

PLAZCRYL & PLAZCRYL SUPER (HI) EXTRUDED ACRYLIC SHEET

Sheets are produced according to ISO 7823-2:2003 standard.

PLAZCRYL sheets are made from extruded Poly Methyl Methacrylate (PMMA).
PLAZCRYL SUPER sheets are made from extruded PMMA including an acrylic impact modifier.
Grades with different impact resistance are available.

1 – Dimensions

Standard Sizes

Thickness	0.75 – 30.0	mm
Width	1000, 1220 and 2050	mm
Length	600 – 6000	mm

Sheets are also available cut to size, according to customer requirements

Thicknesses Tolerances

- Less than 1.5mm $\pm 8\%$
- Between 1.5 - 1.9 mm $\pm 4\%$
- Between 2.0 - 14.9 mm $\pm 3\%$
- Between 15.0 - 20.0 mm $\pm 5\%$
- Over 20.1mm $\pm 10\%$

Width, Length and Diagonals Tolerances

A - Sheets cut at production:

- Width & Length: $-0.0 / +3.0$ mm
- Diagonals:
Up to 4000 mm - up to 2.0 mm
Over 4000 mm - up to 4.0 mm

B - Sheets cut to size

- Width ± 0.50 mm
- Length ± 0.50 mm
- Diagonals: up to 0.5 mm

Flatness:

The maximum allowable bow for Plazcryn extruded sheets, as manufactured, will be 0.5% of linear dimensions. Maximum bow allowed across the width of the sheet shall be ≤ 5 mm per meter of width. Maximum bow allowed along the length of the sheet shall be ≤ 5 mm per meter of length. Flatness is measured on one single sheet placed on a flat and rigid surface.



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2 - Optical Quality

Sheets are examined according to several parameters that determine their optical quality. Regarding optical faults, Plazit standard is stricter than the ISO 7823-2.

Maximum number of faults are as follows:

- Black specks of 0.5 mm in size, with a minimum distance between them of 1 meter.
- Air bubbles of 0.3 mm in size, with a minimum distance between them of 1 meter.
- Fish eyes of 1 mm in size, when there are no more than five (5) on an area of 0.5 m².

Plazcryn Mirror and Top.

Plazcryn Mirror are sheets specially designed for mirror applications. Plazcryn Top are thin gauge highly optical sheets for electronic display applications. These sheets are produced using special materials in dedicated production lines with rigorous clean room environment and computerized state-of-the-art video quality control in order to detect the very small defects in the sheets.

3 - Shrinkage

During the extrusion process, as opposed to the cast process, PMMA sheets are formed and cooled while stretched. PMMA has a memory and when heated will shrink, especially in the extrusion direction, trying to get back to its relaxed form before extrusion.

1. Plazcryn standard – produced according to the shrinkage definitions of ISO standards.
2. Plazcryn for sky domes – lower shrinkage, produced upon special request, for use in thermoforming.

This characteristic of Plazcryn should be taken into account when planning the final sheet's dimensions.

	<i>Standard Grade</i>		<i>Sky Domes Grade</i>	
<i>Sheet Thickness (mm)</i>	<i>Shrinkage M.D*</i>	<i>Shrinkage T.D*</i>	<i>Shrinkage M.D</i>	<i>Shrinkage T.D</i>
1.80 – 2.30	6% – 7%	0.5%	3% – 4%	0.5%
2.30 – 3.50	5% – 6%	0.5%	2% – 3%	0.5%
3.50 – 4.00	3% – 4%	0.5%	1% – 2%	0.5%
4.00 – 6.00	2% – 3%	0.5%	0% - 1%	0.5%
6.00 ++	2%	0.5%	0% - 1%	0.5%

*M.D – Machine (extrusion) direction

*T.D – Transverse (perpendicular to extrusion) direction

4 - Colors

Plazcryn sheets are naturally colorless and exceptionally clear, however they can be pigmented to obtain a wide range of tints and colors. They are available transparent and in a wide range of translucent colors, opaque colors, opals and diffusers. Plazcryn colored sheets maintain the same light transmission percentages regardless of thickness (except for opals, diffusers and LEDs). For a list of updated colors please contact your regional supplier.



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5 – Typical Properties Values

Please note that the technical values given in the following tables are typical values for guidance and they are subjected to certain variability.

Typical Properties – Plazcryn – Extruded Acrylic Sheets

Properties	Method	Units	Plazcryn (R7000)
General			
Density	ISO 1183	g/cm ³	1.19
Water Absorption	ISO 62 (1)	%	0.3
Mechanical			
Tensile Strength	ISO 527-2	MPa	72
Elongation at break	ISO 527-2	%	4
Tensile Modulus	ISO 527-2	MPa	3300
Flexural Strength	ISO 178	MPa	106
Flexural Modulus	ISO 178	MPa	3350
Compressive Strength	ISO 604	MPa	117
Rockwell Hardens	M scale		95
Impact Resistance (Charpy unnotched)	ISO 179/1 fu	kJ/m ²	15
Impact Resistance (Charpy notched)	ISO 179/1eA	kJ/m ²	2
Impact Resistance (Izod notched)	ISO 180/1A	kJ/m ²	1.5
Optical			
Refractive Index	ISO 489		1.49
Light Transmission (3mm transparent sheet)	ASTM D1003	%	92
Haze (3mm transparent sheet)	ASTM D1003	%	< 1
Thermal			
Vicat Softening Temp.(50N)	ISO 306	°C	105
Heat Deflection Temp. (1.82 MPa)	ISO 75-1	°C	95
Coeff. of Linear Thermal Expansion (0-50°C)		µm/m°C	65
Thermal Conductivity	ASTM C177	W/mK	0.19
Maximum Continuous Service Temp.		°C	70
Maximum Short Time Service Temp.		°C	90
Minimum Temp.		°C	-40
Electrical			
Dielectric Strength	DIN 53481	kV/mm	20
Dielectric Constant (50Hz)	DIN 53483		3.7
Dissipation Factor tanδ (50Hz)	DIN 53483		0.04
Surface Resistivity	IEC 60093	Ohm	>10 ¹⁴
Volume Resistivity	IEC 60093	Ohm.cm	>10 ¹⁵



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Typical Properties – Plazcryn Super – Extruded High Impact Acrylic Sheets

Properties	Method	Units	S25 (R7700)	S30 (R7400)	S50 (R7500)	S75 (R7800)	S100 (R7600)
General							
Density	ISO 1183	g/cm ³	1.19	1.19	1.18	1.17	1.16
Water Absorption	ISO 62 (1)	%	0.3	0.3	0.3	0.3	0.3
Mechanical							
Tensile Strength	ISO 527-2	MPa	57	54	50	45	40
Elongation at break	ISO 527-2	%	22	26	30	35	40
Tensile Modulus	ISO 527-2	MPa	2450	2275	2100	1900	1700
Flexural Strength	ISO 178	MPa	88	84	79	71	62
Flexural Modulus	ISO 178	MPa	2470	2285	2100	1950	1800
Rockwell Hardness	M scale		77	73	68	56	44
Impact Resistance (Charpy unnotched)	ISO 179/1fu	kJ/m ²	51	59	67	71.5	76
Impact Resistance (Charpy notched)	ISO 179/1eA	kJ/m ²	4.3	5.3	6.2	6.9	7.6
Impact Resistance (Izod notched)	ISO 180/1A	kJ/m ²	4	4.5	5	5.6	6.3
Optical							
Refractive Index	ISO 489		1.49	1.49	1.49	1.49	1.49
Light Transmission (3mm transparent sheet)	ASTM D1003	%	92	92	91.5	91	91
Haze (3mm transparent sheet)	ASTM D1003	%	< 1	< 1	< 1	< 1	< 1
Thermal							
Vicat Softening Temp. (50N)	ISO 306	°C	99	98	97	94	90
Heat Deflection Temp. (1.82 MPa)	ISO 75-1	°C	92	91	90	85	83
Coeff. of Linear Thermal Expansion (0-50°C)		µm/m°C	70	80	100	105	110
Maximum Continuous Service Temp.		°C	65	63	63	62	62
Maximum Short Time Service Temp.		°C	86	83	81	76	74
Minimum Temp.		°C	-20	-20	-20	-20	-20



Fire Properties

PMMA is a combustible material and will burn if ignited. However, unlike other polymers, does not produce toxic or corrosive gases and produces very little smoke, an important safety benefit.

Plazcryl extruded PMMA sheets classify:

- HB according to UL94
- E according to UNE-EN ISO 13501

Chemical Properties

Some chemical substances do not produce any effect on Plazcryl, some cause staining, swelling, crazing, weakening or dissolve it completely. Plazcryl sheets have good resistance to water, alkalis, aqueous inorganic salt solutions and most common dilute acids. For information regarding specific chemicals please refer to the Plazcryl Guidebook

Important Note:

Any substance that comes with contact with PMMA should be checked for compatibility. Even if the supplier confirms that the material is suitable for PMMA, please apply it first to a hidden area to see if there are any effects. However this will cover you for short-time effects only. To assess long-term effects of substances on PMMA, laboratory testing is required.

ESC (Environmental Stress Cracking)

ESC (Environmental Stress Cracking) is a well-known phenomenon in plastics including PMMA, and a common reason of product failure. ESC is a result of the combination of stress and chemical exposure. Under harsh chemical environment, stressed sheets will fail by cracking and crazing. The level of stress needed for ESC is lower than the normal failure mechanical stress of PMMA in a chemical-free environment. Stresses can be induced during forming and fabrication. These can be eliminated by an annealing process (see Plazcryl Guidebook for machining and forming instructions). Stresses can be induced also by improper installation (see Plazcryl Guidebook for installation instructions). Cold bended sheets under permanent induced stress or sheets under periodic stress (fatigue) are also susceptible to ESC.

6 - Handling Plazcryl Sheets

Plazcryl is a rigid sheet, which with wrong handling can break, leaving sharp edges. Handling Plazcryl must be done with care, always using protective gloves and shoes.

Burning Behavior

Plazcryl sheets are combustible, and if not extinguished, will burn to completion once ignited, producing molten droplets, which will continue to burn.

When burning, in the presence of sufficient air, Plazcryl releases CO₂ and water however if there is a lack of sufficient air toxic CO can be formed.

When storing or working with Plazcryl, the necessary fire precautions must be considered, taking into account the burning behavior of Plazcryl.



Sheets Storage

Plazcryn sheets must be stored with their original protective masking in a cool, dry and well-ventilated room, at a reasonable constant temperature, away from direct sunlight, excessive humidity, rain or solvent's vapors. Failing to store Plazcryn in adequate conditions can produce distortions in the sheets and other effects, which will make later fabricating, a more difficult task. Long term exposure to the sun or other heat sources can cause fusing of the protective polyethylene film to the sheet surface, impeding its removal.

Plazcryn sheets are best stored horizontally on their delivery pallets. Pay attention to avoid pressure on the unsupported areas.

Never leave uncovered sheets or pallets. It is advisable to replace the original packaging over the stack after a sheet is removed from stock to avoid moisture absorption. If stored for long time, the use of dry-packaging is highly recommendable.

Protective Film

Both surfaces of Plazcryn sheet are protected by a fully recyclable polyethylene (PE) film. Keep this film in position as long as possible and remove only and immediately after installation. Sharp objects, sharp particles or even small chips can penetrate the protective PE masking, and damage the surface, therefore always lay Plazcryn on a clean smooth surface.

There are two kinds of protective film for Plazcryn:

1. Universal film
 - This is the standard film used on Plazit sheets.
 - This film is suitable for machining as well as for thermoforming.
2. Easy removal film
 - This film is suitable for sheets that require removal of the PE before processing.
 - This film is not suitable, if machining of the sheet is required with the protective film on the sheet.

Both of the above types of film are suitable for thermoforming and laser cutting.

Machining and Forming with PE Film

It is preferable to leave the protective film in position throughout machining to keep the sheet surface in perfect condition. Normal thermoforming temperatures do not affect the adhesive used for the film on Plazcryn sheets and can therefore be left in place during most heating and forming operations. However, care should be taken to ensure there are no defects in the film (holes, scratches, bubbles), which could mark the part during the forming process. High-heat deep-draw thermoforming applications can cause the PE film to adhere more strongly. Printed film must be removed before thermoforming, to avoid transfer of the printing ink to the sheet's surface.

Cleaning Plazcryn Sheets

Plazcryn sheets are produced in clean room environment and do not need to be cleaned before use. However, cleaning may be needed after fabrication, before sensitive processes like vacuum metallization or printing or for maintenance during use. In the case that Plazcryn sheets needs to be cleaned, wash the sheet surface with clean fresh water with a mild soap. Be sure that the soap you are using is compatible with PMMA. Test a hidden area before cleaning. Use a clean, soft cloth or sponge and rinse well. Do not scrub or use brushes. Dry with a soft cloth. Do not rub dry. The use of window cleaning fluids or solvents such as alcohols, turpentine, acetone, etc., can cause damage to the sheet.



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Plazcryn Environmental Advantages

Plazcryn sheets are environmental friendly. LCA (Life Cycle Assessment) is a methodology used to assess the environmental impact of a product. The LCA evaluates quantitative information about resources consumption and waste production during the whole life cycle of a product (cradle to grave). LCA and Ecoprofiles of PMMA sheet production show a low impact on the environment. (see: <http://www.plasticseurope.org/plasticssustainability/eco-profiles> for an Ecoprofile of PMMA extruded sheets, including Plazcryn). The outstanding chemical stability and long-time resistance to aging and weathering of Plazcryn sheets often ensures a service time of decades. They do not need to be removed or replaced for many years reducing the environmental burden of plastics waste. The sheets and their polyethylene protective layers are fully recyclable. They do not contain any toxic materials, halogens or heavy metals which may cause environmental damage or health risks. Plazcryn sheets do not contain Bisphenol-A. Ozone Depleting Substances (ODP) are not used in the manufacture of Plazcryn sheets. Plazcryn do not release pollutant substances to the environment during manufacture. They do not produce toxic or corrosive gases upon burning. Fires can be extinguished with water. Plazcryn sheets can be used for energy recovery and chemical or mechanical recycling. Plazcryn scrap is not classified as hazardous waste. Small amounts can be disposed as household refuse. Large quantities should be disposed for recycling.

Working with Plazcryn Sheets

For general guidelines about how to work with Plazcryn sheets please refer to the Plazcryn Guidebook.

All information, recommendations or technical advice given in this technical sheet, is given in good faith, to the best of our knowledge and based on our present experience and procedures. However, no liability or other legal responsibility is assumed for the full adequacy, accuracy or completeness of this information. We reserve the right to make any changes, according to technological progress and further developments. The customer is not released from the obligation to conduct careful inspection and testing of incoming goods.

Product design using Plazcryn sheets must be carried out only by qualified experts in the sole responsibility of the customer. Performance should be verified by testing, carried out only by qualified experts in the sole responsibility of the customer.



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