TOP PMMA - PLASKOLITE ULTRA-HIGH OPTICAL QUALITY THIN-GAUGE EXTRUDED PMMA SHEETS

EUROPE

DESCRIPTION

TOP EXTRUDED SHEETS (TOP) are the latest technology breakthrough of PLASKOLITE.

PLASKOLITE TOP sheets are polymethyl methacrylate (PMMA) sheets specially designed for optical applications. TOP PMMA sheets are produced using special ultra-clean materials, the most advanced extrusion lines in the world, rigorous clean room environment and computerized state-of-the-art video technology in order to detect the smallest imperfections, and designed specifically for electronic display application (screens and panels).

Typical Properties

Properties	Method	Units	Values
General			
Density	ISO 1183	g/cm^3	1.19
Water Absorption	ISO 62 (1)	%	0.3
Mechanical			
Tensile Strength	ISO 527-2	MPa	>70
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 Hardness	M scale		95
Impact Resistance (Charpy unnotched)	ISO 179/1fu	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 (thickness dependent)	ASTM D1003	%	>92
Haze (thickness dependent)	ASTM D1003	%	< 0.5
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)	ISO 11359	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	20-25
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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For more information, please contact PLASKOLITE Technical Support.

DIMENSIONS

Thickness, mm	Width, mm	Length, mm
0.5, 0.65, 0.8, 1.0, 1.5, 2.0	Up to 1250 max	600 – 3000

Other thicknesses may be available upon request.

Sheets are also available cut-to-size according to customer requirements.

TOLERANCES FOR DIMENSIONS

Sheet Thickness, mm	Thickness Tolerances, %	Width Tolerances, mm	Length Tolerances, mm	Diagonals Tolerances, mm	Flatness Tolerances
0.5-0.65	± 2	Sheets cut at production: -0.0 /+2.0 Sheets cut to size: ± 0.25	Sheets cut at production: -0.0 /+3.0 Sheets cut to size: ± 0.25	Sheets cut at production: ±2	Max allowed bowing - 0.5% from linear dimensions. Flatness is measured on one single sheet placed on a flat and rigid surface.
0.8-1.5	± 1				

OPTICAL QUALITY

Sheets are examined according to several parameters that determine their optical quality

Defect	Inspection method	Quality Standard
Scratch	Eye test from 350 mm at angle 25°-45°	Very weak scratches are allowed, scratches of more than 0.02 mm width are not allowed
Ripple		Inconspicuous even ripple is allowed. Obvious ripple is not allowed.
Foreign Particles	Particles ≥ 1.0mm^2	Not Allowed
	0.5mm^2 ≥ Particles ≤ 1.0 mm^2	5 particles or less for sqm
	Particles smaller than 0.5 mm^2	Allowed
Grain (Dot)	Eye test from 350 mm under daylight lamp of 1000 Lux	- Dot allowed < 0.1 mm ^{2} - 50 dots per m^2 for 0.1-0.3 mm^2 - 8 dots per m^2 for 0.3-0.5 mm^2 - Dots not allowed > 0.5 mm ^{2}
Bubble		Bubbles not allowed > 0.1 mm ^{2}
Edges		Neat and clear edges, no cracks and big dust particles

* All quantities refer to an area of 1.0 sqm

COLORS

TOP sheets are naturally colorless and clear.

For optical data, please contact PLASKOLITE Technical Support.

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DEFINITIONS

FIRE TEST PERFORMANCE

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. When storing or working with TOP sheets, the necessary fire precautions must be considered.

PLASKOLITE extruded PMMA sheets classify:

- HB according to UL94
- E according to UNE-EN ISO 13501 (for 2 mm only)

CHEMICAL RESISTANCE

Some chemical substances do not produce any effect, some cause staining, swelling, crazing, weakening or dissolve it completely. PLASKOLITE “TOP” sheets have good resistance to water, alkalis, aqueous inorganic salt solutions and most common dilute acids.

The chemical stability depends on many factors such as concentration of the chemical agents, internal stresses and exposure temperature.

Important Note:

Any substance that meets TOP sheets should be checked for compatibility. 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 TOP sheets, laboratory testing is required.

For information regarding specific chemicals please refer to PLASKOLITE Technical Support.

ENVIRONMENTAL STRESS CRACKING

Environmental Stress Cracking (ESC) is a result of the combination of stress and exposure to chemicals. 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 created during forming and fabrication and can be controlled by an annealing process. Stresses can be created also by improper installation. Cold bended sheets under permanent induced stress or sheets under periodic stress (fatigue) are also susceptible to ESC.

GENERAL GUIDELINES

STORAGE

TOP sheets should 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 TOP sheets in adequate conditions can compromise the performance of the product. 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. TOP sheets are best stored horizontally on their delivery pallets. Pay attention to avoid pressure on the unsupported areas. Never leave the sheets on uncovered pellets.

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PROTECTIVE FILM

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

The PE cover is examined according to several parameters that determine its quality.

Defect	Inspection method	Quality Standard
Uniformity	Eye test over light box	Area with ripples < 1%
Dust		Slight dust below the edge of the sheet, up to 2 mm from the edge, is allowed
Scratch		Not allowed if it cuts through until the sheet surface
Glue residue		Not allowed

CLEANING & MAINTENANCE

TOP 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 coating, vacuum metallization or printing or for maintenance during use. In the case that TOP 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 the sheets. 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.

ENVIRONMENTAL ADVANTAGES

TOP sheets are environmentally friendly. The sheets and their polyethylene protective layers are fully recyclable. They do not contain any toxic materials or heavy metals, which may cause environmental damage or health risks. Ozone Depleting Substances are not used in the manufacture of TOP sheets. TOP sheets 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. TOP sheets can be used for energy recovery and chemical or mechanical recycling. TOP scrap is not classified as hazardous waste. Small amounts can be disposed as household refuse. Large quantities should be disposed for recycling.

RE-WORKING

- HANDLING:

  TOP is a rigid sheet, which with wrong handling can break, leaving sharp edges.
  Handling of TOP sheets must be done with care, always using protective gloves and shoes.
  TOP sheets can be cut, sawn, drilled, milled and bent easily using standard workshop equipment for wood or metal. However, it is always recommended to use specific tools specially designed for plastics.

- 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 TOP 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.
  Machining, Assembling, Forming, Glazing and Signage Installation recommendations can be found to PLASKOLITE Technical Support.

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