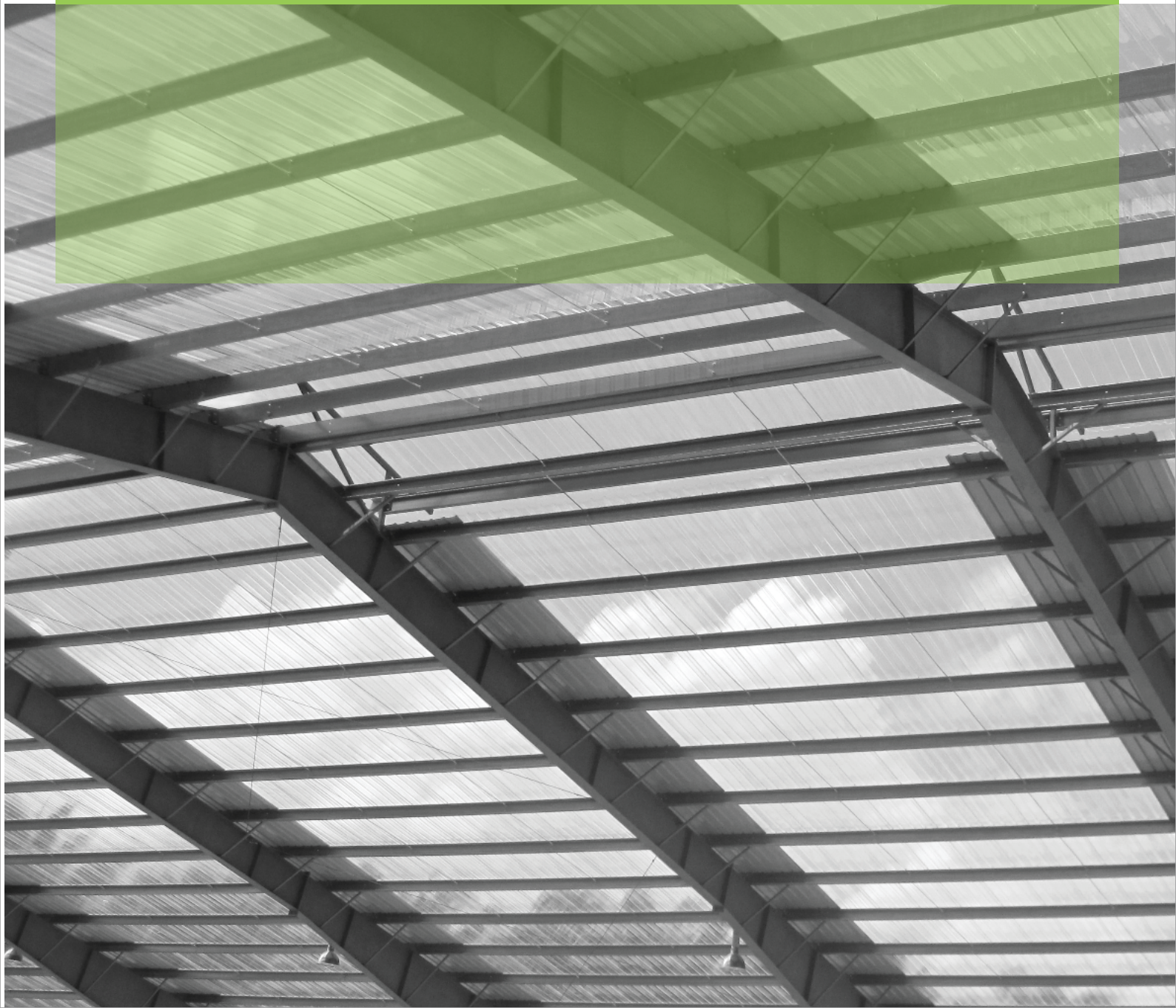
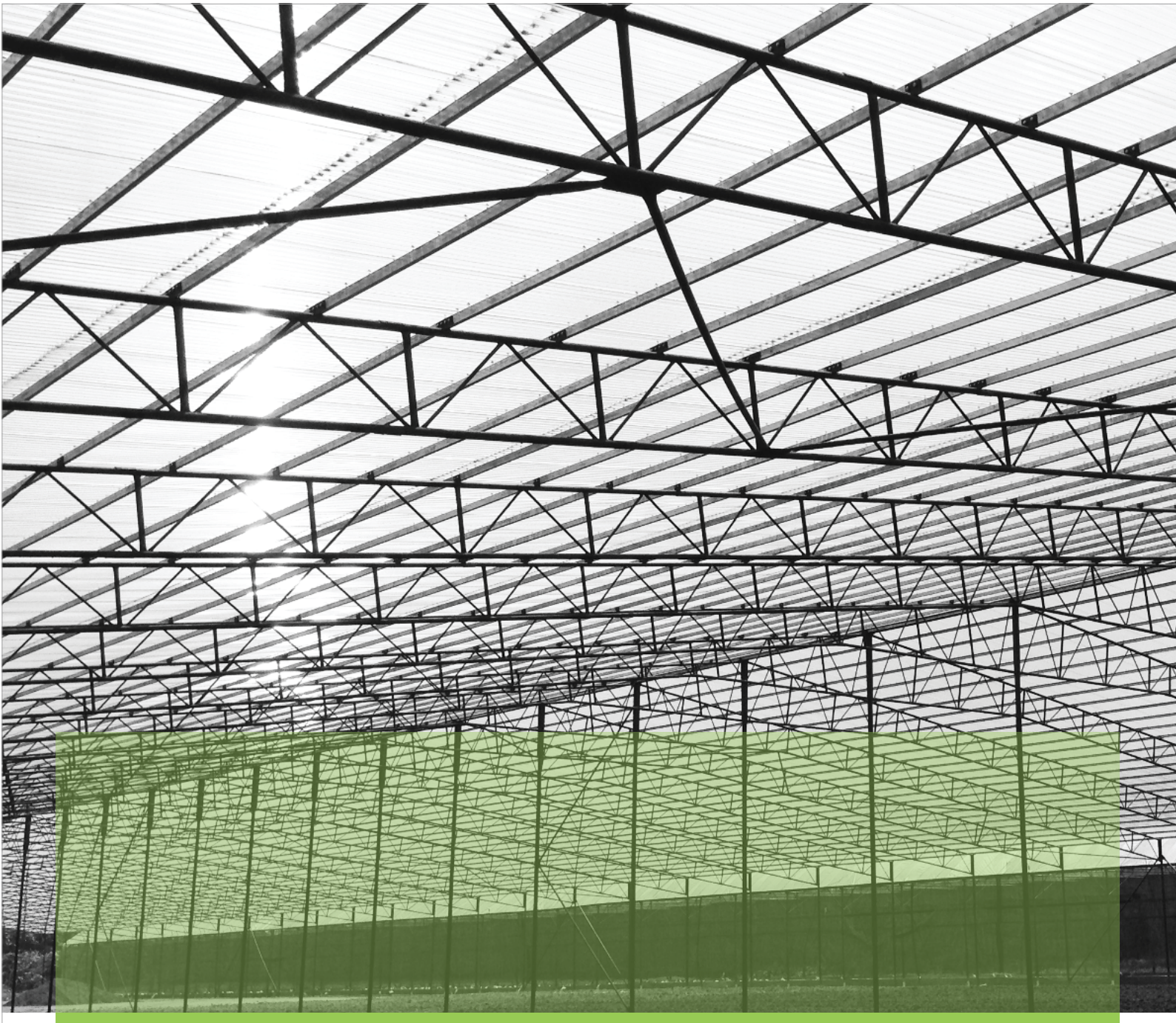
HIGH-IMPACT ACRYLIC

- IMPACT RESISTANCE
- CHEMICAL RESISTANCE
- EXECELLENCE WEATHER RESISTENCE
- CLARITY & RADIATION FILTERING

VERMAX®





Malaysia
MULFORD
PLASTICS
delivering solutions

MULFORD PLASTIC (M) SDN BHD

No. 3, Jalan IMP 1/3
Pusat Teknologi Sinar Meranti
Taman Industri Meranti Perdana
47120 Puchong, Selangor, Malaysia

Tel: +603 8066 8298
Fax: +603 8066 5193

MALAYSIA'S ONLY MANUFACTURER OF
HIGH IMPACT ACRYLIC ROOFING SHEETS

VERMAX® HIGH-IMPACT ACRYLIC

Vermax® High Impact acrylic transparent roofing sheets are specially developed for versatile range of applications.

The composition of resins is unparalleled in combating the effects of UV degradation and effects of corrosive environment, ensuring that the transparent roofing maintain the clarify, allowing maximum light transmission and with no changes in its properties over long periods of time.

Vermax® High Impact acrylic transparent roofing sheets are well known and very sought after for their durability, weatherbility and chemical resistance. The roofing sheets are the perfect choice of skylight roofing material as it offers the best of both worlds in terms of performance

BUATAN MALAYSIA
MADE IN MALAYSIA

SIRIM

- 100% VIRGIN GRADE
- SIRIM TESTED
- HI-QUALITY

VERMAX®

KEY ADVANTAGES OF USING VERMAX® HIGH-IMPACT TRANSPARENT ROOFING SHEETS

- Utilizes 100% virgin grade acrylic resins that are fully imported, ensuring high quality.
- Offers superior UV and chemical resistance, at the same time providing up to >93% light transmission.
- Superb weather ability ensures that the roofing sheets retain its properties and clarity over long periods of time, which prevents yellowing and embrittlement of the sheets.
- Suitable for applications of extreme levels of corrosion, e.g. coastal areas with high levels of salt spray, chemical plants, oil and gas industry, manure drying beds.
- Delivers impact strength 10 times greater than normal acrylic
- Available in all range of roofing profiles and lengths to suit your requirements.

We utilize special impact resistant grade of acrylic that provides additional impact proof characteristics without any loss of characteristics of acrylic resin. The end result is a product that has all the useful benefits of acrylic with ease of transport and assembly.

SPECIAL APPLICATIONS

- Vermax High Impact acrylic is the preferred choice for special applications in highly corrosive environments.
- Supported by a comprehensive warranty from the manufacturer of 7 years and more, giving you the peace of mind.
- Vermax® High Impact acrylic can also be supplied tinted with various colors or light transmission levels according to customer's requirements.
- Available in transparent and translucent finishing.

PERFORMANCE INDICATORS

CLARITY
Light transmittance, superb diffusion and optical retention capabilities.

RADIATION FILTERING
Optional protection againsts harmful UV rays. Glare / solar heat reduction and insulation.

CHEMICAL RESISTANCE
Resists a wide variety of chemical substances and it is most suitable for outdoor.

LENGTH
Any length up to your requirements.

HARDNESS
Degree of surface hardness so tough and hard wearing almost to the point of scratch resistant.

STRENGTH
Reinforced to deliver impact resistance up to 10 times greater than normal acrylic.

WEATHERABILITY
Resistant to differing weather conditions, climatic temperature changes or pollutants. Transparency retains without yellowing over the years.

INSTALLATION
Complete with installation system - specially designed fastener.

PRPDUCT SPECIFICATION

Vermax® High Impact Acrylic Roofing Sheets
Our profiles are compatible with various metal structures and frameworks.

Dimensions : Width (refer diagrams) x length x thickness (range from 1mm - 2mm and custom size)
Colours : Clear, Tinted Brown, Tinted Green and Tinted Grey

KEY FEATURES

- Transparent clear
- Transparent tinted - Custom colours
- Transluscent frosted

Standard thickness : 2.0mm$^{+}/_{-}$
Custom thickness : 3.0mm, 4.0mm$^{+}/_{-}$

Please consult our sales and marketing team for your exact requirements

TECHNICAL INFORMATION

1) Vermax High Impact Acrylic: General physical properties

PROPERTY	CONDITION	UNITS	TEST METHOD	VALUE
PHYSICAL				
Total Light Transmittance	3mm	%	ASTM D1003	91
Haze	3mm	%	ASTM D1004	1.0
Refractive Index	nd	-	ASTM D542	1.49
THERMAL				
Flow Index	230°c, 3.8kg	g/10min	ASTM D1238	1.8
VICAT Softening Point	1kg	°c	ASTM D1525	97
Heat Deflection Temperature	unannealed, 18.5kg/cm	°c	ASTM D648	77
Coefficient of Linear Expansion	-	mm/mm/°c	ASTM D696	$7x10^{-5}$
MECHANICAL				
Impact Strength (IZOD)	with notch	kg.cm/cm	ASTM D256	5.1
Rockwell Hardness	M scale	M scale	ASTM D785	47
Tensile Strength	-	kg/cm^2	ASTM D638	410
Elogation	-	%	ASTM D638	70
Flexural Strength	-	kg/cm^2	ASTM D790	730
Flexural Modulus	-	kg/cm^2	ASTM D790	18,600

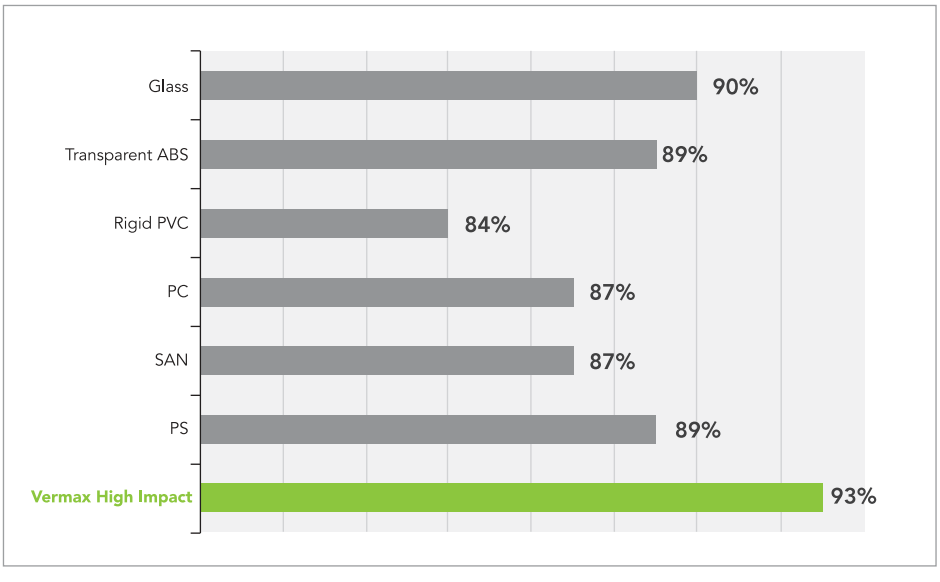
Technical information for reference only. Please consult our sales and marketing for more information

2) Solar Energy and Visible Light Transmittance

LIGHT TRANSMISSION OF Acrylic (PMMA): 93% for colorless and transparent Acrylic (It transmits 93% of visible ray and reflects the rest of it. Vermax High Impact Acrylic roofing sheet absorbs short wavelength ultraviolet (UV) energy, but transmits most of the long wavelength UV (those wavelengths just short of the visible region). The total UV energy absorbed is about 65%.

Vermax High Impact Acrylic roofing sheets exhibits unsurpassed UV stability and thus excellent weatherability.

PMMA has the highest light transmission among the plastics resins; especially its light transmission is superior to glass. Light transmission of PMMA is 93% between 380 nm ~ 780 nmbut that of PC is only 87% between 480 nm ~ 680 nm.



3) Extreme Weatherability

Vermax High Impact Acrylic roofing sheets show minimal hazing (loss of clarity) haze test results after two thousand hours of sunlight exposure show that the haze for acrylic makes a steady albeit marginal increase, as compared to other resins.

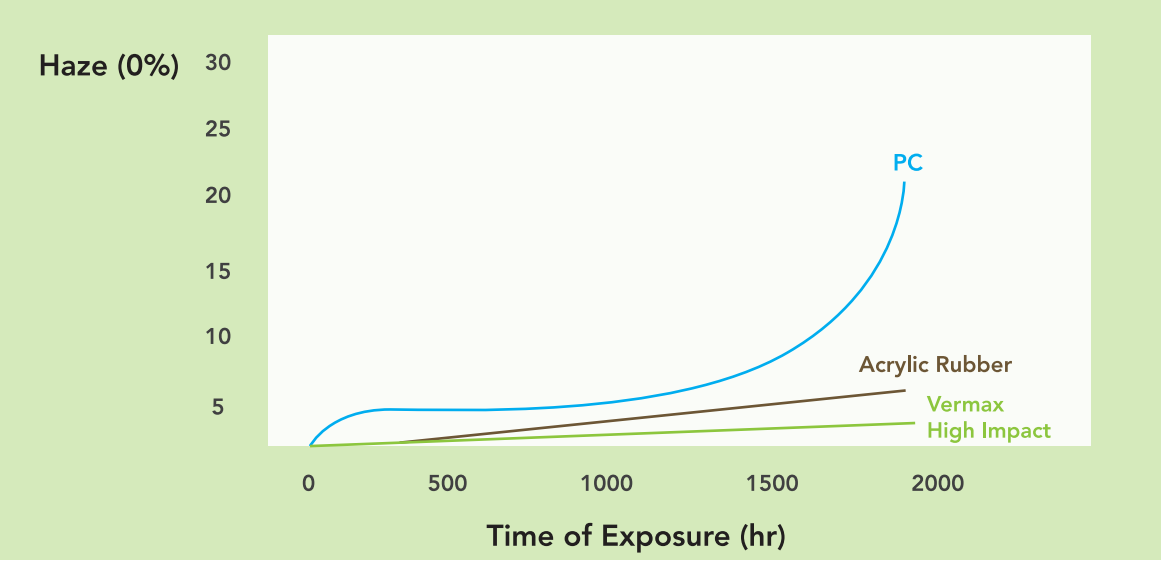


Chart is shown for reference only

At the same time, Vermax High Impact Acrylic also exhibits a low initial yellow index. In other words, it hardly changes despite of long-time exposure over 2000 hours, while as compared to other resins.

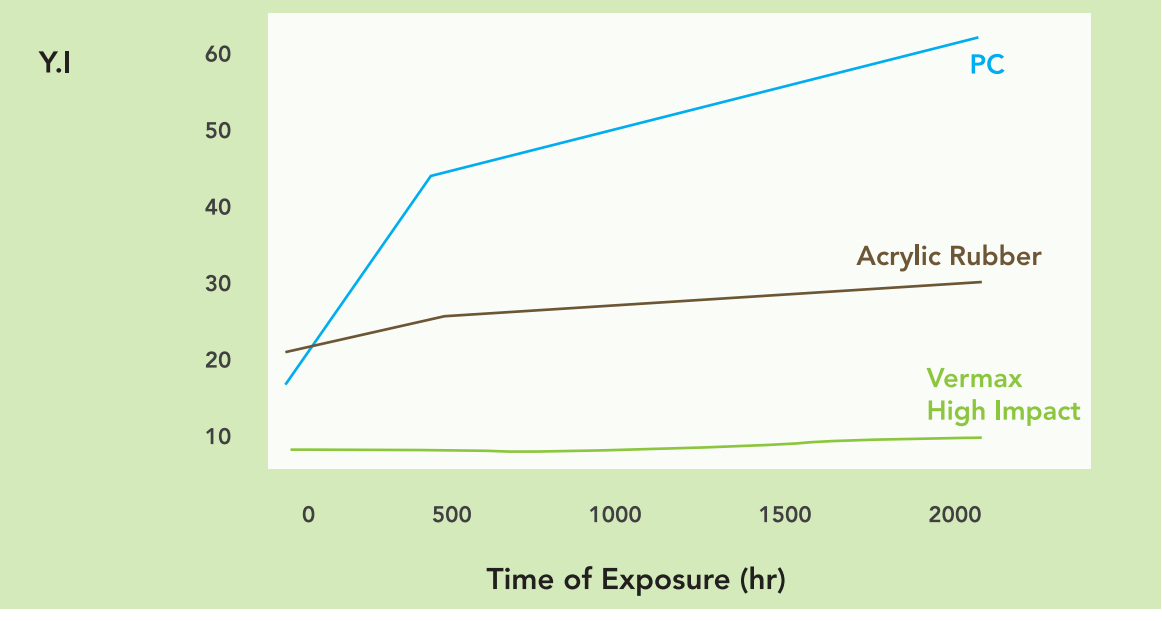


Chart is shown for reference only

4) High Chemical Resistance

Vermax High Impact Acrylic roofing sheets are highly resistant to most common chemicals, acids, alkalis, solvents and thus is suitable for application in extreme corrosion environments.

Chemical resistance

○ Unchanged △ Changed (under specified conditions) × Dissolved

ACID			
98% Sulfuric Acid	×	10% Chromic Acid	△
20% Sulfuric Acid	○	80% Formic Acid	×
35% Hydrochloric Acid	○	Glacial Acetic Acid	×
62% Nitric Acid	×	10% Acetic Acid	○
20% Nitric Acid	○	10% Latic Acid	○
10% Phosphoric Acid	○	Saturated Citric Acid	○

ALKALI			
28% Liquid Ammonium	○	2% Soapsuds	○
Saturated Sodium Hydroxide	○		

INORGANIC SALTS (AQUEOUS SOLUTION)			
Saturated Sodium Chloride	○	Photographic Developer	○
Saturated Potassium Chloride	○	30% Hydrogen Peroxide	○
10% Potassium Chromate	○		

ALCOHOL			
100% Methyl Alcohol	△	100% Isopropyl Alcohol	△
10% Methyl Alcohol	○	10% Isopropyl Alcohol	○
98% Ethyl Alcohol	△	Butyl Alcohol	○
50% Ethyl Alcohol	○	Phenylcarbinol	×

PETROLEUM OIL			
Petroleum Benzine	○	Light Oil	○
Gasoline	△	Heavy Oil	△
Solvent Naptha	○	Diesel Oil	○
Kerosene	○	Turpentine	○
Lubricating Oil	○		

AROMATIC SERIES, HYDROCARBON, OTHER			
Benzene	×	Cyclohexane	×
m-Cresol	×	n-Hexane	○
Toulene	×	Normal Heptane	○
Phenol	×		

KETONE			
Methylethyl Ketone	×	Acetone	×

4) High Chemical Resistance

Chemical resistance

○ Unchanged △ Changed (under specified conditions) × Dissolved

ATHER, ESTER			
Cellosolve	×	Butyl Acetate	×
Diethyl Ether	△	Dibutyl Phthalate	○
Ethyl Acetate	×		

HALOGENATED HYDROCARBON, OTHER			
Chloroform	×	Tetrahydrofuran	×
Methylene Dichloride	×	Diethylene Glycol	○
Carbon Tetrachloride	△	Glycerine	○
Carbon Disulfide	×	Diethylamine	○
Nitrobenzene	×		

GAS			
Ammonia Gas	○	City Gas	○
Chlorine Gas	△	Ozone	○

SEASONING, SPICE AND BEVERAGE			
Cider	○	Wine	○
Beer	○	Vegetable Oil	○
Fruit Juice	○	Animal Oil	○
Liqueur	×	Alcohol (<20%)	○

PACKAGE, ETC			
Insulating Tape	○	Plaster	○
Packing Tape	○	Cement	○

PAINT			
Gun Cotton Lacquer	×	Oil Paint	○

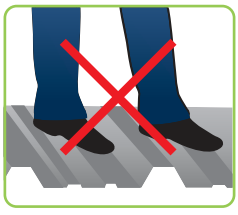
ETC			
Sensitizer	○	Bleaching Solution	△
Seawater	○		

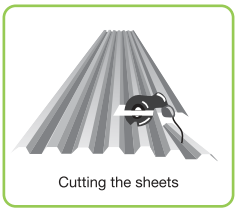
VERMAX® INSTALLATION GUIDE

Storage of sheets

Handling and Storage

1. Transport and storage Vermax® High-Impact Acrylic Transparent Roofing Sheets horizontally on flat.
2. Avoid storing unwrapped Vermax® High-Impact Acrylic Transparent Roofing Sheets.
3. Short Vermax® High-Impact Acrylic Transparent Roofing Sheets should be stacked on top of longer ones. Do not stack up more than 1 meter in height.
4. Store Vermax® High-Impact Acrylic Transparent Roofing Sheets in a cool, dry and shaded place, protected from direct sunlight.
   Avoid covering the stacks of Vermax® High-Impact Acrylic Transparent Roofing Sheets with dark or heat-absorbing materials objects, to prevent solar heat build-up.
5. Recommended handling:
   a) Protect the sheets from any physical damage.
   b) Avoid stepping on the panel when it on the ground.
   c) Avoid folding panels across the corrugation during handling and installation.
   d) Do not drag the Vermax® High-Impact Acrylic Transparent Roofing Sheets on the ground or scrape them against structural elements or other rough objects.



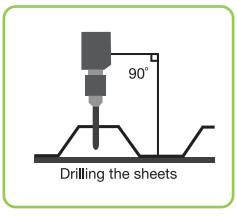


Cutting the sheets

Processing

1. Cutting

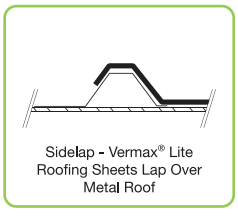
a) Use fine-toothed tenon saw.
b) Power saws with abrasive cutting-off wheel or circular saw blade suitable for cutting Vermax® High-Impact Acrylic Transparent Roofing Sheets with dark or
c) Jig saw with suitable blade may be used as well.



Drilling the sheets

2. Drilling

a) Pre-drill the required fixing holes to at least 4-5 mm larger than the diameter of the screw used. *(e.g. Diameter of screw 4mm, hole drilled require minimum 10mm or larger).*
b) Power drill may be use at LOW SPEED and the drill bit must be ground to suit the Vermax® High-Impact Acrylic Transparent Roofing Sheets with dark or
c) Avoid drilling hole by punching.
d) Drilling vertically at 90°.

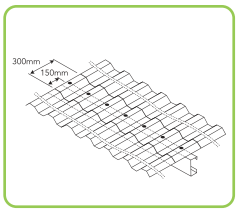


Sidelap - Vermax® Lite Roofing Sheets Lap Over Metal Roof

Roof Details

1. Pitch

a) The minimum recommended roof pitch for Vermax® High-Impact Acrylic Transparent Roofing Sheets application is 6° (10% slope).
b) For roof pitch less than 10° (1:5.6) apply full sealing system (one sided foam tape) on all lapping and drilled holes.

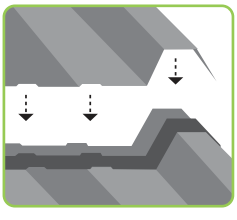


2. Purlins

a) Roof purlins must have a level face parallel to the Vermax® High-Impact Acrylic Transparent Roofing Sheets
b) The allowed maximum roof span (purlins distance - center to center) is 1.2 meter.

3. Positioning

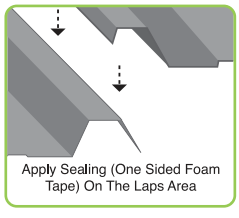
a) Lay the Vermax® High-Impact Acrylic Transparent Roofing Sheets to overlap the metal roof panels on both sides. If not feasible - Vermax® High-Impact Acrylic Transparent Roofing Sheets must underlap the metal roof panels side against the primary direction of wind/rain.



b) Vermax® High-Impact Acrylic Transparent Roofing Sheets must be located and installed without any stresses. Do not pull, stretch or force the sheets when the profiles are not perfectly matched.

4. Overlaps

a) Recommended longtitude overlap of minimum 300mm above purlin.
b) Each Vermax® High-Impact Acrylic Transparent Roofing Sheets to extend 150mm or over the fixings along the purlin.
c) Recommended one sided foam tape on both sides of fasteners line.



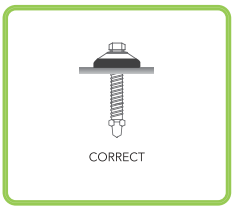
Apply Sealing (One Sided Foam Tape) On The Laps Area

5. Side-laps

a) Recommended one sided foam tape along the centreline of the corrugation ribs.

VERMAX® INSTALLATION GUIDE


INCORRECT
Excess overtightening


CORRECT


INCORRECT
Non-perpendicular

6. Fastening

a) Pre-drill 8mm or more holes at the screw points.

b) Fasten screws on every purlin from the lower end towards the upper end sequentially, starting always from the same side.

c) Always fasten through the ribs of the Vermax® High-Impact Acrylic Transparent Roofing Sheets Do not fasten screw on the valley.

d) The screws should be tightened moderately, without deforming the washer and distorting the Vermax® Polycarbonate Transparent Roofing Sheets. Careful attention should be given to assure prependicular insertion of the fasterners.

e) Excess tightening and oblique insertion will distort the Vermax® High-Impact Acrylic Transparent Roofing Sheets induce undue internal stresses, leading to fracture and cracks, eventually ending in failure.

f) Screws fasten positioning vertically at 90°. Screws fasten position at the center of the pre-drill hole and not the side or corner of the pre-drill hole.

g) Do not fasten screw at the side or corner of the ribs.

h) Never use an impact wrench or driver for fastening Vermax® High-Impact Acrylic Transparent Roofing Sheets. Tighten by hand or by an adjustable torque power screwdriver.

i) Do not use Drive Screw, Nails or Pop Rivets.

TECHNICAL ADVICE:

If you are doubtful over the fixing and installation method, please contact our Project Technician or Marketing personnel for proper advice and assistance.

MANUFACTURER'S LIABILITIES:

The information contained in this brochure is to our best knowledge, accurate and proper, but all the recommendations are made Without Guarantee. Since the conditions of use at work site are beyond our control, we therefore Hold No Liabilities for any mishandling and workmanship defects in using our skylight materials.

PROJECT REFERENCE

CP Shrimp Farm
Johor

Sime Darby Plantation
Kok Foh Mill

Southern Steel
Seberang Prai

PROJECT REFERENCE

Poultry Farm
Seremban

Sime Darby
Elphil Mill

PROJECT REFERENCE

Poultry Farm
Perak

Poultry Farm
Melaka

Poultry Farm
Sungkai

Fertilizer Plant
Taiping

VERMAX®

HIGH-IMPACT TRANSPARENT ROOFING SHEETS