Marlon ST

Brett Martin

Product Guide

Multiwall
Polycarbonate Sheet

Marlon ST

Brett Martin is one of the world's leading manufacturers of polycarbonate sheet, supplying material around the globe for a huge variety of applications.

Marlon ST is a premium quality structured polycarbonate sheet offering good optical clarity, exceptional impact resistance and an outstanding strength to weight ratio. It is complemented by Marlon CS and Marlon FS, corrugated and flat polycarbonate, making Brett Martin a single source for polycarbonate sheet requirements.

Brett Martin has many years of experience in the manufacture of GRP, PVC and polycarbonate sheet products. Marlon ST, as with all Brett Martin products, is manufactured under a quality management system which has earned Brett Martin BSI registered status under BS EN ISO 9001.

Brett Martin

Marlon ST

Contents

PRODUCT SPECIFICATIONS & PERFORMANCE

PRODUCT RANGE

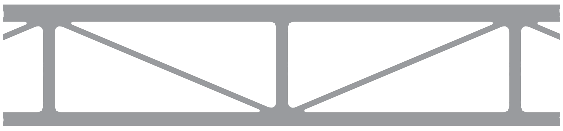
Twinwall (Twin) Thicknesses 4, 6, 8, 10 & 30mm

Fourwall (Four) Thicknesses 8mm & 10mm

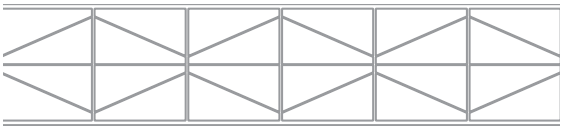
Triplewall (Triple) Thickness 16mm

M Wall (M) Thickness 16mm

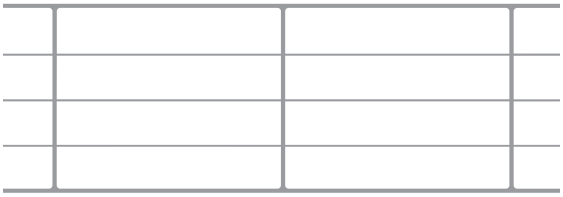
16x32mm M Wall (M) Improved Clarity



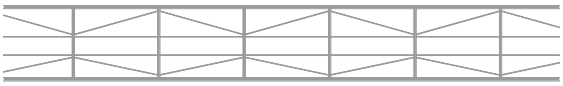
X Wall (X) Thickness 16mm



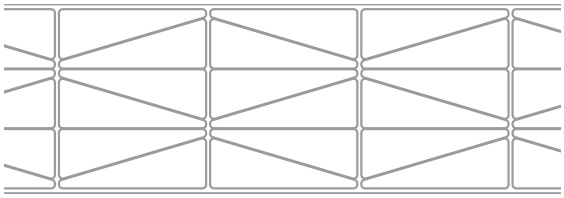
Fivewall (Five) Thicknesses 16 & 25mm



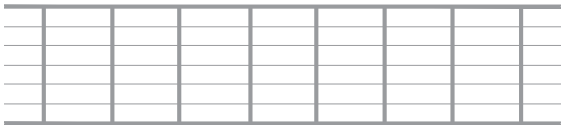
Sixwall (Six) Thickness 10mm



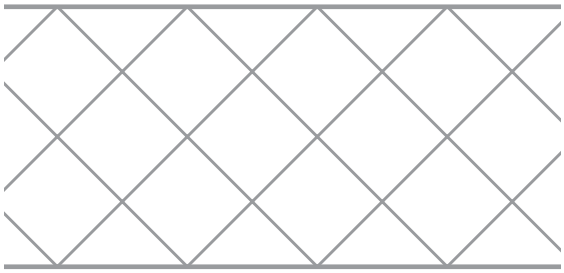
7X Wall (7X) Thicknesses 20mm & 25mm



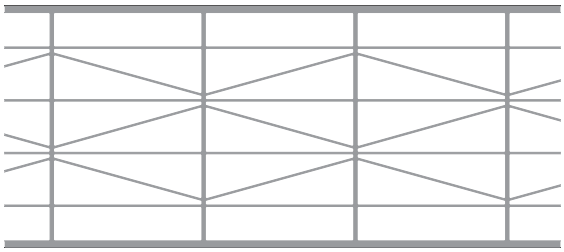
Sevenwall (Seven) Thicknesses 16, 32 & 35mm



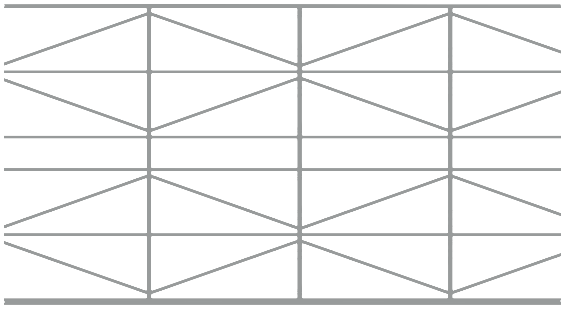
XX wall (XX) Thicknesses 32 & 35mm



Ninewall Thickness 32mm



Tenwall Thickness 35, 40 & 55mm



TINT OPTIONS

Marlon ST is available in a wide range of colours including clear, opal, bronze, blue, green, grey and heatguard. Dual tint sheets are also available in heatguard opal, bronze opal and blue opal.

The choice of colour ultimately depends on the end result needed. Clear is used where maximisation of light is required. In order to take advantage of the heat build-up generated by the high level of light transmission clear is a popular option in colder climates. It is an ideal product for use in industrial and commercial greenhouses.

In hot climates other tint options, such as bronze, blue, green or heatguard, are more effective in limiting the amount of light and minimising glare.

Where diffusion of light is required opal is the optimum choice. Opal prevents the sunlight from concentrating on one area, therefore eliminating hot-spots while allowing light into the building to keep it bright. It is a preferred option in supermarkets where it creates a soft light quality considered by many to enhance the retail environment.

SOLAR HEAT GAIN

Some control of heat gain within a building can be achieved using glazing materials which are designed to influence the nature and quantity of transmitted light. Marlon ST with bronze and opal white tinting are both effective for solar control, reducing glare by diffusing incoming light and reducing heat gain.

Marlon ST heatguard is an innovative development in polycarbonate sheeting which limits heat build up through the sheet while transmitting light. It is ideal in any situation where natural light is required but excessive heat build up can be a problem.

The heatguard option utilises a specially developed pigment to significantly reduce heat build up below the roof. Under the sun heatguard acts like a mirror to reflect the heat thus reducing solar heat gain by up to 50%, when compared to other materials. This reduction in solar heat gain can help to reduce air conditioning costs.

Heatguard opal also reduces solar heat gain by up to 50% however, the silvery grey colour is combined with an internal opal surface which creates a white finish and a soft light quality. Heatguard opal has a shading coefficient of 0.32 compared to 0.95 for clear material.

Bronze opal combines a bronze external and opal internal surface. The external bronze surface blends discretely with other roof finishes while the opal internal finish provides privacy and soft light quality. Bronze opal combines the two most popular tint options.

DOUBLE SIDED UV*

Ultra-violet protection is now available on both sides of Marlon ST, giving protection in situations where the underside of the sheet may be exposed to the sun e.g. roof vents.

ANTI DRIP*

Marlon ST, including double sided UV sheets, can be supplied with an anti-drip coating on the reverse of the sheet. This long lasting finish creates a glazing option that is resistant to condensation, ideal for use in commercial, agricultural and horticultural applications.

*Subject to minimum order quantities, contact sales office for full details.

Tint Option	Light Transmission (%) DIN 5036 based on 25mm Fivewall	Benefit	Applications
Clear 'C'	68	Maximisation of natural daylight	Industrial & Commercial Greenhouses
Bronze 'B'	11	Cool internal environment	Walkways, Canopies, Atriums, Domestic applications
Opal 'V'	30	Diffusion of light	Supermarkets & Commercial buildings, Domestic applications
Heatguard Opal 'EG/TU'	7	Reduction of solar heat gain by up to 50% and soft light quality internally	Domestic Application
Bronze Opal 'B/TU'	8	Privacy and soft light quality	Domestic applications
Bronze Opal 'BL/PW'	7	Privacy and soft light quality	Domestic applications

TYPICAL PROPERTIES OF MARLON ST

	Marlon ST Sheet Thickness (mm)																								
	4	**6**	**8**			**10**				**16**				**20**	**25**	**30**	**32**			**35**		**40**	**55**		
Structure	Twin	Twin	Twin	Four	Twin	Four	Six	Triple	Five	M	M	X	Seven	7 X	7 X	Five	Twin	XX	Seven	Nine	XX	Seven	Ten	Ten	Ten
Sheet thickness mm (±0.5)	4	6	8	8	10	10	10	16	16	16	16	16	16	20	25	25	30	32	32	32	35	35	35	40	55
Rib spacing (nominal) mm	6	6	10	12.5	10	12.5	11.3	20	20	17.5	32	12.4	14	20	20	20	35	16	20	20	16	20	20	20	20
Maximum Sheet width mm	2100	2100	2100	2100	2100	2100	2100	2100	2100	1250	1220	2100	2100	2100	2100	2100	1250	1250	2100	1250	980	2100	1250	1250	1250
Approx weight g/m²	800	1300	1500	1500	1700	1700	1700	2700	2700	2800	4000	2500	2500	2800	3100	3400	3500	3800	3600	3600	4200	3900	4100	4200	5000
Light transmission %																									
Clear S	85	82	82	74	82	74	70	77	69	73	74	66	64	62	62	68	77	64	64	57	67	63	54	54	52
Bronze B	28	26	20	21	20	20	–	18	16	–	–	–	–	–	7	11	18	11	7	–	11	7	–	–	–
Opal V	39	39	39	39	40	34	–	42	39	35	39	–	–	28	28	30	37	40	33	–	33	31	35	33	32
U-value W/M²k	3.9	3.7	3.4	2.8	3.2	2.5	2.4	2.4	1.9	2.2	2.5	2.0	1.78	1.6	1.4	1.6	2.6	1.4	1.25	1.2	1.4	1.2	1.08	0.99	0.83
Falling dart Gardiner impact at 23°C Nm	21.3	27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27	>27

The typical properties table includes some non-standard items which may be subject to minimum order quantities and extended lead times.

TYPICAL PROPERTIES OF POLYCARBONATE RESIN

		Standard	Value	Units
Mechanical Properties	Tensile strength at yield	DIN 53455	>60	N/mm²
	Tensile strength at break	DIN 53455	>70	N/mm²
	Elongation at yield	DIN 53455	6-8	%
	Elongation at break	DIN 53455	>100	%
	Modulas of elasticity	DIN 53457	>2300	N/mm²
	Notched impact strength	DIN 53453	>50	kJ/m²
Physical Properties	Specific gravity	DIN 53479	1.20	g/m³
	Refractive index nD25	DIN53491	1.585	
	Water absorption, 24h @ 23°C	DIN 53495	0.35	%
	Water permeability (thickness 1mm)	DIN53122	<2.28	g/m²
Thermal Properties	Softening temperature Vicat 'B'	DIN 53460	145-150	°C
	Deflection temperature, load 1.81N/mm²	DIN 53461	140-145	°C
	Linear thermal expansion	DIN 53752	$6.7x10^{-5}$	m/m°C
	Thermal conductivity (λ-value)	DIN 52612	0.2	W/m°K
	Maximum service temperature - no loading		Permanent 100 Short Term 130	°C

Measured on injection moulded test specimens.

SOUND REDUCTION INDEX

MARLON ST SHEET	SOUND REDUCTION INDEX* (dB)
4mm Twinwall	6
6mm Twinwall	8
8mm Twinwall	13
10mm Twinwall	20
10mm Fourwall	20
16mm Triplewall[a]	21
16mm Fivewall	21
16mm M wall	21
20mm Triplewall	22
20mm Fourwall	22
25mm Fivewall	23
30mm Twinwall	25
32mm XX-wall	25
32mm Sevenwall	25
35mm XX-wall	25
35mm Sevenwall	25

* Airborne Sound Reduction Index to BS EN ISO140-3: 1995, BS2750: Part 3

[a] 16TRW with 20mm and 16mm rib spacing

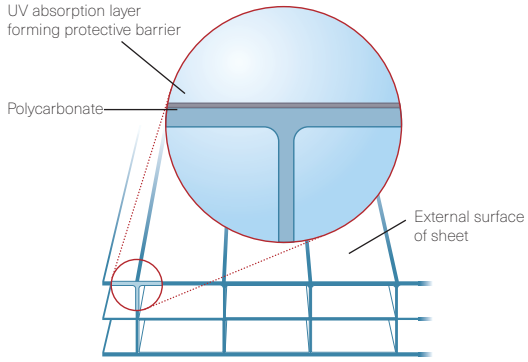
(4mm Single Glazing – 27dB,
4+4mm Double Glazing – 25dB)

RESISTANCE TO UV LIGHT

UV light has two potentially harmful effects on polycarbonate; a yellowing of the material itself and a degradation of mechanical properties, eg. resistance to impact. Marlon ST's surface, which has a high performance co-extruded protection system, has a high degree of resistance to the effects of natural and artificial UV light sources minimising long term yellowing and maintaining durability and toughness.

UV LIGHT ABSORPTION LAYER

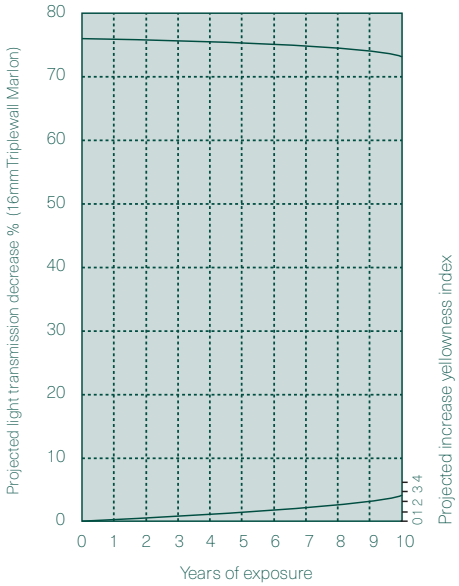
Marlon ST has a high performance UV absorption layer co-extruded on the outer surface. This UV absorption layer forms a barrier to incident UV radiation, preventing it penetrating to the body of the sheet material, so that long term yellowing and loss of mechanical properties, eg. impact strength, are negligible.



Marlon ST cuts out 98% of harmful UV radiation, protecting those working or playing beneath it.

LOSS OF LIGHT TRANSMISSION, INCREASE IN YELLOWNESS INDEX

Testing shows negligible degrading of the material's light transmission properties or yellowing and a retention of its inherent strength and resistance to impact.



This confirms Marlon ST as a most advanced insulating glazing material for exterior installations with numerous advantages over traditional glazing materials.

All Marlon ST sheeting has its UV resistant surface clearly indicated by the removable, branded, protective film and this should face outwards when installed.

Its intrinsic impact durability and optical clarity combined with its valuable energy conserving properties make Marlon ST a very popular material for use in roof glazing, rooflights, windows, doors, partitions and suspended ceilings.

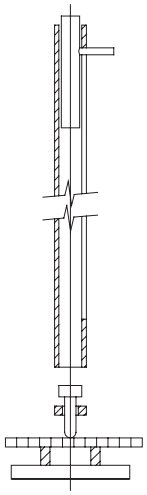
RESISTANCE TO HAIL DAMAGE

Damage to glazing materials, particularly those installed on roofs, occurs when hail storms contains hailstones above 15mm diameter and with impact velocities over 20m/s. Marlon ST sheets in thicknesses over 10mm provide good resistance to impact from material such as hail over a wide range of service temperatures and long service life.

For warranty details for Marlon ST sheets for hail damage please contact our Technical Department.

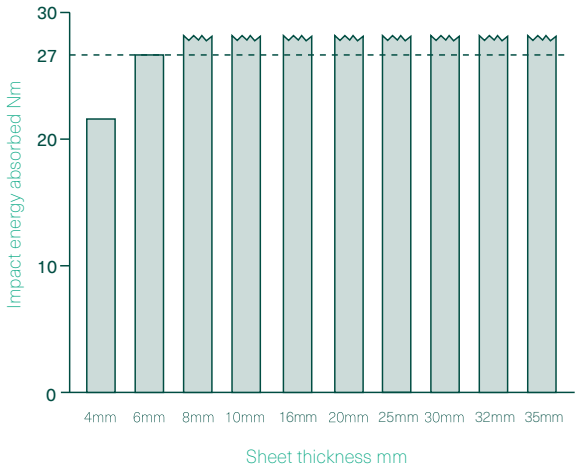
RESISTANCE TO IMPACT

The resistance of Marlon ST to impact damage is assessed using the Gardiner Falling Dart Impact Test.



Marlon ST exhibits excellent resistance to impact damage over a broad service temperature range and prolonged service life. The fact that this resistance is superior to that of other glazing materials means superior resistance to breakage in handling, transport, installation and during its service life.

RESISTANCE TO IMPACT



COMPARATIVE WEIGHTS

Marlon ST has a very high strength to weight ratio. As the self weight is therefore very low, support structures do not need to be quite so heavy as in the case of, for example, glass. Consequently there are savings to be gained in terms of structure costs as well as installation and labour savings when Marlon ST is used.

COMPARATIVE WEIGHTS OF GLAZING MATERIALS kg/m^2

Thickness (mm)	Marlon ST	Single Glass	Double Glass	Twinwall Acrylic
4 TW	0.8	10	20	–
6 TW	1.3	15	–	–
8 TW	1.5	20	–	–
10 TW	1.7	25	–	–
10 FW	1.7	–	–	–
16x16 TRW	2.5	–	–	–
16x20 TRW	2.5	–	–	–
16 TRW	2.7	40	–	5.2
16 FVW	2.7	–	–	–
16 MW	2.8	40	–	–
20 TRW	3.1	–	–	–
20 FW	3.1	–	–	–
25 FVW	3.4	62.5	–	–
30 TW	3.5	–	–	–
32 XXW	3.8	–	–	6.5
32 SW	3.7	–	–	–
35 XXW	4.2	–	–	–
35 SW	3.9	–	–	–

SERVICE TEMPERATURE

Marlon ST can be installed in a diversity of applications, with varying temperatures. However, the material's mechanical performance is known to remain stable in prolonged service in temperatures ranging from -40°C to +100°C. PVC has a maximum service temperature of 60°C whilst that of acrylic is 80°C.

THERMAL EXPANSION

The coefficient of linear expansion of polycarbonate material is 6.7×10^{-5} m/m°C. This is high relative to that of most other materials in conjunction with which it is normally used. As a consequence careful allowance must be made for the thermal expansion of Marlon ST sheets, both longitudinally and laterally. The graph on page 14 shows the expansion allowances that must be made for given lengths and widths of sheet.

INSULATION

A considerable advantage of Marlon ST, particularly in colder regions is that it is much more efficient at preventing excessive heat loss than traditional glazing materials of comparable thickness.

With the emphasis firmly on energy conservation in modern building practice in Northern Europe, Marlon ST polycarbonate insulating glazing can be a great asset to the architect and specifier, particularly in colder regions. The Relative U-values table compares the insulation properties of Marlon ST with other glazing types.

RELATIVE U–VALUES W/m^{2}K

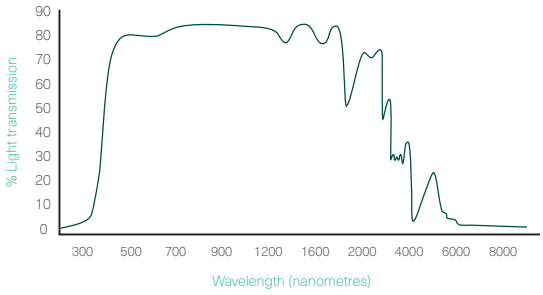
Sheet Thickness (mm)	Marlon ST	Single Glass	Double Glass	Argon Filled Cavity
4 TW	3.9	5.8	2.65	1.6
6 TW	3.7	–	–	–
8 TW	3.4	5.7	2.65	1.6
10 TW	3.2	5.7	2.65	1.6
10 FW	2.5	–	2.65	1.6
16 TRW*	2.4	5.5	2.65	1.6
16 FVW	1.9	–	2.65	1.6
16 MW	2.2	–	2.65	1.6
20 TRW	2.2	–	2.65	1.6
20 FW	2.0	–	2.65	1.6
25 FVW	1.6	–	2.65	1.6
30 TW	2.6	–	2.65	1.6
32 XXW	1.4	–	2.65	1.6
32 SW	1.25	–	2.65	1.6
35 XXW	1.4	–	2.65	1.6
35 SW	1.2	–	2.65	1.6

* 16TRW with 20mm and 16mm rib spacing

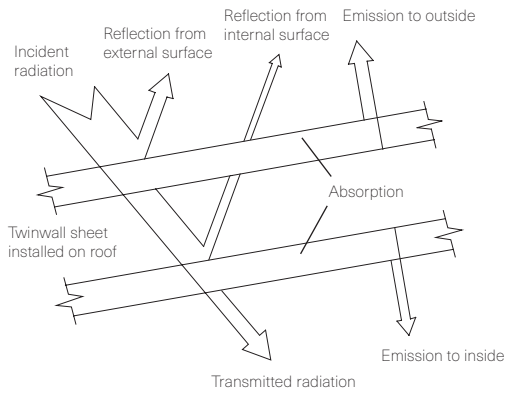
SPECTRAL TRANSMISSION OF POLYCARBONATE SHEETING

Polycarbonate sheet is transparent to wavelengths of light between 385nm at the lower limit and approximately 5000nm at the upper limit. Importantly polycarbonate is opaque to infra-red radiation: light in the visible spectrum entering a building is absorbed by the interior and contents and re-radiated as long wave infra-red radiation, which cannot be re-transmitted back through the polycarbonate sheeting.

Consequently in addition to being an excellent insulating material Marlon ST also retains heat inside buildings due to the greenhouse effect which it creates.



TRANSMISSION REFLECTION AND ABSORPTION OF LIGHT BY POLYCARBONATE SHEETING



CLEANING

As a condition of ensuring that Marlon ST performs at optimum throughout its service life, it is recommended that the sheet be cleaned periodically using suitable household cleaning agents. The recommended cleaning instructions are as follows:

- Use lukewarm water to rinse sheet and soften dirt
- Make up a solution of lukewarm water and ordinary household cleaner or a mild soap and use this to wash sheet
- A sponge or soft cloth should then be used to gently remove dirt and grime
- The cleaning process should then be repeated and the sheet rinsed and dried with a soft cloth

WARNING!

Care should be taken to observe the following precautions:

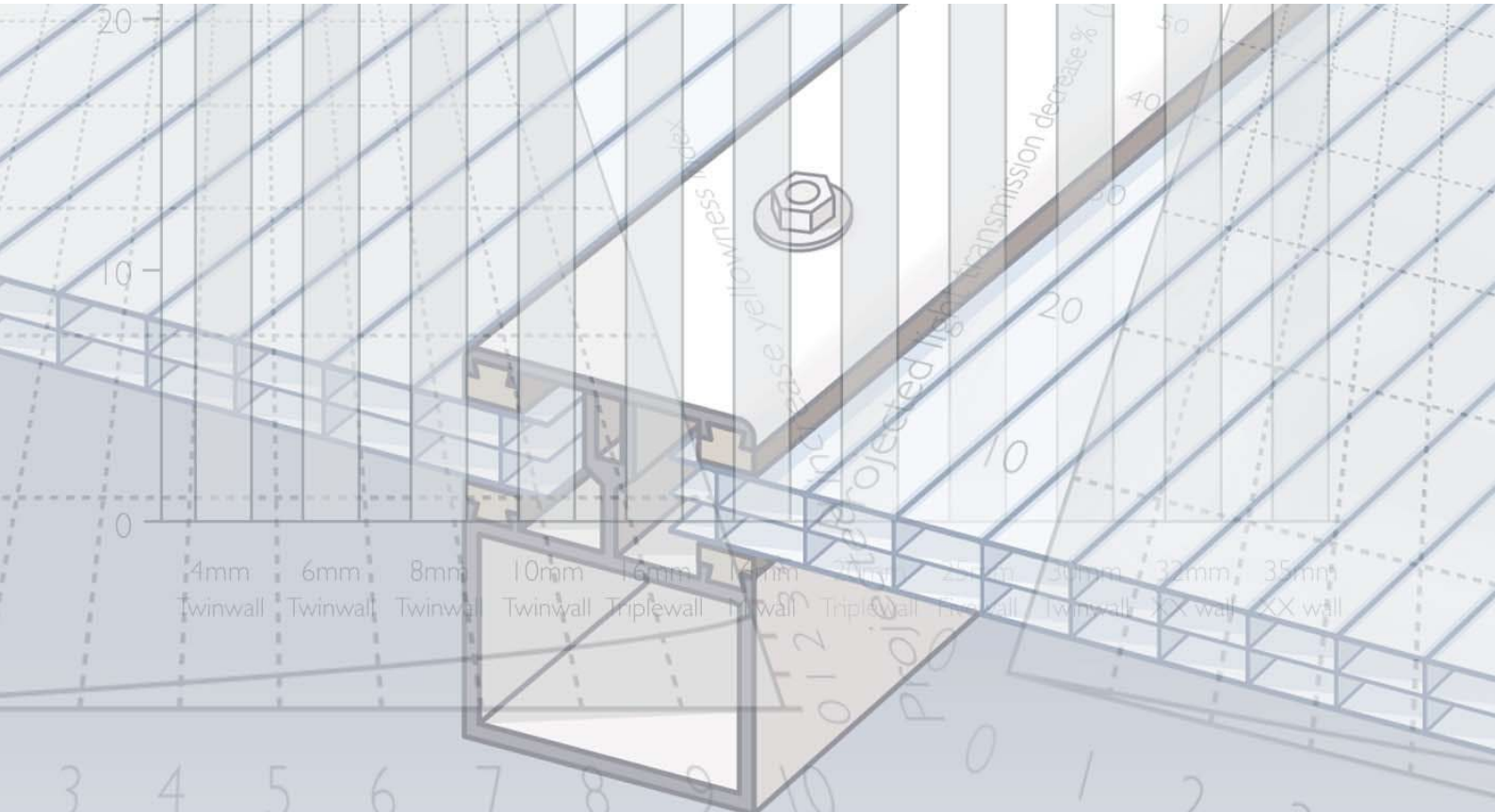
1. Do not scrub Marlon ST sheet with brushes or sharp instruments.
2. Avoid contact with the UV protected surface of Marlon ST by Butyl Cellosolve, Isopropanol or any other solvent.
3. Avoid any abrasives or cleaners of a highly alkaline composition.

It is generally advisable in all instances to test any cleaner on a sample piece of Marlon ST first and it should also be remembered that cleaners and solvents which state that they are suitable for cleaning polycarbonate may not be safe for use on the UV protective surface of Marlon ST.

FIRE PERFORMANCE

Marlon ST sheet exhibit excellent fire performance and in the event of a fire will soften and open, allowing smoke, heat and gases produced by the fire to escape. This 'venting' property means that damage within buildings can be limited. For details of fire ratings please contact our Technical Department.

INSTALLATION GUIDE



INSTALLATION ACCESSORIES

A full range of fully compatible intsallation accessories are available for the complete roofing solutions.

It is important when installing any Marlon ST sheet that accessories are compatible for use with polycarbonate.

PVC U End Profiles

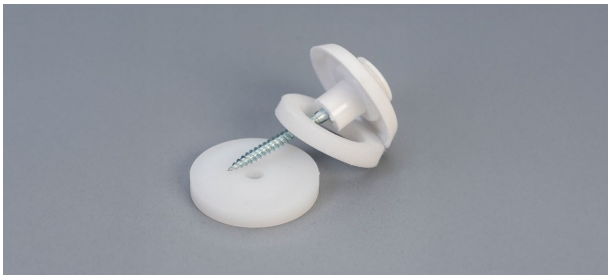
PVC F Side Profiles

PVC Cap & Aluminium Base Connecting Profiles

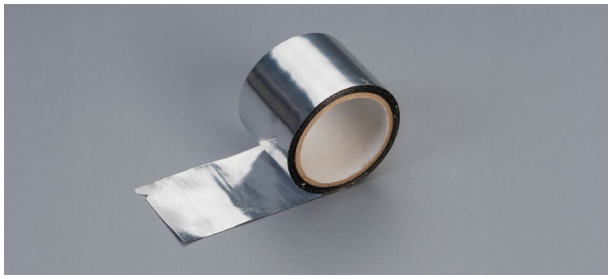
Polycarbonate U End Profiles

Polycarbonate H Connecting Profiles

Polycarbonate Cap & Base Connecting Profiles



Fixings



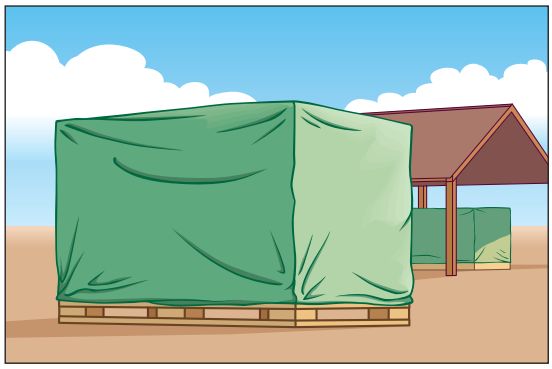
Sealing Tape

Breather Tape

Full Accessories Range

STORAGE

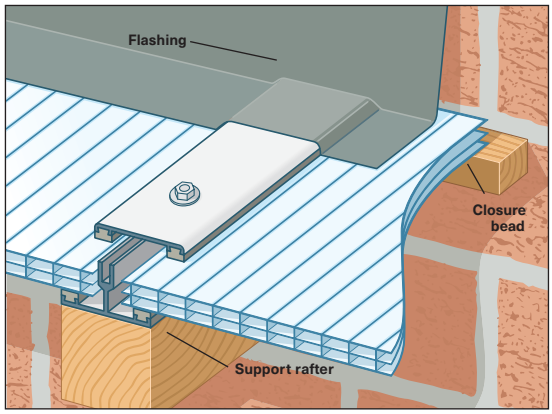
Store sheets on flat surfaces or wooden bearers with 100mm minimum bearing surface placed at centres not exceeding 1m. Use an opaque cover, tightly secured, to protect from wind, rain and sun. Storage is always preferable indoors.



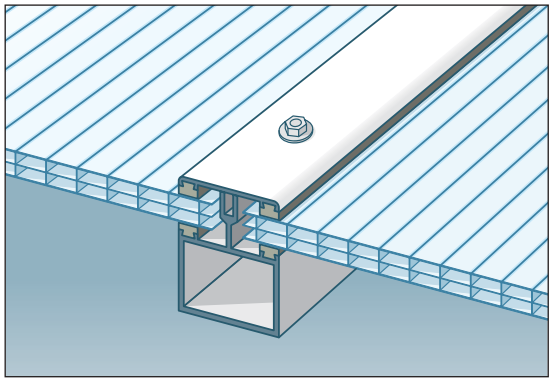
INSTALLATION SYSTEMS

Marlon ST can be installed using many of the currently available glazing systems designed for structured glazing sheets of PVC, acrylic and polycarbonate material. The diagrams illustrate the principle parts.

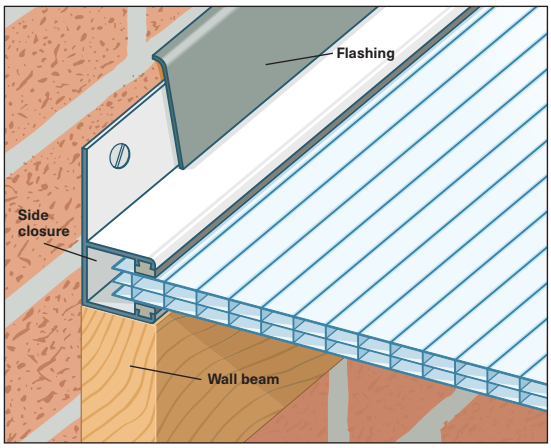
SUPPORTED GLAZING BAR SYSTEM



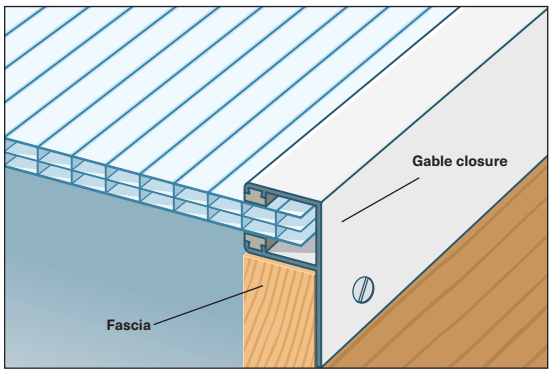
SELF SUPPORTING GLAZING BAR SYSTEM



END WALL ABUTMENT



GABLE CLOSURE



Marlon ST is robust yet lightweight. Installation is straightforward but it is IMPERATIVE that the following RULES are applied to EVERY installation. These rules must read in conjunction with the fitting instructions for the glazing bar system being used.

- Roofs should always be designed with a minimum slope of 5° to allow adequate rainwater run-off.

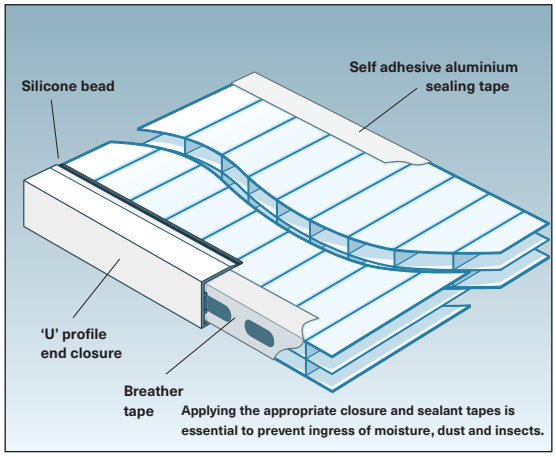
- Fitting of Marlon ST polycarbonate sheets should be the last operation in completing the project. The structure should be finished with all components of the selected glazing system in place and wood preservatives, when used, thoroughly dry.

- **Marlon ST sheets must always be installed with the ribs running vertically, or up-slope.**

- Ensure that the clearly marked UV protected surface of the Marlon ST sheet is to the outside. About 50mm of protective film should be peeled back from the edges of the sheet prior to application and the residual film removed after glazing is complete.

SEALANTS

Always ensure that sealants, gaskets and other materials used with Marlon ST do not have a detrimental effect on the material. **A low-modulus neutral silicone MUST be used as an all-purpose silicone will cause polycarbonates to crack and disintegrate.**



Applying the appropriate closure and sealant tapes is essential to prevent ingress of moisture, dust and insects.

TAPES

The diagram above shows the correct orientation of Marlon ST sheet in application and the positioning of the tapes. A sealing tape, preferably aluminium, is applied at the top of the sheet to prevent ingress of moisture, dust and insects. A breather tape applied to the bottom end of the sheet permits air to move freely in and out of the sheet, helping minimise condensation by equalisation of the air vapour pressure inside and outside the sheet. The breather tape also prevents dust or insects entering the sheet. The breather tape must be covered with a 'U' profile, sealed to the top face of the sheet with a small silicone bead to protect both the tape and the lower end of the sheet from rainwater run-off.

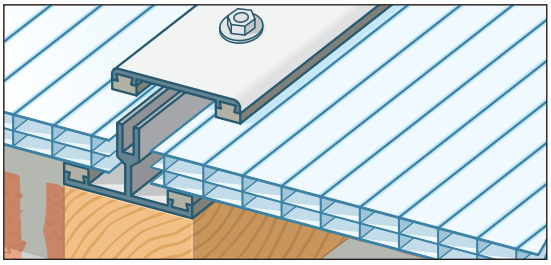
Allowing air movement through the breather tape does not reduce the insulation performance. Following these procedures reduces the risk of condensation, water ingress and the growth of algae within the sheet.

Drainage of condensed water vapour is facilitated by installing the sheet with its ribs running in the direction of the slope.

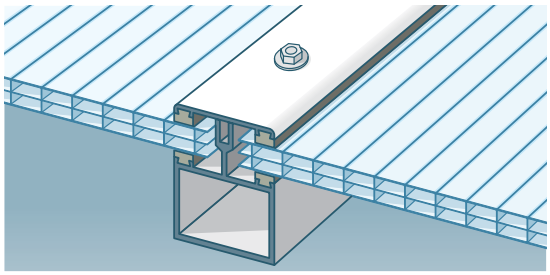
Marlon ST sheet has been proven to be suitable for use with a substantial number of commercially available glazing compounds, building materials and profile systems. However, it is still vital that advice on chemical compatibility should be sought either from Brett Martin's Technical Department or the manufacturer of interfacing products.

EDGE ENGAGEMENT

To ensure optimum security under load it is imperative that at least one vertical rib of the sheet is engaged and securely clamped in the glazing system. This is most easily achieved when sheets have closed edges.



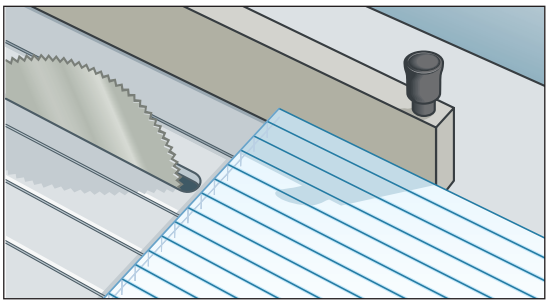
Where open edge sheets are used the sheet must be cut as closely as possible to the rib thus minimising the unsupported top and bottom faces. Glazing systems of adequate width to provide sufficient engagement must be selected.



CUTTING

Marlon ST can be cut with a fine tooth circular saw or hand saw held at a shallow angle. Dust MUST be removed from the sheet using a vacuum cleaner or dry compressed air.

It is necessary to support the sheet close to the cut and to hold it firmly to prevent stress and vibration.



	Circular Saw	Bandsaw
Clearance angle	20-30°	20-30°
Rake angle	15°	0.5°
Cutting speed	180-250 m/min	200-250 m/min
Blade speed	1800-2400 m/min	-
Tooth spacing	2-5 mm	1.5-2.5 mm

THERMAL EXPANSION

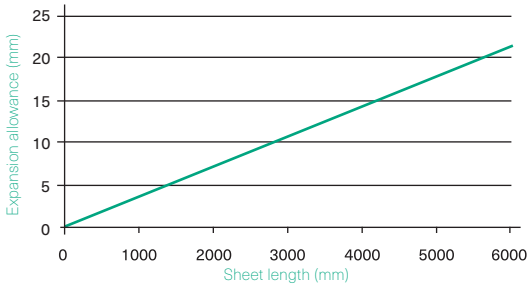
Accommodating the thermal expansion of Marlon ST sheet cannot be over emphasised as this is generally greater than that of other popular glazing materials and affects both length and width.

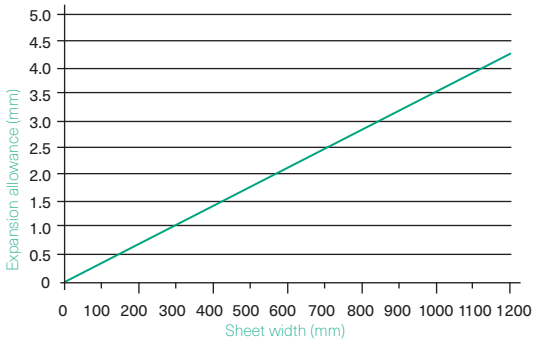
	Linear thermal expansion
Marlon ST	6.7 x 10^{-5} m/m°C
PVC	6.8 x 10^{-5} m/m°C
Acrylic	7.0 x 10^{-5} m/m°C
Aluminium	2.3 x 10^{-5} m/m°C
Steel	1.2 x 10^{-5} m/m°C
Glass	0.85 x 10^{-5} m/m°C

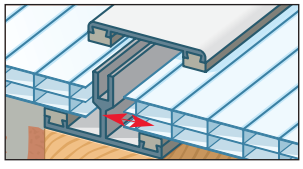
Comparison of the linear thermal expansion of Marlon ST with other common materials.

Installing without sufficient allowance for thermal movement will result in thermal stress and bowing of the sheet.

The table above compares the linear thermal expansion of Marlon ST with other common materials. In practical terms it is necessary to allow 3.5mm/metre length and width for thermal expansion. The graph below shows the amount of thermal expansion allowance which must be made for given lengths and widths of sheet.

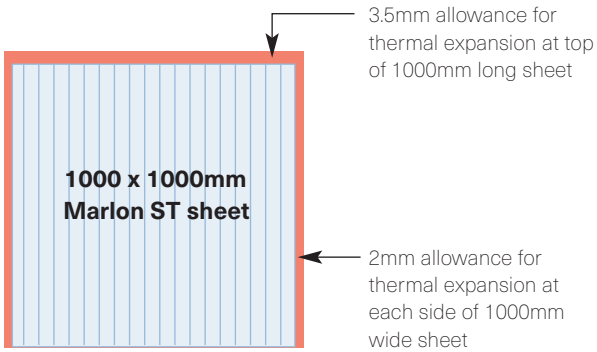


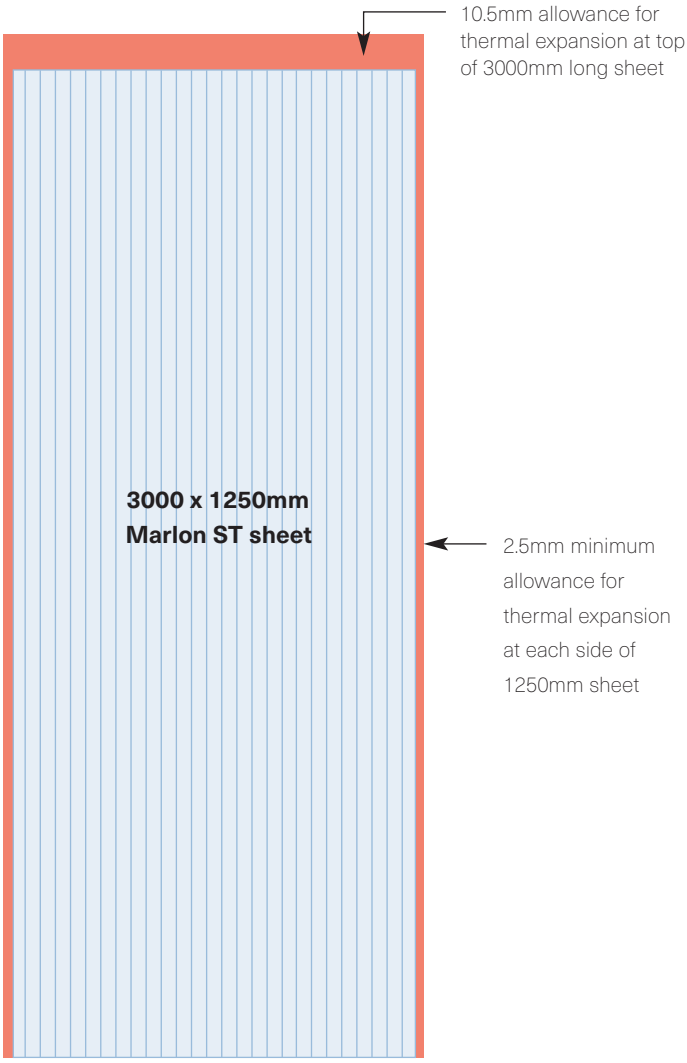




Sufficient allowance for thermal movement must be made in all glazing bars, side and end closures.

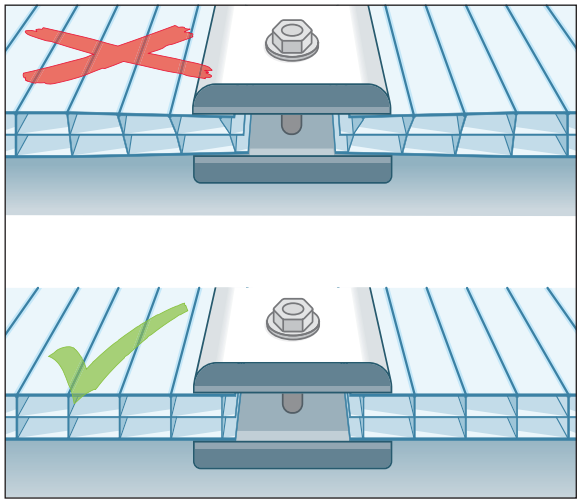
Example: If the sheet length is 1000mm allow 3.5mm minimum for thermal expansion at the top. For sheets that are 6000mm long allow 21mm for thermal expansion at the top.



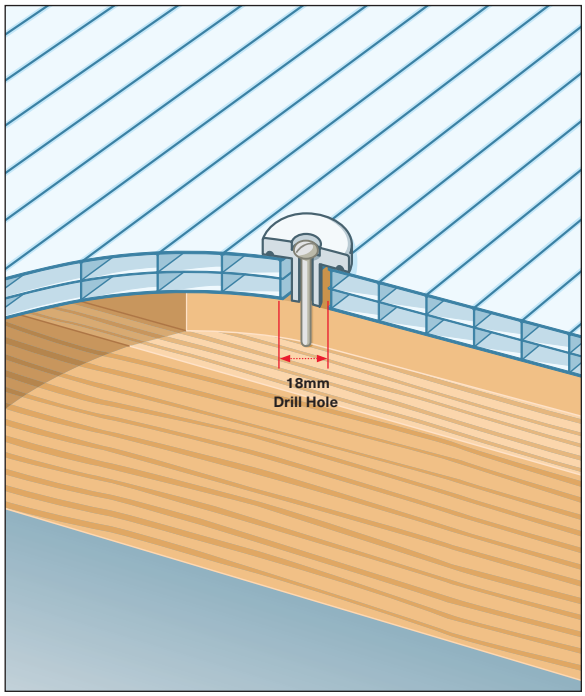


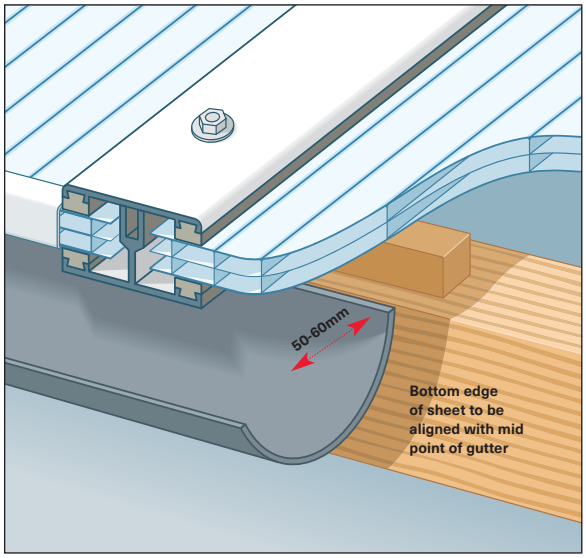
SECURING SHEET

Sheets must not be fixed or clamped too tightly as this will prevent thermal expansion and contraction and will adversely affect the installation.

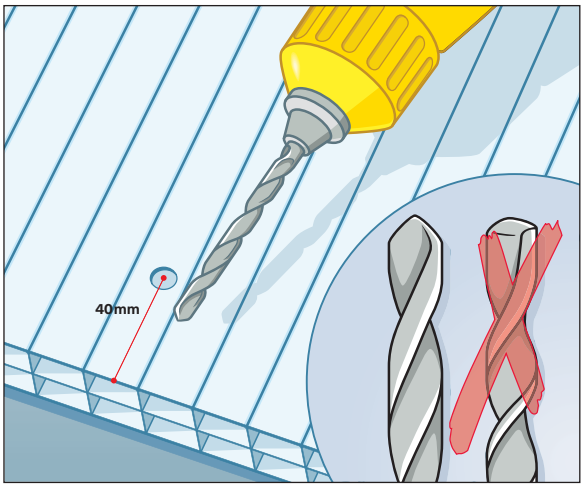


At the eaves purlin additional fixing is necessary to prevent wind uplift and downslope slippage due to repeated thermal movement. One button per sheet width, centrally located between glazing bars should be sufficient. **When drilling fixing holes they must be oversized (18mm in diamter) to allow the sheet to move.**





The maximum overhang of the end of the sheet should be 50-60mm. This will ensure proper run off of rainwater into the gutter.



Drill between ribs. **When drilling Marlon ST use standard twist drills and carbide tipped drills.** The sheet must be supported firmly underneath when drilling. Holes must not be drilled any less than 40mm from the edges of the sheet.

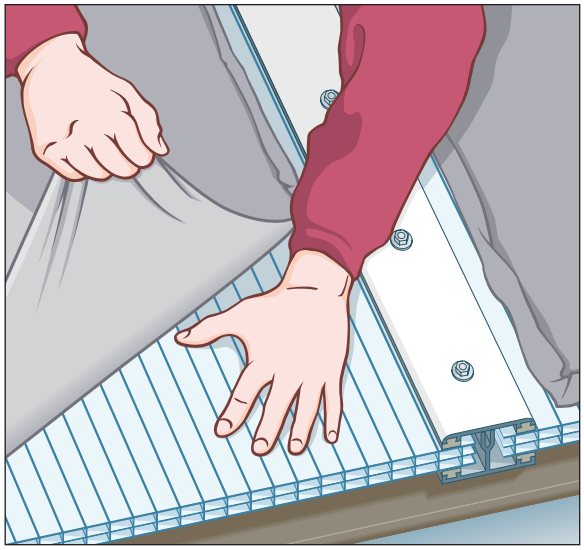
A successful polycarbonate installation must satisfy load conditions, remain weathertight at all times and have one fixed point from which there can be unrestricted thermal movement in length and width.

FILM REMOVAL

The UV protected surface of Marlon ST is covered at manufacture with a branded film. This should always be on the outside of the installation.

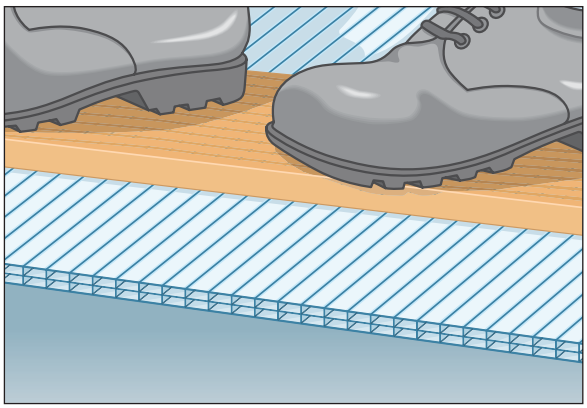
A further plain film is applied to the inner surface. To install, the films should be peeled back about 50mm to allow clean sheet insertion into the glazing system and application of end tapes and closure.

Both films should be left in place for protection of the sheet until project hand over, particularly when there are following trades and then they can be removed. If the project is likely to take time to complete, regularly check that the film does not bond on to the sheet, particularly in sunny weather.



SAFETY - ROOF ACCESS

Do not walk on Marlon ST sheets at any time.
Always use a crawling board placed across several support purlins of the structure.

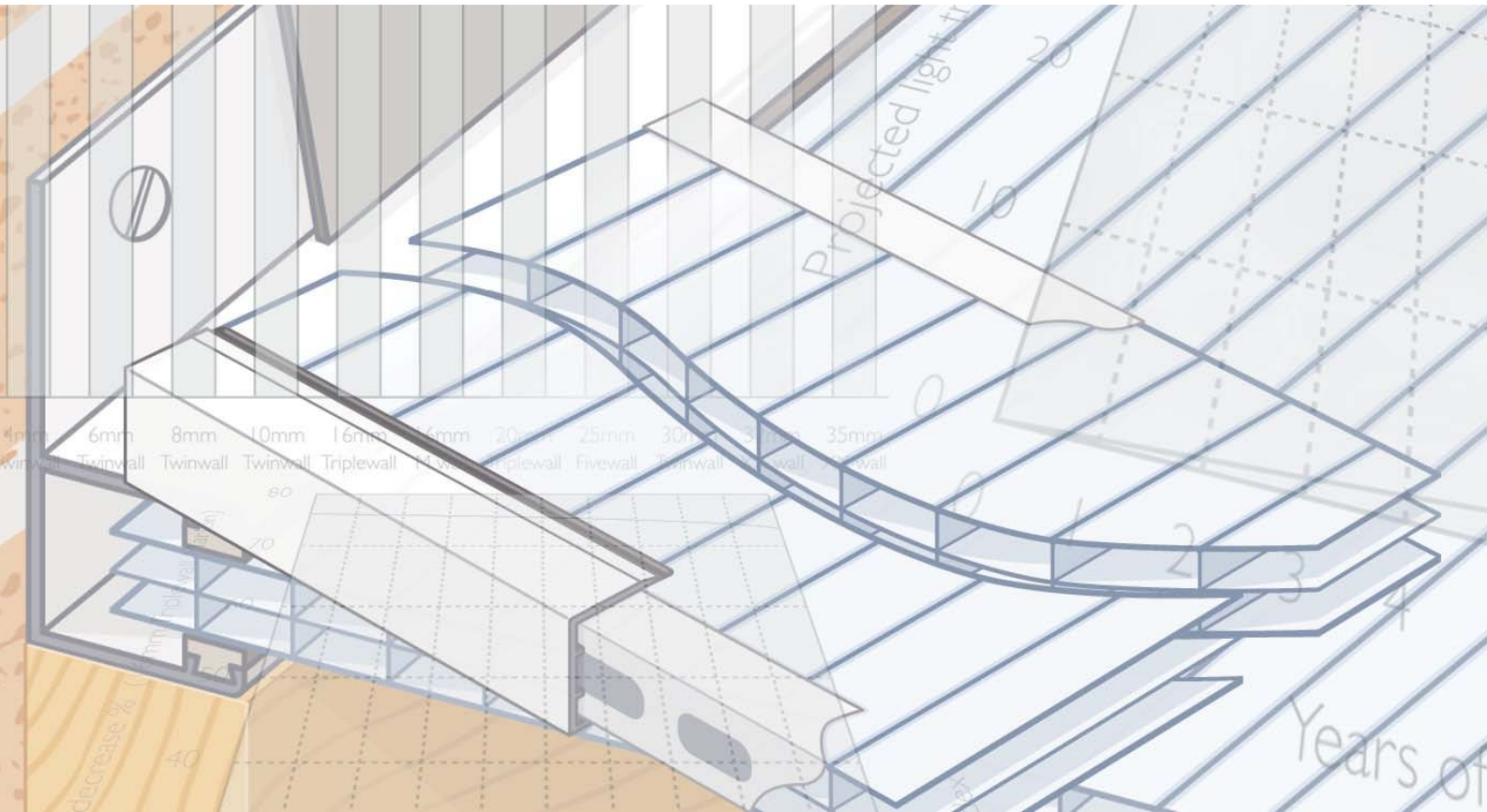


SAFETY - HANDLING

Sheets up to 3m long x 1m wide can be safely handled by one person but larger sheets will require two or more people. When handling and fitting sheets, particular care must be taken in windy conditions.

Any pallets of 6 metres or longer must be lifted using a spreader beam of adequate length (with no more than 2.5m unsupported at each end) or have the sheets removed by hand (one or two at a time) and re-stacked on a suitable pallet.

APPENDIX



Marlon ST polycarbonate sheeting has, in general, excellent resistance to most chemicals. It is, however, difficult to simulate the sheer breadth of potential exposure conditions to which the sheet will be subjected in application.

The chemical resistance of Marlon ST depends not only on the actual chemical agent but also on the concentration, temperature, length of contact, pressure and the level of stress within the material.

Tabulated below are the chemical resistances of Marlon ST to a range of chemicals at 23°C : these are typical for unstressed and unloaded samples immersed for six months in a solution of the chemical.

Good - little or no reduction in physical properties.
Fair - some reduction in physical properties after long exposure.
Poor – significant change in physical properties after short exposure.
N.D. - not determined.
Note: - Values are only indications and should not be interpreted as absolute proof of resistance of any part against a certain substance. Testing under actual exposure conditions will provide a better indication of performance.

Acids	**Concentration**	**Room Temperature 23°C**	**Elevated Temperature 73°C**
Acetic (CH_3COOH)	Up to 50% 70%	Good Poor	Poor Poor
Benzoic (C_6H_5COOH)	10%	Fair/Poor	Poor
Borium (H_3BO_3)	N.D.	Good	N.D.
Chromic (CrO_3)	20% 50%	Good Fair	N.D.
Citric $(HOOC)_3(CH_2)_2COH$	10%	Good	N.D.
Formic (HCOOH)	40% 70% 97%	Good Fair Poor	Poor Poor Poor
Hydrochloric (HCl)	10% 20% 30%	Good Fair Poor	N.D. N.D. N.D.
Hydrogen flouride (HF)	Conc.	Good/Fair	N.D.
Lactic ($CH_3CHOHCOOH$)	85%	Good	Fair/Poor
Nitric (HNO_3)	10% 50% 70%	Good Fair/Poor Poor	Good Poor Poor
Oleic	-	Good	N.D.
Orthophosphoric (H_3PO_4)	10% 100%	Good Good	Fair Good
Oxalic ($HOOCCOOH.2H_2O$)	10% 30%	Good Poor	N.D. Poor
Picric	2%	Fair	N.D.
Phosphoric	85%	Good	Good
Sulphuric (H_2SO_4)	70% 90%	Good Fair	Good

Alcohols	Concentration	Room Temperature 23°C	Elevated Temperature 73°C
Allyl alcohol (CH_2=$CHCH_2OH$)		Fair	N.D.
Amyl alcohol ($CH_3(CH_2)_3CH_2OH$)	–	Good	Fair
Benzyl alcohol ($C_6H_5CH_2OH$)	–	Poor	N.D.
Butyl alcohol ($CH_3(CH_2)_3OH$)	–	Good	Good
Iso-octyl alcohol	–	Fair	N.D.
Isopropyl alcohol ($CH_3CHOHCH_3$)	–	Fair	Fair
Phenyl-ethyl alcohol	–	Poor	N.D.
Propargyl alcohol	–	Good	N.D.
Dowanol PM	–	Poor	N.D.
Ethanol (C_6H_5OH)	90% 100%	Good Poor	Good Poor
2-amino-ethanol ($H_2NC_2H_4OH$)	–	N.D.	Poor
Methanol (CH_3OH)	–	Poor	Poor
Cyclohexanol ($C_6H_{11}OH$)	–	Fair	Fair
Glycerine ($HOCH_2HOCHCH_2OH$)	–	Fair	N.D.
(di) Ethylene glycol $O(CH_2CH_2OH)_2$	–	Good	Good
Butylene glycol	–	Good	N.D.

Alkalis	Concentration	Room Temperature 23°C	Elevated Temperature 73°C
Ammonium hydroxide (NH_4OH)	5% 30%	Fair (crazing) Poor	N.D. Poor
Potassium hydroxide (KOH)	1% Conc.	Fair (crazing) Poor	N.D. Poor
Sodium carbonate (Na_2CO_3)	15%	Good	Fair
Sodium hydroxide (NaOH)	1% conc.	Fair (crazing) Poor	N.D. Poor

Salts	Concentration	Room Temperature 23°C	Elevated Temperature 73°C
Ammonium fluoride (NH_4F)	Sat.	Poor	Poor
Ammonium chloride (NH_4Cl)	10%	Good	N.D.
Ammonium sulphate ($(NH_4)_2SO_4$)	10%	Good	Good
Ammonium sulphite ($(NH_4)_2SO_3$)	10%	Poor	N.D.
Ammonium nitrate (NH_4NO_3)	10%	N.D.	Good
Aluminium chloride ($AlCl_3$)	Sat.	Good	Poor
Aluminium oxalate	-	Good	N.D.
Aluminium sulphate ($Al_2(SO_4)_3$)	10%	Good	Good
Barium chloride ($BaCl_3$)	10%	Good	Good
Barium bromide ($BaBr_2$)	10%	N.D.	Fair
Calcium chloride ($CaCl_2$)	10%	Good	Good
Calcium nitrate ($Ca(NO_3)_2$)	10%	Good	Good
Calcium hypochlorite ($Ca(Ocl)_2$)	-	Good	N.D.
Copper chloride ($CuCl_2$)	Sat.	Good	Good
Copper sulphate ($CuSO_4$)	Sat.	Good	N.D.
Iron chloride ($FeCl^3$)	Sat.	Good	Good
Iron sulphate ($FeSO_4$)	10%	Good	N.D.
Magnesium chloride ($MgCl_2$)	10%	Good	Good
Magnesium sulphate ($MgSO_4$)	Sat.	Good	N.D.
Nickel/Zinc sulphate (NiSO4/ZnSO4)	Sat.	Good	N.D.
Potassium bromide (KBr)	Sat.	Good	N.D.
Potassium carbonate ($K2CO_3$)	Sat.	Good	N.D.
Potassium cynite (KCN)	-	Poor	N.D.
Potassium chloride (KCl)	Sat.	Good	N.D.
Potassium chromate (K_2CrO_4)	Sat.	Good	N.D.
Potassium manganate ($KMnO_4$)	10%	Good	Good
Potassium nitrate (KNO_3)	Sat.	Good	N.D.
Potassium sulphate (K_2SO_4)	Sat.	Good	N.D.
Sodium chloride (NaCl)	10%	Good	Good
Sodium chlorate ($NaClO_3$)	10%	Good	N.D.
Sodium chromate ($Na_2Cr_2O_7$)	10%	Good	Good
Sodium carbonate (Na_2CO_3)	10%	Good	N.D.
Sodium nitrate ($NaNO_3$)	10%	Poor	N.D.
Sodium sulphide (Na_2S)	10%	Good	Good
Sodium sulphate (Na_2SO_4)	10%	Good	Good

Food Stuffs	Concentration	Room Temperature 23°C	Elevated Temperature 73°C
Fruit & vegetable juice	Normal use	Good	Good
Beer, cognac, whisky, gin, vodka, wine, rum	Normal use	Good	N.D.
Milk, coffee, chocolate	Normal use	Good	Good
Black tea	Normal use	N.D.	Fair/Poor
Mineral water	Normal use	Good	Good
Butter, margarine, sauces & vinegar	Normal use	Good	Good/Fair
Cooking oils	Normal use	Good	Good
Vegetables	Normal use	Good	Good
All spices except: Nutmeg Clove oil	Normal use	Good Poor Poor	Good N.D. N.D.
Salt, sugar	Normal use	Good	N.D.
Tobacco	Normal use	Good	Good
Ketchup, tomato puree	Normal use	Good	N.D.
Fish, meat	Normal use	Good	Good

Oils	Concentration	Room Temperature 23°C	Elevated Temperature 73°C
Mobil 10 W 40	Normal use	Good	N.D.
Skydrol 500 A	Normal use	Poor	N.D.
Jet fuel JP-4	Normal use	Fair	N.D.
Drill Oil	Normal use	Poor	N.D.
Brake Fluid (ATE)	-	-	N.D.
Diesel oil	Normal use	Fair	N.D.
Terpene oil	-	Fair	N.D.
Gasoline Super	-	Poor	N.D.
Test Gasoline	-	Poor	N.D.
Refined oil	-	Good	N.D.
Gasoline normal	-	Poor	N.D.
Soy bean oil, peanut oil, castor oil	Normal use	Fair/Good	N.D.
Spindle oil, dynamo oil, turbine oil, machine oil	Normal use	Fair	N.D.
Refrigerator oil	-	Good	N.D.
Cylinder oil	-	Good	N.D.
Cable insulation oil	-	Good	N.D.
Other lubricant oils	-	Good	N.D.
Silicon oil	Normal use	Good	Poor
Whale grease, soap grease, lubrication greases	Normal use	Good	N.D.
Molikote paste or powder	Normal use	Good	N.D.
Camhor oil	Normal use	Good	Fair
Vaseline	Normal use	Good	N.D.
Fish oil	Normal use	Good	N.D.

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