ACRYLITE®

ACRYLITE® LED sign grade
Physical Properties

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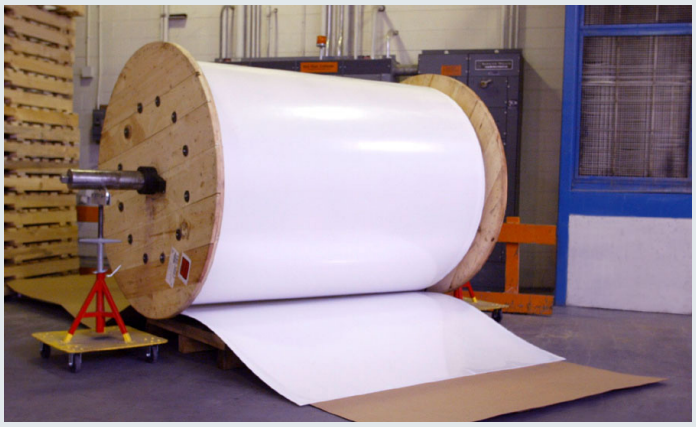
ACRYLITE® LED sign grade is a continuously manufactured, thermoplastic sheet product developed specifically for the sign market. It is produced utilizing innovative polymers and the same proprietary technology used when manufacturing ACRYLITE® extruded sheet. ACRYLITE® LED sign grade is the universal sign product which combines light weight and high optical quality with outstanding ease of fabrication and greater impact strength than standard acrylic sheet.

Characteristics

ACRYLITE® LED sign grade is a versatile thermoplastic sheet that is rigid, tough, lightweight, and offers ease of fabrication and machining. Cutting, routing, drilling, forming and cementing can be performed on ACRYLITE® LED sign grade. Specifically designed for the sign industry, ACRYLITE® LED sign grade is ideal for use in channel letters, formed letters and shapes as well as back-painted signs. ACRYLITE® LED sign grade offers the look of acrylic with the impact strength required for fabrication, handling, shipping and sign installation.

Availability

ACRYLITE® LED sign grade is available in 3.0 mm (0.118") and 4.5 mm (0.177") thicknesses. Standard sheet sizes are 51" x 100" and 75" x 100". Custom sizes are available upon request. White, colorless and some colors are available in 4.5 mm (0.177") thickness, in sizes of 75" x 125". All sheets are protected with paper masking. ACRYLITE® LED sign grade is also available on reels in 4', 5', 6', and 8' widths in several thicknesses.



Impact Strength

ACRYLITE® LED sign grade is a modified acrylic sheet with much higher impact strength than glass or standard acrylic sheet. (Testing per ASTM D 5420).

Lightweight

ACRYLITE® LED sign grade weighs about half as much as glass.

Rigidity

ACRYLITE® LED sign grade is more rigid than many other plastics including polycarbonates, co-polyesters and vinyls. ACRYLITE® LED sign grade has greater surface hardness than polycarbonates and is less susceptible to surface marring during fabrication, installation and sign usage.

Weather Resistance

ACRYLITE® LED sign grade offers excellent weatherability. It will withstand most outdoor conditions for many years without significant deterioration of clarity, color or physical properties. Actual results will vary due to differences in exposure to sunlight, moisture, heat and environmental pollutants.

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Strength and Stresses

Tensile strength of ACRYLITE® LED sign grade is 8,800 psi at room temperature (ASTM D 638). Continuous loads well below 8,800 psi will lead to stress crazing and eventual failure. For applications subject to continuous loadings, the design should allow for a load that will not exceed 600 psi at 23 °C (73 °F).

Expansion and Contraction

Like most other plastics, ACRYLITE® LED sign grade will expand and contract due to temperature changes. Its co-efficient of thermal expansion is about 3 times greater than that of metal and about 8 times greater than that of glass. The fabricator must be aware of this and make appropriate provisions. A 48" panel will expand and contract approximately 0.002" for each °F change in temperature. In outdoor use, where summer and winter conditions differ as much as 100 °F, a 48" sheet will expand and contract approximately 1/4".

Heat Resistance

ACRYLITE® LED sign grade can be used at temperatures up to 160 °F. When colorless sheet is exposed to temperature extremes, as in the case of thermoforming, it will take on a white, translucent appearance. Once the sheet is allowed to return to room temperature, it will return to its original, high light transmitting clarity. Typical outdoor temperature variations encountered in use will cause little or no visible changes in the material's appearance.

Light Transmission

Colorless ACRYLITE® LED sign grade has a light transmittance of greater than 92%.

Cutting & Machining

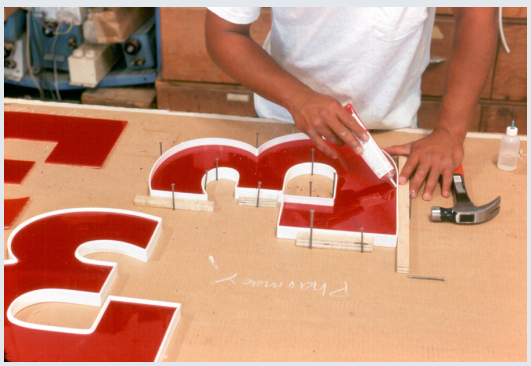
ACRYLITE® LED sign grade has outstanding cutting and machining properties and can be cut by a variety of methods. All of the same types of machining operations that are used with standard acrylic sheet can be performed on ACRYLITE® LED sign grade. Due to its proprietary formulation, ACRYLITE® LED sign grade provides opportunities for increased production efficiencies in cutting, routing and drilling.

Formability

ACRYLITE® LED sign grade will soften as the temperature is increased above 220 °F. As the temperature is increased, the sheet passes through a thermoelastic state to the thermoplastic state. The change is gradual rather than sharply defined. Forming temperatures range from 270 °F to 350 °F. Because the sheet gradually becomes thermoplastic, certain procedures should be considered during thermoforming. If the sheet is to be hung in an oven, it is necessary to use a continuous clamp rather than several individual clamps. This will prevent permanent deformation of the sheet between the clamps. If the sheet is heated by infrared heaters supported in a horizontal frame, it may be necessary to have control of the heaters positioned over the center of the sheet. This will prevent overheating in the center of the sheet, which could cause an excessive amount of sagging of the sheet. Shrinkage will occur in the machine direction when heating is performed without clamping. Shrinkage will range from 1-5%, depending on the thickness and forming temperature. Expansion can be expected in the cross machine direction. This will range from 0-2%, depending on the thickness and forming temperature.

Cementing

Common solvent cements or polymerizable cements work well for joining ACRYLITE® LED sign grade to itself, other acrylic sheet materials and to trim caps for channel letters. Care must be taken to provide a sheet edge that is machined properly and that contains low stress. A generous quantity of cement should be applied to ensure the surfaces being cemented are completely wetted. Avoid cement contact with polished edges.



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Annealing

ACRYLITE® LED sign grade may be annealed at 180°F with the heating and cooling times dependent on the thickness of the sheet. An approximate guideline is as follows: annealing time in hours equals the sheet thickness in millimeters, and the cool down period in hours also equals sheet thickness in millimeters.

Flammability

ACRYLITE® LED sign grade is a combustible thermoplastic. Precautions should be taken to protect this material from flames and high heat sources. ACRYLITE® LED sign grade usually burns rapidly to completion if not extinguished. The products of combustion, if sufficient air is present, are carbon dioxide and water. However, in many fires, sufficient air is not available and toxic carbon monoxide will be formed, as it will when other common combustible materials are burned. We urge good judgement in the use of this versatile material.

Physical Properties

Property	ASTM method	Typical Value 3.00 mm Thickness
Mechanical		
Specific Gravity	D 792	1.17
Tensile Strength	D 638	8,900 psi
Elongation, Yield	D 638	4.8%
Modulus of Elasticity (tensile)	D 638	350,000 psi
Flexural Strength	D 790	14,000 psi
Modulus of Elasticity (flexural)	D 790	330,000 psi
Rockwell Hardness	D 785	70 “M” scale
Impact Strength Izod milled notch	D 256	0.63 lbs/in of notch
Gardner Impact (B)	D 5420	20 in-lbs
Instrumented Dart	D 3763	4.6 ft. lbs (total energy)
Optical		
Refractive Index	D 542	1.49
Gloss 20°	D 523	125
Light Transmission	D 1003	90%
Thermal		
Forming temperature	-	270-350 °F (135-175 °C)
Deflection Temperature Under Load, 264 psi	D 648	199 °F (93 °C)
Vicat Softening point	D 1525	223 °F (106 °C)
Maximum Recommended Service Temperature	-	160 °F (71 °C)
Coefficient of Linear Thermal Expansion	D 626	.00004 in/in °F
Water Absorption		
24 hours at 73°F	D 570	0.3%

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Chemical Resistance ACRYLITE® LED sign grade

Chemical resistance was determined at a test temperature of 68 °F (20 °C), and a relative humidity of 50%. Care should be taken when using this table as chemical resistance is very dependent on temperature and the material's moisture content.

In practice, chemical resistance is dependent not only on internal and external stresses, but also to a large extent on the method of fabrication. We recommend that appropriate testing be carried out in doubtful cases and technical advice be requested from POLYVANTIS Sanford LLC by calling 207-324-6000.

KEY: **+** Resistant **x** Limited Resistance **-** Non-resistant

Chemical Resistance											
Drinks and Edible Liquids		+	Pure-oil paints	-	Carbolic Acid	-	Benzene	+	Hexane
+	Beer, wine, fruit juice	x	Wax polish	+	Hydrogen peroxide, up to 40%	-	Butanol	x	Isopropyl alcohol
+	Coffee, tea	**Gases**		-	Tincture of iodine, 5%	-	Carbon disulfide	-	Lactic acid butyl acetate
x	Cooking oil	+	Ammonia	**Inorganic Substances**		-	Chlorinated hydrocarbons	-	Methyl ethyl ketone
x	Liqueurs, see ethyl alcohol	x	Bromine	x	Chromic acid	-	Chlorophenol	x	Methanol, up to 30%
+	Milk, chocolate	+	Carbon dioxide	+	Calcium hypochlorite	-	Cresol	-	Methanol over 30%
+	Vinegar	x	Chlorine	-	Hydrochloric acid	x	Cyclohexane	-	Methyl chloride
+	Water, mineral water	+	Methane	x	Hydrofluoric acid, up to 20%	-	Diacetone alcohol	-	Motor fuel mixture, with benzene
Spices		+	Natural Gas	+	Nitric acid, up to 20%	-	Dibutyl phthalate	x	Motor fuel mixture without benzene
+	Aniseed, bay leaves, nutmeg	+	Nitrogen dioxide	x	Nitric acid 20 to 70%	+	Diethylene Glycol	x	Paraffin
-	Cloves	+	Nitrogen monoxide	+	Phosphoric acid, up to 20%	-	Dioxane	x	Perchlorethylene
+	Pepper, cinnamon, onions	-	Sulfur dioxide (dry)	+	Sulfuric Acid, up to 30%	-	Ether	-	Phenols
Greases & Oils without additives		**Alkalis**		x	Sulfurous Acid, concentrated	-	Ethyl acetate	-	Pyridine
+	Animal	+	Caustic potash	+	Sulfurous Acid, up to 5%	x	Ethyl alcohol, up to 30%	+	Tricresyl phosphate
+	Mineral	+	Soap suds	-	Sulfur dioxide, liquid	-	Ethyl alcohol, over 30%	+	Triethyl amine
+	Vegetable	+	Soda	**Organic Solvents & Plasticizers**		-	Ethyl bromide	-	Toluene
Paints, Waxes, Etc		+	Whitewash	-	Acetone	-	Ethyl butyrate	-	Xylene
x	Acrylic paints	**Disinfectants**		-	Amyl Acetate	-	Ethylene bromide	**General**	
-	Cellulose paints	+	Bleaching Powder paste	-	Aniline	x	Ethylene glycol	+	Photographic baths
-	Paint thinners	+	Bleaching powder solution up to 20%	-	Benzaldehyde	+	Heptane	-	Nail polish

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where solutions take shape

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

Compatibility
Like other plastic materials, ACRYLITE® sheet is subject to crazing, cracking or discoloration if brought into contact with incompatible materials. These materials may include cleaners, polishes, adhesives, sealants, gasketing or packaging materials, cutting emulsions, etc. See the Tech Briefs in this series for more information, or contact your ACRYLITE® sheet Distributor for information on a specific product.