



GE Structured Products

Product Data

Lexan® 9030 sheet

Description

All Lexan transparent sheet products are extruded of Lexan Polycarbonate resin with Physical, Thermal, Mechanical and Electrical properties as listed in the table. Lexan® 9030 sheet is the standard grade of Lexan sheet without UV protected nor Mar resistant surface treatment. As all Lexan sheet grades, Lexan 9030 sheet combines high impact and temperature resistance with optical clarity.

Lexan 9030 sheet can be utilised for secondary glazing behind existing glazing for economical protection against breakage or intrusion.

Lexan 9030 sheet can be cut, sawn, drill, milling and bent easily using standard workshop equipment without the risk of cracking and breakage and is therefor ideally suited for fabricating a wide range of indoor applications such as machine guards etc.

Lexan 9030 sheet can be easily thermoformed into complex parts while retaining its excellent properties necessary for demanding applications such as vandal proof street furniture.

Lexan 9030 sheet may be decorated using a wide variety of modern techniques such as painting and screen printing.

Product availability

Lexan 9030 sheet is supplied in the following standard specifications:

Standard Sizes	Masking	Standard Colors
Thin gauge in mm 0.75*-1-1.5		
625 x 1250*	Top side: Coex opal white PE	transparent code 112 and opal white code 82103
1250 x 1250	blue print	
Bottom Side:	Coex transparent PE	
Standard gauge in mm 2-3-4-5-6-8-9.5-12		
2050 x 3050	Top side: Coex opal white PE	
2050 x 6050	blue print	
Bottom Side:	Coex transparent PE	

*Dimensions only for 0.75 mm

Lexan 9030 sheet can be supplied by prior arrangements in non - standard widths, lengths and colour. Such arrangements may affect prices, terms and/or other conditions of sales.

Light transmission

Transparent Lexan 9030 sheet have excellent light transmission, dependent of thickness between 84 - 87%.



Lexan 9030 Polycarbonate resin typical properties ¹⁾		Typical value	Unit	Standard
Physical				
Density		1.2	g/cm ³	ISO 1183
Water absorption, 24 hours		10	mg.	ISO 62
Water absorption, saturation /23°C		0.35	%	ISO 62
Mould shrinkage		0.6-0.8	%	ASTM-D955
Poisson's Ratio		0.38	-	ASTM-D638
Mechanical				
Tensile stress at yield	50 mm/min	60	Mpa	ISO 527
Tensile stress at break	50 mm/min	70	Mpa	ISO 527
Tensile strain at yield	50 mm/min	6	%	ISO 527
Tensile strain at break	50 mm/min	120	%	ISO 527
Tensile Modulus	1 mm/min	2350	Mpa	ISO 527
Flexural stress at yield	2 mm/min	90	Mpa	ISO 178
Flexural Modulus	2 mm/min	2300	Mpa	ISO 178
Hardness H358/30		95	Mpa	ISO 2039/1
Taber Abrasion, CS17.1 kg, 1000 Cy		10	mg	ASTM-D1044
Taber Abrasion, CS10F, 500g/100Cy/Haze			%	ASTM-D1044/D1003
Impact				
Charpy impact, notched		35	kJ/m ²	ISO 179/2C
Izod impact, unnotched	23°C	NB	kJ/m ²	ISO 180/1U
Izod impact, unnotched	-30°C	NB	kJ/m ²	ISO 180/1U
Izod impact, notched	23°C	65	kJ/m ²	ISO 180/1A
Izod impact, notched	-30°C	10	kJ/m ²	ISO 180/1A
Thermal				
Vicat B/120		145	°C	ISO 306
HDT/Ae, 1.8 Mpa edgew. 120*1*04/s=100		127	°C	ISO 75
Thermal conductivity		0.2	W/m.°C	DIN52612
Coef.of Lin.Therm.Exp.extr. 23-80°C		7.00E-05	1/°C	DIN53752
Ball pressure test 125 ±2°C		Passes	-	IEC335-1
Thermal Index. Electrical Properties		100	°C	UL746B
Thermal Index. Mech. prop.with impact		100	°C	UL746B
Thermal Index. Mech.prop.w/o impact		100	°C	UL746B
Flammability				
Oxygen Index	²⁾	25	%	ISO 4589
Glow Wire Test, 850°C, passes at		1	mm	IEC695-2-1
Glow Wire Test, 960°C, passes at		3.2	mm	IEC695-2-1
Electrical				
Volume Resistivity		10 ¹⁵	Ohm.cm	IEC93
Relative Permittivity	50Hz	3	-	IEC250
Dissipation Factor	1Mhz	2.9	-	IEC250
Dissipation Factor	5Hz	0.0009	-	IEC250
Dissipation Factor	1 Mhz	0.01	-	IEC250
Arc Resistance Tungsten		119	sec.	ASTM-D495
Optical				
Light transmission ³⁾	3 mm	89	%	ASTM-D1003

¹⁾ Typical values only. Variations within normal tolerances are possible for various colours.

All values are measured at least after 48 hours storage at 23°C/50% relative humidity.

All properties are measured on injection moulded samples.

All samples are prepared according ISO 294.

²⁾ This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

³⁾ Light transmission value may vary by + or - 5%.

Fire performance

Lexan 9030 has good fire behaviour characteristics. Lexan sheet does not contribute significantly to the spread of fire or to the generation of toxic gases.

For details please contact your local sales office.

Sound reduction

Installing Lexan 9030 sheet as secondary glazing behind glass meets the acoustic requirements of today's glazing.

Acoustic insulation DIN 52210 - 75 Rw (Db)

Lexan 9030 thickness	Air space in mm	Glass	Rw in Db
4 mm	85	6 mm	39
5 mm	85	6 mm	40
6 mm	85	6 mm	42
8 mm	85	6 mm	44

Thermal Insulation

When using Lexan 9030 sheet in combination as secondary glazing behind glass considerable energy savings can be achieved.

K-Values

Lexan 9030 thickness	Air space in mm	Glass	K-Value in W/m ² K
4 mm	20-60	4 mm	2.77
5 mm	20-60	4 mm	2.73
6 mm	20-60	4 mm	2.72

Steel ball impact test

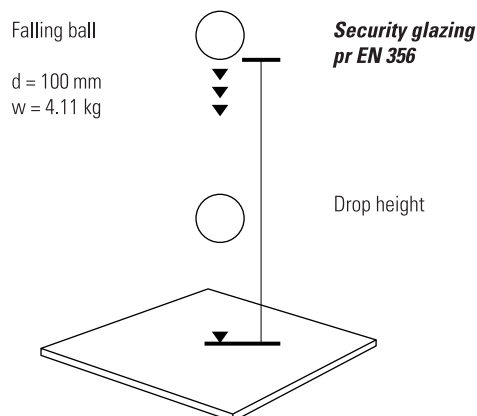
Norm prEN356

Lexan 9030 sheet meets the highest impact performance required by the European Norm prEN356 for security glazing. A steel ball of 4.11 kg, with a diameter of 100 mm is freely dropped from different heights onto the glazing specimen. The steel ball must impact the specimen 3 times. Lexan 9030 sheet reached the highest standard required by the test at a thickness of 5 mm and above.

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 prEN356

Steel Ball Impact Test



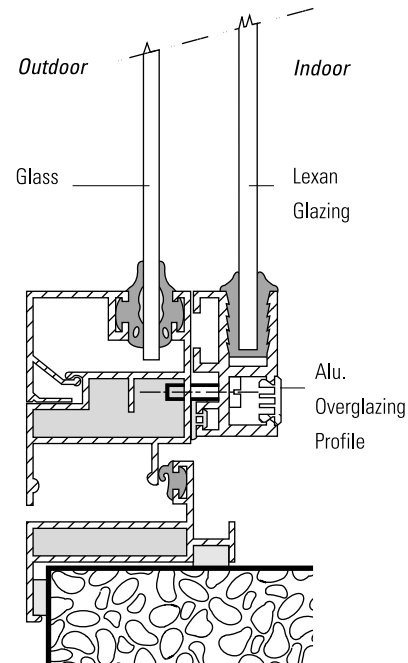
Glazing guidelines

Thermal expansion allowance

When installing Lexan 9030 sheet in a frame care should be taken to allow free expansion of the sheet.

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

Internal Overglazing



Sheet edge engagement

The required sheet edge engagement of Lexan 9030 sheet in the glazing profiles is around 20 mm

Gaskets/Sealants

When using glazing compounds it is essential that the compound accepts thermal expansion movements and that it is compatible with Lexan 9030 sheet.

Silicone sealants and Neoprene, EPT or EPDM Rubber gaskets (65 shore) are generally recommended.

Thickness recommendation

Lexan 9030 sheet thickness recommendation installed as secondary glazing behind glass.

Shortest sheet side	Lexan 9030 sheet thickness
<400 mm	3 mm
<650 mm	4 mm
<900 mm	5 mm
<1200 mm	6 mm
<1400 mm	8 mm

Cleaning

Small area's: wash sheet with a solution of mild soap and lukewarm water using a soft cloth or sponge.

Large area's: clean surface with a high pressure water and/or steam cleaner.

Note: do not use abrasive cleaners or detergents or sharp instruments which may scratch the sheet.

Forming, fabricating, finishing

Cutting, drilling and milling

Circular saws, band saws, jig saws and common hacksaws, all with fine toothed panel blades, can be used for trouble free cutting of Lexan 9030 sheet.

Standard high speed steel twist drill or carbide tipped drills can be used for drilling holes in Lexan 9030 sheet.

Lexan 9030 sheet can be machined using conventional milling machines fitted with standard high speed knife cutting tools. During above mentioned operations the Lexan 9030 sheet must be always securely clamped to avoid rough cut edge by undesirable vibration and the masking should be left on the sheet to prevent surface damage by scratching.

Cold curving

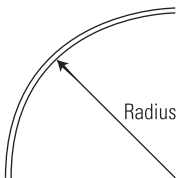
Cold curving of Lexan 9030 sheet is acceptable for shapes having a radius of 100 times the sheet thickness or greater.

Sheet thickness	Minimum allowable radius
2 mm	200 mm
3 mm	300 mm
4 mm	400 mm
5 mm	500 mm
6 mm	600 mm
8 mm	800 mm

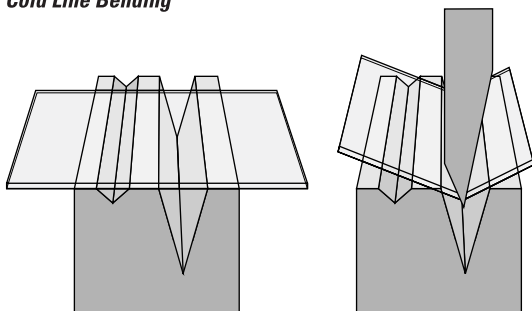
Cold line bending

Cold line bending of Lexan 9030 sheet as metal is possible when taking into account the following guidelines.

- Use hydraulic bent equipment
- Protective masking should be left during bending process
- Angle max. 45 degree at sheet thickness ≥ 8 mm
- Angle max. 90 degree at sheet thickness < 8 mm
- Use sharp bending knife
- Bending operation should be performed quickly
- Overbending is required to achieve the desired angle after stress relaxation
- Smooth and notch free edge of Lexan 9030 sheet to avoid side cracking



Cold Line Bending

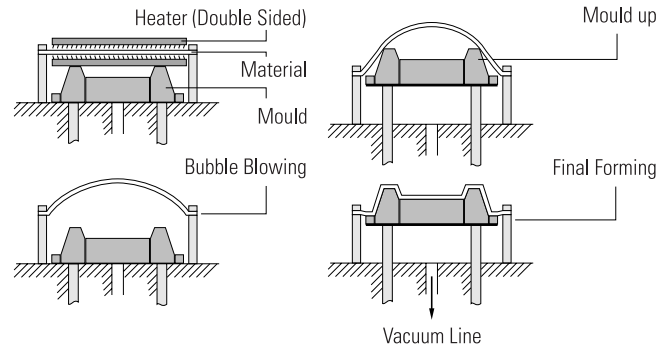


Thermoforming techniques for Lexan 9030 sheet

Vacuum forming

Lexan 9030 sheet is ideally suited to vacuum forming. It allows deep draw ratios, equal wall thickness distribution and it can be formed into complex shapes using standard thermoforming equipment which is equipped with its own sandwich type of heating devices. Lexan 9030 sheet has a forming temperature range of 185 - 205°C.

Vacuum forming



Drape forming

The process involves placing the sheet, without the masking, and mould in a hot circulating oven. The temperature is raised to the point where the Lexan 9030 sheet sags (between 140 - 155°C) and conforms to the shape of the mould.

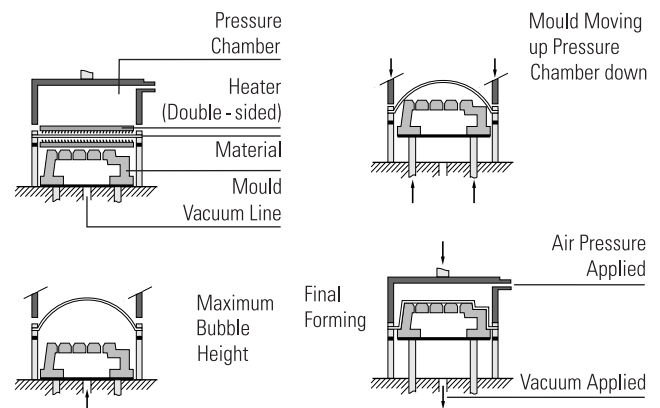
Typical Drape Forming Set-up



Pressure forming

Pressure forming is basically the same as vacuum forming. However, during the final forming stage compressed air is applied to the positive side of the mould to force the sheet to conform more closely to the mould. The result is a component with sharp features and detailed geometry.

Pressure forming

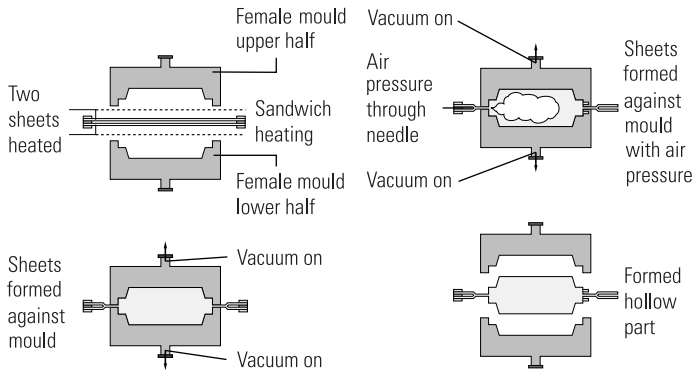


Twin sheet forming

Twin sheet forming is a vacuum forming technology whereby two sheets are formed at the same time, producing an application with hollow sealed section. The connection joint between the two parts is obtained by melting of the two materials and the exposed pressure of the mould.

No additional glue or other adhesive is therefor necessary.

Twin Sheet Forming



Pre-drying

It is extremely important to ensure that Lexan 9030 sheets are free of moisture prior to thermoforming. A hot circulation oven set at 120°C is recommended.

Sheet thickness	Drying time
2 mm	3 hours
3 mm	4 hours
4 mm	10 hours
5 mm	16 hours
6 mm	24 hours

Decorating

Painting

Lexan 9030 sheet can be painted without surface treatment other than cleaning. Provided certain basic recommendations are followed, most techniques used to apply paint to other material, can be used for Lexan 9030 sheet. Paint systems for Lexan 9030 sheet are readily available as standard items from various manufacturers.

Use only recommended paint

Painting systems

Supplier	Paints	Thinner	Comments
AKZO Coatings	Autocryl 01-69004 Class 45	- 06-302007	2K Acrylic Primer/2K/PUR Top coat/2K/PUR
Diegel	PA 21	24896	1K Flex. acrylic
Schaepman	C1 F57 C1 W28 C4 P212	VOA 462 Water VOA421/H4P4	Acrylic Acrylic/water based 2K Acrylic
Herberts	R 47633 41605 R4790 R4780	- 11098 - -	2K Primer Basecoat BMW mete 2K Clearcoat 2K One layer system
Becker	TH 130 DJ-331-5176 TC 132	NT19 ET-134 -	2K Top coat 1K Primer (flexible) 2K Clear coat
HSH	Interplan 1000		1K Water-based
Morton	L446	U987	1K Acrylic System

NB For information regarding application techniques and property values please contact the relevant paint supplier.

Screen process printing

Screen printing is a well established process that offer a wide variety of options for a decorative finish.

Approved Lexan 9030 sheet screen paints, when applied to flat, uniformed sheet are handled in the same manner as screen paints fit other plastic material.

Silk Screen Inks

Supplier	Inks
Sericol	Seritec TH Polyplast PY Plastipure PP
Wiederhold	HG/PK/PK-Jet
Visprox	TCI 8700/STR 5700/TCP 9900
Diegel	HV/Z
Gibbon Inks & Coating Ltd.	Matercryl Polyvin/Marlerstyrene
Coates	Vynaglaze/Vynafresh/Touchkey
Pröll	Jet 200/Thermo-Jet/Noriprint PS
Marabu	Marastar SR/Maraplast D

Anti static treatment/cleaning

Lexan 9030 sheet tends to build up a static charge. It is often necessary to clean and discharge surface prior to painting and screen printing. Special anti static formulations are available which reduce the static charge. Cleaning prior to thermoforming Lexan 9030 sheet it is recommended that dust is blown off with anionising air.

Anti-static Products

Company/Supplier	Product/Brand Name
American Cyanamid Co.	Cyastat SN50
AKZO Chemicals	No. 03643
Morton	S154

Adhesives/tapes

The use of adhesives and tapes to bond Lexan 9030 sheet to other materials is now universal and offers a technique that is one of the most efficient and economical methods of joining components. It is vitally important to select the adhesive or tape carefully ensuring its compatibility with Lexan 9030 sheet being used and working environment.

Adhesive Groups and Property Profile

	Impact Behaviour	Moisture Behaviour	Number of Components	Temperature Limits (°C)	Gap filling
Epoxy	Bad	Very Good	1 or 2	200+	+
Polyurethane	Very Good	Good	1 or 2	140	+
Hot Melt	Good	Good	1	60	±
Silicone	Excellent	Very Good	1 or 2	250	+

Adhesive Selection Chart for Lexan® polycarbonate sheet products

Adhesive Type	Product Name	Joins Lexan® sheet to:	1/2 Part System	Supplier	Comments
Epoxy	Scotch Weld DP110	Metals, Plastics, Rubbers	2 part	3M Company	Fast curing, flexible epoxy with high shear strength
Epoxy	Scotch Weld DP190	Plastics	2 part	3M Company	Very flexible epoxy with high shear strength
Polyurethane	Bison PUR	Plastics, Metals, Wood	2 part	Perfecta	
Polyurethane	Plio-grip 6000	Plastics, Metals, Wood	2 part	Good Year	Flexible, very short pot life (10 min)
Hot Melt	Jet Melt 3736 Jet Melt 3764	Plastics, Wood Plastics, Wood	1 part	3M Company	Good heat resistance Oil and water resistant
Hot Melt	Macromelt XS6335	Plastics, Metal Glass, Ceramics	1 part	Henkel	Clear
Silicone	*Silpruf® SCS2000	Lexan® uncoated Lexan® Exell® D Lexan® Margard® MR5E + FMR Building Materials	1 part	GE Silicones	Excellent adhesion, UV and weather resistant, flexible
Silicone	*SEA 210	Plastics, Glass Metal, Wood	2 part	GE Silicones	Fast Cure
Tapes	Scotchtape VHB Range	Plastics, Glass, Metals	-	3M Company	Double sided Pressure sensitive
Tapes	Fas Tape	Metals/Plastic	-	Fasson	Double coated
Tapes	PS-18	-	-	Velcro	Hook and loop tape
Tapes	SR321 SW 321	- -	- -	Multifoil	PE Foam, 2 sides PE Foam, 2 sides
Tapes	5669	-	-	Sellotape	PE Foam, 2 sides

* These products are compatible with coated Lexan® sheet products Lexan® Exell® Margard®. Other silicone sealants may contain AMINO or BENZAMID curing agents which are not compatible with Lexan® sheet and may cause stress corrosion. Consult the manufacturer before using other silicone sealants.

The listed adhesives, adhesive tapes and sealants have only been tested under normal atmospheric conditions to determine their compatibility and adhesion performance with Lexan® sheet products. The actual choice of adhesive will depend upon the design of the joint, the circumstances under which the joint will be used and the prevailing environmental conditions. In all cases the adhesive type should be fully tested under exact conditions to determine complete compatibility and performance.

Chemical resistance

Taking into account the complexity of chemical compatibility, all chemicals which come into contact with Lexan 9030 sheet should be tested.

Consult our technical service center for more technical info.

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