ACRYLIC DEFINITION

Acrylic extrusions have outstanding optical properties and excellent resistance to prolonged exposure to both sunlight and electric light sources.

OPTICAL PROPERTIES

TRANSPARENCY: Clear acrylic plastic is as transparent as the finest optical glass. It has a low haze level, superb optical clarity, and is free from distortion. DR® impact resistant acrylic shows a slight increase in haze at the extremes in service temperatures. The haze disappears when the temperature returns to normal. Since in most cases the lens temperature in fluorescent fixtures is generally below 120°F, haze should not be a problem. Durayl® (acrylic/DR® blends) with a high acrylic content have a low haze level and therefore good optical clarity.

TRANSMITTANCE: 92% of the light perpendicular to the surface of acrylic parts is transmitted. Standard grade acrylic transmits some light in both the ultraviolet and infrared bands (both of which are outside the visible range of light). In applications such as museum and art gallery lighting where ultraviolet degradation is not acceptable, lenses of ultraviolet absorbing acrylic (UVA grade) will filter out most of the ultraviolet light. In applications such as lenses for long wavelength black light fixtures where ultraviolet light must be transmitted, ultraviolet transmitting acrylic (UVT grade) should be used.

LIGHT DIFFUSION AND REFRACTION

DIFFUSION: There are a variety of white translucent acrylics that scatter light in all directions. It is easy to choose a diffusing medium to suit almost any application.

REFRACTION: Acrylic sheet and profile extrusions can be embossed to make prismatic lenses that will control the distribution of light for the most efficient illumination and to minimize glare.

STABILITY OF ACRYLIC

Well over 30 years of actual use prove acrylic plastic resists sunlight and the effects of weathering. Acrylic does not yellow significantly after prolonged exposure to sunlight or to various electric light sources including fluorescent lamps. This inherent exposure stability makes acrylic an ideal material for use in lighting fixture lenses.

CHEMICAL RESISTANCE

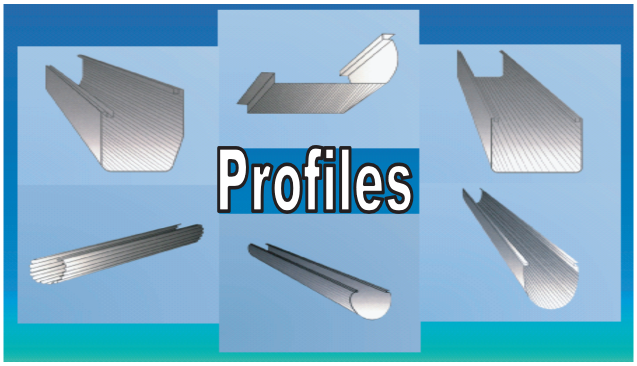
Acrylic plastic is unaffected by many detergents and cleaning agents, thereby adding to its ease of maintenance.

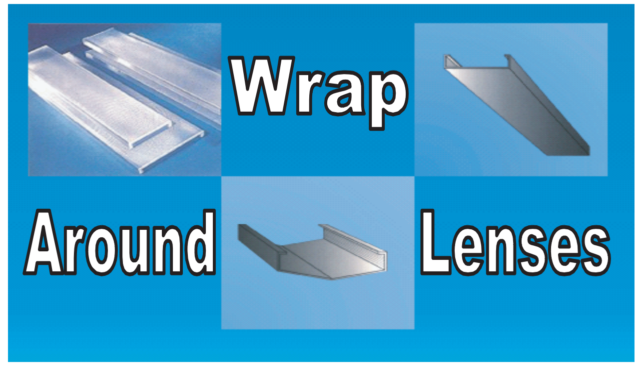
MECHANICAL PROPERTIES

Acrylic plastic is lightweight, tough, durable and rigid. Parts of standard grade acrylic are as impact resistant at -40°F as they are at room temperature. Parts of impact resistant DR® have up to eight times the impact strength of standard grades of acrylic and are suitable for lighting fixture lenses subject to accidental or vandal-caused breakage. Parts made of DR® will lose some impact resistance at low temperatures. The impact resistance, however, is still sufficient for lighting lenses and diffusers, and will be higher than that of standard grade acrylic. Durayl® (acrylic/DR® blends) has a greater impact resistance than acrylic, but less than that for DR®. The impact resistance of Durayl® depends on the proportion of DR® in the blend–the higher the DR® content, the greater the impact resistance will be. (Note: For best impact strength, prisms should be on the outer surface of the lens.)

THERMAL PROPERTIES

Depending on which grade acrylic is used, the maximum continuous service temperature varies from 145°F to 200°F.
Since the operating temperature of most fluorescent lighting fixtures rarely exceeds 110°F, acrylic lenses can be used without difficulty.





Profiles and Wrap Around Lenses details are available on our website.

ACRYLIC DESIGN CONSIDERATIONS

Design Considerations for acrylic lenses and diffusers

When designing new fixtures or determining the proper size lens or diffuser for an existing fixture, it is important to take into consideration the following:

THERMAL EXPANSION AND CONTRACTION

When acrylic is heated it expands, and when it cools, it contracts. The amount it expands or contracts is determined by the coefficient of thermal expansion. Although this coefficient varies with temperature, over the range of temperatures encountered in lighting applications, the coefficient of linear thermal expansion will be approximately as shown in the table below. A plastic lens cannot be rigidly fastened to a metal fixture since the plastic expands roughly 10 times as much in length and width as does the metal fixture as the temperature increases. The length and width of the plastic lens and the metal fixture also contract the same relative amount as the temperature decreases. It is important to allow sufficient clearance inside the lens frame or fixture to allow for expansion of the lens so it won't buckle or warp when the temperature increases. It is also important to allow room for the lens to contract without falling out of the frame or fixture when the temperature decreases.

When several lighting diffusers are butted together end to end without sufficient allowance for expansion, the lenses will buckle when they become warmer. In a 12 ft. row, the diffusers will expand over 1/4" when the temperature increases 50?F. This would be the case if the lighting fixtures were installed when the room temperature is 50?F and the temperature of the lenses reaches 100??with the lights on. Now consider what happens in a 48 ft row of diffusers installed during the winter when the room temperature is 30°F. Disaster—the row of diffusers will expand over 1-1/2".

Table: COEFFICIENT OF THERMAL EXPANSION

	Acrylic	DR®	Durayl®
Coefficient of Linear Thermal Expansion (inches per inch per °F)	0.00004	0.00006	.00004 to .00006 (Increases as DR® content in blend increases)

Expansion in inches = Length in inches x coefficient in inches per inch per °F x increase in temperature in °F. Contraction of the same magnitude occurs when the temperature decreases. The expansion or contraction of the width or thickness is calculated in the same manner.

Example: A 48" long acrylic lighting panel expands approximately .019" if the temperature increases 10°F. (48" Lg. x .00004 inches per inch per °F x 10°F change in temperature = .019".)

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