



CYRO Industries
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Acrylite[®] OP-4

ACRYLIC SHEET

Ultraviolet-Transmitting Acrylic Sheet

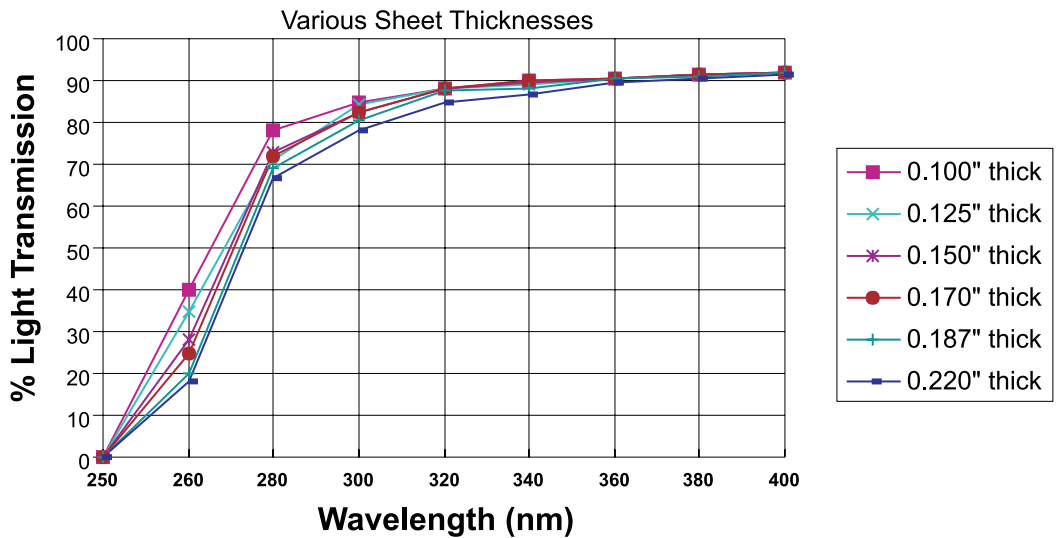
Ultraviolet Transmission

ACRYLITE[®] OP-4 acrylic sheet is designed for use in indoor sun tanning equipment. It offers high levels of UV light transmission and strong resistance to degradation caused by UV light.

ACRYLITE OP-4 sheet transmits a high percentage of light in the UV-A (315 – 400 nm) and UV-B (280 – 315 nm) regions. Only a small portion of light in the UV-C region (200 – 280 nm) is transmitted. Light transmission, particularly in the UV-C and UV-B regions, will be dependent on sheet thickness. However, for thicknesses of sheet below 1/4", differences are small, as shown in Figure 1 below.

Low levels of light transmission typically begin at about 250 nm and then increase steadily as wavelength increases. At 300 nm, the light transmission of ACRLITE OP-4 sheet is approximately 80%. The transmission level increases to approximately 92% at 400 nm, the upper limit of the UV region.

Figure 1: Light Transmission of ACRYLITE OP-4 Sheet



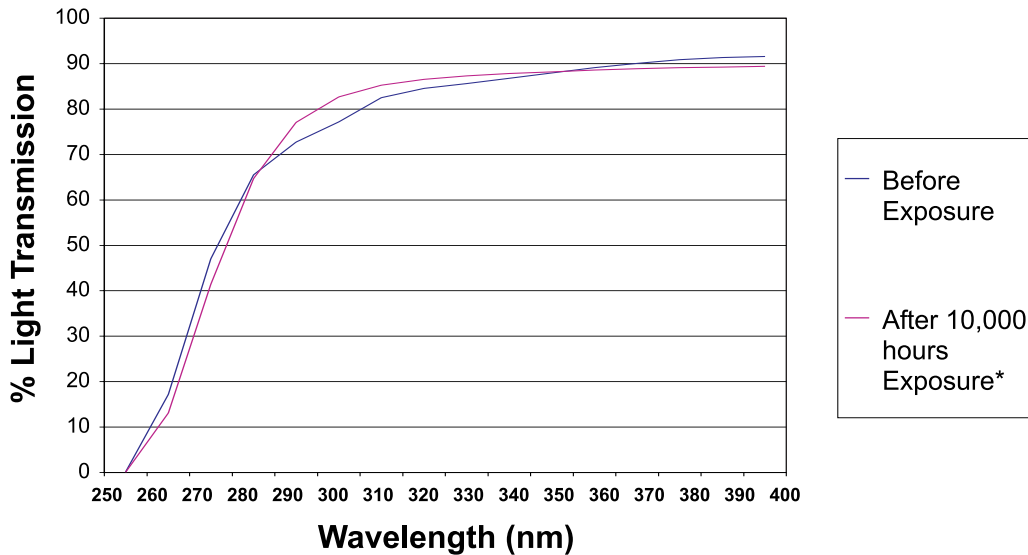
Ultraviolet Resistance

The ability of ACRYITE OP-4 sheet to resist ultraviolet light without loss of physical properties is important in applications such as indoor sun tanning equipment. If the sun tanning bed is to produce consistent and rapid tanning results, the acrylic sheet must maintain consistently high levels of light transmission in the UV-A and UV-B regions during the life of the material.

The light transmission of the acrylic sheet measured at 300 nm is a useful parameter for gauging a sheet's performance in sun tanning bed applications. Most commercial tanning bulbs only emit a few percent of their total light energy in the UV-B region (280 – 315 nm). However, UV-B light is necessary to cause erythema, a slight reddening of the skin, which is necessary to initiate the tanning process.

Without erythema the pigmentation process resulting in tanning cannot begin. The pigmentation process is subsequently caused by exposure to UV-A light. Because UV-B exposure is needed before tanning can start, the light transmission of the acrylic sheet at 300 nm can have a very significant affect on the overall performance of a sun tanning bed.

Figure 2: Light Transmission of ACRYLITE OP-4 Sheet Before and After Tanning Bulb Exposure



* Exposure to a GENESIS 170W VHO lamp from a distance of 1.25" with air temperature maintained at 80°F

Service Life

ACRYLITE OP-4 sheet stands up to various climate conditions. Natural UV light and high humidity will not harm it.

ACRYLITE OP-4 sheet can be expected to outlast other acrylic materials due to its ability to maintain light transmission and resist UV degradation. In Figure 2 above, the light transmission of ACRYLITE OP-4 sheet is shown before and after 10,000 hours of exposure to a sun tanning bed bulb. The light transmission is nearly unchanged.

ACRYLITE OP-4 sheet comes with a limited 10,000 hour warranty against loss of light transmission due to exposure to sun tanning bulb radiation. For details, contact your local Authorized Distributor or call CYRO Industries' Technical Service Department at (203) 795-6081.

When sheets are replaced, it is usually due to physical wear or mechanical damage. Following proper care and cleaning procedures will help to ensure maximum life of the sheet.

Cleaning

ACRYLITE OP-4 sheet is easy to clean. Clean with a soft cloth or chamois and a solution of mild detergent and lukewarm water.

ACRYLITE OP-4 sheet offers excellent resistance to staining from dirt, bacteria, and perspiration.

NOTE: When cleaning, never use concentrated disinfectants, solvents such as methyl alcohol or other liquids containing alcohol. CYRO's Technical Service department can assist with the selection and evaluation of compatible cleaning solutions.

Scratches can be removed by rubbing with a polishing paste designed for use with acrylic or by using a solvent-free car polish.

Safety

ACRYLITE OP-4 sheet is more impact resistant than glass. If subjected to impact beyond the limit of its resistance, it does not shatter into small slivers but, rather, breaks into comparatively large pieces.

Comfort

ACRYLITE OP-4 sheet is comfortable and warm to the touch, making it attractive to the tanning bed user.

Machining and Fabrication

Users can machine ACRYLITE OP-4 sheet with all the same tools recommended for ACRYLITE® GP acrylic sheet. As with ACRYLITE GP sheet fabrication, the masking should remain in place as long as possible to avoid scratching.

For general fabrication guidelines refer to our brochure, Working with ACRYLITE® acrylic sheet, (#1084) or visit the Techknowlogy Center at www.cyro.com.

Physical Properties

With the exception of its unique light transmission properties, ACRYLITE OP-4 sheet has similar physical properties to ACRYLITE GP sheet. Typical values are listed on the next page.

Physical Properties of ACRYLITE OP-4 sheet

Property ^(a)	ASTM Method	Typical Value (0.25" Thickness) ^(b)
Mechanical		
Specific Gravity	D 792	1.19
Tensile Strength	D638	10,000 psi (69 M Pa)
Elongation, Rupture		4.2%
Modulus of Elasticity		4000,000 psi (2800 M Pa)
Flexural Strength (Rupture)	D 790	16,500 psi (114 M Pa)
Modulus of Elasticity		475,000 psi (3300 M Pa)
Compressive Strength (Yield)	D 695	18,000 psi (124 M Pa)
Impact Strength		0.4 ft. lbs/in. of notch
Izod Milled Notch	D 256	(21.6 J/m of notch)
Rockwell Hardness	D 785	M-94
Barcol Hardness	D 2583	49
Optical (Clear Material)		
Refractive Index	D 542	1.49
Light Transmission, Total	D 1003	92%
Haze	—	Less than 1%
Thermal		
Forming Temperature	—	300-350 °F (149-177°C)
Deflection Temperature under load, 264 psi	D 648	192°F (89°C)
Maximum Recommended Continuous Service Temperature	—	140°F ^(c) (60°C)
Coefficient of Linear Thermal Expansion	D 696	.000040 in/in/°F (.000072 in/in/°C)
Coefficient of Thermal Conductivity (k-Factor)	Cenco-Fitch	1.3 BTU/(Hr) (Sq. Ft.) ((°F/in.) (0.19 w/m ² K)
Specific Heat @ 77°F	—	0.35 BTU/(lb.) (°F) (1470J/Kgk)
Electrical		
Dielectric Strength Short Time (0.125"-thickness)	D 149	430 volts/mil (17 KV/mm)
Dielectric Constant		
60 Hertz	D 150	3.5
1,000 Hertz		3.2
1,000,000 Hertz		2.7
Dissipation Factor		
60 Hertz	D 150	0.06
1,000 Hertz		0.04
1,000,000 Hertz		0.02
Volume Resistivity	D 257	1.6 x 10 ¹⁶ ohm-cm
Surface Resistivity	D 257	1.9 x 10 ¹⁵ ohms
Water Absorption		
24 hrs @73 °F	D 570	0.2%
Weight Gain during Immersion		0.2%
Soluble Matter Lost		0.0%
Water Absorbed		0.2%
Dimensional Change during Immersion		0.0%
Long Term Water Absorption		
Weight Gain during Immersion	D 570	
7 days		0.5%
14 days		0.6%
21 days		0.8%
35 days		1.0%
48 days		1.1%
Odor	—	None
Taste	—	None

NOTES: (a) Typical values; should not be used for specification purposes.

(b) Values shown are for 0.250" thickness unless noted otherwise. Some values will change with thickness.

(c) It is recommended that temperatures not exceed 140°F for continuous service or 160°F for short, intermittent use.

Thermoforming

ACRYLITE OP-4 sheet can be thermoformed using the guidelines for ACRYLITE GP sheet. Recommended forming temperature is 320°F. If the part is line bent, annealing at 180°F will provide optimum strength and quality.

Cementing

ACRYLITE OP-4 sheet can be cemented using the same solvent cements, thickened cements or two-part polymerizable cements used for ACRYLITE GP sheet. Contact CYRO's Technical Center, consult our publication Working with ACRYLITE acrylic sheet (#1084) or visit the Techknowlogy Center at www.cyro.com for more information on recommended cements. Be sure to obtain a material safety data sheet (MSDS) from the cement manufacturer and follow their recommendations.

Flammability

ACRYLITE OP-4 sheet is a combustible thermoplastic. Precautions should be taken to protect the material from flames and high heat sources. The products of combustion are carbon dioxide and water, if sufficient air is present. However, in many fires sufficient air will not be available and toxic carbon monoxide will be formed, as it will from other common combustible materials. We urge good judgment in the use of this versatile material and recommend that building codes be followed carefully to assure it is used properly.

Important Notice:

The information and statements herein are believed to be reliable but are not to be construed as a warranty or representation for which we assume legal responsibility. Users should undertake sufficient verification and testing to determine the suitability for their own particular purpose of any information or products referred to herein. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS MADE. Nothing herein is to be taken as permission, inducement or recommendation to practice any patented invention without a license.

We invite you to visit our TechKnowlogy Center on www.cyro.com.

Visitors have immediate access to frequently asked questions, technical concerns, physical properties, processing conditions, fabrication tips, regulatory compliance information, engineering guidelines, tips for troubleshooting, and hundreds of other facts about acrylics from one of North America's leading manufacturers of acrylic-based polymer and sheet products.



Technical Service

For more information or specific questions about your project, contact CYRO's Technical Service Representatives.

Sales Offices

For the name of your local Authorized Distributor, visit www.cyro.com or call 800-631-5384.

