# Content

# SUNTUF®

Corrugated Polycarbonate Sheet

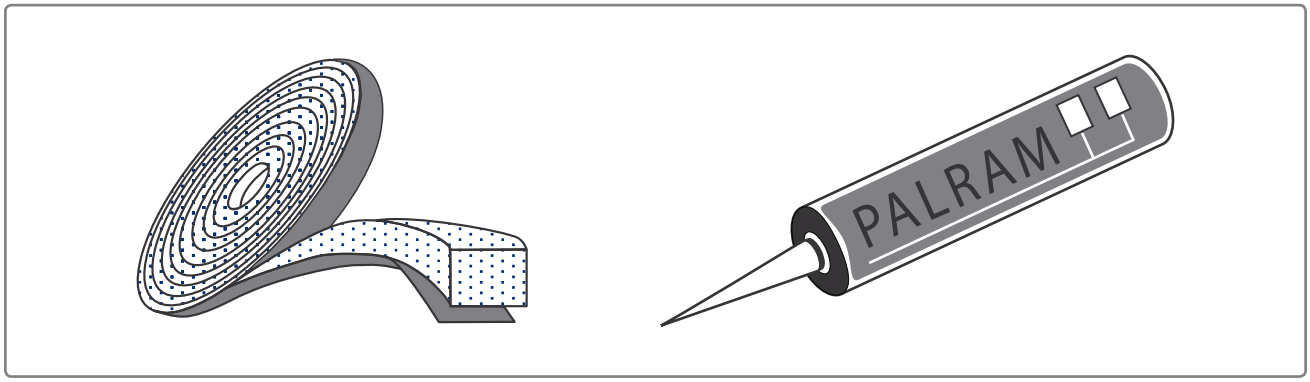
## Technical Data

71754-06.2011

Build On.

# 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 bellow 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 |
| Duplomont 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 |

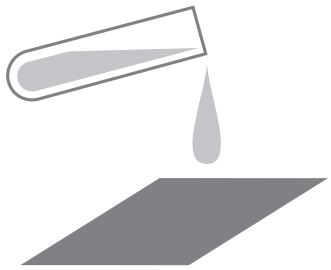
**Important Note:** Since in general products composition might change in time, Palram is not responsible for the results obtained when using these materials. It is imperative that the manufacturer's instructions be strictly followed. This includes following the required safety procedures. Some products 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 |
|---|---|---|
| Acetaldehyde | | N |
| Acetic Acid | 10% | R |
| Acetic Acid | 25 (concentrated) | LR (N) |
| Acetone | | N |
| Acetylene | | R |
| Acrylonitrile | | N |
| Ajax Detergent | | R |
| Allspice | | N |
| Allyl Alcohol | | LR |
| Alum (Aluminum Ammonsium Sulfate) | | R |
| Aluminum Chloride | Saturated | R |
| Aluminum Oxalate | | R |
| Aluminum Sulfate | Saturated | R |
| Ammonia (Gas) | | N |
| Ammonia (Aqueous) | | N |
| Ammonium Carbonate | | LR |
| Ammonium Chloride | | R |
| Ammonium Fluoride | | N |
| Ammonium Hydroxide | | N |
| Ammonium Nitrate | | R |
| Ammonium Sulfate | Saturated | R |
| Ammonium Sulfide | | N |
| Amyl Acetate | | N |
| Amyl Alcohol | | LR |
| Aniline | | N |
| Antimony Trichloride | Saturated | R |
| Aqua Regia (3 parts HCl:1 part HNO3) | | LR |
| Arsenic Acid | 20% | R |
| Automatic Switch Grease | | R |
| Automotive Waxes | | LR |
| Baby Lotion | | R |
| Bacon Fat | | R |
| Barium Chloride | | R |
| Battery Acid | | R |
| Beer | | R |
| Beet Syrup | | R |
| Benzaldehyde | | N |
| Benzene | | N |
| Benzoic Acid | | N |
| Benzyl Alcohol | | N |
| Betadine | | R |
| Bleach (Clorox) | | R |
| Blood and Blood Plasma | | R |
| Borax | | R |
| Boric Acid | | R |
| Brake Fluid | | N |
| Bromine | | N |
| Bromobenzene | | N |

| Chemical | Concentration* | Resistance |
|---|---|---|
| Butane | | R |
| Butter | | R |
| Butyl Acetate | | N |
| Butyl Alcohol (Butanol) | | R |
| Butylene Glycol | | R |
| Butyric Acid | | N |
| Calcium Chloride | Saturated | R |
| Calcium Hypochlorite | | R |
| Calcium Nitrate | | R |
| Calcium Soap Fat | | R |
| Camphor Oil | | N |
| Carbolic Acid | | N |
| Carbon Bisulfite | | N |
| Carbon Dioxide Gas (Moist) | | R |
| Carbon Disulfide | | N |
| Carbon Monoxide | | R |
| Carbon Tetrachloride | | N |
| Castor Oil | | R |
| Catsup (Ketchup) | | R |
| Caustic Potash (Potassium Hydroxide) | | N |
| Caustic Soda (Sodium Hydroxide) | | N |
| Chlorine Gas (Dry) | | LR |
| Chlorine Gas (Wet) | | N |
| Chlorobenzene | | N |
| Chloroform | | N |
| Chocolate | | R |
| Chrome Alum | Saturated | R |
| Chromic Acid | 20% | R |
| Cinnamon | | R |
| Citric Acid | 10% | R |
| Cloves | | N |
| Coal Gas | | R |
| Coca Cola | | LR |
| Cocoa | | LR |
| Cod Liver Oil | | R |
| Coffee | | LR |
| Cooking Oil | | R |
| Copper Sulfate | Saturated | R |
| Cresol | | N |
| Cupric Chloride | Saturated | R |
| Cuprous Chloride | Saturated | R |
| Cyclohexane | | R |
| Cyclohexanol | | LR |
| Cyclohexanone | | N |
| DDT | | R |
| Dekalin | | R |
| Detergent (most) | | LR or R |
| Developing Solutions | | N or LR |

# Chemical Resistance of Polycarbonate Products at Room Temperature

| Chemical | Concentration* | Resistance |
|---|---|---|
| Diamyl Phthalate | | N |
| Diesel Fuel | | R |
| Diethyl Ether (Ethyl Ether) | | N |
| Dimethyl Formaldehyde (DMF) | | N |
| Dimethyl Sulfoxide (DMSO) | | N |
| Dinonyl Phthalate (plasticizer) | | LR |
| Doctyl Phthalate (plasticizer) | | LR |
| Dioxane | | N |
| Diphyl 5,3 | | LR |
| Ethanol (Ethyl Alcohol) and Water | 96 | R |
| Ethanol (Ethyl Alcohol) | Pure | LR |
| Ethyl Amine | | N |
| Ethyl Acetate | | N |
| Ethyl Bromide | | N |
| Ethylene Chloride | | N |
| Ethylene Chlorohydrin | | N |
| Ethylene Dichloride | | N |
| Ethylene Glycol (Antifreeze) | | LR |
| Ferric Chloride | Saturated | R |
| Ferrous Sulfate | | R |
| Fish and Fish Oils | | R |
| Floor Polish | | R |
| Formalin | 10% | R |
| Formic Acid | 10% (30%) | R (LR) |
| Freon TF | | R |
| Freon (all others) | | N |
| Fruit Juices and Pulp | | R |
| Gasoline | | N |
| Gear Oil | | R |
| Glazers Putty | | R |
| Glucose | | R |
| Glycerine | | R |
| Glycerol | | R |
| Glycols | | R |
| Glutaraldehyde | 50% | R |
| Grease, Automotive (Most) | | R |
| Heptane | | R |
| Hexane | | R |
| Hydrazine | | N |
| Hydrochloric Acid | 20 (Concentrated) | R (N) |
| Hydrofluoric Acid | 20% | R |
| Hydrogen Peroxide | 30% | R |
| Hydrogen Sulfide | | R |
| Iodine (aqueous solution) | 5% | R |
| Iodine | | N |
| Inks (Most) | | R |
| Isoamyl Alcohol | | LR |
| Isopropyl Alcohol | | R |

| Chemical | Concentration* | Resistance |
|---|---|---|
| Kerosene | | R |
| Lactic Acid | 20% | R |
| Lacquers and Thinners | | R |
| Laundry Detergents (Most) | | R |
| Ligroin (Hydrocarbon Mixture) | | R |
| Lime Solution (2%) or paste | | R |
| Liquors or Liqueurs | | R |
| Linseed Oil | | R |
| Loctite | | R |
| Lubricating Oils (Most) | | R |
| Machine Oils (Most) | | R |
| Magnesium Chloride | Saturated | R |
| Magnesium Sulfate | Saturated | R |
| Manganese Sulfate | Saturated | R |
| Margarine | | R |
| Mayonnaise | | R |
| Meat | | R |
| Mercuric Chloride | Saturated | N |
| Mercury | | N |
| Methane | | R |
| Methanol (Methyl Alcohol) | Pure | LR |
| Methylamine | | R |
| Methylcellusolve | | N |
| Methylene Chloride | | N |
| Methyl Ethyl Keton (MEK) | | N |
| Methylmethacrylate | | N |
| Milk | | N |
| Mineral Oil | | R |
| Motor Oils (Most) | | R |
| Mustard | | R |
| Naphtha (Stanisol) | | R |
| Nickel Sulfate | | N |
| Nitric Acid | 20% | R |
| Nitrobenzene | | R |
| Nitropropane | | R |
| Nitrous Oxide | | R |
| Nutmeg | | N |
| Oleic Acid | | N |
| Onions | | R |
| Oxalic Acid | 10% | R |
| Oxygen | | R |
| Ozone | | R |
| Paprika | | R |
| Paraffin | | R |
| Pentane | | LR |
| Pepper | | LR |
| Perchloric Acid | 10 (concentrated) | N |
| Perchloroethylene | | R |

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

# Chemical Resistance of Polycarbonate Products at Room Temperature

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

"Entries indicate the following: R - resistant,. LR - limited resistance, N- not resistant"
*concentration of aque?ous 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 x (%ST + (0.27 x %SA)) / 100
%ST + (0.27 x %SA) = %STt
SC = 1.15 x STt /100

## 4. First Aid Measures

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.

## 5. Fire Fighting Measures

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. $CO_2$ 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 closing, 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.

## 6. Accidental Release Measures

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

## 7. Handling and Storage

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 | Address: 9735 Commerce Circle |
| Tel: +972 4 8459 900 | Industrial Estate, White Rose Way | Kutztown, PA 19530, USA |
| Fax: +972 4 8444 012 | Doncaster DN4 5JH, UK | Tel: +610-285-9928 |
| | Tel: +44 1302 380738 | Fax: +484-647-8210 |
| | Fax: +44 1302 380739 | |

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.

## 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 |

## 9. Physical Properties

| | | |
|---|---|---|
| Appearance | : | Flat or corrugated plastic sheets |
| Physical State | : | Solid |
| Color | : | Clear or colored |
| Odor | : | None |
| Density | : | 1.2 gr/cm$^3$ |
| Change In State | : | $T_g$=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 |

## 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 ($CO_2$) | - | 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. |

## 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 $LD_{50}$ > 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 $LD_{50}$ (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 $LD_{50}$ (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 Riscs
No hazard expectation to terrestrial or aquatic flora and fauna.

| | |
|---|---|
| Ecotoxicity | : $LD_{50}$ (rats) > 5 gr/kg |
| | : $IC_{50}$ (bacterial inhibition) - no data available |
| Aquatic toxicity | : $LC_{50}$ (daphnia magna) - no data available |
| | : $LC_{50}$ (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.

## 14. Transport Information

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.

## 15. Regulatory Information

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$^3$.

## 16. Other Information

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.

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# SUNTUF®

Corrugated Polycarbonate Sheet

## Physical Properties

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 |
|---|---|---|---|---|
| **Physical** | | | | |
| Density | D-1505 | | g/cm3 | 1.2 |
| Water Absorption | D-570 | 24 hr. @ 23°C | % | 0.15 |
| **Mechanical** | | | | |
| 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 |
| **Thermal** | | | | |
| 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 | | $10^{-5}$ cm/m °C | 6.5 |
| Thermal Conductivity | C-177 | | W/m K | 0.21 |
| Specific Heat Capacity | C-351 | | kJ/kg°K | 1.3 |
| **Optical** | | | | |
| Haze | D-1003 | | % | <0.5 |
| Light Transmission | D-1003 | | % | 90 |
| Refractive Index | D-542 | | | 1.57 |
| Yellowness Index | D-1925 | | | <1 |
| **Electrical** | | | | |
| 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 | $4.1 \times 10^{15}$ |
| Volume Resistance | D-257 | Ketley | Ohm-cm | $1.7 \times 10^{17}$ |

* ASTM method except where noted otherwise

PALRAM

# SUNTUF®

Corrugated Polycarbonate Sheet

## SUNTUF® Rooflights Technical Guide

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.
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