



Perspex® spectrum block

Technical Data Sheet

1. Introduction

Perspex® Spectrum Block cast acrylic sheet has been specially formulated to give optimized transmitted light using white or colored LEDs. The excellent brightness and evenness of illumination of the sheet allows sign makers and specifiers to develop LED integrated signage that is brighter and more cost-effective in operation than more traditional designs. The use of Perspex® Spectrum Block cast acrylic sheet allows for simplified and robust construction using integral channels rather than built-up designs.

2. Benefits

In service, Perspex® Spectrum Block offers many benefits:

- Optimum brightness and strength of color
- High hiding power that conceals LED light sources and avoids “banding” or “hot spots” associated with some backlit systems
- New aesthetic opportunities in channel letter construction and signage
- Excellent machining characteristics enabling complex shapes to be created
- Cost savings as fewer and lower energy LED light sources can be used
- Environmental benefits due to lower energy use and lower heat output
- Greater weatherproofing in external applications achieved by integrating the LED light source within the Perspex® Spectrum Block sheet

Type of LED

Although specially designed to excel with white LEDs, Perspex® Spectrum Block will perform equally well with colored LEDs. As with any other light source, the color of the LED will have an impact on the transmitted shade.

Perspex® Spectrum Block sheet also works well with High Brightness LEDs, however the depth of the channels may need to be adjusted to give optimised even illumination.

Design flexibility

The excellent brightness and evenness of illumination allows sign makers and specifiers to develop back-lit solutions that are slimmer, brighter and more cost-effective in operation. Additionally the robustness of the sheet allows for greater protection against environmental factors.

All Perspex® Spectrum Block products are manufactured using Perspex® cell cast acrylic sheet. They therefore retain the superior physical attributes and characteristics of Perspex® cast acrylic sheet products (e.g. outstanding gloss surface and weatherability).

3. Product Range

Perspex® Spectrum Block opal / white is available as in 1T77 2000 x 1500 x 30 mm and 2000 x 1500 x 20 mm

4. 10 Year Guarantee

The normal Perspex® 10 year outdoor weathering guarantee applies to this product.

5. Masking

Perspex® Spectrum Block sheet is supplied with double-sided, non-thermoformable protective masking.

6. Table of Properties

Values quoted for the properties of Perspex® cast acrylic sheet are the results of tests on representative samples and do not constitute specifications.

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Property	Test Method	Unit	Value
General			
Density	ISO 1183	g cm ⁻³	1.19
Rockwell Hardness	ISO 2039-2	M scale	102
Water Absorption	ISO 62	%	0.2
Flammability	BS 476 Part 7	Class	3
	DIN 4102	-	B2
	NFP 92-507	-	M4
	UL94	-	HB
	ISO 11925-2	-	E
Optical Properties			
Light Transmission	ASTM D1003	% (3 mm)	35
Thermal Properties			
Vicat Softening Point	ISO 306 A	°C	> 110
Coefficient of Thermal Expansion (Linear)	ASTM D696	x 10 ⁻⁵ . K ⁻¹	7.7
Mechanical Properties			
Tensile Strength	ISO 527 (5 mm/min)	MPa	75
Elongation at Break	ISO 527 (5 mm/min)	%	4
Flexural Strength	ISO 178 (2 mm/min)	MPa	116
Flexural Modulus	ISO 178 (2 mm/min)	MPa	3210
Impact Strength – Charpy (unnotched)	ISO 179	kJ M ⁻²	12
Poisson's Ratio	ISO 179	kJ M ⁻²	0.38
Electrical Properties			
Surface Resistivity	IEC 93	Ω.m-2	> 10 ¹⁴
Electrical Strength	IEC 243	kV.mm-1	15

7. Application

With the wide range of available LED lights and letter/sign designs, it is not possible to present a simple set of rules which assures the most effective results for every project. However some general guidelines can be given to aid design.

Luminance

The luminance of any internally illuminated letter or sign is determined by five factors:

1. LEDs - quantity, type, light output, color and position in the letter or sign case.
2. Materials - light transmission, reflection, absorption and diffusion factors of the Perspex® grade and thickness used.
3. The Channel Letter or Sign Design - dimensions, particularly its depth and the reflection factor of the paint or other finish used on any backing panel or outside surfaces. Also the orientation of the LEDs; back-facing, front-facing or side-facing.
4. Light Absorption - effect of absorption of light by the lamps and electrical equipment within the design.
5. Maintenance - reduction in the light output of the lamps with increasing age.

Machining

The machining characteristics of Perspex® Spectrum Block are the same as for standard Perspex® cast acrylic sheet.

General machining recommendations can be found in [The Perspex® Design Guide](#). It is particularly suited for routing and this enables complex shapes such as letters to be easily machined, especially when using CNC routing machines.

Additionally channels can be easily machined into the sheet to enable the installation of light modules or strips. The superior physical characteristics of cell cast acrylic enables very even and matt surfaces to be generated during routing; there is no smearing or melting of the material. This property adds to the light diffusing properties as well as making any additional processing such as painting more uniform.

The lamp spacing ratio for LEDs will depend on the shape of the design and on the construction of the LED itself, particularly the beam angle. Typically LEDs used in this type of application will have a beam angle of 120 – 160 degrees. Generally the wider beam angles give more even light diffusion.

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Lamp location

Typical designs will use one of the following orientations:

Rear-facing LEDs

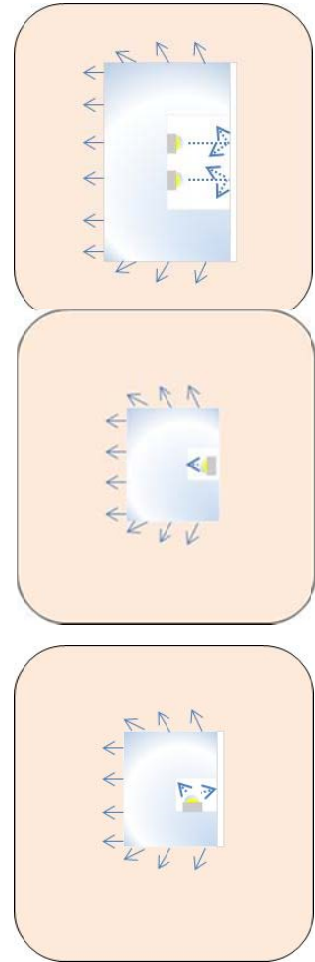
Typically for larger area channels or cavities using LED strips or multiple LED modules where use of a high light reflecting white paint is used to direct the light back throughout the block. Or alternatively for open 'halo' designs where a shadow effect is projected from the rear of the design. Generally, this orientation provides the most even light diffusion especially when a slightly matt surface reflecting panel is used.

Front-facing LEDs

Typically for designs using single LED modules or more conventional back-lighting construction.

Side-facing LEDs

Typically for narrow channels where LED strips can be fixed around the edge of the cavity.



Channel depth and wall thickness

Any removal of material thickness will have some effect upon the light performance of the sheet. As the thickness of the block becomes thinner so its light transmission will increase and similarly there is less light diffusion available. Typically channel depths of up to 9 mm (0.354") have been used for optimum diffusion.

The maximum channel depth will depend to a great extent upon the power, design and orientation of the LED lamp. However, experience has shown that channel depths of up to about 50% can give acceptable results i.e. a 15 mm channel in a 30 mm block. Similar thickness guidelines should be applied to wall thicknesses of any channels.

Embedment cements

Sealing or embedding the LEDs into the channel or cavity will depend on the design and expected use of the letter or sign.

Acrylic-based 2-component polymerisation cements can give very good rigid, permanent embedment of the LEDs and have good light transmission.

Alternatively a more flexible sealant such as a clear polyurethane or silicone sealant can be used. These sealants are more flexible than acrylic-based cements and therefore can be removed from the channel or cavity if required e.g. to replace faulty LED strips.

When embedding LEDs into the acrylic consideration should be given to the heat generated from the LED. The maximum service temperature of Perspex® cast acrylic sheet is 85 deg C.

Coatings

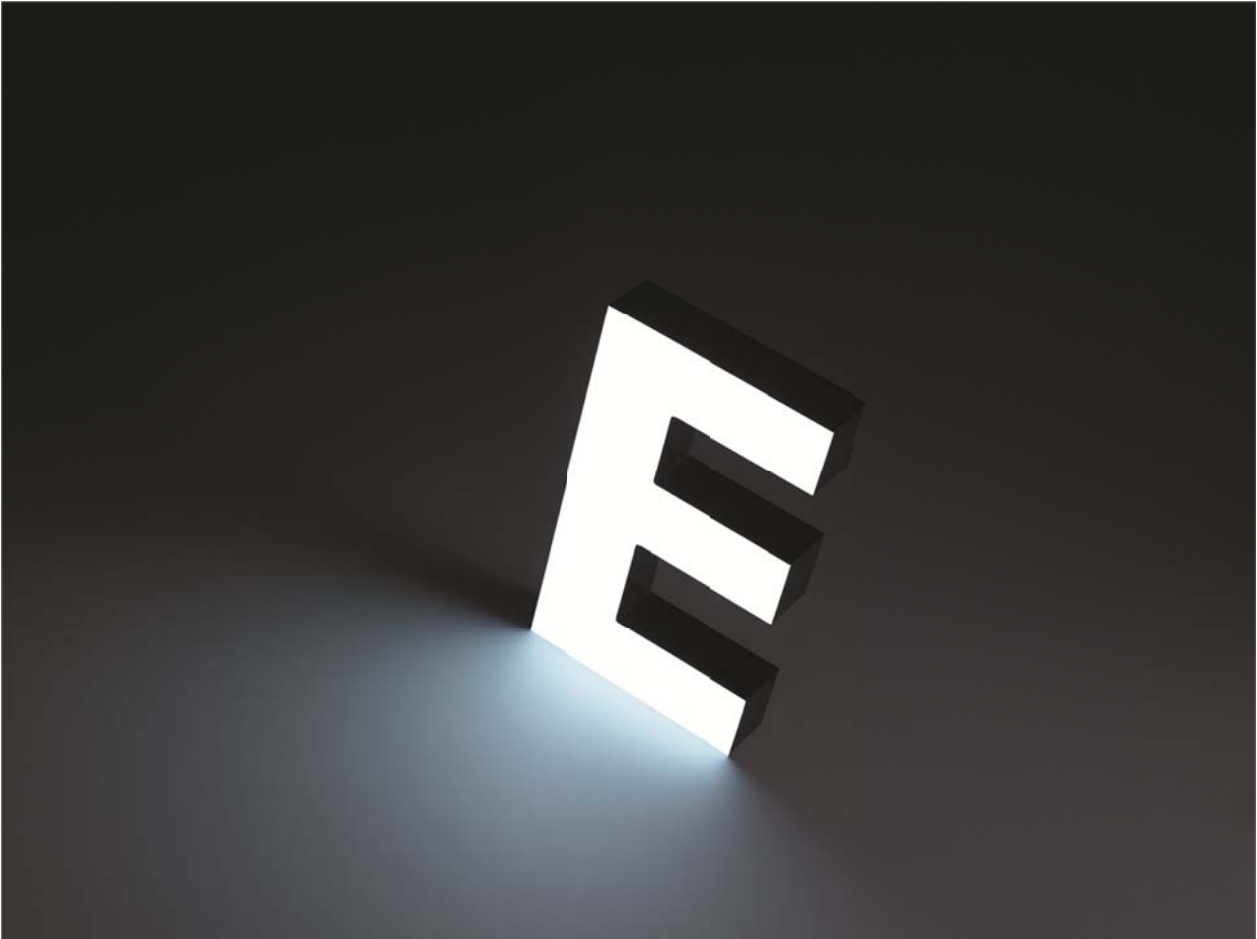
The choice of whether to use coatings will depend on the individual design of the letter or display. In a typical design an opaque highly reflective white paint or self-adhesive tape is applied to those areas where light transmission is not desired. If required, a specific color can then be applied on top of the white reflective coating to provide the custom design.

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The coating manufacturer's recommendations should be followed when applying the coating.

There is very little preparation required on the Perspex® sheet, however, to ensure maximum bond strength it is recommended to clean the surface of the Perspex® with clean, fresh water using a chamois leather or soft cloth before applying the coating.



Perspex® Spectrum Block

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