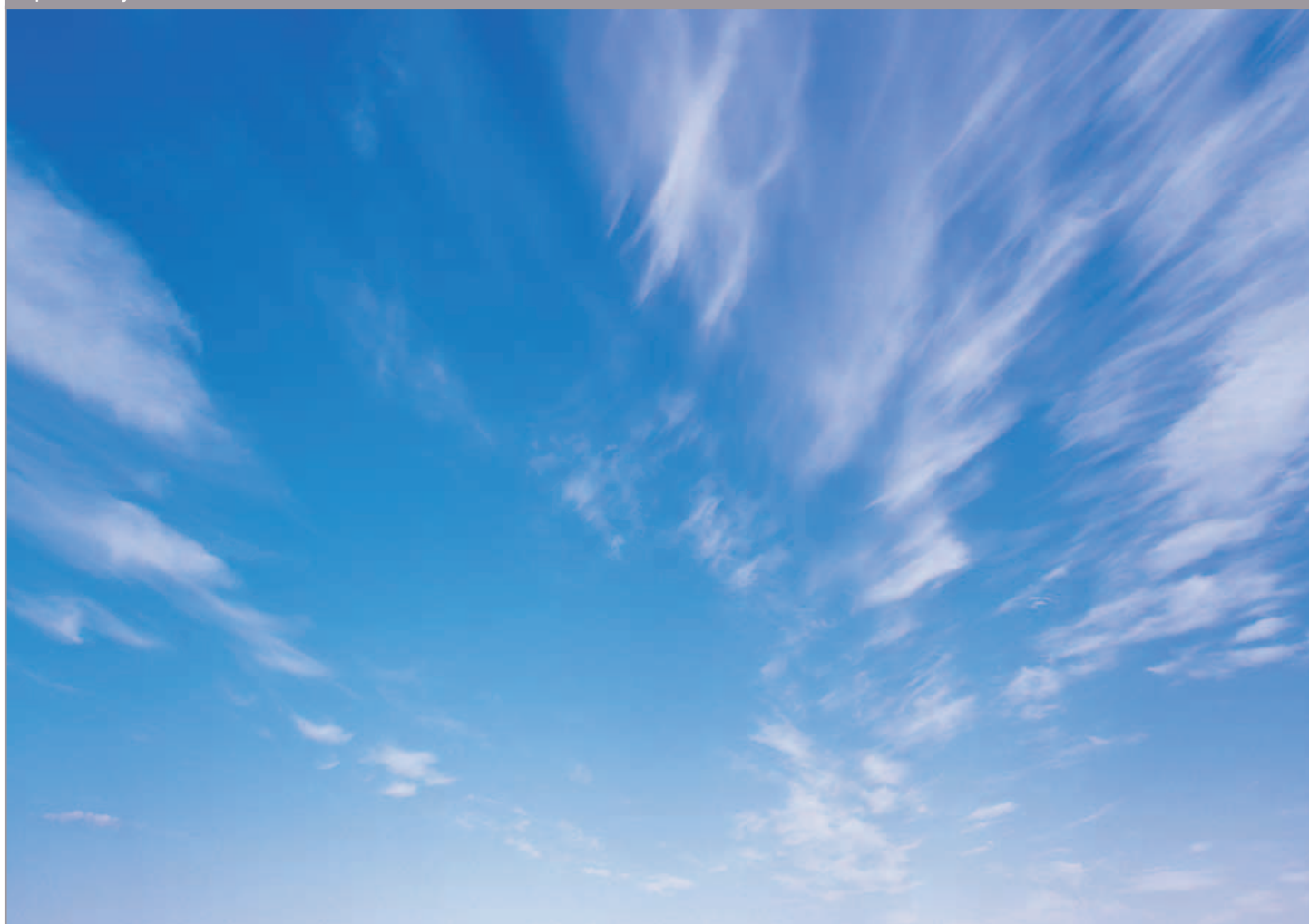


Specialty Film & sheet



Lexan* Thermorooft* sheet

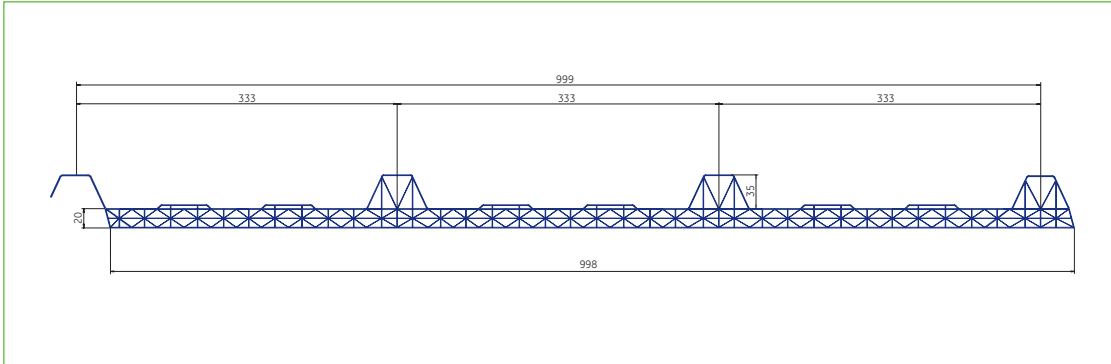
LTR55K product technical manual

Content

Introduction	3
Lexan Thermorooft sheet Mechanical properties	5
Condensation	6
Lexan Thermorooft sheet Thermal Properties	7
Temperature Resistance	8
Various Properties	8
Weight Factors	8
Outdoor weathering performance	8
Solar control properties	8
Panel end sealing	9
Cleaning Recommendations	9
General guidelines	10
Installation guidelines	10
Wind and Snow Loading	11

Lexan polycarbonate is a unique engineering thermoplastic which combines a high level of mechanical, optical and thermal properties. When extruded in multi-wall sheet form with side wing and intermediate corrugated crowns, its optical and impact properties in particular render this panel highly suitable as roofglazing for insulated corrugated metal industrial buildings.

Lexan Thermorooft sheet, LTR55K, is an impact resistant, energy saving multi-wall transparent corrugated sheet matching specific insulating corrugated metal panels.



1.1

Lexan Thermorooft sheet LTR55K offers

- Three wall structure offering excellent thermal insulation
- Insulated rooflight panel to perfectly match to metal sandwich roofpanel
- UV protected surface
- Long-term warranted weather resistance
- High impact strength
- Good light transmission and light diffusion characteristics
- Extremely high stiffness
- Easy and fast installation

Property Profile	Value	Test Method
Panel width ctc	999 mm (-3 mm; +3 mm)	
Standard length	≤ 6 meter -0 +20 mm	
	> 6 meter -0 +30 mm	
Panel total thickness	± 55 mm	
Weight	3.3 kg/m ² ±5%	
Hail impact	diam. 20 mm v ≥ 21m/sec	TNO Test
Soft body impact	pass grade B	BS 6206
	pass 1200 joule	NF-P33-303-2
Temperature resist.	-40 up to +100 °C	UL 746 BEN
U-Value	1.58 W/m ² K	ISO 10077 (EN673)
Sound insulation	≤ 22dB	DIN 52210-75
Coeff. of linear thermal expansion	7 x 10 ⁻⁵ 1/°C	DIN 53752
Color	opal white transparent	
Light transmission	59% ±5% 62% ±5%	ISO 9050 (EN410)
Solar transmission	67% ±5% 76% ±5%	ISO 9050 (EN410)

Lexan Thermorooft sheet Mechanical properties

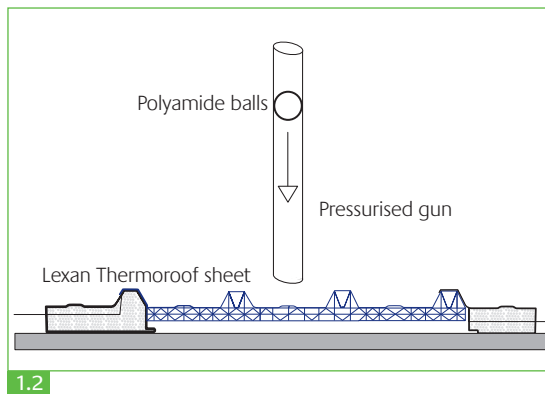
Impact Strength

Lexan Thermorooft sheet has outstanding impact performance over a wide temperature range of -40°C to +100°C. The product has been shown capable of withstanding the extremes of weather: storms, hailstones, snowfall and ice formation.

Hail simulation

As a roof glazing material Lexan Thermorooft sheet is subject to extremes of weather; storms, hailstones, wind, snowfalls and ice formation. Under these conditions, the product is virtually unbreakable and is able to withstand the subsequent temperature change to sunny conditions without breaking or buckling.

In a test developed by the Dutch testing Institute TNO, samples of Lexan Thermorooft sheet have been subjected to simulated hailstones of varying diameters without significant damage. Polyamide balls of varying diameters are shot at the surface of the Lexan Thermorooft sheet sample using a pressurized air gun.



In practice, hailstones with a diameter of 20 mm can reach a terminal velocity of around 21 m/s. Under these conditions, traditional roof glazing materials such as glass and acrylic fails.

It should be noted that when the glass and the acrylic are tested their failure characteristics are typically brittle, whilst the Lexan Thermorooft sheet shows ductile behavior: upon impact the ball will leave indentations but the sheet will not break.

Hail Simulation Test Results	
Material	Velocity with ball diameter 20 mm
Acrylic multi-wall sheet t=16mm	7-14 m/s
Float glass t=4 mm	10 m/s
Lexan Thermorooft sheet	≥21 m/s
Equilibrium velocity of hail	21 m/s

Soft body impact

According to HSE G33 Safety in Roofwork falls through fragile roofing material continue to be one of the single major causes of fatal accidents in the construction industry. Certain roofing materials give the impression of a surface which is solid enough to bear a person's weight but they will not carry a concentrated load such as that applied by a person stumbling or by the heel of a person. In order to assess the fragility of roofing materials the HSE uses a test which is based on BS 6206: **Impact performance requirements for safety glass and safety plastics for use in buildings.**

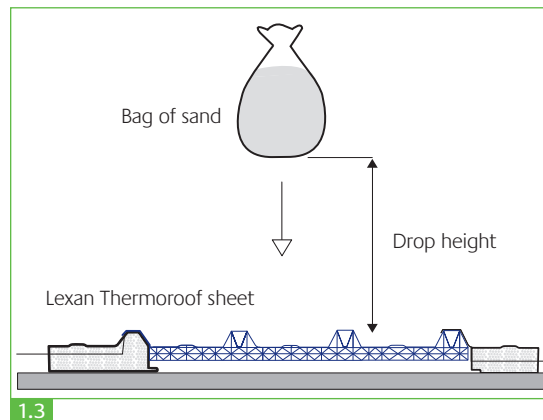
In BS 6206 the glazing material is subjected to impact from a bag of sand weighting 45 kg dropped from 3 heights: 305 mm, 457 mm and 1219 mm.

The material is then classified according to the drop height it can withstand. Failure occurs when the sand bag is not retained by the roof material.

Lexan Thermorooft sheet reached the highest standard required by above mentioned test.

Also Lexan Thermorooft sheet pass the highest soft body standard according the French norm NF-P 33-303-2.

A bag of sand at a weight of 50 kg will be freely dropped from a height of 1.2 - 1.8 and 2.4 meter. Even dropped from a height of 2.4 meter the Lexan Thermorooft sheet is not broken and retain the bag of sand.



Daylight/light transmission

Transparent Lexan Thermorooft sheet has a light transmission value of 62% ±5%. And is almost opaque to radiation in the UV region which helps prevent discoloration of sensitive and valuable materials placed under or behind Lexan Thermorooft sheet.

Designs for daylight in buildings should provide a pleasant visual environment and sufficient illumination. The unit of measure used in daylight designs is the Daylight Factor. This factor is the percentage of light which is available inside a building, compared to that simultaneously available outside.

SABIC Innovative Plastics offers a Ten Years Limited Warranty on Lexan Thermorooft sheet covering loss of strength or impact due to weathering.

Location correction factor	Thermoroof glazing	Required daylight factor (percentage)											
		1	2	3	4	5	6	7	8	9	10	11	12
0.4	Transp./ Opal white	2.3	6.8	11.3	15.9	20.5	25	29.6	34.1	38.6	43.2	47.8	52.3
0.5	Transp./ Opal white	1.75	5.5	9.0	12.8	16.4	20	23.7	27.3	30.9	34.6	38.2	41.8
0.6	Transp./ Opal white	1.5	4.6	7.5	10.6	13.6	16.7	19.7	22.7	25.7	28.8	31.9	34.8
0.7	Transp./ Opal white	1.3	3.9	6.5	9.0	11.7	14.3	16.9	19.5	22.0	24.8	27.3	29.9
0.8	Transp./ Opal white	1.1	3.4	5.7	8.0	10.3	10.4	14.7	17	19.3	21.6	23.9	26.2
0.9	Transp./ Opal white	1.0	3.0	5.0	7.1	9.0	11.0	13.1	15.3	17.1	19.2	21.2	23.2

Area of rooflights (percentage of floor area)

Industrial buildings

Illumination requirements in a warehouse or factory depend upon the work undertaken. It is recommended that the primary design requirements should be to provide a pleasant visual environment and therefore the daylight factor should be between 5% and 10%.

Recreational buildings

Illumination requirements for recreational buildings such as sport halls, swimming pools and shopping centers are far more demanding, since all round vision is required. The required daylight factor should be approx. 10%.

Determination of daylight factors

First we need to establish the location correction factor in relation to location and roof slope. After that we can read the required area of rooflight from above table.

Location correction factor

Type of location	Angle of glazing to the horizontal		
	0°-9°	10°-59°	60°-90°
Clean (rural suburban)	0.7	0.8	0.9
Industrial (urban industrial)	0.5	0.6	0.7
Dirty (heavy industrial)	0.4	0.5	0.6

Light transmission transparent = 62%
Light transmission opal white = 59%

Working example

Consider a building requiring a daylight factor of 6% and with a 10% roof pitch. Located in an urban industrial area, incorporating transparent Lexan Thermoroof sheet. The netto light openings as a percentage of the floor area read direct from the table: Lexan Thermoroof sheet transparent = 16.7%. 16,7% of the total floor area should be covered with transparent or Opal white Lexan Thermoroof sheet.

Condensation

Moisture is always present in the air in the form of an invisible vapour. The amount of water vapour expressed as a percentage present in a given amount of air at a certain temperature is described as the Relative Humidity.

Condensation is formed when moisture in the atmosphere changes back to water as it comes into contact with a surface at a temperature below the 'dewpoint' of the surrounding air. Water droplets on the inner surface of the glazing reduce light transmission, and if they fall, damage sensitive goods and equipment underneath. The extremely low insulation value of Lexan Thermoroof sheet will contribute in maintaining high inner surface temperature during the winter season.

The figure below shows a typical condensation prediction chart showing the relationships between internal and external temperatures, relative humidity and the insulation value.

Condensation prediction chart

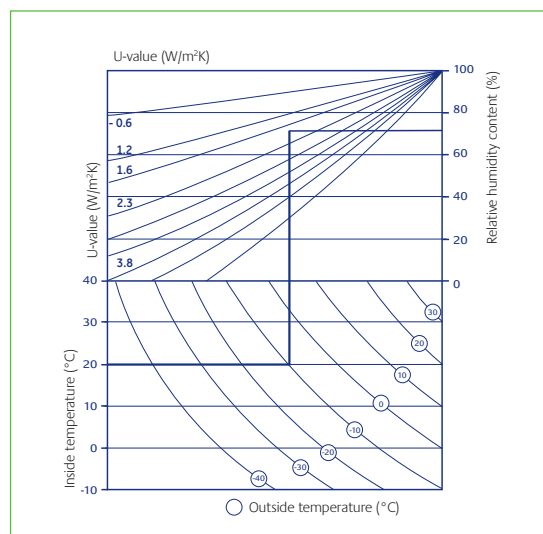
Example of reading the prediction chart:

Inside temperature: 20°C

Outside temperature: -10°C

Lexan Thermoroof sheet U-value: 1.58 W/m²K

Condensation on the inner sheet surface will occur at 77% Relative humidity.



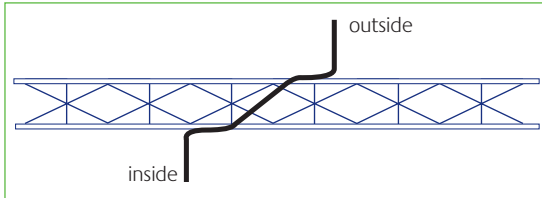
1.4

Dewpoint calculation

If condensation on the inner sheet surface is critical exact dewpoint temperature can be calculated using below mentioned formula:

Sheet surface temperature
- outside surface temperature

$$T_{os} = T_o + \frac{1}{\alpha_o} Ht$$



1.5

- inside surface temperature:

$$T_{is} = T_i - \frac{1}{\alpha_i} Ht$$

Where:

$$Ht = K (T_i - T_o)$$

T_{os} = outer surface temperature

T_{is} = inner surface temperature

T_o = outer temperature

T_i = inner temperature

Ht = U-value of glazing Lexan Thermorooft sheet:
1.58 W/m²K

α_o = outer heat transfer coefficient acc. Din 4108
 $\alpha_o = 23 \text{ W/m}^2 \text{ K}$

α_i = inner heat transfer coefficient acc. Din 4108
 $\alpha_i = 8 \text{ W/m}^2 \text{ K}$

Check if the calculated inner surface temperature is below or higher than the dewpoint temperature as illustrated in the table.

Dewpoint temperature (°C) in relation with air temperature (°C) and relative humidity content (%)

Air temp. in °C	Dewpoint temp. °C at a relative humidity content %													
	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
30	10.5	12.9	14.9	16.8	18.4	20.0	21.4	22.7	23.9	25.1	26.2	27.2	28.2	29.1
29	9.7	12.0	14.0	15.9	17.5	19.0	20.3	21.7	23.0	24.1	25.2	26.2	27.2	28.1
28	8.8	11.1	13.1	15.0	16.6	18.1	19.5	20.8	22.0	23.2	24.2	25.2	26.2	27.1
27	8.0	10.1	12.2	24.1	15.7	17.2	18.6	19.9	21.1	22.2	23.3	24.3	25.2	26.1
26	7.1	9.4	11.4	13.2	14.8	16.3	17.6	18.9	20.1	21.2	22.3	23.3	24.2	25.1
25	6.2	8.5	10.5	12.2	13.9	15.3	16.7	18.0	19.1	20.3	21.3	22.2	23.2	24.1
24	5.4	7.6	9.6	11.3	12.9	14.4	15.8	17.0	18.2	19.3	20.3	21.3	22.2	23.1
23	4.5	6.7	8.7	10.4	12.0	13.5	14.8	16.1	17.2	18.3	19.4	20.3	21.3	22.2
22	3.6	5.9	7.8	9.5	11.1	12.5	13.9	15.1	16.3	17.4	18.4	19.4	20.3	21.2
21	2.8	5.0	6.9	8.6	10.2	11.6	12.9	14.2	15.3	16.4	17.4	18.4	19.3	20.2
20	1.9	4.1	6.0	7.7	9.3	10.7	12.0	13.2	14.4	15.4	16.4	17.4	18.3	19.2
19	1.0	3.2	5.1	6.8	8.3	9.8	11.1	12.3	13.4	14.5	15.5	16.4	17.3	18.2
18	0.2	2.3	4.2	5.9	7.4	8.0	10.1	11.3	12.5	13.5	14.5	15.4	16.3	17.2
17	-0.6	1.4	3.3	5.0	6.5	7.9	9.2	10.4	11.5	12.5	13.5	14.5	15.3	16.2
16	-1.4	0.5	2.4	4.1	5.6	7.0	8.2	9.4	10.5	11.6	12.6	13.5	14.4	15.2
15	-2.2	-0.3	1.5	3.2	4.7	6.1	7.3	8.5	9.6	10.6	11.6	12.5	13.4	14.2
14	-2.9	-1.0	0.6	2.3	3.7	5.1	6.4	7.5	8.6	9.6	10.6	11.5	12.4	13.2
13	-3.7	-1.9	-0.1	1.3	2.8	4.2	5.5	6.6	7.7	8.7	9.6	10.5	11.4	12.2
12	-4.5	-2.6	-0.1	0.4	1.9	3.2	4.5	5.7	6.7	7.7	8.7	9.6	10.4	11.2
11	-5.2	-3.4	-1.8	-0.4	1.0	2.3	3.5	4.7	5.8	6.7	7.7	8.6	9.4	10.2
10	-6.0	-4.2	-2.6	-1.2	0.1	1.4	2.6	3.7	4.8	5.8	6.7	7.6	8.4	9.2

Example

T_i : inside temperature: 20°C

T_o : outside temperature: -10°C

Relative humidity content: 80% expected

Dewpoint temp.: 16.4°C

Lexan Thermorooft sheet U-value: 1.58 W/m²K

Calculated inner sheet surface

$$T_{is} = T_i - \frac{1}{\alpha_i} q \quad Ht = U (T_i - T_o)$$

$T_{is} = 18^\circ\text{C}$

This is higher than dewpoint temperature so no condensation will occur.

Lexan Thermorooft sheet Thermal Properties

Thermal insulation

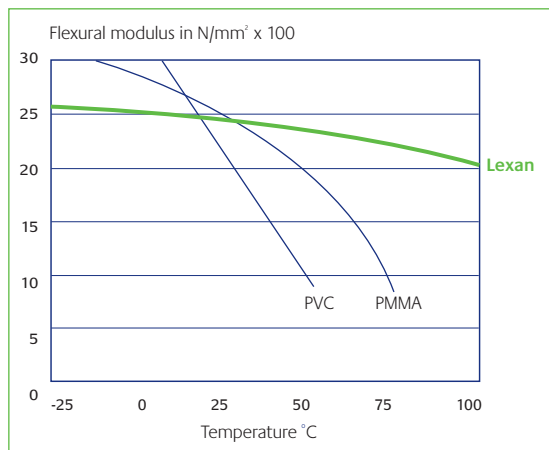
When rooflights are incorporated into insulated claddings which must comply with the high insulation requirements, it makes commercial sense to consider Lexan Thermorooft sheet glazing to reduce heat losses and minimise possible condensation problems.

The multi-wall structure of Lexan Thermorooft sheet offers potential advantages where thermal insulation is a major consideration. The amount of energy transmitted through the material per square meter and per degree temperature difference, referred to as the K or U-Value is only 1.58 W/m²K.

Temperature Resistance

Dimensional stability

Lexan Thermorooft sheet is characterised by its excellent retention of impact strength and stiffness at elevated temperatures, even over an extended period. Lexan Thermorooft sheet retains 85% of its room temperature flexural modulus at 80°C.



1.6

Continuous use temperature

UL ratings – The U.S.A. Underwriters Laboratories continuous-use temperature rating can be considered as a reliable indicator of a thermoplastic's long-term high temperature performance. The most important properties of the thermoplastic are tested at various temperatures. Test results are extrapolated over a period of 10 years and no property may lose more than 50% of its original value. The table on the next page outlines the UL-continuous use temperatures of typical thermoplastic glazing materials.

UL temperatures ratings UL746B

Underwriters Laboratories Continuous-use temperature ratings	
Lexan polycarbonate	100°C
Acrylic	50°C
PVC	50°C

Lexan Thermorooft sheet has a continuous-use temperature of 100°C. The minimum continuous-use temperature has been set at -40°C. However, using Lexan Thermorooft sheet at lower temperatures is possible since the embrittlement temperature is as low as -110°C.

Various Properties

Fire performance

Lexan Thermorooft sheet has good fire behavior characteristics, and receives high ratings in several major European fire performance tests. More detailed information is available from your local SABIC Innovative Plastics Service Centre or authorised dealer. E.g. Lexan Thermorooft sheet tested acc. the French norm NFP92-501 has obtained a M2 rating cert. nr. SME 11115-03.

Weight Factors

Lexan Thermorooft sheet is an ideal replacement for more traditional glazing materials such as a GRP or polyester or PVC rooflight. It is safe and easy to handle, cut and install

and is virtually unbreakable. Its light weight offers significant savings in terms of transportation, handling and installation. The normal weight for Lexan Thermorooft sheet is 3.3 kg/m². When compared with double or triple GRP panels (weight between 4.14 and 8.10 kg/m²) Lexan Thermorooft sheet offers weight savings between 25-145%. Lexan Thermorooft sheets have shown in many roofglazing applications that its light weight and ease of handling contribute to significant savings in overall installation costs.

Sound insulation

The sound insulation characteristics of a material are largely pre-determined by its stiffness, mass and physical construction. In accordance with DIN 52210-75, the maximum obtainable sound transmission class for Lexan Thermorooft sheet is 22 dB.

Outdoor weathering performance

UV Protection

Solar radiation has a particularly harmful effect upon polymeric materials initiating degradation by causing superficial surface crazing. These crazes become sites for further erosion from water, dust, chemicals etc. Lexan Thermorooft sheet has on one side a proprietary UV-protected surface, giving excellent resistance to outdoor weathering. This unique protection ensures long-term optical quality under intensive UV exposure, and maintains the superior toughness of the polycarbonate material in comparison to other roof glazing materials.

Solar control properties

Solar heat gain within a building is caused by heat input from radiation emitted from the sun. Sunlight entering the building heats the air both directly and through absorption by the framework, furniture etc. and is released as infra-red energy.

In combination with the insulating properties of Lexan Thermorooft sheet, this prevents heat escaping faster than it is created causing a temperature increase – the so-called 'greenhouse effect'. The temperature can be controlled by venting, often in combination with specially tinted opal white Lexan Thermorooft sheet. Lexan Thermorooft sheet is available in translucent opal white which cuts down the brightness of sunlight to a pleasing level and reduces heat build up inside the building. Calculations for solar heat input through glazing are normally based on data published in 'The Institution of Heating and Ventilating Engineers Guide Book'. These calculations are based on clear glass and correction factors or shading coefficients are then applied when alternative glazing materials are used.

Solar properties Lexan Thermorooft sheet

Color	Light transm.	Solar transm.	Shading coef.
Transparent	62%	67%	0.77
Opal white	59%	64%	0.73

The diffusing characteristics of Lexan Thermorooft sheet will prevent local hot spots during midsummer days. Where large areas of translucent Lexan Thermorooft sheets are used over recreational buildings, covered ways etc. Special tinted Lexan Thermorooft sheet colors with lower light transmission and/or lower solar transmission are available on request.

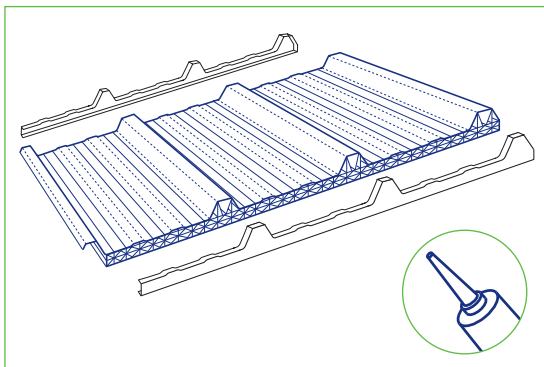
SABIC Innovative Plastics offers a Ten Year Limited Warranty on Lexan Thermorooft sheet covering discolouration, loss of light transmission and loss of impact strength due to weathering as more specifically defined in such warranty. Please consult your local distributor or SABIC Innovative Plastics Sales Office for more details.

Panel end sealing

Lexan Thermorooft sheet should be mounted with the ribs running downwards to assist condensation water drainage. Condensation inside the channels occurs when warm moist air penetrates into the channels. When the temperature within the channels drops below the point at which the air within becomes saturated, excess water vapour will condensate in the channels. There are several techniques that can be adopted to significantly reduce condensation inside the channels.

1. Thermoformed end caps

Thermoformed end caps, matching the configuration of the Lexan Thermorooft sheet are available. The end caps must be glued on the top as well as on the bottom side of the Lexan Thermorooft sheet by silicone. The end caps are sealing the open channel ends and a groove is provided to allow condensation water drainage.



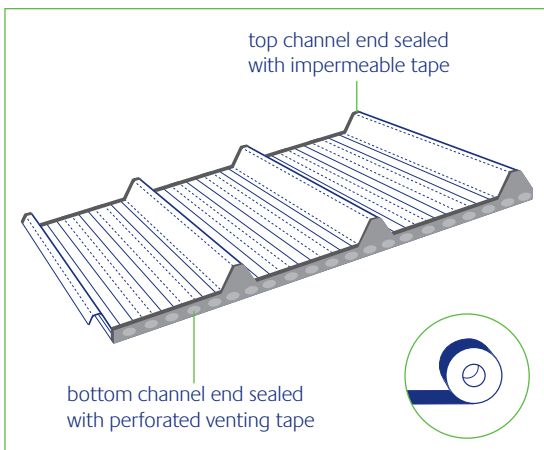
1.7

2. Sealing with tape

The top channel ends of the Lexan Thermorooft sheet are sealed with an impermeable tape and the bottom channel ends are sealed with a perforated venting tape.

The perforated venting tape allows ventilation into the channels helping to prevent excessive condensation and drainage of condensation water out the channels is possible. Ensure tapes are completely covered by flashings, end closures etc.

No tape should be left exposed when installation is complete.



1.8

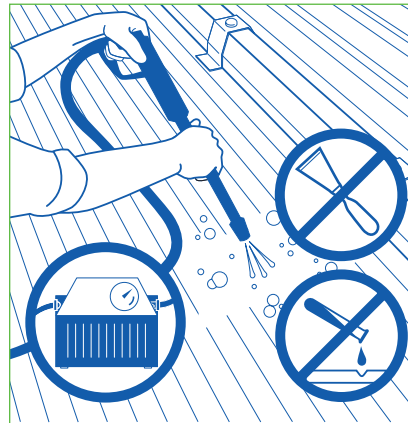
Cleaning Recommendations

Periodic cleaning using correct procedures with compatible cleaners is recommended to prolong service life. For general cleaning, it is recommended that the following instructions be adhered to.

Clean surface with high pressure water and/or steam cleaner. Use of additives to the water should be restricted to those compatible with Lexan Thermorooft sheet.

Important

- Never use an abrasive or highly alkaline cleaner on Lexan Thermorooft sheet.
- Never scrub with brushes, steel wool or other abrasive materials.
- Don't clean Lexan Thermorooft sheet in the hot sun or at elevated temperatures as this can lead to staining.



1.9

Recommended Cleaner Suppliers

JohnsonDiversey
Haachtsteenweg 672
B-1910 Kampenhout
Belgium
Tel. 016 - 61 77 77

JohnsonDiversey France
9-11, Avenue du Val de Fontanay
94133 Fontanay Sous Bois
France
Tel. 01 - 45 14 76 76

JohnsonDiversey
General Offices
Weston Favell Centre
Northampton NN3 8PD
United Kingdom
Tel. 01604 - 40 53 11

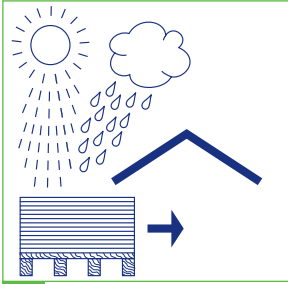
JohnsonDiversey
Mallaustrasse 50-56
Postfach 81 03 60
D-68219 Mannheim
Germany
Tel. 0621 - 875 70

JohnsonDiversey
Maarssebroeksedijk 2
3606 AN Maarssen
The Netherlands
Tel. 030 - 247 69 11

Web page: www.johnsondiversey.com

Storage

Lexan Thermorooft sheet should be stored and protected against atmospheric influences like rain, sun etc. The masking should not be removed before installation.



2.1

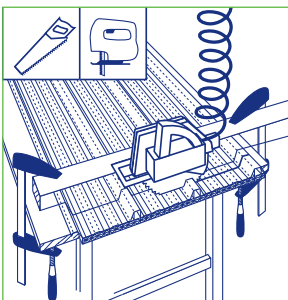
Installation guidelines

Rooflights

Rooflights are effective tools for delivering daylight deep into interior areas of buildings. Between 5 and 15% Lexan Thermorooft sheet rooflights as a percentage of floor area appears to have a number of benefits. It provides adequate illumination levels and will offset electric lighting costs, limit excessive amount of solar gain and the multiwall construction of Lexan Thermorooft sheet minimize heat losses through radiation. Lexan Thermorooft sheet can be used as a rooflights, covering the roof from ridge to eaves, mid roof lights, ridgetlights and from mid roof to eaves.

Sawing / drilling

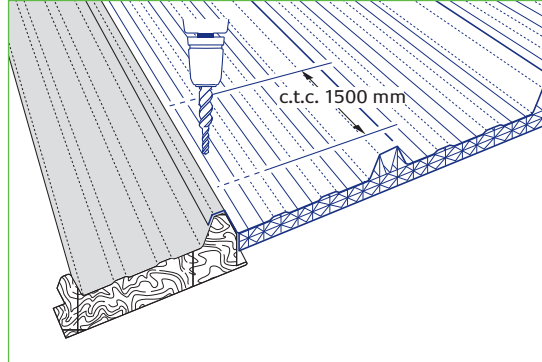
Lexan Thermorooft sheet can be cut easily and accurately with standard workshop equipment. This includes common circular saws with fine toothed blades. The panel should be clamped to the worktable to avoid undesirable vibrations and the saw dust should be blown out of the channels. Holes in the side wings can be drilled by a hand or power drill using a metal working bit. When drilling, support should be given immediately beneath the drill.



2.2

Fixing holes must be drilled larger than the diameter of the shank of the fixing screw to allow for thermal expansion and contraction.

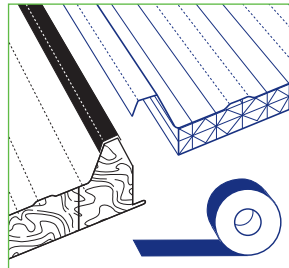
As a general rule, the hole diameter should be minimum of 5 mm larger than the shank size. The spacing of the side lap fixing is determined by sealing efficiency, and their loading capacity. The recommended fixing center is 1500 mm. If the purlin distance exceeds 1500 mm than the recommended fixing center is 1000 mm.



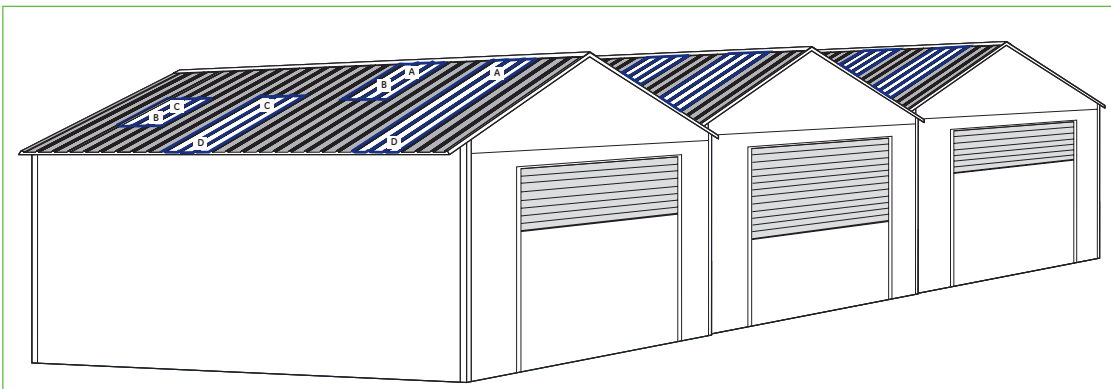
2.3

Barrier tape

Lexan Thermorooft sheet must not be allowed to come into contact with plastisol or PVC based coating of the metal panels. For all laps where Lexan Thermorooft sheet could come into contact with plastisol coated sheeting a barrier tape such as polyester, aluminium, butyl or EPDM rubber tape must be applied on the steel panel to ensure no contact is possible.



2.4



2.5

Dynamic wind pressure

The wind speed is used to determine the actual loading upon the glazing panels. In mathematical terms, the pressure loading is calculated by multiplying the square of the design wind speed by 0.613.

$$p = KV^2$$

Where p = dynamic wind pressure in N/m²

$$K = 0.613$$

V = design wind speed in meters/second

Values of p in SI units (N/m²)

Wind speed m/s	Wind pressure N/m ²	Wind speed m/s	Wind pressure N/m ²
10	61	40	981
15	138	45	1240
20	245	50	1530
25	383	55	1850
30	552	60	2210
35	751	65	2590

The Beaufort scale transforms wind into static pressure

WIND	Light	Moderate	Strong	Storm
Speed (km/h)	20	40-60	80-100	120-140
Speed (m/sec)	6	11-17	22-28	33-39
Static pressure (N/m ²)	20	80-170	300-480	680-950

Pressure coefficient

To allow for local fluctuations in the acceleration/deceleration of the wind by building or glazing geometry, it is necessary to include an appropriate pressure coefficient.

Determining pressure coefficients requires knowledge of:

- Form and type of building
- Height of glazing
- Shape of glazing e.g.
 - flat vertical
 - inclined roofing
 - curved glazing

The wind loading is obtained by multiplying the dynamic wind pressure by the pressure coefficient. The total wind loading can be positive indicating a wind pressure load or negative indicating a wind suction load. Detailed pressure coefficient values can be found in the appropriate national building norms.

Snow loading

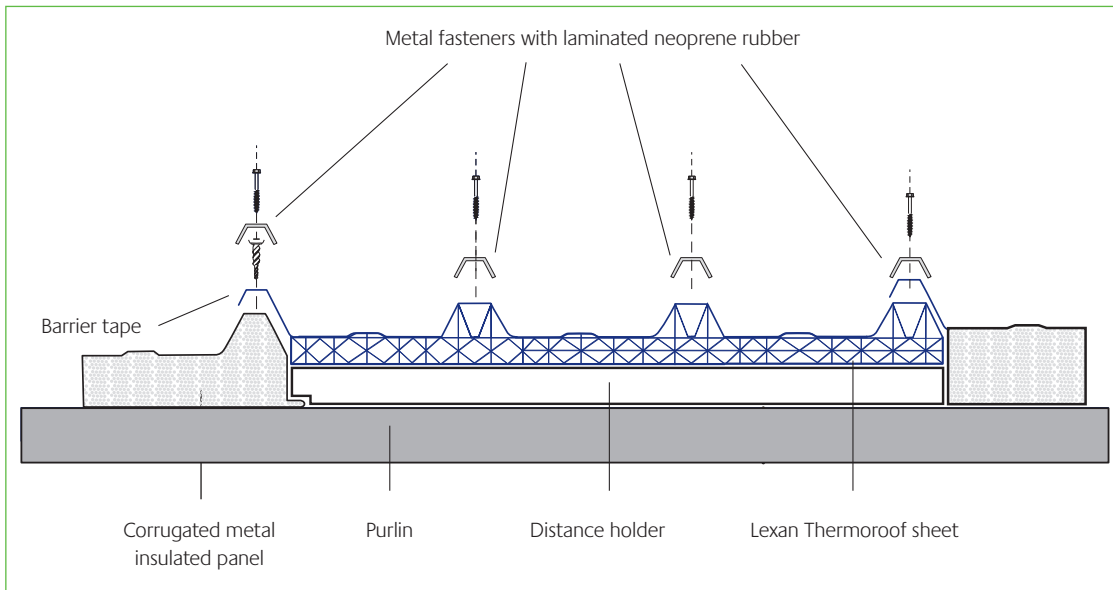
Snow loading on the roof glazings can be considered equivalent to a vertically, uniformly distributed load, acting per m² of the horizontal projection of the glazing. A roof made of Lexan Thermorooft sheet does not permit immediate melting of the snow, due to its excellent thermal insulation, and therefore the load produced by the snow must be carefully taken into consideration.

Indicative snow weights per centimeter of height are:

- fresh snowfall: 0.8-1.9 kg/m² per cmh.
- wet snowfall: 2.8 kg/m² per cmh.

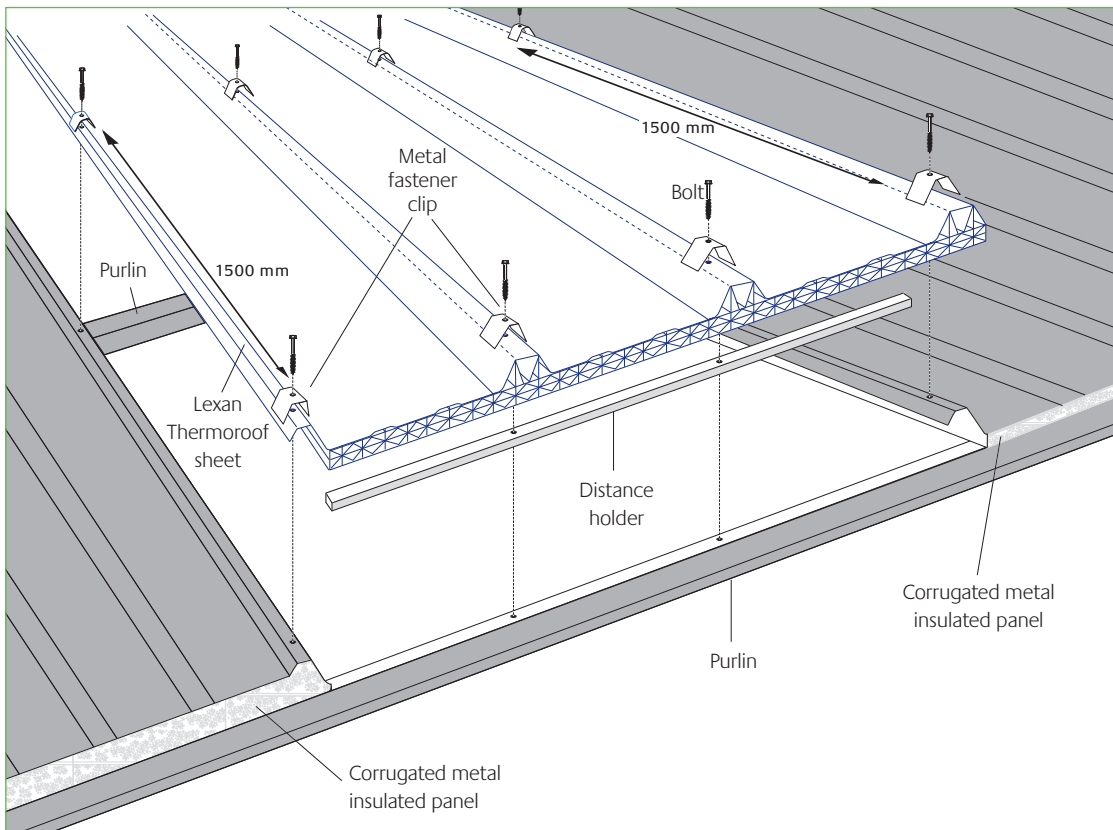
Snow loading factors can be obtained from the appropriate local building norm.

Lexan Thermoroof sheet fixing example

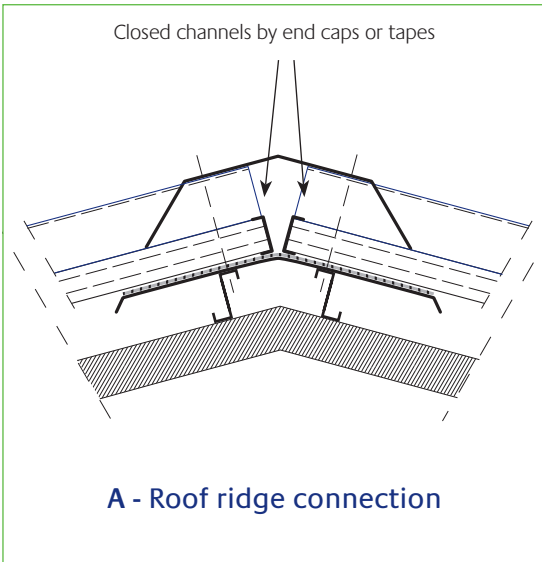


3.1

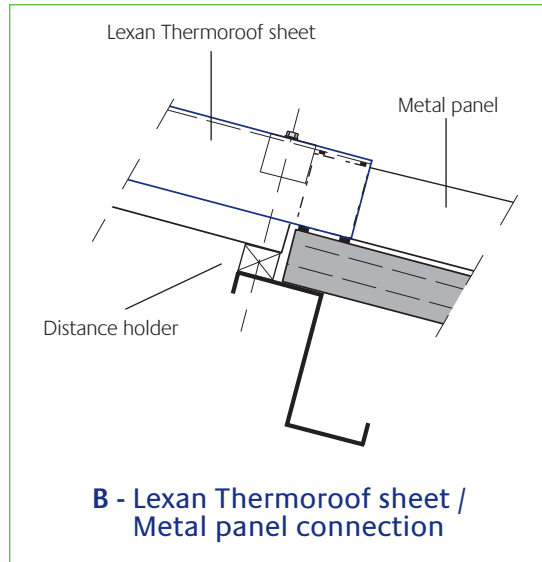
If Purlin distance is >1500 mm additional side wing fixing is required at 1000 mm centers.



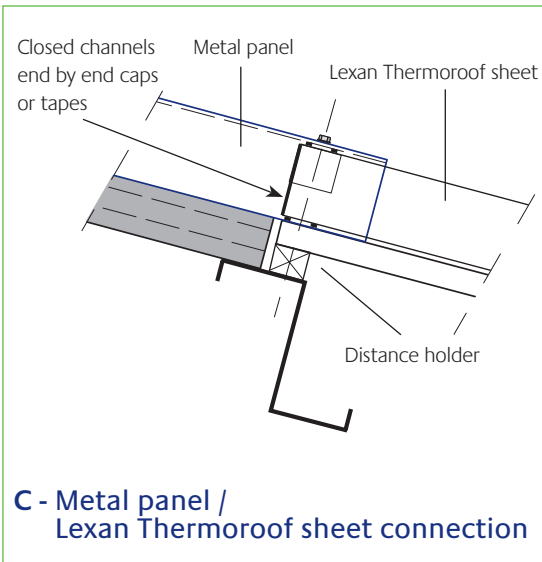
3.2



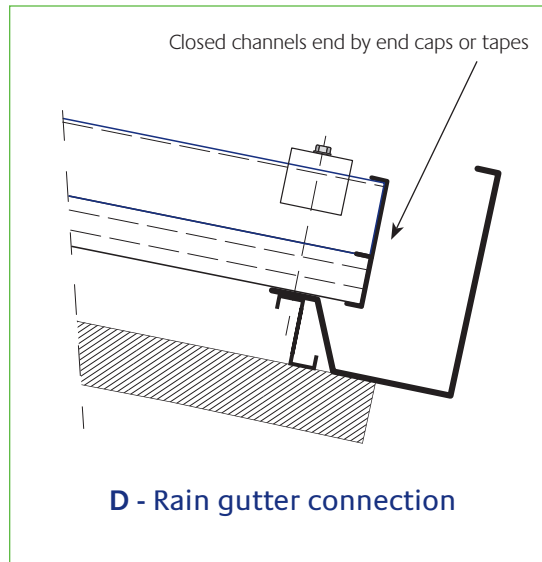
3.3



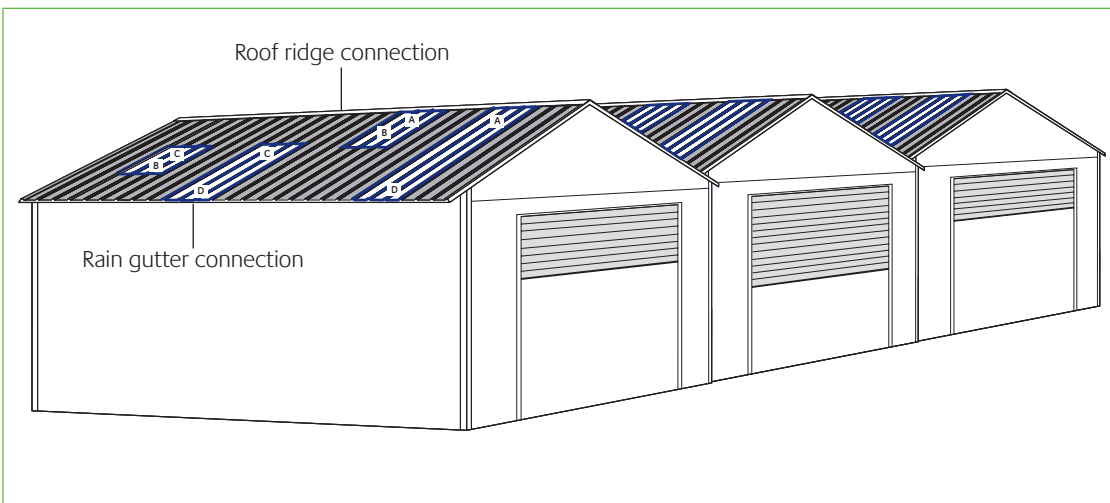
3.4



3.5



3.6



3.7

Americas:

SABIC Innovative Plastics
Specialty Film & Sheet
One Plastics Avenue
Pittsfield, MA 01201
USA
T +1 413 448 7110
F +1 413 448 5573

Europe:

SABIC Innovative Plastics
Specialty Film & Sheet
Plasticslaan 1
4612 PX Bergen op Zoom
The Netherlands
T +31 164 292911
F +31 164 292940

Pacific:

SABIC Innovative Plastics
Specialty Film & Sheet
1468 Nanjing Road (W)
26th Floor, United Plaza
200040 Shanghai
China
T +86 21 3222 4500
F +86 21 6289 8998

email: productinquiries@sabic-ip.com

THE MATERIALS, PRODUCTS AND SERVICES OF SABIC INNOVATIVE PLASTICS HOLDING BV, ITS SUBSIDIARIES AND AFFILIATES ("SELLER"), ARE SOLD SUBJECT TO SELLER'S STANDARD CONDITIONS OF SALE, WHICH CAN BE FOUND AT <http://www.sabic-ip.com> AND ARE AVAILABLE UPON REQUEST. ALTHOUGH ANY INFORMATION OR RECOMMENDATION CONTAINED HEREIN IS GIVEN IN GOOD FAITH, SELLER MAKES NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, (i) THAT THE RESULTS DESCRIBED HEREIN WILL BE OBTAINED UNDER END-USE CONDITIONS, OR (ii) AS TO THE EFFECTIVENESS OR SAFETY OF ANY DESIGN INCORPORATING SELLER'S PRODUCTS, SERVICES OR RECOMMENDATIONS. EXCEPT AS PROVIDED IN SELLER'S STANDARD CONDITIONS OF SALE, SELLER SHALL NOT BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF ITS PRODUCTS OR SERVICES DESCRIBED HEREIN. Each user is responsible for making its own determination as to the suitability of Seller's products, services or recommendations for the user's particular use through appropriate end-use testing and analysis. Nothing in any document or oral statement shall be deemed to alter or waive any provision of Seller's Standard Conditions of Sale or this Disclaimer, unless it is specifically agreed to in a writing signed by Seller. No statement by Seller concerning a possible use of any product, service or design is intended, or should be construed, to grant any license under any patent or other intellectual property right of Seller or as a recommendation for the use of such product, service or design in a manner that infringes any patent or other intellectual property right.

SABIC Innovative Plastics is a trademark of SABIC Holding Europe B.V.

* Trademark of SABIC Innovative Plastics IP B.V.

©2008 SABIC Holding Europe B.V.

All Rights Reserved