

LEXAN SOLID SHEET

Properties of Lexan Sheet



Properties vs Temperature

An outstanding feature of Lexan* solid sheet is the retention of mechanical properties over a wide range of temperatures.

Lexan* solid sheet is characterised by its excellent mechanical behaviour, maintaining high strength and stiffness when exposed to elevated temperatures over a long period of time. For example Lexan* solid sheet retains 85% of its room temperature flexural modulus at 82°C. Figure 2 shows flexural modulus as a function of temperature.

Impact strength

Lexan* polycarbonate sheet is one of the toughest, transparent thermoplastic materials. It withstands impact from all kinds of objects, from stones to hammers without shattering. Its proven energy absorbing characteristics are maintained at sub-zero winter temperatures or high summer temperatures. Polycarbonate sheet has 250 times the impact strength of glass and so gives greater protection against vandalism and forced entry.

LEXAN SOLID SHEET

Mechanical Properties

Properties vs Temperature

Across the glazing sheet range, which includes Lexan* Exell*-D, Exell*-D FR, Exell*-D VEN, Exell*-D SC IR, Lexan* Margard* MR5E, MR5 IR, MRA3, MRX and FMR5 XT, Lexan* 9030 and 9030 FR and Lexan* Exell*-D ST sheet, the outstanding toughness offers superior protection against breakage. The entire product range meets the highest impact performance required by the European Norm EN356 for security glazing.

Table 2:

Category of resistance	Drop height (mm)	Total number of strikes	Code designation for category of resistance	Impact energy per stroke
P1A	1500	3 in a triangle	EN 356 P1A	62 Joule
P2A	3000	3 in a triangle	EN 356 P2A	123 Joule
P3A	6000	3 in a triangle	EN 356 P3A	247 Joule
P4A	9000	3 in a triangle	EN 356 P4A	370 Joule
P5A	9000	3 x 3 in a triangle	EN 356 P5A	370 Joule

Classification table for the resistance of security glazing products according to European Norm EN356

Norm EN356

Steel Ball Impact Test

A steel ball of 4.11 kg with a diameter of 100 mm is dropped freely from different defined heights onto the glazing specimen. In each class the steel ball must impact the specimen three times. The glazing material fulfils the requirements of the test if all impacts do not cause penetration by the steel ball. The relative classes, drop height requirements and test results are outlined in Table 2 with a diagrammatic representation of the test shown in Figure 4 (next slide). Each of the products tested reached the highest standard required by the test at a thickness of 5 mm and above.

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Physical Properties

Optical Performance

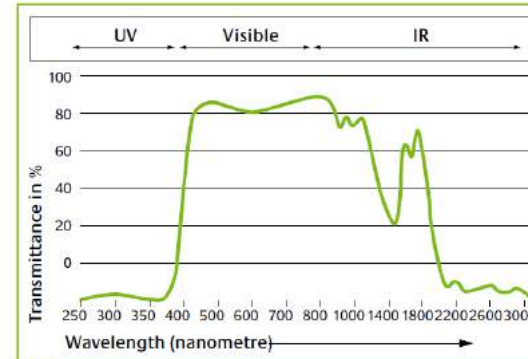
Light Transmission

The sunlight which reaches the surface of the earth has a wavelength that ranges between 295 – 2140 nano-metres (10-9 metres).

The optical window is divided into the following sections.

UV-B Middle UV Region	280 - 315 nm
UV-A Near UV Region	315 - 380 nm
Visible Light Region	380 - 780 nm
Near Infra-red Region	780 - 1400 nm
Middle Infra-red Region	1400 - 3000 nm

As shown in Figure 6, Lexan* sheet products have the highest transmission in the visible light and near infra-red region of the spectrum. Lexan* polycarbonate sheet products are essentially opaque to all wavelengths below 385 nanometres. Lexan* solid sheet glazing can therefore be used to shield sensitive materials such as fabrics or other organic materials against discolouration in environments such as factory warehouses, museums or shopping centres.



Light Transmission Spectrum of Lexan* Polycarbonate

△ WARRANTYSABIC Innovative Plastics offers a Ten Year Limited Warranty on Lexan* Exell*-D and Lexan* Exell*-D ST sheet covering discolouration, loss of light transmission and loss of strength due to weathering. Please consult your local distributor or SABIC Innovative Plastics, Specialty Film & Sheet Sales Office for specific details.

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Solar Heat Gain

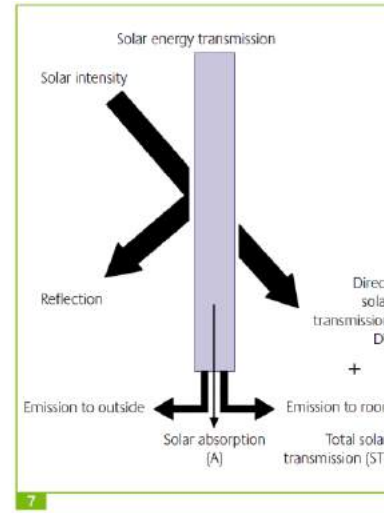
Temperature Increase Inside the Building

Solar Control

Transparent grades of Lexan* solid sheet have excellent light transmission of between 75 and 87% depending upon thickness. However, for buildings in hot climates or with south facing aspects, Lexan* sheet is available in translucent grades of bronze, grey and opal white and Lexan* Exell* Venetian. These grades significantly reduce solar heat build-up, helping to maintain comfortable interior temperatures. The specially tinted sheet and Exell*-D Venetian cut down the brightness of sunlight to a pleasing level and reduces air conditioning costs in the summer.

Solar Heat Gain

The solar radiation reaching the sheet is reflected, absorbed and transmitted, as shown in Figure 7. The greatest proportion is transmitted and the total solar transmission (ST) is the sum of the direct transmission (DT) and the inwardly released part of the absorbed energy (A). Table 3 outlines the overall solar control properties of Lexan* solid sheet.



Solar Energy Transmission

Table 3: Solar Energy Transmission

	LT	R	A	DT	ST	SC
Lexan* solid sheet Colour number	Light transm. in %	Solar reflection in %	Solar absorption in %	Direct solar	Total solar transm. %	Shading coefficient transm. %
Transparent 112	87	9	9	82	84	0.97
Bronze 5109	50	7	38	55	65	0.75
Grey 713	50	7	38	55	65	0.75
Opal white WH7D2780	54	20	29	51	58	0.67
Opal white WH4D3480	25	54	18	28	33	0.38
Exell** D VEN Transparent 112W with white stripes	37	48	-	-	51	0.59
Natural GN9A047T	62	7	57	34	50	0.57
Natural GN8A81T	73	7	40	50	61	0.71

LEXAN SOLID SHEET

Abrasion Resistance

5

Lexan* Margard* sheet MR5E, MR5 IR, MRX, MRA3 and FMR5 XT

High resistance to abrasion

Lexan* Margard* sheet has a unique, hard surface coating which provides a high level of protection against unsightly scratching. It is therefore ideal for use in applications where frequent contact is likely. The state-of-the-art coating on both surfaces of the Margard* sheet makes it one of the most abrasion-resistant plastic safety and security glazing products available.

Mutual benefits of Lexan* Margard* MR5E, MR5 IR, MRA3, MRX and FMR5 XT

UV protection

Whilst the coating of Lexan* Margard* is essentially an abrasion-resistant barrier, the proprietary technology also offers improved UV protection. MRA3 is not UV protected

High resistance to chemicals

Lexan* Margard* sheet is immune to contact with many chemicals such as cleaning fluids,

paints and adhesives. Its unique surface coating also resists graffiti, enabling easy restoration to a 'good as new' condition. Not for FMR5 XT.

Comprehensive warranty Δ

Lexan* Margard* sheet is backed by a five years limited warranty Δ against loss of light transmission and coating failure, and by a ten years warranty Δ against breakage.

Flat applications only

Due to its mar-resistant coating, Lexan* Margard* MR5E/MRA3 sheet cannot be cold-formed. The sheet is intended for flat applications only.

Anti-vandal glazing

Glazing with Lexan* Margard* sheet is the ideal solution in areas where there may be a risk of vandalism.

Security glazing

Lexan* Margard* sheet will prevent a burglar from forcing an entry.

Safety screens and acoustic screens Lexan* Margard* sheet is the ideal material for safety screening in sports stadia and other outdoor applications. MRA3 only suitable for indoor applications.

Premises safety glazing

Lexan* Margard* sheet will not shatter or splinter, so greatly reducing the risk of accidental injury in applications like interior partitions, doors and machineguards.

LEXAN SOLID SHEET

Sound and Thermal Properties

Sound reduction

Single Glazing

Installing Lexan* solid sheet into single or double glazing systems, meets the acoustic requirements of today's glazing. Table 6 compares single glazed Lexan* solid sheet's performance with that of glass.

Table 6: Acoustic insulation DIN 52210-75 Rw (dB)

Thickness in mm	Lexan* solid sheet	Glass
4	27	30
5	28	30
6	29	31
8	31	32
12	34	34
15	pending	pending

Double Glazing

When applied together with existing glass and an air-space of >50 mm, Lexan* solid sheet considerably reduces sound transmission, particularly at low frequencies, such as traffic noise.

Table 7: DIN 52210-100 Acoustic Insulation

Sheet thickness in mm			
Lexan* solid sheet	Glass	Air Space in mm	Rw w dB
4	6	85	39
6	6	85	40
8	6	85	42
9.5	6	85	44
4	6	54	36
6	6	54	37
8	6	54	39
9.5	6	54	41

Thermal Insulation

Energy Loss Calculation

The need to reduce energy consumption, and therefore energy costs, is one of the highest priorities in any business today. Substantial savings in excess of 20% are possible when installing Lexan* solid sheet instead of mono-layer glass. When calculating according to the guidelines laid out in DIN Standard 4701, an average annual saving of between 0.9–1.3 litres of oil or 1.0–1.5 m³ of gas per m² of glazing area will be obtained by decreasing the K-value by 0.1 W/m²K.

Single Glazing

When using Lexan* solid sheet, considerable energy cost savings can be achieved by preventing excessive heat loss in winter and heat entry in summer. Heat loss is normally recorded as a K-value, which is the amount of energy transmitted through a material per square metre of glazing area and per degree of temperature difference.

Table 8: Single glazing K-values W/m²K

Thickness in mm	Lexan* Solid Sheet	Glass
4.0	5.33	5.82
5.0	5.21	5.80
6.0	5.09	5.77
8.0	4.84	5.71
9.5	4.69	5.68
12.0	4.35	5.58
15	4.17	5.45

LEXAN SOLID SHEET

Sound and Thermal Properties

Thermal Insulation

Double Glazing

Double Glazing The selection of Lexan* Exell*-D or Margard* as either internal or external secondary glazing will depend upon the specific requirements of the building. Internal or external secondary glazing can improve protection against burglary. External installation can protect against vandalism. For effective insulation, the best results are obtained by leaving a 20–60 mm space between the existing glazing and the Lexan* Exell*-D, Lexan* 9030 or Margard* overglazing. Table 8.4 shows the K-value as a function of different Lexan* solid sheet thicknesses in combination with different glass thicknesses.

Table 9: Double Glazing

Thickness Glass (in mm)	Thickness Lexan* Solid Sheet (in mm)	Air Space (in mm)	K-values [W/m ² K]
4	4	20-60	2.77
4	5	20-60	2.73
5	5	20-60	2.72
4	6	20-60	2.70
6	6	20-60	2.68
5	8	20-60	2.62
6	8	20-60	2.60
6	9.5	20-60	2.56
6	12	20-60	2.54
6	15	20-60	2.50

Triple Glazing

Extremely low K-values can be obtained by overglazing Lexan* Exell*-D, Margard* or Lexan* 9030 in combination with double sealed glass units.

Table 10: Triple Glazing

Thickness sealed glass unit in mm	Thickness Lexan solid sheet in mm	Air Space in mm	K-values [W/m ² K]
4+4	5	30-60	1.85
6+4	6	30-60	1.82
8+4	8	30-60	1.78

*air space = 12 mm

Note: For overglazing fixing details see page 20

Light Weight

Lexan* polycarbonate sheet products are ideal replacements for more traditional glazing materials. They are safe and easy to handle, cut and install and are virtually unbreakable. Their light weight offers significant cost savings in transportation, handling and installation; when compared with glass of the same thickness they offer a weight saving of more than 50%.

Table 11: Acoustic insulation DIN 52210-75 Rw (dB)

Thickness	Lexan* Sheet	Class
3	3.60	7.50
4	4.80	10.00
5	6.00	12.50
6	7.20	15.00
8	9.60	20.00
9.5	11.40	23.80
12	14.40	30.00
15	18.00	37.50

LEXAN SOLID SHEET

Fire performance

Note: The information in this section is based on European tests. If Australian Fire Tests are required we can provide upon application.

Lexan* solid sheet has good fire behaviour characteristics, and receives high ratings in several major European fire performance tests. As a thermoplastic, Lexan* solid sheet will melt under the intense heat of a fire. However, it will make almost no contribution to the growth of a fire through flame spread.

The base raw material has an LOI (Limiting Oxygen Index) of 25 and does not contain additional flame retardant additives. The LOI (ISO 4589 ASTM D2863) is defined as the minimum oxygen concentration in which the material will burn for three minutes or can keep the sample burning over a distance of 50 mm. The higher the LOI value, the less the likelihood of ignition.

Large-scale roof test

When exposed to heat, the Lexan* solid sheet will soften at 150°–160°C. This creates a hole in the sheet which allows smoke and heat to escape and reduces the temperature to around 60°C. (A reference report is available upon request). Provided there is enough room to cool down and fall away from the heat source, any droplets of molten Lexan* sheet will solidify and self-extinguish. Therefore no propagation of fire takes place. Most test devices are designed in such a way that, because burner and the space measured between the test

specimen is so short, solidification and the extinguishing of flames is sometimes not observed.

National Standards

In Germany the recognized practice for buildings is to measure according to DIN 4102-1 "fire performance of building materials". Thermoplastics are tested for B1 (combustible, low flammability) in the "Brandschacht test" and for B2 (combustible, moderate flammability) in the small burner test.

In France the classification of the fire performance of building materials ranges from M0 (non-combustible) to M4 (highly flammable). The épiradiateur test (NF P92-501) is the method of determining the fire performance of rigid samples. In the UK, the performance of plastics is tested according to BS 476 part 7 "surface spread of flame", C-classification ranges from class 1 (best) to class 4 (worst). A suffix "Y" is added to the result if softening or slumping occurs.

EU-classification. Under the Construction Products Directive (89/106/EG) a new system for fire classification has been introduced. Testing is according EN-ISO 11925-2, "Small burner test" and EN 13823 "Single burning item" test. Fire classification reaches from A1 (non-combustible – F (no performance determined), smoke density S1, s2 or s3 and d0 (no flaming droplets), d1, d2 .

Remark: For FR grades, please check datasheets.

LEXAN SOLID SHEET

Wind and Snow Loading

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.

$q = KV^2$ where: q = dynamic wind pressure w
 N/m^2 $K = 0.613V$ = design wind speed in metres/second

Table 16: Values of q 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

For glazing projects with an unusual loading condition, please contact your local SABIC Innovative Plastics, Specialty Film & Sheet Sales Office.

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. The wind loading is obtained by multiplying the dynamic wind pressure by the pressure coefficient. Detailed pressure coefficient values can be found in the appropriate building norms.

Snow Loading

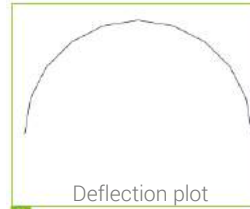
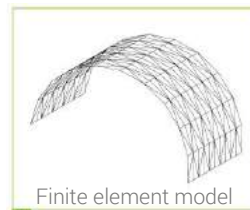
Snow loading on roof glazings can be considered equivalent to a vertically, uniformly distributed load, acting per m² of the horizontal projection of the glazing. Snow loading factors can be obtained from the appropriate building norm.

Computer Aided Sheet Engineering

A computer aided design program has been developed especially for large glazing projects, or projects with an uncommon shape or unusual loading conditions. The program creates the finite element model of a particular glazing design, applies the specified loads and edge conditions and runs the deflection analysis. Consult your nearest SABIC Innovative Plastics, Specialty Film & Sheet Technical Service Centre for further advice.

Wind and Snow Load Consideration

The results shown in Tables 16, 24–28 are applicable for loads varying from 600 up to 2000 N/m². These loads cover most of the normal glazing projects fulfilling requirements according to European standards BSI - CPS chapter V part 1, NEN 3850 and DIN 1055.



LEXAN SOLID SHEET

Installation

Glazing Precautions

Glazing of Lexan* sheet should be considered a finishing operation and should be scheduled as a final step in the completion of a building. Care should be taken to avoid surface marring during storage, cutting, transporting and installation.

After installation and removal of masking, Lexan* sheet should be protected from paint, plaster and other contamination by polyethylene or other covering taped to the framing members. Check compatibility of the Lexan* sheet with the suppliers of the selected glazing tapes, gaskets and sealants.

Thermal Expansion Allowance

Since Lexan* sheet has a larger coefficient of linear thermal expansion than that of the glazing profiles commonly used, care should be taken to allow free expansion of the sheet to avoid bowing and thermal stress. Linear Thermal Expansion

Coefficients for various materials are shown below:

Table 17:

Material	m/m°C x 10-5
Lexan* Sheet	6.7
Glass	0.7 - 0.9
Aluminium	21. - 2.3
Steel	1.2 - 1.5

Allowance for thermal expansion must be made for both the length and the width of the Lexan* sheet. The recommended allowances for various sheet dimensions are outlined in Table 18.

In general: Thermal expansion of the sheet is approximately 3 mm per linear metre.

Sheet Edge Engagement/Rebate Depth Requirements

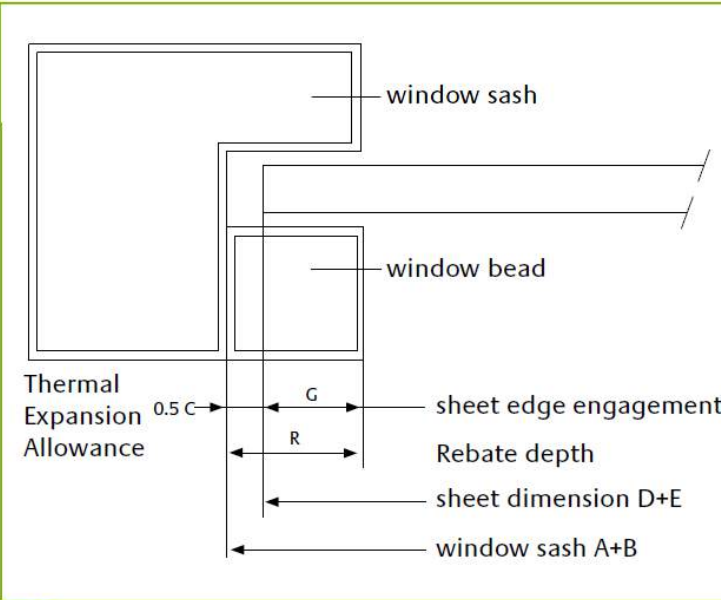
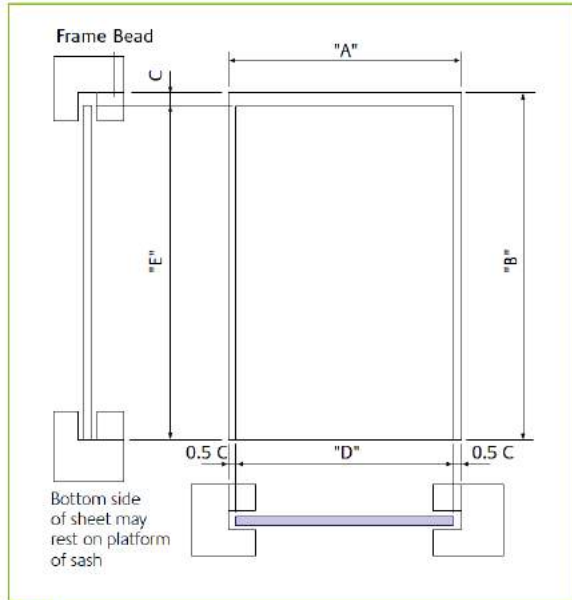
Table 15.2 indicates the minimum required sheet edge engagement of Lexan* sheet in the glazing

profiles. The rebate depth is the sum of the specific edge engagement and the expansion allowance. The total rebate depth should include a minimum edge engagement and an allowance for thermal expansion.

Table 18: Thermal Expansion/Sheet edge engagement

Sash Dimensions (A-B) (mm)	Trim Sheet by C (mm)	Sheet edge engagement C (mm)
300	1	6
300 - 600	1 - 2	6 - 9
600 - 900	2 - 3	9 - 12
900 - 1200	3 - 4	12 - 15
1200 - 1500	4 - 5	15 - 18
1500 - 1800	5 - 6	18 - 20
1800 - 2100	6 - 7	20
2100 - 2400	7 - 8	20
2400 - 2700	8 - 9	20
2700 - 3000	9 - 10	20

LEXAN SOLID SHEET Installation



13

14

LEXAN SOLID SHEET

Sheet Glazing Guide-lines

12

Glazing Systems

Figures 15 and 16 illustrate typical installations for dry and wet glazing systems using Lexan* polycarbonate sheet products.

It is extremely important when installing Lexan* sheet that the edges are correctly clamped, whether the application involves wet or dry glazing conditions. See page 22 for thermal expansion clearance and minimal sheet edge engagement.

Wet Glazing Systems

Lexan* sheet can be glazed using standard metal or wo-oden window frames in combination with glazing tapes and non-hardening glazing compounds. Polybutylene glazing filler tapes are suitable.

When using glazing compounds it is essential that the sealant system accepts a certain amount of movement, to allow for thermal expansion, without loss of adhesion to the frame or sheet. Silicone sealants are generally recommended for use with Lexan* sheet, but it is strongly advised when using sealing compounds to check compatibility before use.

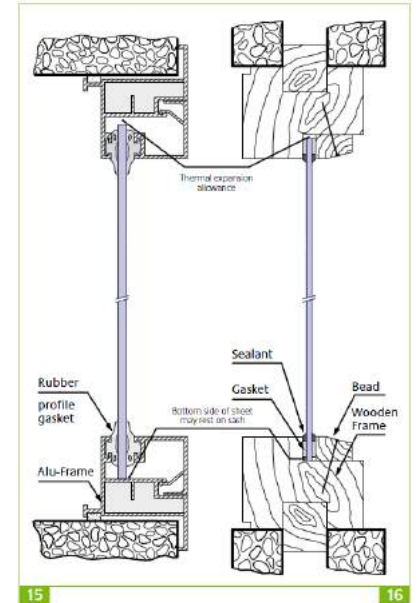
Care should be taken not to use Amine nor Benzamide curing silicone sealants, which are not compatible with Lexan* sheet and result in crazing, particularly when stress is involved. See page 15 for suitable sealants.

Dry Glazing Systems

The advantage of dry glazing is that the rubber gaskets snap-fit into the glazing bars which allows free movement of the sheet during expansion and contraction. This should be considered therefore for both aesthetic reasons and for applications where sheet expansion exceeds sealant limitations. Neoprene, EPT or EPDM rubbers, ± 65 shore, are recommended.

15. Dry glazing installation

16. Wet glazing installation



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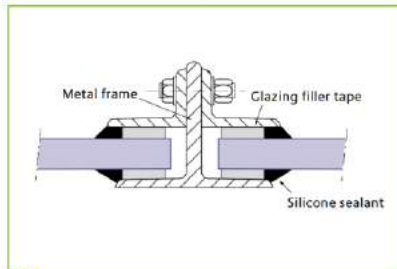
Sheet Glazing Guide-lines

13

Do's

- Clean the window frame. Remove old putty or broken glass, if necessary.
- Measure the sheet edge engagement area and internal window frame dimensions, i.e. the space into which the Lexan* sheet will be fitted.
- Calculate the sheet size, allowing clearance for thermal expansion (3 mm per linear metre).
- Select the right thickness to fulfil loading requirements.(See Tables 18.5 and 18.6)
- Clamp the Lexan* sheet to a support table to avoid vibration and rough cutting.
- Cut the sheet to the required size, using a standard electric circular or jig saw.
- Remove any sharp edges and irregularities from the sheet.
- Peel back approximately 50 mm of the masking film from all edges of the cut sheet on both sides.
- For wet glazing, apply single-sided self-adhesive glazing tape or rubber profile to both the window

Wet Glazing



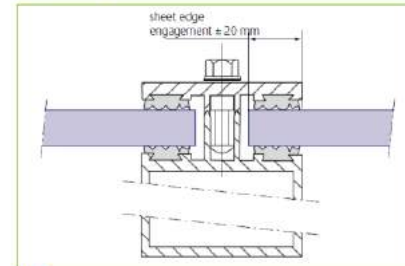
17

- For dry glazing, snap-fit compatible neoprene rubber gaskets in place in the support profile as well as in the clamping cover profile.
- Insert the Lexan* sheet into the window frame.
- Fix the window bead or the clamping cover profile in place.
- For wet glazing, apply an approved silicone sealing compound, such as Silglaze/Silpruf between the sheet and the window frame/bead.
- Remove all masking film immediately after installation.
- Clean the window carefully with warm soapy water and with a soft cellulose sponge or woollen cloth.

Don't's

- Do not use plasticised PVC or incompatible rubber sealing tapes or gaskets.
- Do not use Amine, Benzamide or Methoxy based sealants.
- Do not use abrasive or highly alkaline cleaners.
- Never scrape Lexan* sheet with squeegees, razor blades or other sharp instruments.
- Do not walk on Lexan* sheet at any time.
- Do not clean Lexan* sheet in hot sun or at elevated temperatures.
- Benzene, gasoline, acetone, carbon tetrachloride or butyl cellosolve should never be used on Lexan* sheet.

Dry Glazing



18

LEXAN SOLID SHEET

Flat Glazing Installation

Overglazing Double Glazing

The selection of Lexan* 9030, Exell*-D or Lexan* Mar-gard* sheet as either internal or external secondary glazing will depend upon the specific requirements of the building: external or internal secondary glazing for improved burglar resistance and externally for protection against vandalism.

Specialised companies, recognising the need for more substantial and secure overglazing designs, have developed pre-assembled profile systems. These systems allow for easy pre-fabrication and the rubber gaskets are interchangeable to hold sheet thicknesses of between 5–10 mm.

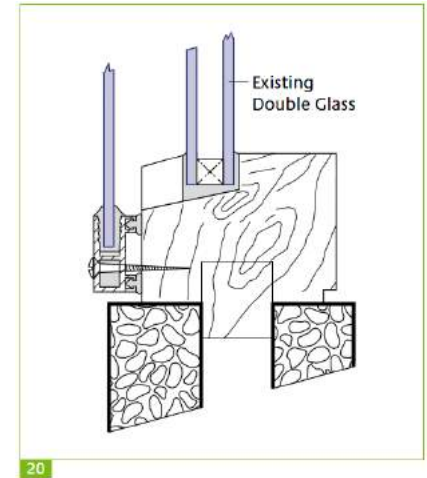
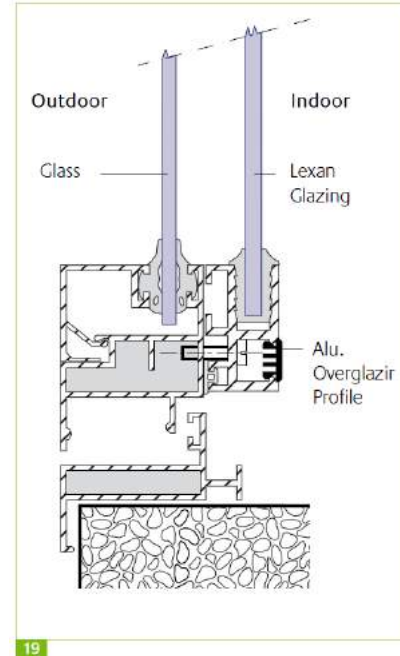
Figures 19 and 20 show typical examples of overglazing installations.

Internal Overglazing

Lexan* Margard* sheet is also an ideal glazing material for interior applications, (Figure 19). When Lexan* Margard* sheet is installed internally, the criteria for deflection under wind load (as indicated in Table 19) no longer apply and therefore the recommended sheet thickness can be reduced.

External Overglazing

Depending upon requirements, either Lexan* Margard* or Lexan* Exell*-D can be used (Figure 20). Taking into account the functional and aesthetic requirements with respect to deflection under wind load, the sheet thickness recommendations given in Table 18.4 are suitable.



19. Internal Overglazing
20. External Overglazing

LEXAN SOLID SHEET

Flat Glazing Sheet Thickness Selection

15

Four sides clamped Lexan* sheet

The deflection characteristics in this particular configuration are dependent upon the ratio of the support bar spacing a:b, (see Figure 22).

In practice "a" represents the centre to centre distance of glazing profiles on the short glazing side i.e. the width of sheet.

"b" represents the centre to centre distance of glazing profiles on the long glazing side i.e. length of sheet.

Table 18 indicates the maximum allowable short glazing side of three different ratios of glazing bar spacing.

Ratio sheet width "a": sheet length "b" 1:>2
Ratio sheet width "a": sheet length "b" 1:2
Ratio sheet width "a": sheet length "b" 1:1

The chart assumes an edge engagement as indicated in Table 20, page 30, on all four edges.

Safety Factor

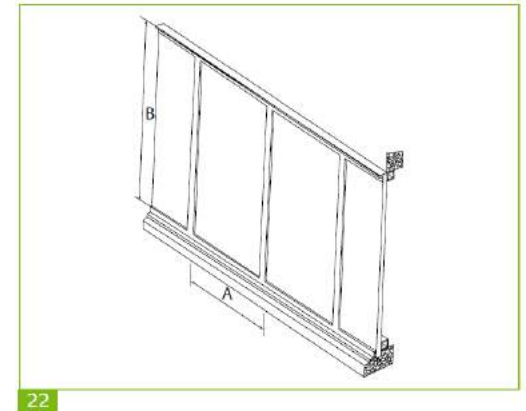
Tables 18.1 and 18.2 indicate the maximum allowable sheet sizes at a specified loading which results in an acceptable sheet deflection behaviour without the risk of sheet buckling or pop-out effect. To calculate the allowable deflection, divide the shortest sheet side "a" by 20. A maximum deflection of 50 mm is recommended.

Example I

Window size: Width: 1600 mm Length: 3200 mm
Ratio a:b = 1:2
Loading: 1000 N/m²
Required sheet type: 12 mm
Maximum deflection: 50 mm

Example II

Window size: Width: 1000 mm Length: 4000 mm
Ratio a:b = 1:>2
Loading: 800 N/m²
Required sheet type: 8 mm
Maximum deflection: 50 mm



LEXAN SOLID SHEET

Flat Glazing Sheet Thickness Selection

Table 19: Centre to centre distance of glazing profiles (shortest side a)

Lexan® sheet thickness in mm	Ratio sheet width: sheet length																							
	1:1	1:2	1:>2	1:1	1:2	1:>2	1:1	1:2	1:>2	1:1	1:2	1:>2	1:1	1:2	1:>2	1:1	1:1.5	1:>1.5	1:1	1:2	1:>2	1:1	1:2	1:>2
3	775	600	400	700	550	375	650	500	-	600	450	-	575	400	-	550	-	-	525	-	-	500	-	-
4	1050	800	550	950	700	490	875	650	450	825	600	425	780	550	400	740	500	-	710	475	-	685	450	-
5	1300	975	675	1180	875	625	1100	800	575	1025	750	550	975	700	510	930	670	490	900	625	470	875	560	450
6	1475	1150	800	1375	1010	725	1300	960	680	1225	900	650	1175	850	600	1125	800	575	1075	710	550	1025	650	525
8	1850	1450	1150	1700	1350	1000	1600	1275	925	1525	1200	860	1475	1150	810	1425	1075	775	1375	100	750	1325	950	725
9,5	2050	1600	1300	1950	1475	1150	1850	1400	1075	1750	1350	1025	1675	1300	975	1625	1250	925	1575	200	880	1525	1100	850
12	2050	1750	1500	2050	1700	1400	2050	1600	1325	2050	1525	1275	2000	1475	1225	1950	1450	1175	1875	1400	1125	1800	1350	1075
15																								
Loading in N/m ²	600			800			1000			1200			1400			1600			1800			2000		

LEXAN SOLID SHEET

Curved Glazing Installation

With the exception of Lexan* Margard* MR5-E and MRA3, all Lexan* sheet can be successfully cold-curved over curved support glazing profiles, to suit many glazing applications, e.g domes, roof-lights, etc. Providing the radius is not below the minimum recommended value, then the introduced stress by cold-curving will not have any adverse effect upon the mechanical performance of the sheet. Sheets must always be bent longitudinally, never across the width of the sheet. The minimum radius values are outlined below.

Table 21:

Lexan* 9030, 9030 FR thickness in mm	Minimum allowable radius in mm
3	300
4	400
5	500
6	600
8	800
9.5	950
12	1200
15	1500

Table 22:

Lexan* Drel*4, D ST, D FR and D VEN thickness in mm	Minimum allowable radius in mm
3	525
4	700
5	875
6	1050
8	1400
9.5	950
12	1200
15	1500

Table 23:

Lexan* Margard* FMR5-E thickness in mm	Minimum allowable radius in mm
3	900
4	1200
5	1500
6	1800
8	2400

Lexan* Sheet curved glazing using standard metal profiles

this section illustrates the possibilities of curved glazing, combining standard profiles with Lexan* sheet. When specially developed patented glazing systems are not required, good possibilities still exist for Lexan* sheet curved glazing by using standard metal profiles in combination with glazing tapes and non-hardening glazing compounds. See page 15, Table 5 for suitable sealants.

This type of installation system is mainly used in small domestic type applications, carports, warehouses, conservatories and other glass replacement situations.

Lexan* Sheet curved glazing using patented glazing systems

A wide range of patented glazing systems is commercially available. Many of these systems have already proved to be suitable for curved constructions in combination with Lexan* sheet. Through close contact with system manufacturers and professional installers, SABIC Innovative Plastics, Specialty Film & Sheet can advise and assist architects and engineers on the feasibility of a curved design concept with Lexan* sheet in combination with a selected patented glazing system. Metal or wooden structural support bars with a rubber gasket and an aluminium cover clamping strip with integrated rubber gaskets are often used. See page 15, Table 6 for suitable gaskets.

LEXAN SOLID SHEET

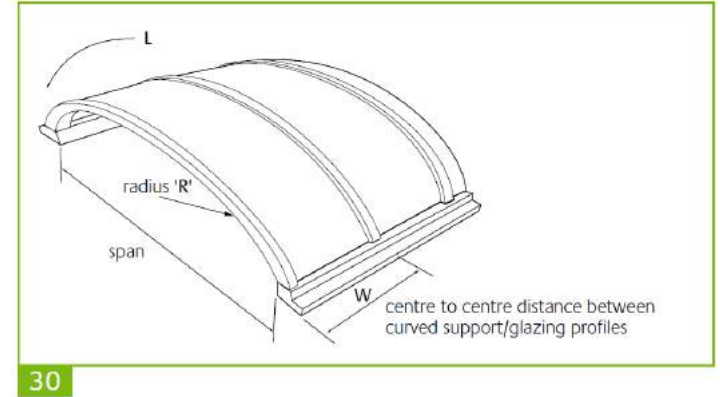
Curved Glazing Installation

Curved Glazing Sheet Thickness Selection

Curvature, as well as the span and curved profile di-stance, influence the cylindrical shell behaviour and the buckling load. The critical load at which buckling occurs is calculated as a function of the shell geometry and the intrinsic properties of the Lexan* sheet. With reference to the calculated linear buckling load as well as the stability, a safety factor of 1.5 is applied. In this way correct sheet thickness and dimensions can be calculated under given load situations. The stiffness of Lexan* sheet in curved glazing applications is mainly determined by the radius "R" and the distance "W" between the curved profiles. Sheet length "L" needs to be greater than sheet width "W" to facilitate curvature; in practice, a ratio of 1:2 or less is never contemplated because of the practicalities of installation.

Table 24:

Example:	
Roof-light Radius: 2800 mm	
Loading: 1000 N/m ²	
c.t.c. distance curved profiles	Lexan* sheet thickness
400 mm	3 mm
530 mm	4 mm
650 mm	5 mm
1000 mm	6 mm
1950 mm	8 mm



Notes on Table 25

At a specified load the distance between the curved profiles can be found for different sheet thicknesses and radii. In the dark tinted section a maximum standard sheet width of 2.05 m may be used.

The light tinted section indicates that the curvature of relevant sheet thickness at that particular loading does not contribute any more to increased stiffness of the sheet. The stiffness of the sheet can be considered the same as flat sheet, and the last value is therefore applicable for all larger radii.