



# SUNTUF<sup>®</sup> Plus

Corrugated Polycarbonate Sheets for Greenhouses

## ***Installation Instructions***

### Table of Contents :

A - Profile Dimensions .....	2
B - Distance Between Purlins .....	2
C - Handling and Storage .....	3
D - Cutting .....	3
E - Drilling .....	3
F - Chemical Resistance .....	3
G - Sealing and Bonding .....	4
H - Use of Shading Compounds .....	4
I - Positioning of Sheets .....	5
J - Overlap .....	5
K - Arching Radius .....	5
L - Roof and Wall Fastener Location .....	6
M - Screws, Washers and Gaskets .....	6
N - Sheet-to-Sheet Stitching Fasteners .....	7
O - Additional Accessories .....	7
P - Standard SUNTUF Plus Accessories .....	8



# SUNTUF Plus

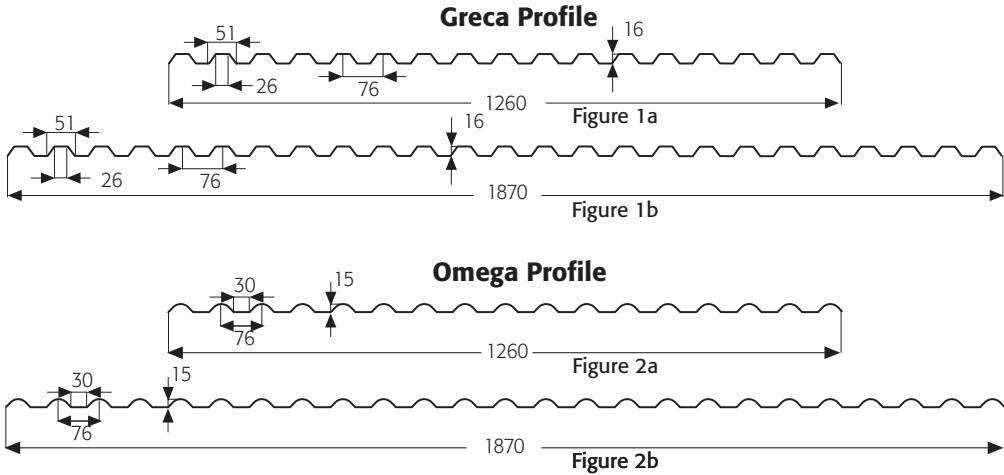
## INSTALLATION INSTRUCTIONS



### A Profile Dimensions:

Distance between Corrugations (mm)	Width (mm)	Effective Width (mm)	Number of Corrugations	Wave Overlap	Percent Overlap
76	1260	1216	17	1*	3.5
76	1870	1824	25	1*	2.5

Table 1



\*Two corrugations length overlap is recommended for slopes below 15%, or in case of extreme weather conditions (excessive rain and/or wind.)

### B Distance between Purlins:

Profile	Sheet Thickness mm	Theoretical Weight kg/m <sup>2</sup>	Load kg/m <sup>2</sup>	Distance between Roof Purlins mm	Distance between Wall Purlins mm
Greca	0.8	1.20	90	1200	1200
Omega	0.8	1.15	120	1100	
			150	1000	

Table 2

- The dimensions depicted above do not supersede the requirements of local construction codes. The distances depicted above were calculated based on the structural properties with the following factors being taken into consideration: sheet deflection, potential wind load, potential snow load, hail and application load according to usual construction practice.
- When designing a new roof, it is strongly recommended that the slope be above 10% (5.7°). (Consult your local PALRAM representative when recovering an existing greenhouse whose slope is shallower than this value).
- The recommended maximum panel length is 7.0 m. The recommended maximum distance between the edge and first purlin is 900 mm or the value dictated by the design engineer. (See drawing on page 5- Figure 8b).

**Calculate the number of sheets as follows:**

- Divide the length of the roof (the length of the gutter) by the effective width of the sheet.
- Calculate the required length of the sheet (to be no greater than 7.0 m) according to purlin to purlin distance plus the required extension beyond first and last purlin and overlap distance, if exists.



# SUNTUF Plus

## INSTALLATION INSTRUCTIONS



### **C Handling and Storage:**

1. PALRAM corrugated sheets must be transported and stored horizontally on a flat, sturdy pallet whose dimensions are equal to or larger than the sheets themselves. The sheets should be secured and fastened to the pallet. It is possible to store sheets of smaller dimensions on top of larger sheets of the same type. (Never store sheets of larger dimensions on top of smaller sheets!) SUNTUF Plus must be stored in a cool and shaded location.
2. Important: Never cover the pallet with, or place on the pallet, materials that are good conductors of heat (e.g. metal, pipes, clear or dark objects).
3. In cases where it is necessary to store the pallet outdoors, cover it with a white opaque polyethylene sheet, card board, or any other material that does not absorb or conduct heat. The total pallet must be covered.

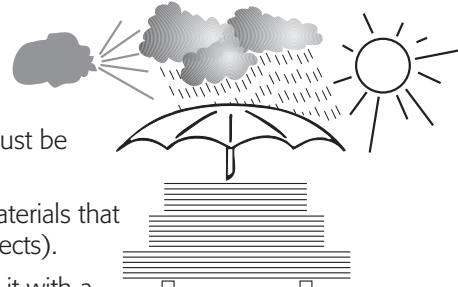


Figure 3

### **D Cutting:**

It is possible to cut SUNTUF Plus corrugated sheets using a circular saw with small teeth, rotating at a high speed, taking care to advance the saw slowly. It is also possible to use a portable electric saw (Jig Saw) or sheet metal shears. In any case, it is important to support the sheet in the vicinity of the cut and clean away the dust and debris generated by cutting.

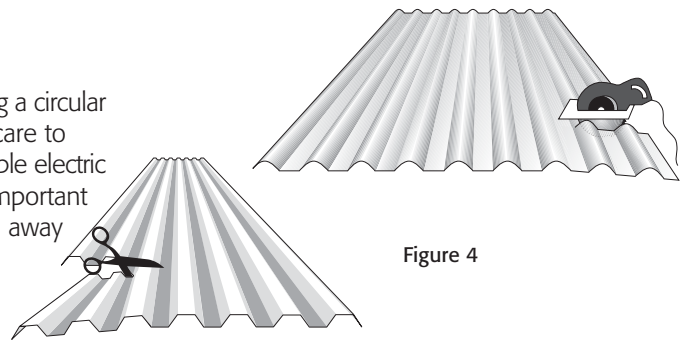


Figure 4

### **E Drilling:**

1. Drilling should be carried out with a drill bit intended for metal. The hole diameter must be 2 mm greater than the diameter of the screw to be used. It is important to support the sheet in the vicinity where the sheet is being drilled. The dust generated by drilling must be cleared away before the insertion of the screw.
2. Special attention should be given to drill all the required holes perpendicular to the face of the material.

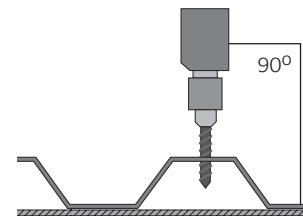


Figure 5

### **F Chemical Resistance (compatible sealants and adhesive materials):**

1. SUNTUF Plus sheets are resistant to a variety of chemicals and exhibit limited resistance to a second group of chemicals. A third group of chemicals will attack and cause damage to the sheet. The degree of damage will depend on the severity of attack and time of exposure.
2. Choose only sealants and adhesives which are compatible with SUNTUF Plus (see paragraph G).
3. Beware of installing the sheets on wet paint, or other incompatible materials, which may damage the polycarbonate sheets.
4. Use of sealants or adhesives not included in the recommended list must receive the Manufacturer's explicit approval. This can be obtained through your distributor. Use of materials not on the list, or which have not received the Manufacturer's explicit approval, may harm the sheet and will void all warranties and any responsibility of the manufacturer for the performance of SUNTUF Plus!!
5. Your local distributor can provide additional information and forward materials for evaluation of their compatibility with SUNTUF Plus.



# SUNTUF Plus

## INSTALLATION INSTRUCTIONS



### G Sealing and bonding:

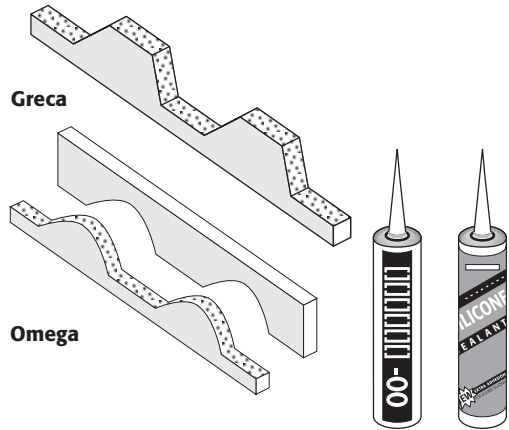
- Compatible silicone sealants recommended for use with PALRAM sheets:

Product Name / Type	Manufacturer
Novasil S-64	Otto Chemie
Plastisil BSR 50-20	Simson BV
Silicone Sealant 3793	Dow-Corning
Silicone Sealant 795	
Silicone Sealant 791-P	
Q3-7098/7099	
Multisil Transparent	GE/Bayer Silicones

Table 3

For other materials please consult your PALRAM distributor

- Corrugated sealing strip closure should be used to prevent the entry of water, wind, insects or other small animals between installed sheets. A seal between the sheet and the edge purlin of the roof can be created using a sealing strip in the form of the profile. It is held in place by the same screw used to fasten the sheet to the purlin. The sealing strip should be manufactured from cross-linked polyethylene foam (XPE)
- Sealing strips between overlapping sheets should be used where the pitch of the roof is less than 15%. Only butyl rubber strips should be used. The strip should be placed between overlapping sheets along the length and width of the overlap at both edges. In cases where penetration of wind or fumes must be prevented, a sealing strip should be used irrespective to roof slope. Wherever a sealing strip is inserted, a fastening sheet to sheet tightening screw should be used.

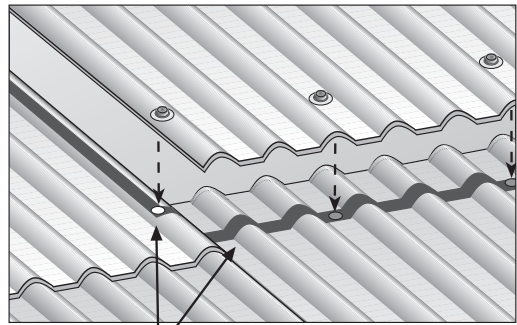


Shaped foam polyethylene top and bottom (PE) sealing strips.

Figure 6a

Silicone sealant.

Figure 6b



Butyl Rubber Sealing Strip

Figure 6c

**WARNING - Do not use materials which are not recommended by Palram. Specifically, polyurethane foam should not be used as installation foam with SUNTUF Plus. Contact with this material will render the sheets fragile. When in doubt, consult your Palram distributor.**

### H Use of Shading Compounds:

- It is possible to apply shading compounds on SUNTUF Plus sheets.
- Use only recognized commercial brands, confirmed to be compatible with polycarbonate. Do not apply dubious mixtures that may contain incompatible components, which will attack and damage the sheets.
- In case of doubt, consult your SUNTUF Plus distributor, who can advise you on the proper use of shading compounds.
- You can ask for recommendations on compatible formulations that were tested and confirmed for use by PALRAM Industries. Note that all the recommended formulations are water-soluble and will eventually be washed away by rains.
- Shading compounds should be easily removed using a strong water jet in conjunction with vigorous brushing with a soft bristle brush, or wiping with soft cotton rags.

# SUNTUF Plus

## INSTALLATION INSTRUCTIONS



### I Positioning of Sheets:

1. Only one side of a SUNTUF Plus sheet is UV protected\*. This side must always face out toward the sun. The UV protected side is indicated by a sticker or polyethylene strip along the length of the sheet. The sticker or polyethylene strip must be removed immediately after the sheet is installed.
2. The sheets should be laid down on the roof or set upon the wall against the primary direction of wind and rain.
3. Do not step on the panels between purlins.
4. Stepping ladders and other devices required for safe work should be used.
5. Never leave panels unattended until all the required screws have been tightened.
6. SUNTUF Plus sheets are lightweight. The sheet can be rolled in a direction perpendicular to the length of the corrugations for the purpose of lifting them to the roof.

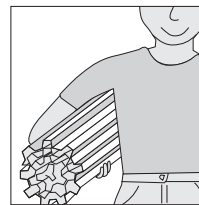


Figure 7a

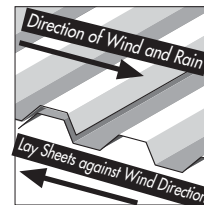


Figure 7b

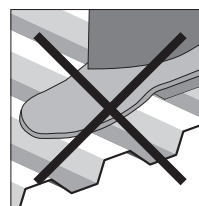


Figure 7c

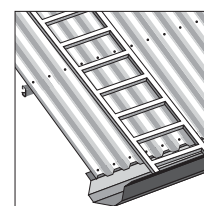


Figure 7d

\* Except for SUNTUF Plus UV2 which is manufactured with co-extruded UV protection on both sides when a special order has been placed.

### J Overlap:

#### 1. Width overlap (sheet edge):

Minimum overlap: 120 mm  
 Minimum distance of 60 mm of each sheet's edge from centerline of supporting purlins (line of screws).  
 Maximum overlap: 200 mm

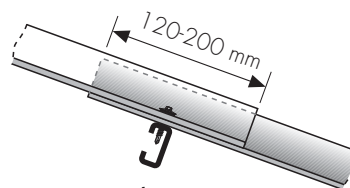


Figure 8a

#### 2. Length overlap:

One corrugation\*\*

#### 3. Roof Edge:

Sheets at the roof's edge should extend beyond over the edge support by not more than 100 mm.

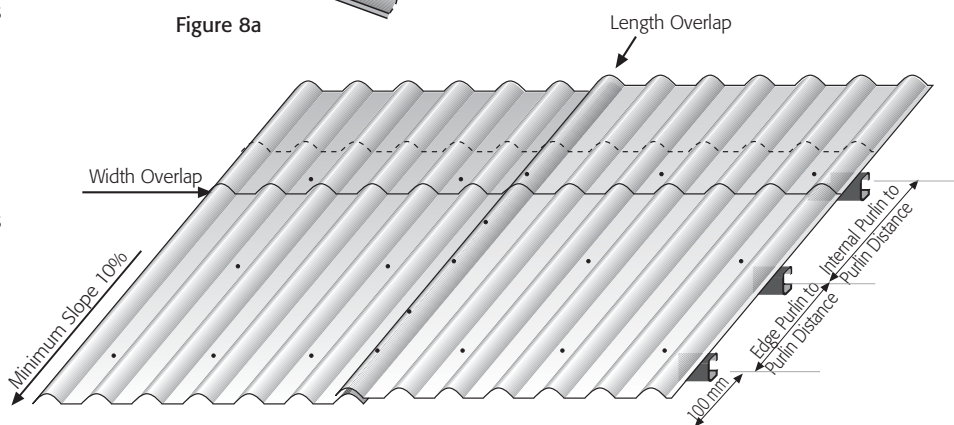
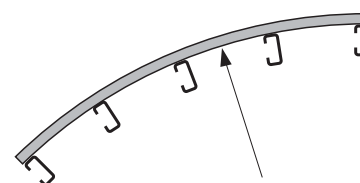


Figure 8b

### K Arching Radius:

When covering curved structures, it is possible to set the sheets on an arched framework so that they will arch within the range of elasticity of the sheets without inducing stress. The minimum radius of the arch created is 3.00 m for Omega and 6.00 m for Greca.



Minimum Radius  
 Figure 9

\*\* See comment on Par. A./ Pg. 2.



# SUNTUF Plus

## INSTALLATION INSTRUCTIONS



### L Roof and Wall Fastener Location:

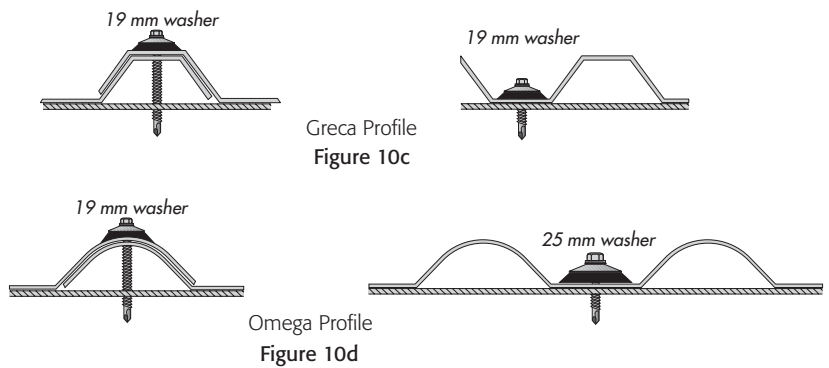
1. A fastening screw should be inserted into at least every third corrugation valley at each internal purlin.
2. Along the edge purlin, the screws are to be inserted into alternate corrugation valleys.
3. Along the length overlap, the screws are to be inserted into the overlapping corrugation crest on top of each purlin.
4. A hole must be pre-drilled into each screw location. The diameter of the hole must be 2 mm larger than that of the screw.
5. The screws should be tightened with an electric screwdriver with an adjustable clutch, taking care not to over-tighten. Excessive tightening may harm the sheet and cause premature failure.
6. Sheet-to-sheet stitching fasteners are recommended along the length of overlapping corrugations between the purlins, at least 2 units at every span. (Par. M. Sheet-to-sheet stitching fasteners, p. 6)



Positions for fastening roof or wall screws at internal purlin.  
Figure 10a



Positions for fastening roof or wall screws at edge purlin.  
Figure 10b

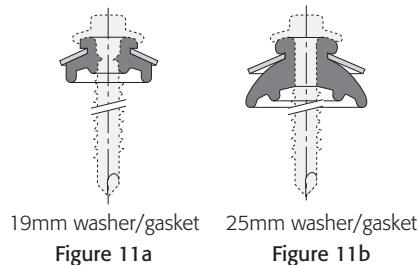


Greca Profile  
Figure 10c

Omega Profile  
Figure 10d

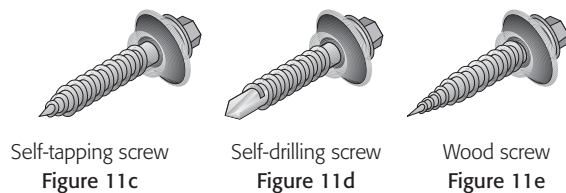
### M Screws, Washers and Gaskets:

1. General Recommendations: For optimal long-term maintenance free service, PALRAM strongly recommends the use of heavy-duty corrosion resistant screws, and special metal washers with profiled 4 mm (at least) thick EPDM rubber gaskets\*, 19 mm (crest) or 25 mm (valley) diameter (in Greca profil both crest and valley with 19 mm), to fasten the sheets to the supporting structure and seal the fastener's hole. (fig. 11a, b).
2. Use of self-tapping screws with pre-drilled holes or self-drilling screws is recommended. For wooden purlins, a special wood-screw should be used. (See Figures 11c, d, e on side.)
3. The screw placed into corrugation crest should be 6.3 x 38 mm (1/4 x 11/2 in.) or a #12 or 14 gage screw. Screws placed in a corrugation valley should be 6.3 x 25 mm (1/4 x 1 in.). Each screw should be fitted with a conical corrosion resistant metal washer at least 1 mm (0.04 in.) thick and a special EPDM gasket (fig. 11a,b). The screw should be tightened moderately without deforming the washer and rubber gasket or distorting the corrugation.
4. Special attention should be given to the insertion of the screws perpendicular to the material face. Oblique insertion could damage the sheet and/or result in leaks. (fig. 12a, b, c)



19mm washer/gasket  
Figure 11a

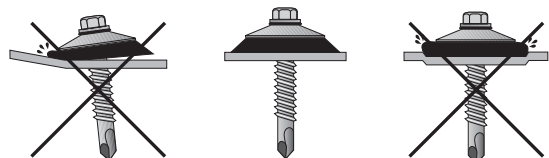
25mm washer/gasket  
Figure 11b



Self-tapping screw  
Figure 11c

Self-drilling screw  
Figure 11d

Wood screw  
Figure 11e



INCORRECT - Non-perpendicular drilling and insertion.  
Figure 12a

CORRECT  
Figure 12b

INCORRECT - Excess overtightening  
Figure 12c

\* PALRAM offers to supply, upon demand, the recommended fastener combinations mentioned above, along with the SUNTUF Plus sheets.



# SUNTUF Plus

## INSTALLATION INSTRUCTIONS



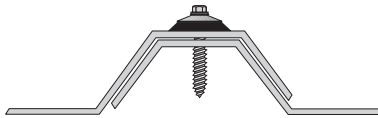
### **N** Sheet-to-Sheet Stitching Fasteners:

1. Stitching fasteners are used to create a complete tightening between overlapping sheets, between purlins. When the slope of the roof is less than 15%, it is necessary to insert such a fastener every 40 cm. Where the slope is greater than 15%, the spacing is every 50 cm. It is recommended to use 1/4" x 3/4" self-tapping screws, **without the need for prior drilling of a hole**.
2. Top & bottom length overlap strengthening profiles (Fig. 14) are also serving as sheet-to-sheet stitching elements, with additional mid-span screws.



Sheet-to-sheet fastening screw between overlapping corrugations (detail), for Omega profil.

Figure 13a



Sheet-to-sheet fastening screw between overlapping corrugations (detail), for Greca profile.

Figure 13b

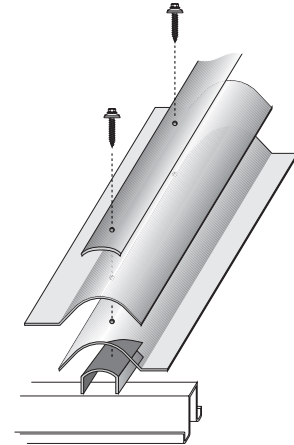


Figure 14

### **O** Additional Accessories:

#### 1. Purlins for Condensation Collection

- a) It is possible to build the greenhouse (consult your greenhouse supplier) utilizing special purlins of omega design that aid in condensation collection and prevent condensation drip from the purlins. Care must be taken to construct the greenhouse with a devise that will carry off the collected condensation at the edge of the purlins.
- b) An aluminum collecting profile will be installed on top of every supporting truss or beam in the greenhouse. Its purpose is collecting and draining the condensed water gathered in the Omega purlins' channels, leading them into the side gutters. (Fig. 16b)

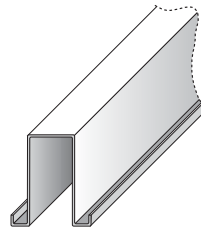


Figure 16a

For complete sealing its recommended to use a butil rubber strip (par. G/Pg. 4)

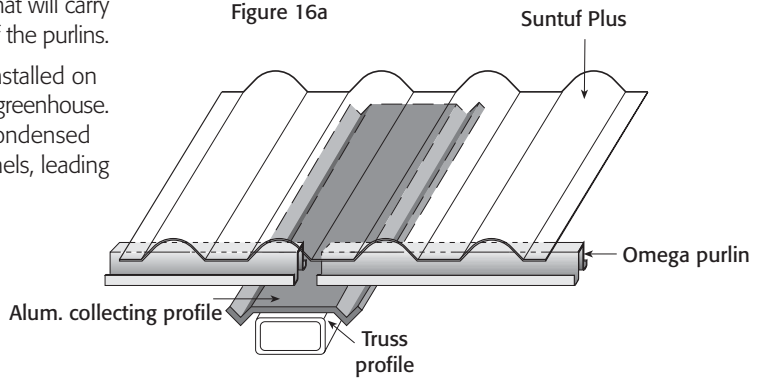
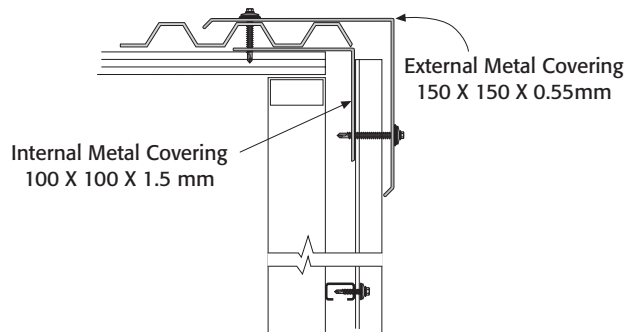


Figure 16b

#### 2. Corner Side Ridge Closure

- a) To close the structure where the roof meets the gable, or a vertical closure between two walls meeting at the corners, two adjoining galvanized sheet-metal profiles are used. (Fig. 17)
- b) The internal L shaped 100 x 100 x 1.5 mm profile is used to attach both edges of the cladding sheets to the structure- at the corner of roof and gable or two wall edges at a corner.
- c) The external L shaped, 150 x 150 x 0.55 mm flashing is fastened to the internal L profile at the roof edge and top end of the gable, or at the greenhouse corners. It closes the gap between the cladding sheets at the corners, with or without additional XPE shaped closure strips (Fig. 7a).



Corner Side Ridge Covering

Figure 17



# SUNTUF Plus

## INSTALLATION INSTRUCTIONS



**P Standard SUNTUF Plus Accessories:**

**Greca Profile Universal Ridge Cap**

(Omega Profile Universal Ridge Cap, not shown, also available)

Dimensions: 2280 x 150 x 150 mm  
2800 x 270 x 270 mm

Number of Corrugations: 30

Net Length: 2204 mm

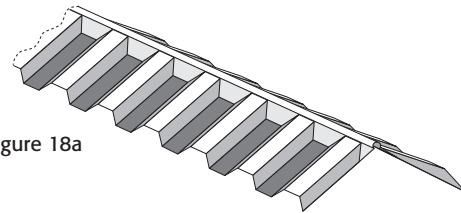


Figure 18a

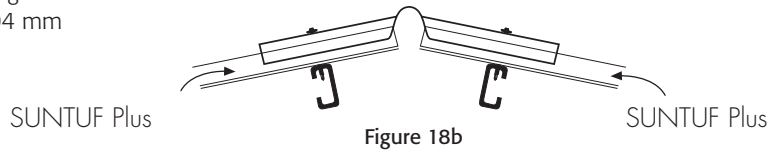


Figure 18b

**Flat Ridge Cap 150°**

Dimensions:  
2500 x 210 x 210 mm  
Net Length: 2400 mm

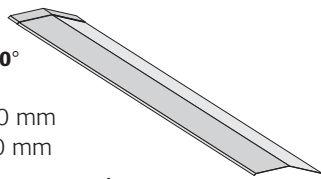


Figure 19a

**Flat Side Ridge - 90°**

Dimensions:  
2500 x 160 x 160 mm  
Net Length: 2400 mm

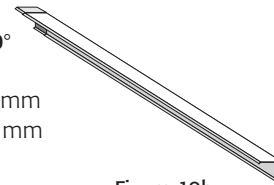


Figure 19b

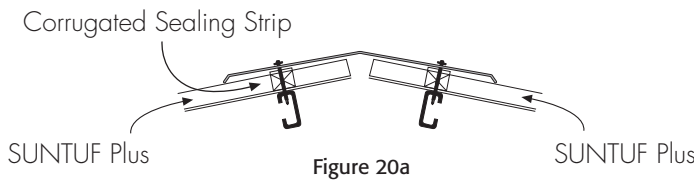


Figure 20a

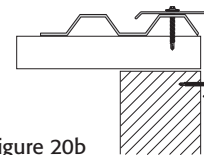


Figure 20b

\* - All the above materials may be purchased from PALRAM Industries and its distributors.

Inasmuch as PALRAM Industries has no control over the use to which others may put the material, it does not guarantee that the same results as those described herein will be obtained. Each user of the material should make his own tests to determine the material's suitability for his own particular use. Statements concerning possible or suggested uses of the materials described herein are not to be construed as constituting a license under any PALRAM Industries patent covering such use or as recommendations for use of such materials in the infringement of any patent. PALRAM Industries or its distributors cannot be held responsible for any losses incurred through incorrect installation of the material. In accordance with our Company policy of continual product development you are advised to check with your local PALRAM Industries supplier to ensure that you have obtained the most up to date information.

Europe  
UK  
Israel  
USA  
Australia  
Far East



EUROPE  
PALRAM EUROPE LTD.  
Tel ▶ (44) 1302 380 777  
Fax ▶ (44) 1302 380 788  
sales.europe@palram.com

PALRAM UK  
Tel ▶ (44) 1302 380 738  
Fax ▶ (44) 1302 380 739  
sales.uk@palram.com

ISRAEL  
PALRAM ISRAEL LTD.  
Tel ▶ (972) 4 8459 900  
Fax ▶ (972) 4 8459 980  
palram@palram.com

USA  
PALRAM AMERICAS  
Tel ▶ 610 285 9918  
Fax ▶ 610 285 9928  
suntuf@suntuf.com



[www.palram.com](http://www.palram.com)

