lucitelux™ utran®

TECHNICAL BULLETIN

Utran® acrylic sheet is designed specifically for transmission of ultraviolet A light (UV-A) and ultraviolet B light (UV-B). Ultraviolet light is the range of invisible radiation wavelengths from about 4 nanometers (nm), near the x-ray region, to about 400 nm, just beyond violet in the visible spectrum. UV-A light (320-400 nm) and UV-B light (280-320 nm) are used in many applications, from medical treatment to suntanning. Utran® acrylic sheet is transparent to UV light and provides the superior quality and clarity needed in these applications.

FEATURES & BENEFITS

- 92% UV Transmission
- Withstands heavy-duty, continuous use
- 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

APPLICATIONS

- Indoor Suntanning Equipment
- Animal Habitats
- Greenhouses and Solaria
- Medical Treatment Devices
- Photodegradable Waste Enclosures
- Full Spectrum Lighting

FABRICATION

Machining

Utran® acrylic sheet 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

Utran® acrylic sheet can be cemented using solvent cement, embodied cement and two-component polymerizable cements.

Painting

Utran® acrylic sheet 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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THERMOFORMING

Utran® acrylic sheet 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 Utran® acrylic sheet:

- 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.

Although vertical air ovens may be used, it is preferable to form sunbed covers using a horizontal oven.

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.

As a general rule, sunbed blanks should be ordered 2-1/2% oversize to allow for shrinkage and for any trimming that may be necessary to correct slight changes in rectangularity.

CLEANING

Utran® acrylic sheet provides excellent resistance to staining from dirt, bacteria or perspiration. It also resists chemical attack from tanning lotions and crazing agents such as household cleaners, cosmetics and mild disinfection agents.

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® UTRAN 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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INDOOR TANNING APPLICATIONS

The tanning process is the result of exposure to a natural balance of ultraviolet radiation in the UV-A and UV-B wavelength range. Since most lamps in tanning equipment emit low levels (2-7%) of the UV-B wavelength, it is important to maintain efficient light transmission in this range. Utran® acrylic sheet continues to transmit more than 80% of the UV-B wavelength after 2500 hours exposure to ultraviolet light.[1] This exceptional performance ensures that Utran® acrylic sheet will continue to perform well within its service life. The average service life of an acrylic sheet in a commercial tanning bed is less than 2000 hours, due to scratches and stains that are impractical to remove by polishing.

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

ULTRAVIOLET TRANSMISSION

Utran® acrylic sheet has been developed for applications requiring high UV transmission and strong resistance to degradation by UV light.

Utran® acrylic sheet transmits a high percentage of light in the UV regions, beginning with low level transmission at 250 nanometers (nm) to 92% at 400nm.

ULTRAVIOLET RESISTANCE

Utran® acrylic sheet's resistance to ultraviolet light degradation means that long-term exposure to UV radiation in a sunbed or other application is unlikely to have any effect on its performance. The loss of UV transmittance is dependent upon UV intensity, duration of exposure, type of lamp, service wattage, ventilation and care of the sheet.

The graph below depicts the transmission of Utran® acrylic sheet in the ultraviolet region.

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PHYSICAL PROPERTIES

Wavelength (^{nm})	UVT range*
UTRAN @ 280	25.6 -30.2
UTRAN @ 290	56.1 -66.0
UTRAN @ 300	70.9 -83.4
UTRAN @ 320	75.3 -88.6
UTRAN @ 340	76.0 -89.4
UTRAN @ 380	78.5 -92.3

		Test Method	Typical Value [a]
General	Specific Gravity	ASTM D792	1.19
Mechanical			
	Tensile Strength ❖ % Elongation @ break ❖ Modulus of elasticity ❖ % Elongation @ yield	ASTM D638	11,000 psi 7.6% 465,000 psi 6.0%
	Flexural Strength Flexural modulus (tangent)	ASTM D790	14,700 psi 461,000 psi
	Impact Strength ❖ Compressive strength (x-y plane) ❖ Compressive stress @ yield ❖ Compressive modulus ❖ Charpy (un-notched) ❖ Charpy (notched) ❖ Shear Strength (punch tool) ❖ Izod (procedure A)	 ASTM D695 ASTM D256 ASTM D6110 ASTM D732 ASTM D256	 83,300 psi 18,000 psi 279,000 psi 5.0 ft lb/in/in 20.8 J/m 11,200 psi 0.32 ft-lb. / in.
	Rockwell Hardness	ASTM D785	M-100
	Residual Shrinkage (b) (Internal Strength)	ASTM D702	2.5 % maximum
Optical	Refractive Index	ASTM D542	1.49
	Haze Light Transmission	 ASTM D1003	Less than 1% 92%
	Yellowness index (YI)		Less than 0.3
	Surface Abrasion Resistance (c) (Taber , CS-10)	 ASTM D1044	500 cycles : < 1% 1000 cycles: <2%
			• *Continued on next page.* •

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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
	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 ❖ Surface Resistivity	 ASTM D257	 >3.912E+15 Ω/cm > 5.237E+15 Ω/sq
	Dielectric Strength (2000v/sec)	ASTM D149	354 V/mil
	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" Rate of Flame Spread ❖ 0.118" ❖ 0.236" Fuel contribution factor Ignition temperature Radiant Panel, Flame spread index ❖ 0.118" ❖ 0.236" Horizontal Burn ❖ 0.118" ❖ 0.236"	ASTM D2843 ASTM E84 ASTM E84 - ASTM D1929 ASTM E162 ASTM D635	13.5% 385 530 140 110 11,300 Btu/lb 750ºF (399°C) 219 249 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
	Taste	-	n/a
	Dimensional tolerances, inches ❖ Length – width ❖ Squareness (Δ in length of diagonal)		 +1/4" – 0" ≤ 1/4"

* All listed test values are on 0.236" thick Lucite™ acrylic

Notes:

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

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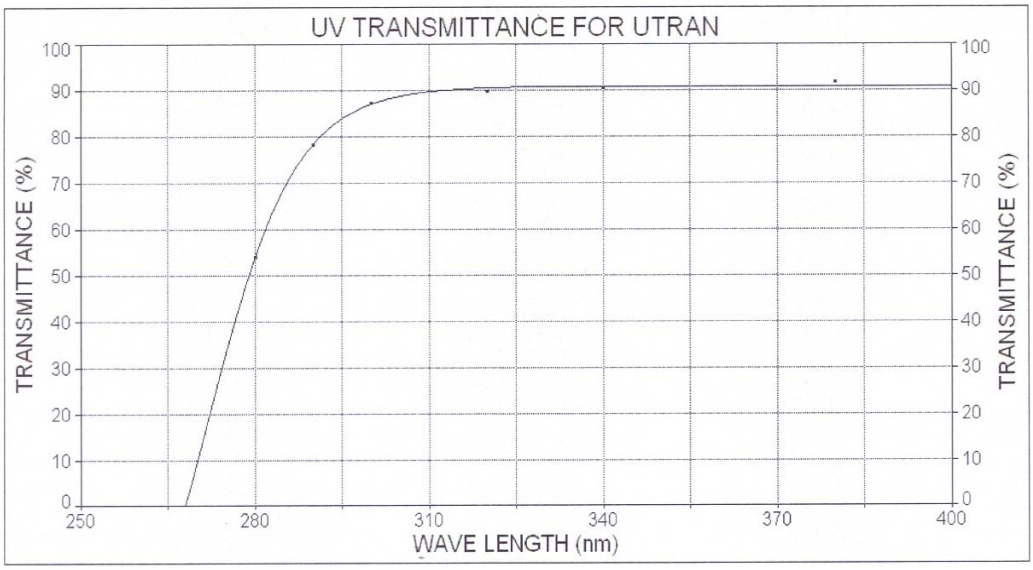
Warning for use: *Utran® is an acrylic sheet used in such applications as sun tanning beds and allows transmission of harmful UV light. Exposure to UV light can cause cancer, cataracts, possible immune suppression, violent outbreaks of skin-related conditions such as herpes lesions, and premature aging of the skin.*



(Graph depicts %UVT on .100" thick UTRAN® acrylic sheet)

Optical Advantages:

Based on product testing and historical data, Lucite International, Inc. submits that UTRAN® acrylic sheet should maintain indices values as per ASTM D1925/ E313-10 of YI ≤ delta E of 5 units for a duration of not less than 1 year of continuous service.

We further state that any assurance offered would not cover loss of UVT caused by the use of oils, lotions, cosmetics, cleaners, pesticides and/or disinfectants that create yellowing, crazing, scratches, dirt, breakage, stains or other damage to the sheet.

All assertions cover UTRAN® continuous cast acrylic sheet as produced and do not pertain to end-use of the product. Users should make their own tests to determine the suitability of the product for their own particular purpose.

The information and recommendations in this publication are, to the best of our knowledge, reliable. Users should perform their own tests to determine the suitability of these products for their own particular purposes. Statements made herein should, therefore, not be construed as representations or warranties. The responsibilities of Lucite International, Inc. for claims arising out of breach of warranty, negligence, strict liability, or otherwise is limited to the purchase price of the material. Statements made herein concerning the use of the products or formulations described herein are not to be construed as granting a license to operate under any patent of Lucite International, Inc. or another, or as recommending the infringement of any patent of Lucite International, Inc. or another, and no liability for infringement arising out of any such use is assumed.

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