

lucitelux™ optical grade

TECHNICAL BULLETIN

Optical Grade sheet offers excellent optical characteristics, uniform thickness tolerances, light stability, and low internal stress levels for consistent performance. Optical Grade sheet is weatherable and can be easily cut, sawed, machined, thermoformed and cemented. Optical Grade is half the weight of glass with double the impact resistance.

Certified to meet or exceed the current version of LP-391 and ASTM-D-4802.

FEATURES & BENEFITS

- Outstanding optical properties
- More impact resistant than glass
- Allows for easy fabrication and fitting
- Broad scope for thermoforming into complex curved shapes
- Smooth, glossy surface that is comfortable and warm to the touch
- Easy to clean
- Excellent weather resistance
- Uniform caliper control
- Lightweight

APPLICATIONS

- Motorcycle Windshields
- Aviation applications for non-military such as general aviation windshields
- Helicopter window applications
- Frame Grade
- Recreational Windshields

FABRICATION

Machining

Optical Grade can be cut, drilled and shaped using traditional acrylic fabricating techniques.

To avoid scratching during such procedures, masking should remain in place as long as possible.

Cementing

Optical Grade can be cemented using solvent cement, embodied cement and two-component polymerizable cements.

Painting

Optical Grade can be decorated using standard acrylic-based paints and silk-screen inks. As with any acrylic painting or screening operation, avoid heavy coats of paint or excessive flooding of screen inks which allow solvents or thinners to remain in contact with the acrylic surface and cause crazing.

Recommended Paints:

- Grip-Flex®, Wyandotte Sign Finishes, Norcross, GA.
- Lacryl®, Spraylat Corporation, Mount Vernon, NY.
- Recommended Screen Inks:
- Multi-Vac Series® Inks, Advance Excello, Chicago, IL.
- 70,000® Series Inks, Naz-Dar Company, Chicago, IL.

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*For sales and information,
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THERMOFORMING

Optical Grade can be thermoformed to any contour – from subtle curves to complex shapes. The forming temperature range recommended for shaping sunbed covers is 320°F +/- 10°F.

Heating Methods

There are two basic heating methods utilized in forming Optical Grade:

- Vertical oven heating
- Horizontal oven heating

If a vertical oven is used, it may be necessary to trim off the edges where clamp marks are present. Clamp along the short edge, exercising great care to ensure the sheets are not exposed to temperatures above 320°F; otherwise stretching of the sheet may occur.

To prevent surface marring, sheets should be loaded onto supporting trays covered with layers of felt or similar material. Dimensional changes will occur when an acrylic sheet is heated freely in an air oven and drape molded without clamping.

The inherent strain present in continuous cast acrylic sheet is relaxed when heated, giving rise to some shrinkage. Precise shrinkage is dependent upon variables such as cycle time, heating temperature, and forming method.

Notes:

(1) Based on laboratory tests conducted in a Q-Panel Company Q-U-V Accelerated Weathering Tester equipped with UVA-340 lamps.

CLEANING

To clean acrylic sheet:

- Dissolve mild liquid detergent in cool water.
- Dip soft, clean cloth in solution and wring out.
- Wipe the surface of the sheet.
- Allow surface to dry naturally, or wipe with a separate cloth slightly dampened with solution.

WARNING: Do not allow concentrated disinfectant, surgical or methylated spirits, any liquid containing alcohol or any other solvents to come in contact with LUCITE® OPTICAL GRADE ACRYLIC SHEET.

DISINFECTION

To disinfect acrylic sheet:

- Dilute an antiseptic or hospital concentrate with cool or cold water in the amount recommended on the label for general disinfection.
- Wipe the surface as described under CLEANING.

CAUTION: When using acrylic sheet in conjunction with applications where electrical units are attached, the unit must be unplugged before cleaning or disinfection. Great care must be taken to see that no water or solution enters the electrical compartment.

DUSTING

Use a soft, clean, slightly damp cloth when dusting. Never use a dry cloth. This tends to generate a static charge which will attract more dust.

POLISHING

If the surface of Lucite® acrylic sheet becomes scratched, it can generally be restored by using a polishing paste designed for use with acrylic or a mild abrasive metal polish applied on a soft clean cloth. If the scratches are too deep to be removed by this method, use a piece of 600 grade waterproof sandpaper (wet). When the surface is smooth, the gloss can be restored with metal polish. Power buffing is only recommended for professional fabricators.

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PHYSICAL PROPERTIES

		Test Method	Typical Value ^(a)
General	Specific Gravity	ASTM D792	1.19
Mechanical	Tensile Strength	ASTM D638	11,000 psi
	❖ % Elongation @ break		7.6%
	❖ Modulus of elasticity		465,000 psi
	❖ % Elongation @ yield		6.0%
	Flexural Strength	ASTM D790	14,700 psi
	❖ Flexural modulus (tangent)		461,000 psi
	Impact Strength		
❖ Compressive strength (x-y plane)	ASTM D695	83,300 psi	
❖ Compressive stress @ yield		18,000 psi	
❖ Compressive modulus		279,000 psi	
❖ Charpy (un-notched)	ASTM D256	5.0 ft lb/in/in	
❖ Charpy (notched)	ASTM D6110	20.8 J/m	
❖ Shear Strength (punch tool)	ASTM D732	11,200 psi	
Rockwell Hardness	ASTM D785	M-100	
Residual Shrinkage (b) (Internal Strength)	ASTM D702	2.5 % maximum	
Optical	Refractive Index	ASTM D542	1.49
	Light Transmission, Total	ASTM D1003	> 95%
	Haze	ASTM D1003	Less than 1%
	Yellowness index (YI)		Less than 0.3
	Surface Abrasion Resistance (c) (Taber , CS-10)	ASTM D1044	500 cycles : < 1% 1000 cycles: <2%
Thermal	Maximum Continuous Service Temperature		175°F (d)
	Coefficient of Thermal Conductivity		1.45 Btu in./ft ² hr. °F
	Deflection Temperature under load, 264 psi	ASTM D648	200°F
	Hot Forming Temperature		280°-340°F (138°-170°C)
	Coefficient of Linear Thermal Expansion	ASTM D696	3.5 E-05 in/in/°F
	Specific Heat		0.35 Btu/ lb (°F)
Electrical	D-C Resistance		
	❖ Volume Resistivity	ASTM D257	>3.912E+15 Ω/cm
	❖ Surface Resistivity		> 5.237E+15 Ω/sq
Dielectric Strength (2000v/sec)	ASTM D149	354 V/mil	

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	Dielectric Constant, k' ❖ 60 Hz ❖ 1 KHz ❖ 1MHz Dissipation Factor, D ❖ 60Hz ❖ 1KHz ❖ 1MHz Arc Resistance	ASTM D150 ASTM D495	3.3 3.0 2.7 0.06 0.04 0.02 No tracking
Combustibility	Smoke Density Rating Tunnel Test (smoke developed) ❖ 0.118" ❖ 0.236"	ASTM D2843 ASTM E84	13.5% 385 530
	Rate of Flame Spread ❖ 0.118" ❖ 0.236"	ASTM E84	140 110
	Fuel contribution factor Ignition temperature	- ASTM D1929	11,300 Btu/lb 750°F (399°C)
	Radiant Panel, Flame spread index ❖ 0.118" ❖ 0.236"	ASTM E162	219 249
	Horizontal Burn ❖ 0.118" ❖ 0.236"	ASTM D635	1.18 in. /min. 0.65 in./min
	UL Horizontal Burn Rating	UL94	94 HB (f1); (f2)
Miscellaneous			
Water Absorption	24 hrs @ 23°C 2 hrs boiling water immersion	ASTM D570	0.2% 0.6%
	Soluble Matter Lost (post immersion)	ASTM D570	Nil
	Odour	-	Nil
Specifications	Code compliance	LP 391 D ASTM D4802 ANSI Z-26.1	Item A, Type 1, Grade C Category A-2, finish 1 Standards 205 & 302

Notes:

- a) Values provided should not be used for specification purposes. Some values will vary with sheet thickness.
- b) Measured at room temperature before and after heating above 300° F.
- c) Numerical values indicate % light transmission loss after indicated cycles.
- d) It is recommended that temperatures not exceed 180°F for continuous service

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