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# SUNTUF®

Corrugated Polycarbonate Sheet

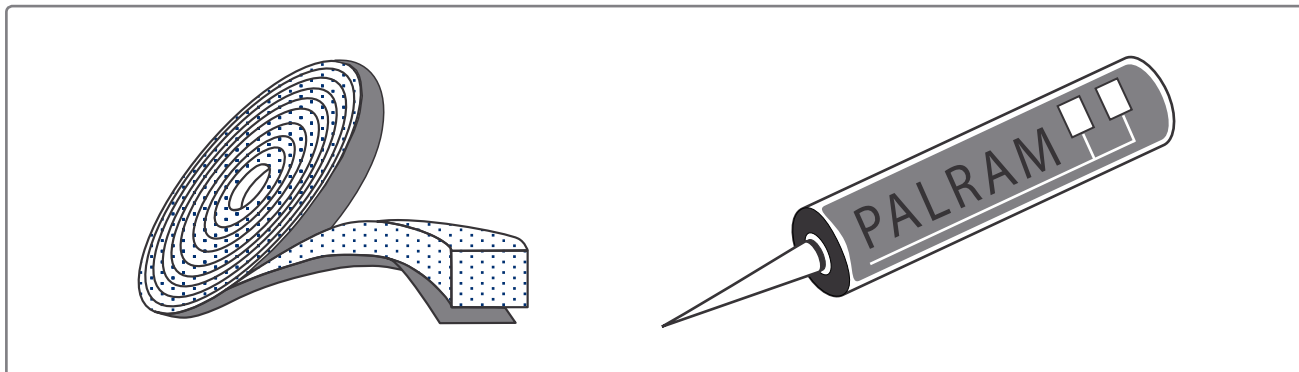
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## Technical Data

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## Recommended Adhesives and Sealants for Palram Polycarbonate Products

Although SUNTUF resists the majority of widely available adhesives and sealants for roof installations, some of the products are not chemically compatible with SUNTUF and are not allowed to be used in installations. The table below lists the products approved to be used in conjunction with SUNTUF. Palram offers compatibility tests for specific sealing materials submitted through an authorized representative.



	Product Name	Manufacturer	Material Type
Adhesives	AX 9330 No. 1	Apollo	Blue – PU adhesive
	HE 1908	Engineering Chemicals	2 component PU
	HE 17017	Engineering Chemicals	2 component PU
	Extru-Fix	EVO-PLAS / EVODE	solvent
	Tensol 12	EVO-PLAS / EVODE	solvent
	Evo-Tech TU 1908	EVO-PLAS / EVODE	2 component PU
	Plio-Grip 6000	Goodyear	
	55	IPS WELD-ON	2 component PU
	4	IPS WELD-ON	solvent
	16	IPS WELD-ON	solvent
	MA 3940	ITW Plexus	2 component
	MA 3940LH	ITW Plexus	2 component
	3054 BN 811767	Loctite	transparent-fast adhesion
	Dichloromethane (Methylene Chloride)	most chemical suppliers	solvent
	Bison PUR	Perfecta	1 component PU
	Acrifix A-118	Rohm	solvent mixture
	Acrifix A-190	Rohm	solvent mixture
	Scotch weld DP 110	3M	Hot melt
	Scotch weld DP 190	3M	Hot melt
	Jet Melt 3736	3M	Hot melt

Silicone Sealants	Product Name	Manufacturer	Material Type
	MS Clear	Soudal	Adhesive Sealant
	Multisil Translucent	GE Bayer Silicones	Sealant
	omosil 319109	Baden Chemie	Sealant
	Domostar 418299	Baden Chemie	Sealant
	Silicon N	Den Braven	Sealant
	Parasilico PL	DL Chemicals	Sealant
	3793	Dow Corning	Adhesive Sealant
	Q3-7098	Dow Corning	Adhesive Sealant
	Q3-7099	Dow Corning	Adhesive Sealant
	795	Dow Corning	Adhesive Sealant
	791-P	Dow Corning	Sealant
	Silicon 794	Dow Corning	Sealant
	6100	Eurolastic	PU Based-sealant
	Mirror adhesive	Evode	Adhesive Sealant
	Ultra-clear sealant	Fuller	Sealant
	Silglase II	GE	Adhesive Sealant
	Silglase N	GE	Sealant
	Contractors	GE	Sealant
	Contraction	GE	Sealant
	Siliconen AZP	Hercuseal	Sealant
	Silpruf	IGE - India	Sealant
	Novasil S-64	Otto Chemie	Adhesive Sealant
	Novasil S-10	Otto Chemie	Sealant
Sika 952	Sika	Sealant	
BSR 50-02	SIMSON BV	Sealant	
PUR FLEX	Stag / UK	Sealant	
All Flex 101	Tremco	Adhesive Sealant	
Tremasil 100	Tremco	Sealant	
Bostik Pro MS106/MS107	Bostik	Adhesive Sealant	

Adhesive & Sealing Tapes	Product Name	Manufacturer	Material Type
	4390	3M	Two Sided Adhesive Tape
	VHB Series Tapes	3M	Two Sided Adhesive Tape
	9473	3M	Two Sided Adhesive Tape
	AFT Series Tape	Scapa	Two Sided Adhesive Tape
	VI 05	Arta	Two Sided Adhesive Tape
	VT 16 + filter	Filta Flo (UK)	Sealing Tape & Breathing Filter For Adhesion Of Multiwall Polycarbonate Sheets
	Aluminium adhesive tape	Filta Flo (UK)	Aluminium Tape For Adhesion Of Multi-wall Polycarbonate Sheets
	AFT 701	Hardcastle -Carlisle	Two Sided Adhesives
	Duplont LO 918	Lohmann	Two Sided Adhesive Tape
	SR 321	Multifoil	
	SW 321	Multifoil	
	IDL 311 L	Sellotape	Butyl Rubber Sealant
	310	Sellotape	Two Sided Adhesive Sealant Tape
	PS-18	Velcro	
	1163	Venture Tape	Two Sided Adhesive Tape
	921	Venture Tape	Two Sided Adhesive Tape
Super Fix Montage Tape	Bison	Two Sided Adhesive Tape	
Car Tape	Bison	Two Sided Adhesive Tape	

**Important Note:** Since in general products composition might change in time, Palram is not responsible for the results obtained when using these materials. It is imperative that the manufacturer's instructions be strictly followed. This includes following the required safety procedures. Some products contain organic solvents which have the potential to damage the health of the user if proper safety procedures are not followed. If you have any comments or questions, feel free to contact your Palram distributor.

## Chemical Resistance of Palram Polycarbonate Products

The table in the following pages lists the resistance of polycarbonate sheets to a number of commonly encountered chemicals and other corrosive media at room temperature (Information on chemical resistance at higher temperatures will be supplied upon request). Where the chemical resistance varies with concentration, the results of tests at different concentrations is presented. It serves as a basis for recommendation. PALRAM does not guarantee chemical resistance, unless specific tests are carried and separate documentation is supplied.

For chemicals and corrosive media not mentioned in the list, please contact your Palram representative, which will place you in contact with the Palram's R&D & Technology Department.

Chemical resistance abbreviations in the table:

R - Resistant

LR - Limited Resistance (gradual attack over time may occur)

N - Not Resistant (rapid attack or attack over short time period will occur)



## Chemical Resistance of Polycarbonate Products at Room Temperature

Chemical	Concentration*	Resistance	Chemical	Concentration*	Resistance
Acetaldehyde		N	Butane		R
Acetic Acid	10%	R	Butter		R
Acetic Acid	25 (concentrated)	LR (N)	Butyl Acetate		N
Acetone		N	Butyl Alcohol (Butanol)		R
Acetylene		R	Butylene Glycol		R
Acrylonitrile		N	Butyric Acid		N
Ajax Detergent		R	Calcium Chloride	Saturated	R
Allspice		N	Calcium Hypochlorite		R
Allyl Alcohol		LR	Calcium Nitrate		R
Alum (Aluminum Ammonium Sulfate)		R	Calcium Soap Fat		R
Aluminum Chloride	Saturated	R	Camphor Oil		N
Aluminum Oxalate		R	Carbolic Acid		N
Aluminum Sulfate	Saturated	R	Carbon Bisulfite		N
Ammonia (Gas)		N	Carbon Dioxide Gas (Moist)		R
Ammonia (Aqueous)		N	Carbon Disulfide		N
Ammonium Carbonate		LR	Carbon Monoxide		R
Ammonium Chloride		R	Carbon Tetrachloride		N
Ammonium Fluoride		N	Castor Oil		R
Ammonium Hydroxide		N	Catsup (Ketchup)		R
Ammonium Nitrate		R	Caustic Potash (Potassium Hydroxide)		N
Ammonium Sulfate	Saturated	R	Caustic Soda (Sodium Hydroxide)		N
Ammonium Sulfide		N	Chlorine Gas (Dry)		LR
Amyl Acetate		N	Chlorine Gas (Wet)		N
Amyl Alcohol		LR	Chlorobenzene		N
Aniline		N	Chloroform		N
Antimony Trichloride	Saturated	R	Chocolate		R
Aqua Regia (3 parts HCl:1 part HNO <sub>3</sub> )		LR	Chrome Alum	Saturated	R
Arsenic Acid	20%	R	Chromic Acid	20%	R
Automatic Switch Grease		R	Cinnamon		R
Automotive Waxes		LR	Citric Acid	10%	R
Baby Lotion		R	Cloves		N
Bacon Fat		R	Coal Gas		R
Barium Chloride		R	Coca Cola		LR
Battery Acid		R	Cocoa		LR
Beer		R	Cod Liver Oil		R
Beet Syrup		R	Coffee		LR
Benzaldehyde		N	Cooking Oil		R
Benzene		N	Copper Sulfate	Saturated	R
Benzoic Acid		N	Cresol		N
Benzyl Alcohol		N	Cupric Chloride	Saturated	R
Betadine		R	Cuprous Chloride	Saturated	R
Bleach (Clorox)		R	Cyclohexane		R
Blood and Blood Plasma		R	Cyclohexanol		LR
Borax		R	Cyclohexanone		N
Boric Acid		R	DDT		R
Brake Fluid		N	Dekalin		R
Bromine		N	Detergent (most)		LR or R
Bromobenzene		N	Developing Solutions		N or LR

## Chemical Resistance of Polycarbonate Products at Room Temperature

Chemical	Concentration*	Resistance	Chemical	Concentration*	Resistance
Diamyl Phthalate		N	Kerosene		R
Diesel Fuel		R	Lactic Acid	20%	R
Diethyl Ether (Ethyl Ether)		N	Lacquers and Thinners		R
Dimethyl Formaldehyde (DMF)		N	Laundry Detergents (Most)		R
Dimethyl Sulfoxide (DMSO)		N	Ligroin (Hydrocarbon Mixture)		R
Dinonyl Phthalate (plasticizer)		LR	Lime Solution (2%) or paste		R
Doctyl Phthalate (plasticizer)		LR	Liquors or Liqueurs		R
Dioxane		N	Linseed Oil		R
Diphyl 5,3		LR	Loctite		R
Ethanol (Ethyl Alcohol) and Water	96	R	Lubricating Oils (Most)		R
Ethanol (Ethyl Alcohol)	Pure	LR	Machine Oils (Most)		R
Ethyl Amine		N	Magnesium Chloride	Saturated	R
Ethyl Acetate		N	Magnesium Sulfate	Saturated	R
Ethyl Bromide		N	Manganese Sulfate	Saturated	R
Ethylene Chloride		N	Margarine		R
Ethylene Chlorohydrin		N	Mayonnaise		R
Ethylene Dichloride		N	Meat		R
Ethylene Glycol (Antifreeze)		LR	Mercuric Chloride	Saturated	N
Ferric Chloride	Saturated	R	Mercury		N
Ferrous Sulfate		R	Methane		R
Fish and Fish Oils		R	Methanol (Methyl Alcohol)	Pure	LR
Floor Polish		R	Methylamine		R
Formalin	10%	R	Methylcellulose		N
Formic Acid	10% (30%)	R (LR)	Methylene Chloride		N
Freon TF		R	Methyl Ethyl Keton (MEK)		N
Freon (all others)		N	Methylmethacrylate		N
Fruit Juices and Pulp		R	Milk		N
Gasoline		N	Mineral Oil		R
Gear Oil		R	Motor Oils (Most)		R
Glazers Putty		R	Mustard		R
Glucose		R	Naphtha (Stanisol)		R
Glycerine		R	Nickel Sulfate		N
Glycerol		R	Nitric Acid	20%	R
Glycols		R	Nitrobenzene		R
Glutaraldehyde	50%	R	Nitropropane		R
Grease, Automotive (Most)		R	Nitrous Oxide		R
Heptane		R	Nutmeg		N
Hexane		R	Oleic Acid		N
Hydrazine		N	Onions		R
Hydrochloric Acid	20 (Concentrated)	R (N)	Oxalic Acid	10%	R
Hydrofluoric Acid	20%	R	Oxygen		R
Hydrogen Peroxide	30%	R	Ozone		R
Hydrogen Sulfide		R	Paprika		R
Iodine (aqueous solution)	5%	R	Paraffin		R
Iodine		N	Pentane		LR
Inks (Most)		R	Pepper		LR
Isoamyl Alcohol		LR	Perchloric Acid	10 (concentrated)	N
Isopropyl Alcohol		R	Perchloroethylene		R

Entries indicate the following: R - resistant, LR - limited resistance, N - not resistant  
 \*concentration of aqueous solution except where noted



## Chemical Resistance of Polycarbonate Products at Room Temperature

Chemical	Concentration*	Resistance	Chemical	Concentration*	Resistance
Petroleum		LR	Sodium Sulfide		N
Petroleum Ether		LR	Sodium Thiosulfate		R
Petroleum Oil (Refined)		R	Spindle Oil		R
Phenol		N	Stannous Chloride		R
Phosphoric Acid	10%	R	Starch		R
Phosphorous Oxychloride		R	Styrene		N
Phosphorous Pentoxide	25%	LR	Sugar	Saturated	R
Phosphorous Trichloride		N	Sulfur Dioxide (Gas)		R
Polyethylene		R	Sulfuric Acid	<50 (50<70)	R (LR)
Polyethylene Glycol		R	Sulfurous Acid	10%	N
Potassium Acetate		LR	Sulfuryl Chloride		N
Potassium Aluminum Alum (Sulfate)	Saturated	R	Tapping Oil		R
Potassium Bichromate		R	Tartaric Acid	30%	R
Potassium Bromate		R	Tear Gas (Chloracetophenone)		LR
Potassium Bromide		R	Terpineol		N
Potassium Chloride	Saturated	R	Tetrahydrofuran		N
Potassium Cyanide		N	Tetralin		N
Potassium Dichromate	Saturated	R	Thiophene		N
Potassium Hydroxide		N	Thyme		R
Potassium Metabisulfite	4%	R	Titanium Tetrachloride		R
Potassium Nitrate	Saturated	R	Tobacco		R
Potassium Perchlorate	10%	R	Toluene		N
Potassium Permanganate	10%	R	Transformer Oils		R
Potassium Persulfate	10%	R	Transmission Fluid		R
Potassium Rhodanide	Saturated	R	Trichloroacetic Acid	20%	LR
Potassium Sulfate	Saturated	R	Trichloroethylamine		N
Propane		R	Trichloroethylene		N
Propargyl Alcohol		R	Trichloroethylphosphate		LR
Propionic Acid	20%	R	Tricresylphosphite		N
Propionic Acid	Concentrated	N	Trisodium Phosphate		R
Propyl Alcohol (1-Propanol)		R	Turpentine		LR
Pyridine		N	Urea		R
Salad Oil		R	Vacuum Pump Oil		R
Salt		R	Vanilla		R
Silicofluoric Acid	30%	R	Vanillin		R
Silicone Grease		R	Varnish		N
Silicone Oil		R	Vaseline		R
Silver Nitrate		R	Vegetable Juices		R
Soap (Ivory)		R	Vegetable Oils		R
Sodium Bicarbonate	Saturated	R	Vinegar		R
Sodium Bisulfate	Saturated	R	Water (Demineralized or Sea)		R
Sodium Bisulfite	Saturated	R	White Spirit		N
Sodium Carbonate	Saturated	R	Wine, Whiskey, Vodka, Rum, Cognac		R
Sodium Chlorate		R	Witch Hazel		R
Sodium Chloride	Saturated	R	Worcester Sauce		R
Sodium Chromate		R	Xylene		N
Sodium Hydroxide		N	Zinc Chloride		R
Sodium Hypochlorite	5% Chlorine	R	Zinc Oxide		R
Sodium Nitrate		N	Zinc Stearate		R
Sodium Sulfate	Saturated	R	Zinc Sulfate		R

\*Entries indicate the following: R - resistant, LR - limited resistance, N - not resistant"

\*concentration of aqueous solution except where noted.

The chemical resistance information in this table is based on our research and experience and may be considered solely as a basis for recommendation, but not as a guarantee, unless specifically furnished as such by PALRAM.

## SUNTUF - Solar Transmission Properties per Color

Product	%LT*	%HAZE*	%LR	%ST	%SR	%SA	%SRt	%STt**	%SC
Clear	90	<5	3	86	3	11	11	89	1.0
Clear Embossed	90	5 to 10	9	87	8	5	12	89	1.0
White Opal 30%	30	100	54	31	48	21	63	37	0.42
White Opal 35%	35	100	59	36	51	13	61	39	0.45
White Opal 40%	40	100	54	38	47	15	58	42	0.49
White Opal 45%	45	100	48	44	41	15	52	48	0.56
Diffuser 85%	85	100	16	77	13	10	20	80	0.92
Solar Grey 20%	20	5 to 10	4	27	4	69	54	46	0.53
Solar Grey 35%	35	5 to 10	3	43	2	55	43	57	0.66
Solar Control 20%	20	70 to 75	29	19	29	52	67	33	0.38
Solar Control 50%	50	35 to 40	25	46	25	29	46	54	0.62
Solar Ice 25%	25	100	53	27	46	27	65	35	0.40
Bronze 25%	25	5 to 10	7	32	7	61	51	49	0.56
Bronze 35%	35	5 to 10	3	41	3	56	44	56	0.64
Bronze 50%	50	5 to 10	4	53	4	43	35	65	0.74
Smooth Cream 30%	30	100	55	50	50	0	50	50	0.58
Mist Green 20%	20	100	25	31	26	43	57	43	0.50
Green 45%	45	<5	7	66	9	25	27	73	0.84
Blue 35%	35	<5	7	69	8	24	25	75	0.87
Smart Grey 20%	20	25 to 30	11	20	11	69	62	38	0.44
Smart Solar control 20%	20	75	30	16	29	55	69	31	0.36
Smart Ice 20%	20	100	53	22	48	30	69	31	0.35

Valid for thickness of 0.8mm to 2.0mm.

According to ASTM E424-71.

\* according to ASTM D-1003.

\*\* STt is the percentage expression of solar heat gain coefficient (SHGC).

Definitions for the terms used in the above table appear in the next page.

## Definision for Solar Transmission Properties Table

### Visible Light Radiation

The portion of the light spectrum whose wavelength ranges from 400 nm to 700 nm.

### % Light Transmission (%LT)

Percentage of incident visible light that passes through an object.

### % Light Reflection (%LR)

Percentage of incident visible light that strikes an object and returns as visible light.

### % Light Absorption (%LA)

Percentage of incident visible light that strikes an object and is absorbed by it.

$$\%LT + \%LR + \%LA = 100\%$$

### Solar Radiation

The solar spectrum ranging from 300 nm to 2400 nm. Included are UV, visible and NIR radiation.

### % Direct Solar Transmission (%ST)

Percentage of incident solar radiation that passes directly through an object.

### % Solar Reflection (%SR)

Percentage of incident solar radiation that strikes an object and is reflected.

### % Solar Absorption (%SA)

Percentage of incident solar radiation that strikes an object and is absorbed by it.

$$\%ST + \%SR + \%SA = 100\%$$

### Total Solar Transmission (%STt)\*

The percent of incident solar radiation transmitted by an object which includes the direct solar transmission plus the part of the solar absorption reradiated inward.

### Total Solar Reflection (%SRt)

The percent of incident solar radiation reflected by an object, which includes the solar reflectance plus the part of the solar absorption, reradiated outward.

$$\%STt + \%SRt = 100\%$$

### Shading Coefficient (SC)

The ratio of the total solar radiation transmitted by a given material to that transmitted by normal glass, whose light transmission is 87%.

It can be approximately calculated by:

$$SC = 1.15 \times (\%ST + (0.27 \times \%SA)) / 100$$

$$\%ST + (0.27 \times \%SA) = \%STt$$

$$SC = 1.15 \times STt / 100$$

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#### 4. First Aid Measures

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In general handling the material will not cause accidents.

##### 4.1. Inhalation

Route of entry – inhalation: No

If exposed to combustion fumes in high concentration - bring victim to fresh air. Medical attention needed.

##### 4.2. Ingestion

Route of entry – ingestion: No

##### 4.3. Skin Contact

Burns resulting from accidental contact with molten material must be flushed immediately with cold water.

Do not remove the polymer from the skin. Do not use solvent for removal. Medical attention needed.

##### 4.4. Skin Absorption

Route of entry – skin: No

##### 4.5. Eye Contact

Like any foreign body, can cause mechanical irritation. Remove contact lenses at once. Immediately flush eyes well with copious quantities of water or normal saline for at least 20-30 minutes. If irritation persists, consult physician.

##### 4.6. Notes For Physician

There are no specific notes.

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#### 5. Fire Fighting Measures

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This material burns with difficulty and generally requires a continuous external flame source to sustain combustion. Without flashover fire conditions it will tend to extinguish it. When forced to burn it will produce a sooty fire.

Main products of combustion are carbon dioxide and carbon monoxide. Some flame-retardant grades will evolve trace quantities of hydrogen bromide on combustion.

Combustion products have been found in independent tests to be essentially non-corrosive.

##### 5.1. Extinguishing Media

Water spray or foam  $\text{CO}_2$  is less recommended due to lack of cooling capacity.

##### 5.2. Extinguishing Media to Avoid

No information currently available.

##### 5.3. Special Fire Fighting Procedures

Personnel without suitable respiratory apparatus should leave the affected area to prevent exposure to toxic or combustible gases.

##### 5.4. Special Protective Equipment for Firefighters

Positive-pressure self-contained breathing apparatus, protective clothing, gas mask approved for acid vapours.

##### 5.5. Unusual Fire and Explosion Hazards

Hazardous combustion products may include intense heat, dense black smoke, carbon dioxide, carbon monoxide and hydrocarbon fragments. Combustion products/processing fumes may include trace levels of phenol, alkylphenols, and diarylcarbonates.

Soot emitted when PC is forced to burn may obscure visibility.

During combustion the base resin does not produce hydrogen cyanide, phosgene, acrolein, hydrogen chloride or sulfur dioxide.

The material is not sensitive to static discharge.

Static electricity discharge sparks possible at handling – avoid vicinity of static discharge sensitive materials.

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#### 6. Accidental Release Measures

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No special precautions and no personal protective equipment needed. Collect mechanically for disposal.

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#### 7. Handling and Storage

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##### 7.1. Handling

General handling precautions

Avoid mechanical contact with eyes. Use good industrial hygiene practices. Provide adequate ventilation. Secondary operations such as grinding, sanding or sawing may produce a dust explosion hazard. Use aggressive housekeeping activities to prevent dust accumulation; employ bonding, grounding, venting and explosion relief provisions in accordance with accepted engineering practices.

Ventilation

General (mechanical) room ventilation is expected to be satisfactory where this product is stored and handled.

Other precautions

No explosion hazard. In the event of fire, cool and overlap product with water. The material is not sensitive to static discharge. Static electricity discharge sparks possible during handling. Avoid contact or vicinity of flammable materials.

# PSDS - Product Safety Data Sheet

## Polycarbonate Sheets

Date of issue: April 2004

Updated: May 2010

Compliance with EU Regulation 1907/2006 (REACH)

The sheets manufactured by PALRAM are exempted from the requirement of the REACH regulation to provide customers with a Safety Data Sheet (EU No. 1907/2006, article 31) since they are defined as "articles." The information herein is provided by PALRAM as courtesy to its customers and a part of its service efforts. The sheets do not contain any substances on the candidate list for inclusion in Annex XIV of REACH above the threshold level of 0.1% by weight of the article.

### 1. Identification of the Article and the Company

#### 1.1. Identification of the Article

Trade Names	:	PALTUF®, PALSUN®, PALSUN® FR, PALGARD™, SUNTUF®, SunSky®, SUNOPAK™, DYNAGLAS®, SUNLITE®, Thermaglas®, SUNPAL®, SUNGLAZE™, PALTILE™, SUNTOP®, SUNSPHERE™, EdgeLock™, Chair-Mat.
Product Name	:	Solid and Foamed Polycarbonate sheets
Material Name	:	Polycarbonate Homopolymer
CAS Number	:	25307-45-0
UN Number	:	None
ACX Number	:	X1017917-2
RTECS	:	Not listed
Material Synonyms	:	PC
NFPA Ratings	:	Health=0, Fire=1, Reactivity=0

#### 1.2. Company Identification & Contact

Israel - PALRAM Paltough	UK - PALRAM Polycarb	Americas - PALRAM 2000
Address: Ramat Yohanan, 30035, ISRAEL	Address: Unit 2, Doncaster Carr Industrial Estate, White Rose Way Doncaster DN4 5JH, UK	Address: 9735 Commerce Circle Kutztown, PA 19530, USA
Tel: +972 4 8459 900	Tel: +44 1302 380738	Tel: +610-285-9928
Fax: +972 4 8444 012	Fax: +44 1302 380739	Fax: +484-647-8210

Local: Call your nearest poison control center

### 2. Composition / Information of Ingredients

Main polymer: Polycarbonate – approximately 100 wt%.

Pigments and additives used to enhance specific properties are encapsulated in the polymer resin matter.

No cadmium, or other heavy metals based pigments or stabilizers used. This product does not contain reportable hazardous ingredients as defined by OSHA Hazard Communication Standard.

### 3. Hazards Identification

No particular hazards known.

#### 3.1. Health Hazard Data

##### 3.1.1 Effects of a Single Overexposure

Swallowing	:	non-relevant
Skin absorption	:	non-relevant
Inhalation	:	non-relevant
Skin contact	:	exposure is not expected to cause adverse health effects
Eye contact	:	non-relevant

##### 3.1.2 Effects Of A Repeated Overexposure -

None currently known

##### 3.1.3 Medical Conditions Aggravated By Overexposure -

None currently known

##### 3.1.4 Other Effects of Overexposure -

None currently known

## 7.2. Storage

Store in a cool shady area. No special technical protective measures required.

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## 8. Exposure Controls / Personal Protection

### 8.1. EXPOSURE LIMITS

No occupational exposure limits established by OSHA, ACGIH, or NIOSH.

### 8.2. PERSONAL PROTECTION

Respiratory protection	:	No special protection needed	
No special protection needed	:		Hand protection / protection gloves
No special protection needed	:		Eye protection
No special protection needed	:		Other protective equipment/measures

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## 9. Physical Properties

Appearance	:	Flat or corrugated plastic sheets
Physical State	:	Solid
Color	:	Clear or colored
Odor	:	None
Density	:	1.2 gr/cm <sup>3</sup>
Change In State	:	T <sub>g</sub> = 140-150°C, DSC according to ASTM D 792
Boiling Point, 760 Hg :	None	
Viscosity	:	Not relevant
Solubility In Water	:	None
Ph Value	:	Not relevant
Flash Point	:	>450°C ASTM D 1929
Autoignition Temp.	:	>650°C ASTM D 1921
Flammability Limit	:	None
Explosion Limits	:	None
Evaporation Rate	:	Not relevant
Percent Volatiles	:	Not relevant

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## 10. Stability and Reactivity

### 10.1. Stability

Stable.

Conditions to avoid

Excessive heat, or open flame.

Incompatible materials

Oxidizing agents or strong mineral acids can cause reaction.

Thermal decomposition

Caused by fire or overheating during improper processing. Fumes damaging to health may be released.

Hazardous decomposition products

Carbon monoxide (CO) - is highly toxic if inhaled, present in combustion fumes of all organic materials;

Carbon dioxide (CO<sub>2</sub>) - in sufficient concentrations can act as an asphyxiant, present in combustion fumes of all organic materials;

### 10.2. Reactivity

Hazardous polymerization : Will not occur

Hazardous reactions : None.

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## 11. Toxicological Information

Independent testing and many years of experience confirm that this material has very low toxicity. The International Agency for Research on Cancer does not list this material as a confirmed or suspected carcinogen. In rats an acute LD<sub>50</sub> > 5 gr/Kg of body weight. Industrial hygiene studies have shown that under normal and expected conditions of use of PC materials, exposures are well below applicable limits.

### 11.1. Acute Toxicological Information

Acute oral toxicity	:	Oral LD <sub>50</sub> (rat) > 5g/kg, estimated.
Acute vapor exposure	:	processing fumes from similar products are not considered toxic. In acute inhalation tests, laboratory rats were exposed to processing fumes at concentrations exaggerating those that would likely occur in workplace situations. No death or signs of toxicity, except transient irritancy in some cases, were noted during the 6-hour fume exposure tests. There were no distinct or consistent treatment related tissue or organ changes noted in gross necropsies.
Primary skin irritation:		product not considered primary skin irritant. Draize Skin Primary Irritation Score (rabbit) for similar products, in finely divided form, for a 24-hour exposure is 0.
Eye irritation	:	product not considered primary irritant. When similar products, in finely divided form, were placed into the eyes of rabbits, slight transient redness or discharge occurred – consistent with the expected slightly abrasive nature of product.
Sensitization	:	Not expected to be a skin sensitized based on results of Modified Buehler Guinea Pig Sensitization Test from similar products. Dermal LD <sub>50</sub> (rabbit) > 2g/kg, estimate.
Chronic effects	:	in sub-chronic testing, the base resin was considered physiologically inert when fed to rats for 8 weeks at a dietary level of 6%.
Carcinogenicity	- NTP :	not tested
	- IARC :	not listed
	- OSHA :	not regulated

### 11.2. Other Toxicological Information

No known toxicological effects with normal use. For heating see section 10.

### 11.3. Additional Information

No additional toxicity information currently available.

## 12. Ecological Information

### 12.1. Persistence and Degradability

Detailed studies have not been conducted concerning the environmental fate of the product. According to present knowledge no unfavorable ecological effects are to be expected. Not generally hazardous to water. Insoluble in water, non-toxic solid.

Mobility	:	No information currently available
Persistence and biodegradability	:	Biodegradation period - tens of years.
Bioaccumulative potential	:	No information currently available.

### 12.2. Environmental Risks

No hazard expectation to terrestrial or aquatic flora and fauna.

Ecotoxicity	:	LD <sub>50</sub> (rats) > 5 gr/kg
	:	IC <sub>50</sub> (bacterial inhibition) - no data available
Aquatic toxicity	:	LC <sub>50</sub> (daphnia magna) - no data available
	:	LC <sub>50</sub> (fathead minnow – fish) - no data available

### 12.3. Other Information

All available ecological data have been taken into account for the development of the hazard and precautionary information contained in this safety data.

## 13. Disposal Considerations

The product is not considered hazardous under current EPA hazardous waste regulations.

Recycling is the preferred method of disposal.

Alternatively, the product may be disposed of in an approved landfill.

Incineration in accordance with federal, state and local regulations – collected processing fume condensates and incinerator ash should be tested to determine waste classification.

All wastes should be evaluated in conjunction with applicable solid and hazardous waste regulations, Toxicity Characteristic Leaching Procedures (TCLP), and disposed of as appropriate.

This product does not contain any cadmium or other heavy metal pigments or stabilizers.

It is the user's responsibility to dispose of all wastes in accordance with all national and local regulations at properly permitted or authorized facilities.

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#### 14. Transport Information

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DOT PSN Code	: ZZZ	
DOT Proper Shipping Name	: Not regulated by this mode of transportation	
IMO PSN Code	: ZZZ	
IMO Proper Shipping Name	: Not regulated by this mode of transportation	
IATA PSN Code	: ZZZ	
IATA Proper Shipping Name	: Not regulated by this mode of transportation	
AFI PSN Code	: ZZZ	
AFI Proper Shipping Name	: Not regulated by this mode of transportation	
Additional transportation data	: Not currently regulated under Department of Transportation regulations	
: No labeling is required in accordance with the EEC directives		Labeling
: No placarding is required in accordance with the EEC directives		Placarding
: None		Special transport requirements
: Avoid dark-colored packaging to prevent heat distortion		Packaging
The product is classified as a non-hazardous material in the meaning of transport regulations.		

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#### 15. Regulatory Information

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With regards to dust formed as a consequence of mechanical treatments, the appropriate regulations value limits for fine dust must be observed: MAC value (fine dust) – 5mg/m<sup>3</sup>.

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#### 16. Other Information

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##### Recommended Uses And Restrictions

Please consult the relevant product and/or application information for this product.

##### Further Information

Additional information on this product may be obtained by calling your PALRAM Sales or Customer Service Contact.

##### Disclaimer:

PALRAM believes that the information and recommendations contained (including data and statements) in this PSDS are accurate as of the date hereof. This PSDS is based on information that is believed to be reliable, but may be subject to change as new information becomes available.

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# SUNTUF<sup>®</sup>

Corrugated Polycarbonate Sheet

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## Physical Properties

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**Build On.**

## Physical Properties Table

SUNTUF corrugated polycarbonate sheet possesses electrical, mechanical, physical, optical and thermal properties, presented in the table below, that provide comprehensive solutions for a wide variety of applications. The combination of these characteristics qualifies SUNTUF sheets as a first class material.

Property	Method*	Conditions	Units - SI	Value
<b>Physical</b>				
Density	D-1505		g/cm <sup>3</sup>	1.2
Water Absorption	D-570	24 hr. @ 23°C	%	0.15
<b>Mechanical</b>				
Tensile strength at yield	D-638	10 mm/min	MPa	62
Tensile strength at break	D-638	10 mm/min	MPa	65
Elongation at yield	D-638	10 mm/min	%	6
Elongation at break	D-638	10 mm/min	%	>70
Tensile Modulus of Elasticity	D-638	10 mm/min	MPa	2,300
Flexural Modulus	D-790	1.3 mm/min	MPa	1,890
Flexural Strength at Yield	D-790	1.3 mm/min	MPa	93
Notched Impact Strength Izod	D-256	23°C (73°F)	J/m	800
Notched Impact Strength Charpy	D-256	23°C (73°F)	J/m	800
Impact Falling Weight	ISO-6603/1b		J	50
Rockwell Hardness	D-785		R scale	118
<b>Thermal</b>				
Long Term Service Temperature			°C	-50 to +100
Short Term Service Temperature			°C	-50 to +120
Heat Deflection Temperature	D-648	Load: 1.82 MPa	°C	135
Vicat Softening Temperature	D-1525	Load: 1 kg	°C	150
Coefficient of Linear Thermal Expansion	D-696		10 <sup>-5</sup> cm/m °C	6.5
Thermal Conductivity	C-177		W/m K	0.21
Specific Heat Capacity	C-351		kJ/kg°K	1.3
<b>Optical</b>				
Haze	D-1003		%	<0.5
Light Transmission	D-1003		%	90
Refractive Index	D-542			1.57
Yellowness Index	D-1925			<1
<b>Electrical</b>				
Dielectric Constant	D-150	1 KHz		2.6
	D-150	1 MHz		2.4
Dissipation Factor	D-150	1 KHz		0.005
	D-150	1 MHz		0.02
Dielectric Strength Short Time	D-149	500 V/s	kV/mm	20
Surface Resistance	D-257	Ketley	Ohm	4.1x10 <sup>15</sup>
Volume Resistance	D-257	Ketley	Ohm-cm	1.7x10 <sup>17</sup>

\* ASTM method except where noted otherwise



# SUNTUF®

Corrugated Polycarbonate Sheet

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## SUNTUF® Rooflights Technical Guide

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**Build On.**



# SUNTUF® Rooflights Technical Guide

## Introduction

SUNTUF is a universal brand-name of light-transmitting polycarbonate sheets for rooflights & sidelights applications in industrial, agricultural & commercial structures.

SUNTUF rooflights profile is matched to that of the roof cover panels, directly replacing the opaque sheets as an in-plane rooflights.

An advanced profile matching capability makes SUNTUF available in a wide range of profiles that matches the majority of metal profiles on the market. It can be integrated with metal sheets at any location where natural lighting is desired.

This technical guide describes all the aspects of handling, processing and installing Suntuf rooflights panels.

## Handling and storage guidelines

1. Transport and store Suntuf panels horizontally, on flat, sturdy pallets, equal or longer than the longest panels.  
Short panels should be stacked on top of longer ones.  
The panels should be secured and fastened to the pallet during transportation.

2. Suntuf Industrial sheets leave factory packaged & wrapped in white, watertight polyethylene. The wrapping should be removed as close as possible to the actual time of installation.

3. Avoid storing unwrapped sheets.

4. Store Suntuf panels in a cool, dry and shaded place, protected from direct sunlight. Avoid covering the stack of panels with dark or heat-absorbing materials or objects, to prevent solar heat buildup.



5. When storing panels outdoors, can not be avoided cover the stack with a white opaque material, which dose not absorb or conduct heat. Verify that the entire stack is covered.

6. in addition, the steps below are recommended while handling:

- Protect the sheets from any physical damage.
- Avoid stepping or driving on the panel when it on the ground.
- Avoid folding panels across the corrugation during handling and installation.
- Do not drag the panels on the ground or scrape them against structural elements or other rough objects.
- Avoid contact or environment of chemicals.





## SUNTUF® Rooflights Technical Guide

### Processing

#### Cutting

Suntuf panels can be cut easily by standard power or manual tools, like: Circular saw, jigsaw, handsaw, scissors (for low thickness).

Cutting with a circular table saw is the most recommended method for efficient, accurate and smooth cutting. Portable circular saw is suitable for on-site cutting.

Use fine toothed blades designated for plastics cutting. Apply high blade speed with moderate feeding rate. For better results cut a few panels together. When cutting, Support the sheets close to the cutting line. Panels should be pressed down during sawing to avoid vibrations.



A jigsaw may be used for limited length cutting or curved lines. Hand tools such as handsaw, metal shears, hand-held cutting knives, or scissors can be used for localized, limited jobs.

For intersecting cuts, drill a hole at the intersection point and cut the panel up to the hole.

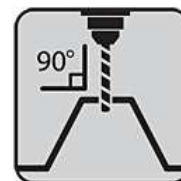


#### Drilling

Pre-drilling of the fasteners holes is mostly recommended.

Drilling in Suntuf panels can be done using standard power drill with regular high-speed steel bits intended for metal, rotating at about 1,000 RPM. Hold or clamp the drilled panel down to avoid vibrations or free movement during operation.

Avoid making holes by punching.



#### Safety

- Wear protective clothing while handling and processing Suntuf panels.
- Use the proper safety equipment at any of the handling and processing activities.
- Follow the local safety regulation codes.



# SUNTUF® Rooflights Technical Guide

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## Roof details

### Pitch

- The minimum recommended roof pitch for Suntuf application is 6° (10% slope). This is the basic factor for Suntuf loading data and installation details.
- Installing Suntuf on a lower pitch require using full sealing system, and smaller roof span.
- Suntuf panels are not applicable on roof pitch lower than 3° (5% slope).

### Purlins

- Roof purlins must have a level face parallel to the roof plane.
- Minimum purlins dimensions:
  - Metal structure: width – 40mm and minimum thickness – 3mm.
  - Wooden structure: width – 40mm and minimum height – 40mm.
- Pre-painted purlins must be fully dried before placing the Suntuf panels.
- For clear SUNTUF onto wooden purlins, apply white acrylic paint, or aluminum protective tape on top of the purlins, in order to prevent over-heating of the purlins surface.
- The allowed max. roof span (purlins distance – center to center) data is available in the Suntuf Data Sheet of the designed profile.

### Curved roof

- Suntuf panels are suitable for curved roof.
- Refer to the Suntuf Data Sheet for minimum applicable radius.





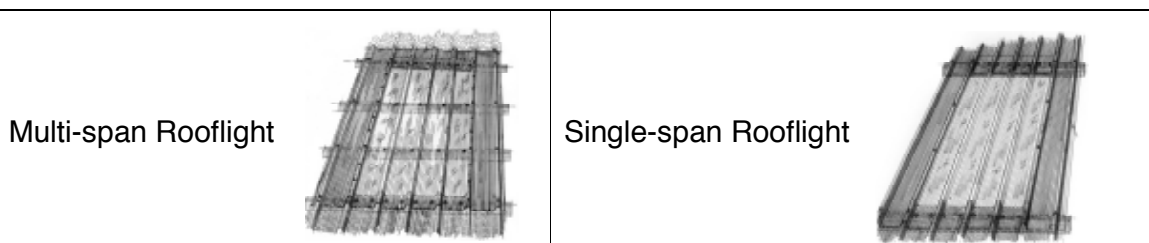
## SUNTUF® Rooflights Technical Guide

### Positioning

- Always install Suntuf with UV protected side facing out. The protected side is marked by the labeled strip. Remove the marking strip shortly after installation.
- Lay the SUNTUF panel to overlap metal panels on both sides. If not feasible - SUNTUF Rooflight panels must underlap the metal roof panels side against the primary direction of rain.
- The SUNTUF panels must be located and installed without any stresses. Do not pull, stretch or force the sheets when the profiles are not perfectly matched.
- Side-lights should be installed with Polycarbonate UV protected on both sides.
- Polycarbonate rooflights should not come in contact with plasticizers. Barrier tape (manufacturer-approved) should be used to prevent direct contact with plastisol coatings on metal sheets.

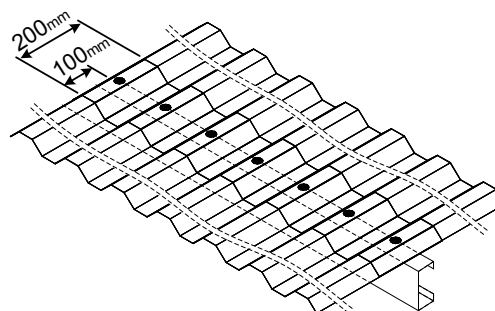


- **Multi-span Rooflight:** Suntuf panel that cover two spans or more, supported by at least 3 purlins.
- **Single-span Rooflight:** Suntuf panel that covers one span, supported by 2 purlins. Overlapped top and bottom by the roof cover panels.



### Overlaps

- Maximum recommended panel length - 7.0 m.
- Recommended longitude overlap of 200mm to 300mm above purlin.
- Each panel to extend 100mm to 150mm over the fixings line along the purlin.
- Panels should overhang Min. 50mm and Max. 150mm beyond the last fixings line.
- For best leak proof apply two runs of sealing strips on both sides of fasteners line.

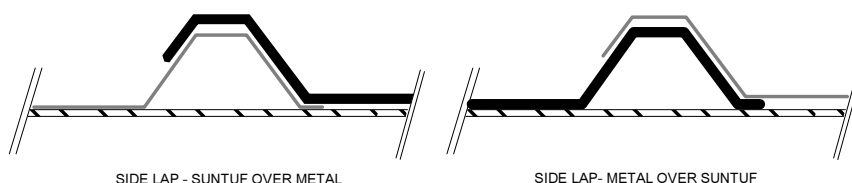




## SUNTUF® Rooflights Technical Guide

### Side-laps

- For best leak proof performance apply sealing strips between the panels, along the overlapping corrugation.
- Suntuf side under-lap must be supported.
- For secure side-lap, it is recommended to apply stitching screws along the side lap every 300-400mm.



### Overlaps sealing

Use butyl rubber strips for sealing the overlaps. The strip should be placed between overlapping panels along the length and width of the overlap at both edges.

- Overlap – two runs of sealing strip across and between the panels, on both sides of the fasteners line.
  - Side-lap – one run of sealing strip between and along the panels.
- The sealing strips cannot supersede the fasteners in overlaps tightening. Sheet to sheet tightening by stitching screw is essential.



### Fastening

- Pre-drill 10mm holes at screw points.
- Start fastening the screws at the lower purlin from the first side-lap  
Through  
the pre-drilled holes.
- Fasten screws on every purlin from the lower end towards the upper end sequentially, starting always from the same side.
- The charts below describe the fasteners setting along the purlin for various profile types.
- Do not over-tighten!
- Fasten stitching screws along the side-laps at every 300-400mm.



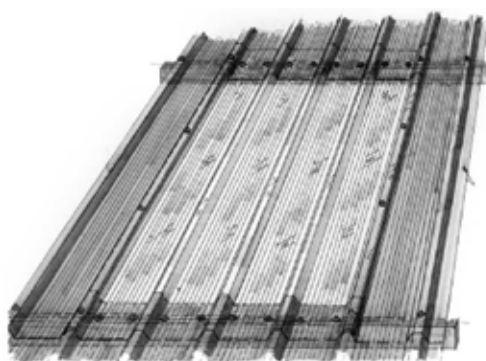
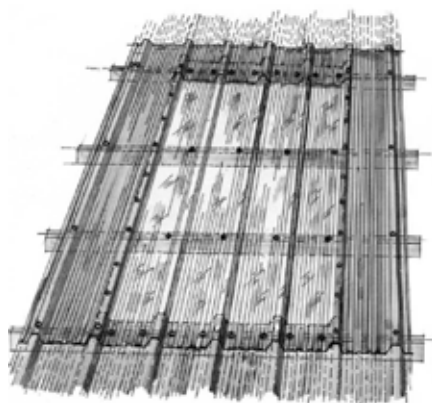




# SUNTUF® Rooflights Technical Guide

## Fasteners location chart

Pitch of corrugation	Fasteners location	
	Middle purlin	End purlin
> 200mm	<p>Every corrugation</p>	<p>Every corrugation</p>
100 to 200mm	<p>Every 2 corrugations</p>	<p>Every corrugation</p>
Up to 100mm	<p>Every 3 corrugations</p>	<p>Every 2 corrugations</p>







# SUNTUF® Rooflights Technical Guide

## Accessories

### Fasteners




Metal screws should be long enough to protrude at least 15mm into the metal purlin (not including the thickness of the metal).

Wood screws should be long enough to penetrate at least 25mm (1") into the wooden purlin.

	Illustration	Length mm (in.)
Self - Drilling Screw		25, 38, 64, 76, 89, 121 (1, 1½, 2½, 3, 3½, 4¾)
Self - Tapping Screw		25, 38, 64, 76, 89, 121 (1, 1½, 2½, 3, 3½, 4¾)

### Washers

- Palram washers:  
Domed washer, 25 mm and 19mm diameter, with upper “collar” (to seal between the screw head and the metal tapered disk) combined with a tapered metal cone, and is used together with a suitable screw in 5.5 and 6.3 mm diameter (#12-#14) and in specified lengths in pre-drilled holes.

	Illustration	
19mm Washer/Gasket		
25mm Washer/Gasket		

- Storm Washers:  
Standard aluminum or galvanized metal crest rider with EPDM or foam polyethylene gasket, sized to fit onto the corrugation crests.





## SUNTUF® Rooflights Technical Guide

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### Sealing strips

- Overlaps sealing: Butyl sealant strip, 6mm (wide) X 4mm (thick).
- End closure: shaped closure strip can be used wherever sealing between the Suntuf panel and the edge purlin of the roof is needed (usually at ridge-to-gutter rooflight application). The end closure is made of polyethylene foam (XPE) strip, shaped to fit the panel. The strip is held in place, between panel and purlin, by the fasteners.\*

\* Especially *manufactured according to specific order*



### Compatible Adhesives & Sealants

The majority of widely available adhesives and sealants for roofing are compatible to SUNTUF. However, some of the products are not chemically compatible with SUNTUF. The Recommended Adhesives and Sealants for Polycarbonate table (Annex 1) lists the products approved to come in contact with SUNTUF. PALRAM offers compatibility tests with SUNTUF for any sealing material submitted through authorized representatives.



### Maintenance

Suntuf panels do not require special maintenance or treatment.

For cleaning use water pressure cleaner and allow natural drying.



## SUNTUF® Rooflights Technical Guide

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### Safety

The following safety measures should be followed during and after installation of Suntuf panels.

1. Use ladders, crawling boards and other safety equipment required for safe installation. Ladders and crawling boards must be laid crosswise to corrugation.
2. Never leave loose Suntuf panels on the roof, until all the required fasteners have been appropriately installed or the panels temporarily secured to the supporting structure.
3. **Never step directly on installed panels** for fear of falling. Use a sturdy board or ladder adequate to support your weight and long enough to span at least three structural members.
4. Use the proper safety equipment wear protective clothing while applying Suntuf panels.
5. Work according to the local safety regulations codes.

