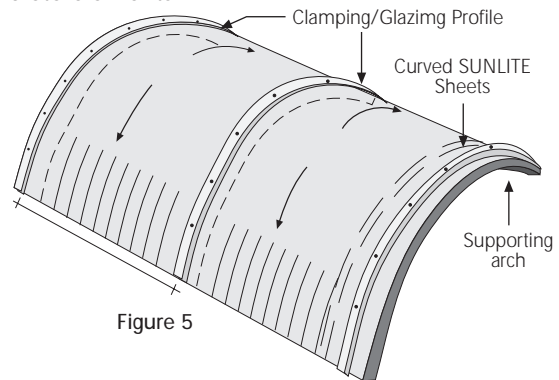


Figure 5

The following table shows the growing rigidity from the curving of SUNLITE, at various uniform loads.

Table 6. Recommended Distances between Arched Supports, According to Radius of Curve and Load for Two Sided Clamped Glazing

Profile	Thickness	Radius of sheet curvature (arched install. two-sided clamping)		Recommended (center-to-center) distance between supporting arches (in mm and in.) according to wind loads appearing below.							
				mm		in.		mm		in.	
				Uniform wind/snow loads							
				kg/m ²	psf	kg/m ²	psf	kg/m ²	psf	kg/m ²	psf
	mm	mm	in.	50	10.25	80	16.40	100	20.50	120	24.60
Twin wall	6	1100	43.5	2000	79	1730	68	1420	56	1020	40
		1500	59.0	1470	58	1090	43	890	35	660	26
		1800	71.0	1140	45	860	34	690	27	580	23
		2200	86.5	810	32	690	27	-	-	-	-
		2800	110.0	500	20	350	13.8	-	-	-	-
		4000	157.5	500	20	350	13.8	-	-	-	-
		6000	236.2	500	20	350	13.8	-	-	-	-
	8	1500	59.0	1980	78	1700	67	1320	52	1170	46
		1800	71.0	1700	67	1320	52	1070	42	890	35
		2200	86.5	1090	43	890	35	710	28	600	23.6
		2800	110.0	840	33	480	19	450	18	-	-
		4000	157.5	600	23.6	480	19	-	-	-	-
	10	1800	71.0	1730	68	1420	56	1170	46	1020	40
		2200	86.5	1320	52	960	37.8	810	31.9	660	26
		2800	110.0	890	35	750	29.5	600	23.6	550	21.6
4000		157.5	750	29.5	550	21.6	500	20	450	17.5	
6000		236.2	750	29.5	550	21.6	500	20	450	17.5	
Triple wall	8	1500	59.0	2000	78.7	1750	68.9	1350	53.2	1200	47.2
		1800	71.0	1710	67.3	1360	53.5	1120	44.1	900	35.4
		2200	86.5	1150	45.3	920	36.2	750	22.4	620	24.4
		2800	110.0	850	33.52	720	28.3	480	18.9	-	-
		4000	157.5	650	25.6	520	20.5	-	-	-	-
		6000	236.2	650	25.6	520	20.5	-	-	-	-
	16	2800	110.0	2080	82	1930	76	1550	61	1300	51
		4000	157.5	1580	62	1220	48	940	37	850	33.5
		6000	236.2	1100	43.5	1050	41.5	900	35.5	850	33.5
		-	-	-	-	-	-	-	-	-	-
Structured	25	4500	177.2	1200	47.5	1200	47.5	1200	47.5	1200	47.5
		6000	236.2	1200	47.5	1200	47.5	1200	47.5	1200	47.5

Notes:

1. (-) This sign in the table indicates where the specific type of sheet cannot be used. In most cases, a distance of less than 600mm (about 24 inches) is not really practical for this installation method.
2. (*) The Structured sheet's maximum available width is 1200 mm (47.3 inches).
3. the lowest radius dimension (first in the column) appearing in the table, for each type of sheet, is the minimum permitted cold bending radius of that specific type.
4. The values appearing in the table are derived in part from theoretical calculations, partly from empirical experience, and by extrapolation.

D. "Roofing and Cladding" Installation Method:

This is a simpler, more practical method, resembling the one used for single-wall, corrugated plastic (or metal) sheets. It employs longer strips, with wider dimension. Length is as long as possible without excess deformation by thermal expansion. SUNLITE sheets are laid on top of the purlins, with rib channels directed down the slope, perpendicular to the purlins. Span between purlins is determined by the load and deflection characteristics of the specific SUNLITE sheet.

1. The sheets are connected to each other by long connecting elements.
2. The wide variety of these connection methods falls into two main categories: "wet" or "dry" installation systems. The connecting elements (made of aluminum, sheet metal or plastic- rigid PVC or polycarbonate) are designed as connectors, not as load supporting members. They connect the sheets to each other, achieving one unified watertight exterior shell. Additional strength and rigidity achieved through them is an added bonus.

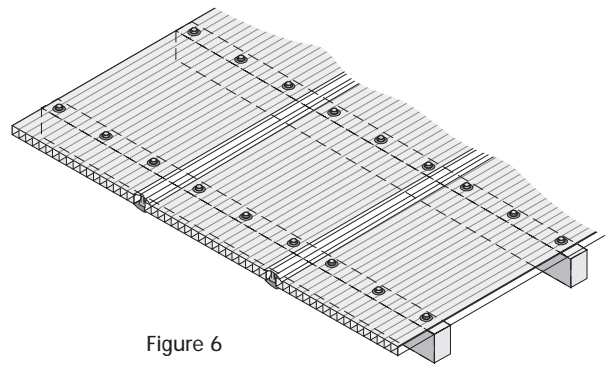


Figure 6

a. A basic inverted "H" polycarbonate connecting profile:

- 1) "Dry" system: The edges on both sides are inserted into the profile, with the sheets on both sides fastened to the structure, along the purlins, by fixing screws, about 500-600 mm (20-24 inches) apart.
- 2) "Wet" system: both channels of the profile are half-filled with silicone, which acts, after installation and curing, as a sealer and an adhesive. It may offer better weatherproofing at shallower slopes, but is very difficult to install properly and cleanly (Fig 7).

(Note: the connector itself is not fixed to the purlins.)



Figure 7. Basic, Inverted H Polycarbonate Connecting Profile

b. A two-part polycarbonate connecting profile comprised of:

- 1) A lower base profile, usually the more rigid of the two, on which the edges of the adjoining sheets are placed. Usually the base profile is fastened to the purlins by screws through the middle, with both edges free, letting the sheets slide easily due to the thermal expansion and contraction process.
- 2) The upper part, usually more flexible than the base, clips on the base profile by hand pressure, holding both sides of the adjoining sheets in place by mechanical pressure.

This type is easier to install, more reliable in holding the sheets and sealing the connection. It is used, mostly, in "dry" installation, but could be assisted by silicone on the upper and lower profile. "Wet" installation like this is difficult to keep clean during installation and with long sheets may lose its effectiveness due to excessive expansion.

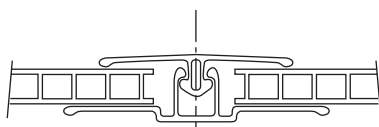


Figure 8a

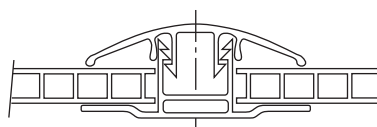


Figure 8b

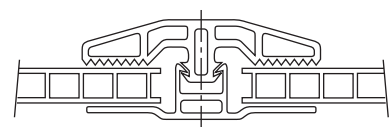


Figure 8c

Figure 8. Depiction of Typical Two-Part Polycarbonate Connecting Profiles Currently Used

c. Combination of Metal and Plastic Two-Part Connecting Profile is a connector for added strength and rigidity. The lower part of the profile is made of metal- (aluminum or steel), and the upper part is made of plastic (rigid PVC or polycarbonate), clipped on top of the metal profile, pressing on the edges of the two adjoining sheets.

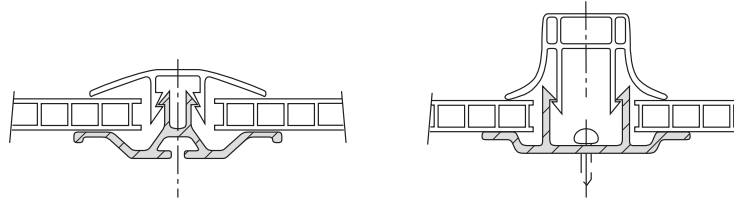


Figure 9. Depiction of Typical Two-Part Plastic and Metal Connecting Profiles Currently Used

d. Wood Connecting Profiles, developed from wooden window frames, supports the installed SUNLITE sheets. They are usually used along with the “wet” system, with rubber packing strips and silicone sealant. Lengths are generally limited by the nature of wood. If long, laminated wooden rafters are used, they usually come with one or more of the other connecting solutions below.

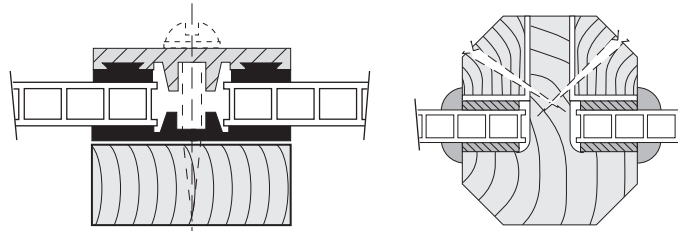


Figure 10. Depiction of Typical Two-Part Wood Connecting Profiles Currently used in the Market

e. Metal Connecting Profiles comprise the largest group of connecting profiles. They come in wide variety of designs, are made from aluminum or steel, in “dry” or “wet” systems, and in plain or sophisticated detailing and finish. Some profiles are equipped with built-in drains, neoprene rubber weather strips, concealed fixing screws, and high-end finish, for more luxurious structures.

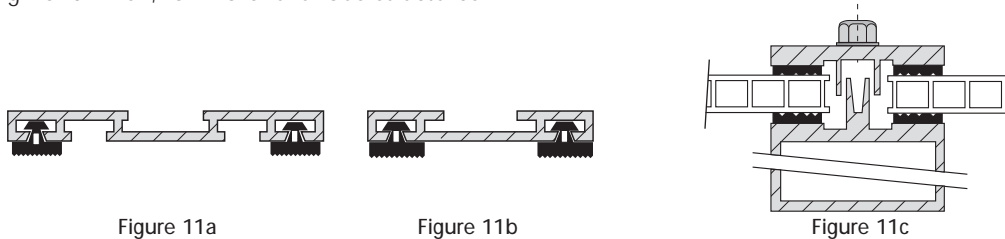


Figure 11a

Figure 11b

Figure 11c

Figure 11. Depiction of Typical Two-Part Metal Connecting Profiles Currently Used

f. Mid-Sheet Fasteners:

1) A wider sheet has to be fastened to the supporting structure by additional fastening along its width, as the connectors on both longitudinal sides are not enough to hold the sheet down, against the uplift force it has to withstand.

2) Fastening is usually done by screws, inserted along the supporting internal purlins, spaced about 500 mm (20 in.) apart.

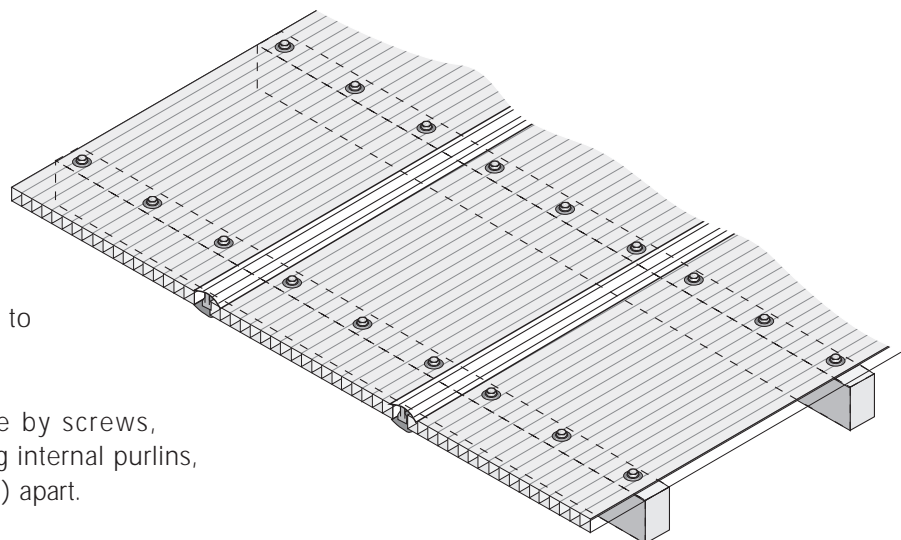


Figure 12. Schematic Isometric View of Partial Roof Installation with Mid-sheet Fasteners

- 3) Along the edge purlin, the fastening screws should be inserted about 300 mm (12 in.) apart.
- 4) A hole must be pre-drilled into each screw location. The diameter of that hole should be 2 mm larger than that of the screw, to allow for thermal expansion movements.
- 5) An electric screwdriver with an adjustable clutch should be used to tighten the screws. Avoid excess overtightening, which might induce undue internal stresses, causing premature failure and buckling to the sheet. Pay attention to insert the screws perpendicular to the material face, as inclined insertion could damage the sheet and/or result in leaks.

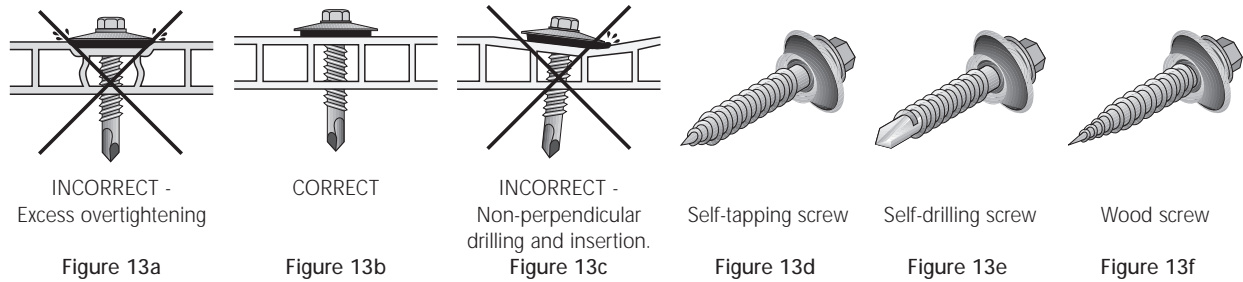


Figure 13. Typical Installation Screws

- 6) Use of self-tapping or self-drilling screws is recommended. In case of wooden structures, suitable wood-screws should be used. All the screws should be corrosion resistant, with at least heavy-duty hot-dipped galvanized finish, or stainless steel (if used in an extremely corrosive environment). The screws should be 6 mm (1/4 in.) diameter, with length according to sheet thickness, type of washer and type of supporting structure.
- 7) Each screw should be fitted with a conical corrosion resistant steel washer, with specifications as the screws above or of aluminum, at least 1 mm (0.04 in.) thick, 25 mm (1 in.) diameter, with a 2 mm integral rubber gasket, (EPDM or neoprene). The screw should be tightened carefully, with no distortion of the washer and rubber gasket, or the flat face of the sheet.
- 8) **Screw buttons:** Improved performance can be obtained by replacing the washers with special plastic screw buttons, fitted with a suitable rubber gasket, with or without a closing cap. They fit the thickness of each type of sheet (6, 8, 10, 16 mm, and possibly 25 mm), differing by sleeve length. Their advantage: the sleeve prevents excessive tightening and local squash around the screw, and is softer on the sheet, reducing risk of tear or shear around the screw's stem. Screw buttons work with the same screws mentioned above (6 mm, 1/4 in.), maybe a little longer due to the higher thickness of the button.

PALRAM recommends perforating SUNLITE for fastening as little as possible, and prefers the use of clamped edge installation. PALRAM recommends that the use of fastening screws in a glazing system, even with plastic buttons, should be limited to economical, price conscious projects only. Two or four-sided clamped glazing is a preferred choice.

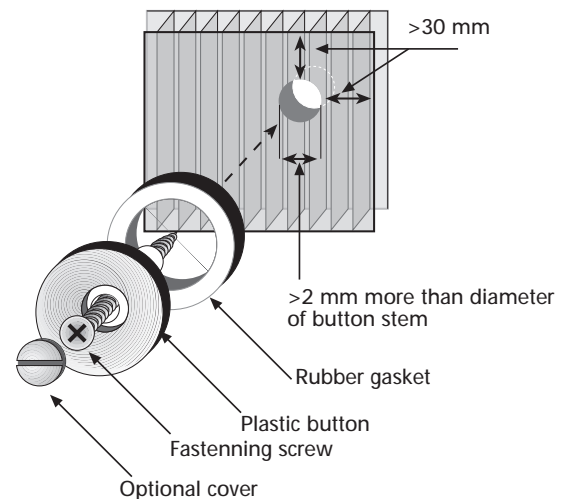


Figure 14

g. Design spans between Supporting Purlins According to Designated Loads for the Roofing and Cladding Method:

Table 7. Recommended Spans between Support Purlins- Flat and Slightly Curved Roofing/Glazing

Profile	Thickness mm	Distance (center-to-center) between supporting purlins							
		mm		in.		mm		in.	
		Uniform wind/snow loads							
		kg/m ²	psf	kg/m ²	psf	kg/m ²	psf	kg/m ²	psf
	50	10.25	80	16.40	100	20.50	120	24.60	
Twin wall	6	800	31.5	600	23.6	400	15.75	-	-
	8	1000	39.4	850	33.5	550	21.65	400	15.7
	10	1250	49.21	1100	43.3	950	37.4	800	31.5
Triple wall	8	1080	42.52	930	36.61	750	29.53	650	25.60
	16	1600	63.0	1400	55.12	1250	49.21	1130	44.5
Structured	25	1750	68.9	1600	63.0	1450	57.1	1300	51.2

Notes: Based on a maximum deflection of 1/20 of span, or 5%, using continuous, multi-spans supports. The data appearing in this table refers to mid-spans. The edge spans (lower and upper ends) should be smaller by about 20%. The sheets can withstand even higher loads or wider spans without failure, but deflection may then grow up to almost 10%, or 1/10 of the span.

Curving SUNLITE sheets gives them higher strength and rigidity, as in the case of two-sided clamped described below:

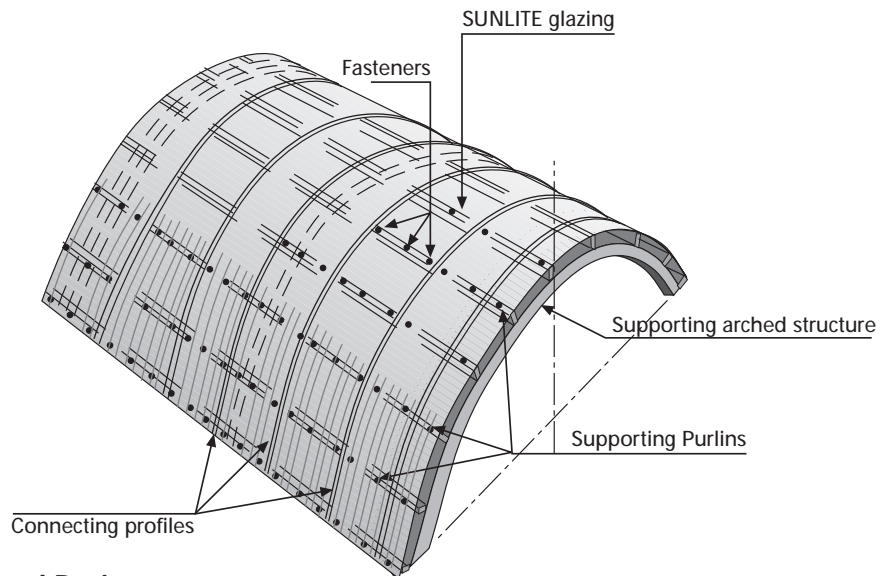
Table 8. Recommended Maximum Distances between Purlin Supports, According to Radius of Curvature and Load, for Roofing and Cladding Glazing, with a 5% Deflection (1/20 of span between supports).

Profile	Thickness mm	Radius of sheet curvature (arched installation Regular cladding method)		Recommended (center-to-center) maximum distance between supporting purlins (in mm and inches) according to wind loads appearing below.									
				mm		in.		mm		in.			
		mm		in.		Uniform wind/snow loads							
		kg/m ²	psf	kg/m ²	psf	kg/m ²	psf	kg/m ²	psf	kg/m ²	psf		
	50	10.25	80	16.40	100	20.50	120	24.60					
Twin wall	6	1100	43.5	1500	59	1150	45	900	36	750	30		
		1500	59.0	1500	59	1150	45	900	36	600	24		
		1800	71.0	1500	59	1150	45	750	30	500	20		
		2200	86.5	1350	53	1050	41	-	-	-	-		
		2800	110.0	1200	47	900	36	-	-	-	-		
		4000	157.5	880	35	660	26	-	-	-	-		
	8	6000	236.2	800	32	600	24	-	-	-	-		
		1500	59.0	1900	75	1600	63	1300	51	1150	45		
		1800	71.0	1750	69	1550	61	1150	45	780	31		
		2200	86.5	1700	67	1450	57	1050	42	700	28		
		2800	110.0	1500	59	1250	49	900	36	-	-		
	10	4000	157.5	1100	44	950	38	-	-	-	-		
		6000	236.2	1000	40	850	34	-	-	-	-		
		1800	71.0	1800	71	1750	69	1700	67	1650	65		
		2200	86.5	1750	69	1700	67	1600	63	1550	61		
Triple wall	8	2800	110.0	1600	63	1550	61	1500	59	1450	57		
		4000	157.5	1300	51	1200	47	1150	45	1050	42		
		6000	236.2	1250	49	1100	43	950	38	800	32		
		1500	59.0	1950	76.8	1650	65	1400	55.1	1300	51.2		
		1800	71.0	1780	70.0	1580	62	1300	51.2	1150	45.3		
		2200	86.5	1730	68.1	1500	59	1200	47.2	1100	43.3		
	16	2800	110.0	1550	61.0	1400	55	1050	41.3	850	33.5		
		4000	157.5	1200	47.2	1100	43	850	33.5	-	-		
		6000	236.2	1120	44.1	1000	39	-	-	-	-		
Structured	25	2800	110.0	2100	83	2050	81	2000	79	1950	77		
		4000	157.5	1750	69	1700	67	1650	65	1600	63		
		6000	236.2	1600	63	1400	55	1250	49	1150	45		
Structured	25	4500	177.2	2550	100	2450	97	2400	95	2350	93		
		6000	236.2	1750	69	1600	63	1450	57	1350	54		

Note:

(-) This sign in the table indicates a situation where the specified sheet cannot be used. However, in most cases, a distance of less than 600 mm (about 24 inches) is not really practical to use with this installation system.

Figure 15. Schematic Depiction of Regular, above Structure Roofing and Cladding Method of Glazing, in a Vaulted Form.



h. General Notes for Structural Design:

- 1) The recommended support spacing, as depicted in the load/span tables, should not supersede the requirements of local structural and construction codes. The final values are to be dictated by actual conditions on site and engineering design.
- 2) The end spans, i.e. the distance between the edge support (or purlin) and the first internal purlin should be about 80 percent of the common recommended span for this load and type of sheet, or the value dictated by the design engineer.
- 3) The spacing values shown, are based partly upon theoretical calculations, and partly on empirical experience gained out of field use, educated estimates, extrapolations and evaluations made according to similar or parallel products. Known structural properties taken into consideration: permissible sheet deflection, potential wind and snow loads, hail and other applicable loads according to the usual structural and construction practice.
- 4) Actual values may be updated later on, due to further testing and evaluations.

VII. Positioning of Clamping Profiles and Fastener Location:

A. Using the four-sided clamped glazing system, the support bars should be underneath (or inside), and the glazing clamps on top (or outside). SUNLITE must be installed with the clamping profiles covering all four edges of the sheet. (These are load-bearing elements, which connect the glazing to the supporting structure, transferring loads from the glazing to it.)

B. Using the two-sided clamped glazing system, the support bars (and glazing clamps) should be installed covering the two longitudinal edges of the sheet, parallel to the rib channels. (Again, these are load-bearing elements, connecting the glazing to the supporting structure, transferring loads from the glazing to it.)

C. Using the roofing/cladding method, glazing connectors (of any version) should be installed on both long sides of each sheet (parallel to the rib channels). Their main duty is connecting adjoining sheets. They may assist transferring loads to the structure, but here the fastening screws transfer most of the load to the supporting structure (the purlins). The screws, with their metal washer and rubber gaskets, should be inserted along the length of the supporting purlins, about 500-600 mm (20-24 in.) apart and 300-400 mm (12-16 in.) at the edge purline. When using metal glazing connectors, they are positively fastened to the purlins. Using polycarbonate connecting-profiles, some types are fastened and others do not. In that case, the fastening screws will be placed on both sides of the connector, about 200-250 mm (8-10 in.) on each side.

VIII. Preparation for Glazing:

A. Determination of Rebate Depth and Thermal Expansion Allowance:

These parameters depend on the SUNLITE sheet dimension, and relate to the four sides of the sheet (four-sided clamped system), or to the two edges parallel to the rib channels two-sided clamped system).

1. Allowance for expansion:

SUNLITE expands about 3 mm for every meter (1/8 in. per 3 1/3 ft.) of length (or width) for a service temperature range of about 50 °C (90 °F), the practical working range in most cases.

For a sheet of 1.00 m (or 40 in.) wide, 1.50 m (60 in.) long, a net allowance of 3 mm (width) and 5 mm (length) should theoretically suffice. We recommend doubling this allowance for practical reasons. Allowance should be divided between both sides of the sheet.

2. Rebate depth: (the recess that supports the glazing edge). PALRAM recommends a rebate depth of 20 mm (0.8 in.), at least for widths up to 1.0 m (40 in.) and a depth of 25-30 mm (1.0-1.2 in.) for wider spans.

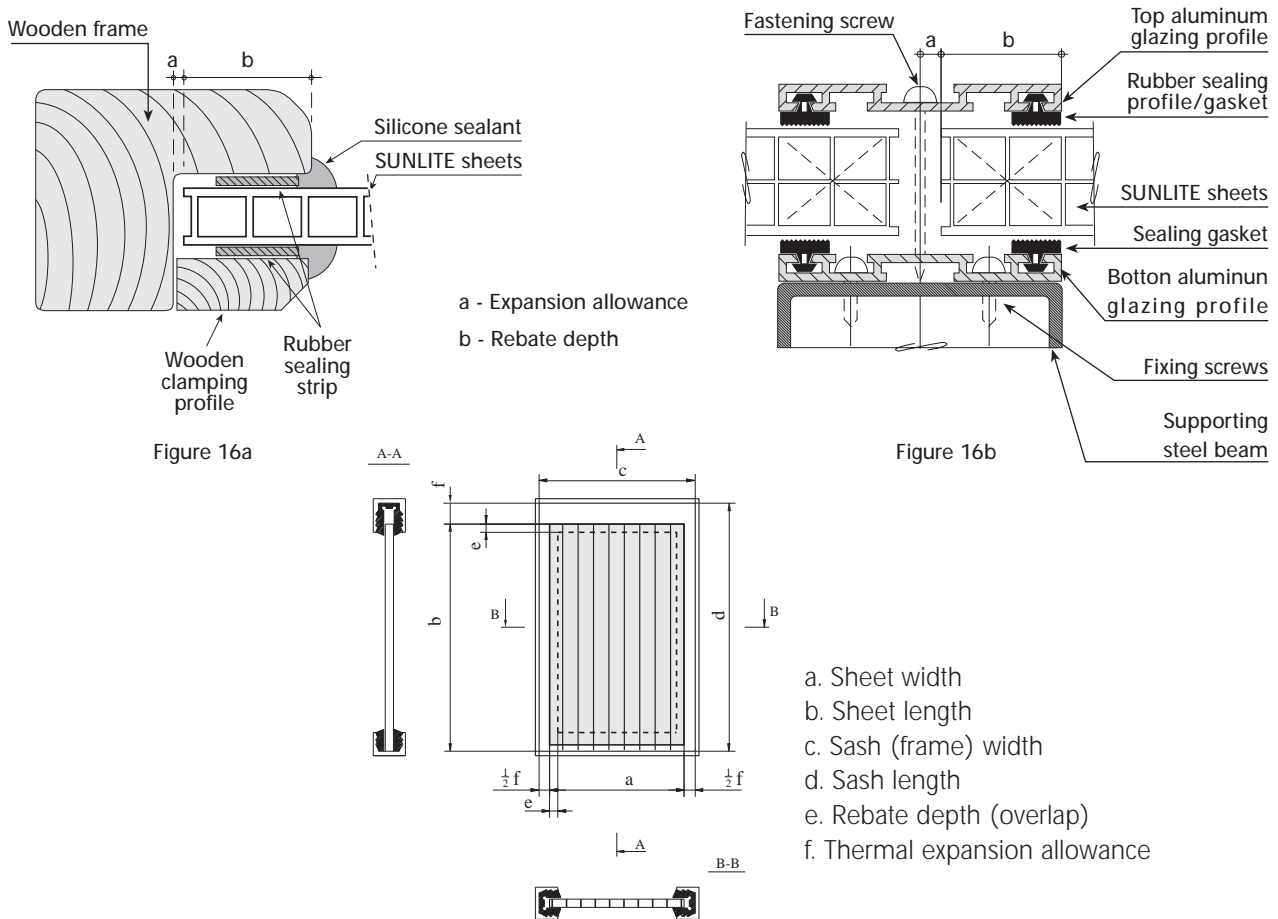


Figure 16. Schematic Sketch of Rebate and Expansion Allowance. ("wet" and "dry" methods)

IX. Preparations Prior to Installation:

A. Peel off the protective foil on both open ends of the sheet (the width sides) to about 80-100 mm (3.5-4 in.) from the edges of the sheet, to enable taping of the aluminum sealing tape. If a factory installed temporary seal is taped over the open ends, it should be removed prior to the installation of the aluminum tape. Tape the sealing tape straight along the open-end side, so it will cling well and evenly to both sides of the sheet, making sure that all the open ends of the rib channels are properly sealed.

B. Peel the masking along the edges of length sides, both sides of the sheet, for about 80-100 mm (3.5-4 in.) from the edges, preparing the sheet for the insertion into the connecting profiles or the glazing frame.

C. Remove the underside masking just prior to the actual installation on the roof. Premature removal of protective film may result in damage to the sheet during handling.

D. Remove the upside, exterior protective foil as soon as the installation of the whole glazed area is completed, or very short time afterwards. Failing to do so, exposing the protective film to direct sunlight, may cause difficulties in removal, due to deterioration of the film, and void the warranty.



Figure 17a.
Partial or Complete
Removal of Protective
Foil Prior and after
Installation

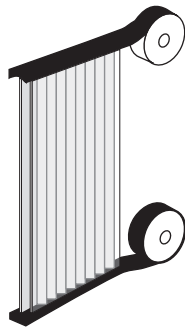


Figure 17b. Installation
of Sealing Tape on
Open Ends of Sheet

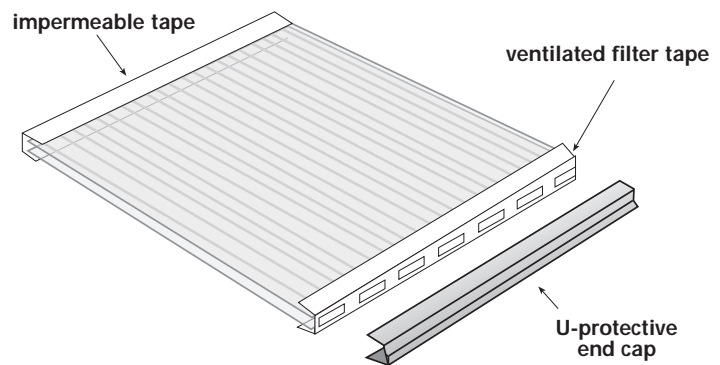


Figure 17c. Installation of Impermeable Tape at Top of the Sheet
and Installation of Ventilated Tape at the Bottom of the Sheet

E. Ensure the use of the proper type of sealing tape according to the glazing form used, verifying that the prepared sheets are mounted correctly. **Please note:** In case of curved installation, where both open ends are situated at the bottom - apply the ventilated tape on both ends.

X. Glazing Profiles and Fastening Screws:

Type of glazing/clamping profile used in the installation of SUNLITE sheets, differ according to the glazing system chosen:

A. Framing profiles are similar in concept and detail to those used in fixed glass windows, curtain walls and skylights, made of wood, steel or aluminum, but wider, allowing for the larger rebate depth required for SUNLITE. The frames are prepared in advance, and glazing is done after they are all in place, along with completion of the other finishing jobs. (See Figures 3a, 3b).

B. Two and four-sided clamped glazing employ practically the same profiles used for framing, as used in curtain walls and skylights. Almost all are prepared prior to the glazing work, and just the clamps, the rubber packing profiles (and silicone sealant in "wet" glazing) are installed along with or after the glazing is in place.

C. The roofing and cladding glazing installation method installs SUNLITE over the supporting skeleton, rafters and purlins. The glazing profiles, which are usually flatter by design, consist of top and bottom parts, made of polycarbonate, rigid PVC or a combination (a bottom aluminum profile and top profile made of polycarbonate, or rigid PVC). SUNLITE sheets and their connecting profiles (also acting as glazing profiles) are installed together, advancing step by step. Most profiles are flexible enough to be easily shaped into curves by hand, when installed over curved structures, enabling inexpensive implementation of curved glazing.

XI. Handling and Storage:

A. SUNLITE sheets should be transported and stored horizontally, on a flat, sturdy pallet whose dimensions are equal to or larger than the sheets themselves. The sheets must be secured and fastened to the pallet during transportation and handling on site. It is possible to stack the sheets with the longer sheets at the bottom and the shorter on top, leaving no unsupported overhang.

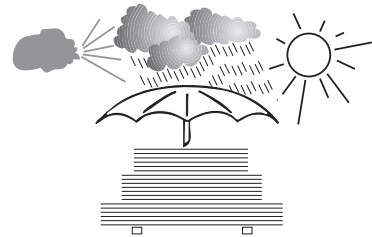


Figure 18

B. While moving a pallet with a forklift, always use forks as long as the sheets' width. Shorter forks on a wider pallet may cause damage to the sheets.

C. SUNLITE sheets leave the factory in packages, wrapped in white, watertight polyethylene. The wrapping should be taken off as close to the actual time of installation as possible. Storage of the sheets should be in a covered, dry, ventilated place, away from direct sunlight and rain.

D. Avoid leaving the sheet pallet in the rain, even if still wrapped, for extended periods, as water may condense inside the hollow core. Extended exposure to direct sunlight may cause heat buildup, softening the protective film, fusing it to the sheets face, making removal difficult or impossible.

E. Avoid leaving the sheets stored unwrapped, with their ends open, for more than a few days, as dust may collect inside the hollows.

F. Important! Never cover the pallet with, or place on the pallet, materials that collect heat or are good heat conductors (e.g. dark objects, metal profiles or pipes, steel sheets etc.) They may collect and deliver excess heat, and damage the sheets.

G. When necessary to store the pallet in the open, cover it with a white opaque polyethylene sheet, cardboard, or any other insulating material, taking care to cover the pallet completely.

XII. Cutting:

A. SUNLITE sheets can be cut with standard wood or metal workshop equipment. Saw blades designed especially for plastic yield best results. A circular saw (fixed or portable, with small teeth suited for hardwood), rotating at high speed, band saw or a jigsaw (best for short, complex cuts) can all be used, taking care to advance the blade slowly. A hand and hacksaw may also be used for local cutting.

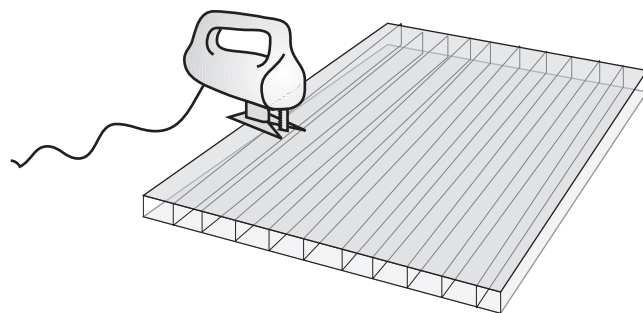


Figure 19

B. Always support the sheet in the vicinity of the cut and clean (with compressed air and/or by a vacuum cleaner) the dust and debris generated by the cutting. Running clean compressed air through the hollow channels, blowing away sawdust and shavings inside is a good practice.

C. Sheets of low and intermediate thickness, with modest dimensions, can be cut (taking the appropriate precautions) with a short, thin, sharp blade. A special cutting-wire hand tool may also be used, to make lengthwise cuts.

XIII. Drilling:

A. Drilling can be carried out with drill bits intended for metal. When pre-drilling for a fastening screw, the hole's diameter should be 2 mm larger than that of the screw used. As when cutting, always support the sheet in the vicinity of the place being drilled, and clean away the sawdust and shavings, both on and inside the sheet.

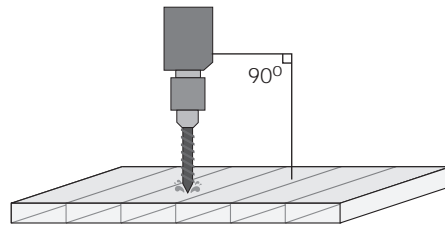


Figure 20

B. Special attention must be given to drill all the required holes perpendicular to the face of the sheet.

C. Though drilling the sheet for fastening is a common way of installation, it is recommended to be used mostly in plain, economy-oriented projects, and used sparingly elsewhere.

XIV. Sealing and Bonding:

A. Silicone Sealant: PALRAM strongly recommends using Dow Corning 3793 (white) or Novasil S-64 from Otto Chemie (white or translucent).

B. Sealant and Weather Strips: Applied in "wet" or "dry" systems. The "Wet" system can use IDL 311 L Butyl rubber double-sided sticky tape by Sellotape, or simple neoprene or EPDM rubber strips, combined with the silicone sealant above.

The "Dry" system uses neoprene or EPDM rubber packing strips (in simpler framing system), or profiled neoprene or EPDM rubber strips inserted into grooves in the metal connecting/framing profiles. Mechanical pressure of the clamping profile on the rubber gasket achieves the sealing, like in glass systems.

C. Sealing the Sheets is done by aluminum impermeable, or ventilated filter sticky tapes, as described in the paragraph "Pre-preparation of the sheet" above. Such specialty tapes can be obtained from the leading tape manufacturers. (See figures 17b, 17c).

For other materials, please refer to our "Adhesives and Sealants Compatible with Polycarbonate Sheets" technical information leaflet, or consult with your PALRAM distributor

XV. Accessories:

Different profiles, structural elements, sealing materials and other components required for the completion of installation appear, in concept, in the sketches in this manual. These materials are usually available through professional suppliers of glazing accessories. Other designated elements like gutters, closures, ridge caps, trimming and flashing, etc. are to be specially fabricated according to the specific design.

XVI. General Recommendations for Working with SUNLITE Sheets:

A. Cleaning

1. Keeping SUNLITE clean will yield the best long-term results. Self-cleaning by rain is usually sufficient. Local small areas may be washed using diluted mild household detergents. Make sure the detergent contains no abrasives or solvents. Pre-wash with warm water, then wash the stained area with a soft sponge or brush, preferably with hot water, until the stain disappears. Rinse with water and dry with a soft cloth.

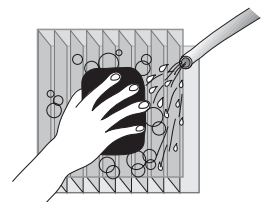


Figure 21

2. Heavy oil or tar stains can be removed with an ethyl alcohol watery solution. Rub the area gently with a soft rag. Follow with the treatment depicted above, rinsing with a lot of water.
3. Avoid dry cleaning, as the sand and dust particles clinging to the exterior of the glazing may scratch the surface.
4. Large areas may be professionally washed by high-pressure water jet, possibly adding a mild compatible detergent, and/or a steam jet.
5. Avoid the repeated sliding of sheets over each other, even when still protected by the masking foil. This action generates electrostatic charge in the sheet, attracting dirt and dust and hindering cleaning.

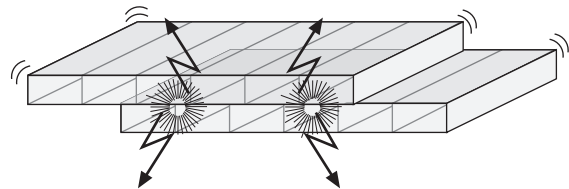


Figure 22

B. Safety Measures During Installation and Maintenance:

1. When installing SUNLITE or doing maintenance work, always consider the sheet to be unfit to support a person's weight. Always use stepping ladders or crawling boards, supported by the roof structural elements, when working on a glazed roof of any kind.
2. Never step on SUNLITE sheet between the purlins or in the middle of a framed glazing!!! In emergency, step only on the lines of purlins or of structural framing.

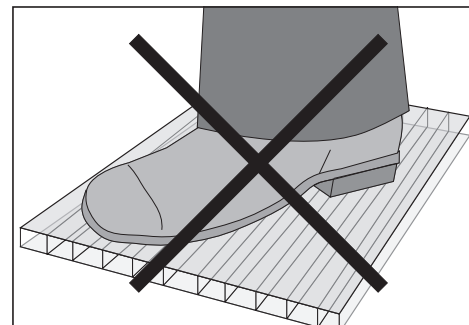


Figure 23

3. Never leave the glazing sheets unattended on the roof or at the glazing area, until all the required fastening clamps or screws are secured properly. Throughout the installation process, always ensure that the sheets ready for installation are temporarily secured against sudden wind gusts.

C. Alternative PALRAM Products for Certain Applications:

PALSUN flat, solid, light transmitting polycarbonate sheets or SUNTUF corrugated clear or translucent polycarbonate sheets, manufactured by PALRAM, may offer better solutions for certain applications. You are invited to consult with your PALRAM distributor.

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