

ACRYLITE® LED sign grade (Resist SG)

Physical Properties

ACRYLITE® LED sign grade

ACRYLITE® LED sign grade (formerly Resist SG) 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 (.118") and 4.5 mm (.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 (.177") thickness. All sheets are protected with paper masking.

ACRYLITE® LED sign grade is also available on reels in 4', 6', and 8' widths.



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.

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 coefficient 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.

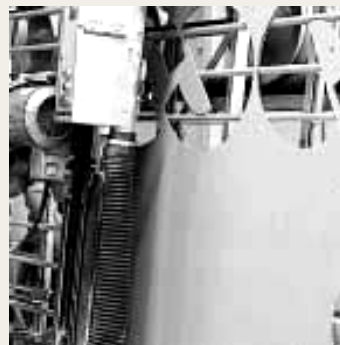
Light Transmission

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.

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.

Property		ASTM Method	Typical Value 3 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	33,000 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%

Typical values of properties listed not to be construed as specifications.

Chemical Resistance of 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 Evonik Cyro LLC.

	Resistant	Limited Resistance	Susceptible		Resistant	Limited Resistance	Susceptible		Resistant	Limited Resistance	Susceptible
Drinks and Edible Liquids				Sulfur Dioxide (dry)	X			Cresol			X
Beer, wine, fruit juices	X			Disinfectants				Cyclohexane	X		
Coffee, tea	X			Bleaching powder	X			Diacetone alcohol			X
Cooking oil		X		Bleaching powder solution, up to 20%	X			Dibutyl Phthalate			X
Liqueurs, see alcohol		X		Carbolic acid			X	Diethylene glycol	X		
Milk, chocolate	X			Hydrogen peroxide, up to 40%	X			Diocane			X
Vinegar	X			Tincture of iodine			X	Ether			X
Water, mineral water	X			Gases and Oils without additives				Ethyl acetate			X
Spices				Animal	X			Ethyl alcohol, up to 30%	X		
Aniseed, bay leaves, nutmeg	X			Mineral	X			Ethyl alcohol, over 30%			X
Cloves			X	Vegetable		X		Ethyl bromide			X
Pepper, cinnamon, onions	X			Paints, Waxes, Etc...				Ethyl butyrate			X
Inorganic Substances				Acrylic paints				Ethylene bromide			X
Chromic acid		X		Cellulose paints			X	Ethylene glycol		X	
Calcium hypochlorite	X			Paint thinners			X	Heptane	X		
Hydrochloric acid			X	Pure-oil -paints	X			Hexane	X		
Nitric acid, up to 20%	X			Wax polish		X		Isopropyl alcohol		X	
Nitric acid 20 to 70%		X		Alkalis				Lactic acid butyl ester			X
Phosphoric acid, up to 10%	X			Caustic potash	X			Methyl ethyl ketone			X
Sulfuric acid, up to 30%	X			Soap suds	X			Methanol, up to 30%		X	
Sulfurous acid, conc.		X		Soda	X			Methanol, over 30%			X
Sulfurous acid, up to 5%	X			Organic Solvents and Plasticizers				Motor fuel mixture, with benzene			X
Gases				Amyl acetate			X	Motor fuel mixture, w/o benzene		X	
Ammonia	X			Aniline			X	Paraffin		X	
Bromine		X		Benzaldehyde			X	Perchloroethylene		X	
Carbon dioxide	X			Benzene		X		Phenols			X
Chlorine		X		Butanol		X		Pyridine			X
Methane	X			Carbon disulfide			X	Tricresyl phosphate	X		
Natural gas	X			Chlorinated hydrocarbons			X	Triethyl amine	X		
Nitrogen dioxide	X			General				Toluene			X
Nitrogen monoxide	X			Chlorophenol			X	Xylene			X

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