

PLEXIGLAS® Satin Ice

Product Description

Technical Information

The Product – Mode of Action and Main Benefits

PLEXIGLAS® Satin Ice is an extruded acrylic (polymethyl methacrylate, PMMA) that contains **special diffuser beads**. These give the material its **satiny surfaces** and **intensive translucency**, properties that offer unique application potential.

The benefits offered by PLEXIGLAS® Satin Ice make it particularly suitable

- for all types of lighting and design elements, e.g. for lamp shades, luminaire covers, backlighting etc.;
- in the areas of shopfitting, trade fair booths and furniture, as well as for high-quality P-O-S displays;
- as elements of large partitions;
- wherever suitability for food contact is required;
- when fingerprints are to remain invisible;
- because its surface is less sensitive to scratching;
- and because the material can be machined, bonded and thermoformed without any problem, leaving the matte surface intact!

This leaflet describes the material benefits of the basic grade **Colorless OD010** as compared with conventional PMMA. However, PLEXIGLAS® Satin Ice is also available in colored grades.

Diffuser beads are spherical polymer particles that are “embedded” in PLEXIGLAS® Satin Ice without being visible. They show a **specific difference** in light refraction (refractive index) as compared with the PLEXIGLAS® matrix. Each of the spherical polymer particles therefore deflects impinging light rays in a special way, **toward** the service side. As a result, hardly any light is reflected or absorbed, i.e. PLEXIGLAS® Satin Ice offers **extraordinarily high light transmission paired with superlative light diffusion**.

The basic grade Colorless OD010 of PLEXIGLAS® Satin Ice is perceived by the human eye – in spite of its colorless nature – as an opalescent, milky-white translucent material. This makes it comparable with conventional white PMMA grades. These, however, as shown in Fig. 1, reflect and absorb more light because of the incorporated pigments, i.e. light is “lost.”

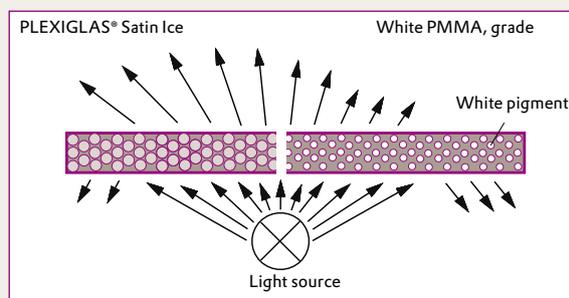


Figure 1: Schematic of lighting benefits of PLEXIGLAS® Satin Ice

PLEXIGLAS® Satin Ice therefore provides a **higher output ratio**:

Greater luminous intensity from a light source of the same power, or lower energy requirement at the same brightness!

A further positive effect of the diffuser particles is the satin (matte) surface on both sides. The beads protrude very uniformly from the PMMA matrix, giving PLEXIGLAS® Satin Ice a stylish shimmer and making it agreeable to

the touch. This noble appearance and pleasant feel lend the product its high value.

The matte surface texture also remains intact even after thermoforming (Fig. 2).

This special property offers creative scope for design and construction.

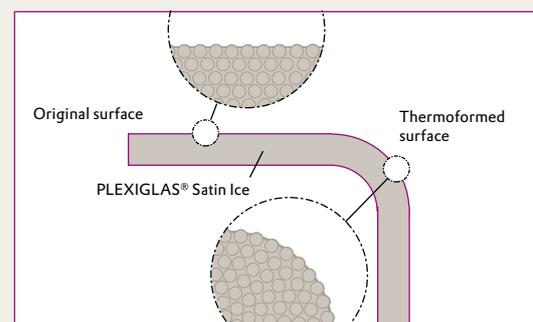


Figure 2: Principle of matte texture of PLEXIGLAS® Satin Ice

Physical Forms

PLEXIGLAS® Satin Ice is supplied in grade **Colorless 0D010 DF**

- as **solid sheets**
- in **size 3050 x 2050 mm**
- in **thicknesses 2, 3, 4 and 5 mm**

as well as

- in the form of **tubes**
- with **outside diameters 50, 60, 70, 80, 90, 100, 150 and 200 mm**
- with **3 mm wall thickness**
- in **2000 and 4000mm length**.

Colored and **impact-modified** varieties of solid sheets and tubes are available on request.

Comparison of Product Properties

Lighting Engineering Properties	PLEXIGLAS® Satin Ice Colorless 0D010 DF	PLEXIGLAS® XT White 00770	PLEXIGLAS® XT White 01670	Unit	Test Method
Transmittance	82	40	75	%	DIN 5036,T.3
Reflectance	10	45	15	%	DIN 5036,T.3
Intensity half-value angle	25	80	8	°	DIN 5036
Diffusion	0,35	0,85	0,21	-	DIN 5036
Gloss at 20°	<5	>60	>70		
at 60°	<25	>80	>90		
at 85°	<15	>95	>95	-	DIN 67530

The table shows the most important typical values for lighting purposes (23 °C/50% RH) as compared with the relevant white grades.

The graphs in Figs. 3 and 4 clearly demonstrate the benefits offered by PLEXIGLAS® Satin Ice. The so-called diffusion indicatrix and the polar diagram reflect measurements that prove the much more favorable effect of the material's "forward diffusion."

Conclusion:

In the observer's eye, PLEXIGLAS® Satin Ice shines more brightly over a wide angle than a conventional white grade.

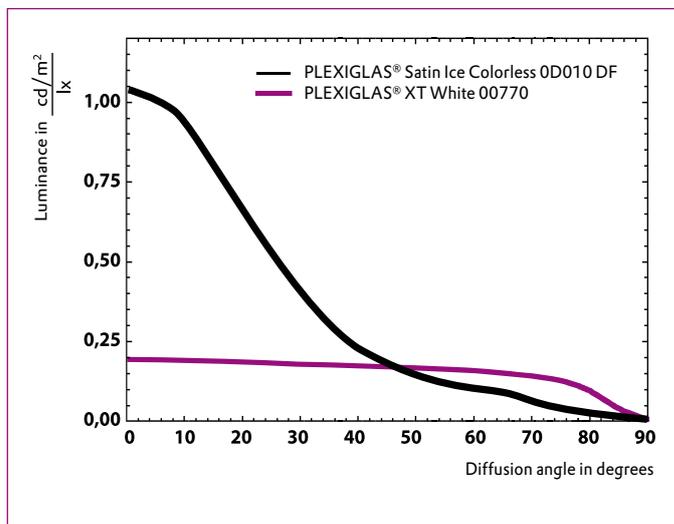


Figure 3: Diffusion indicatrix of luminance as a function of angle

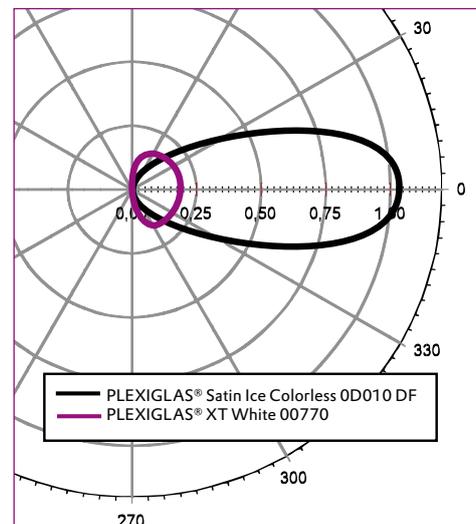


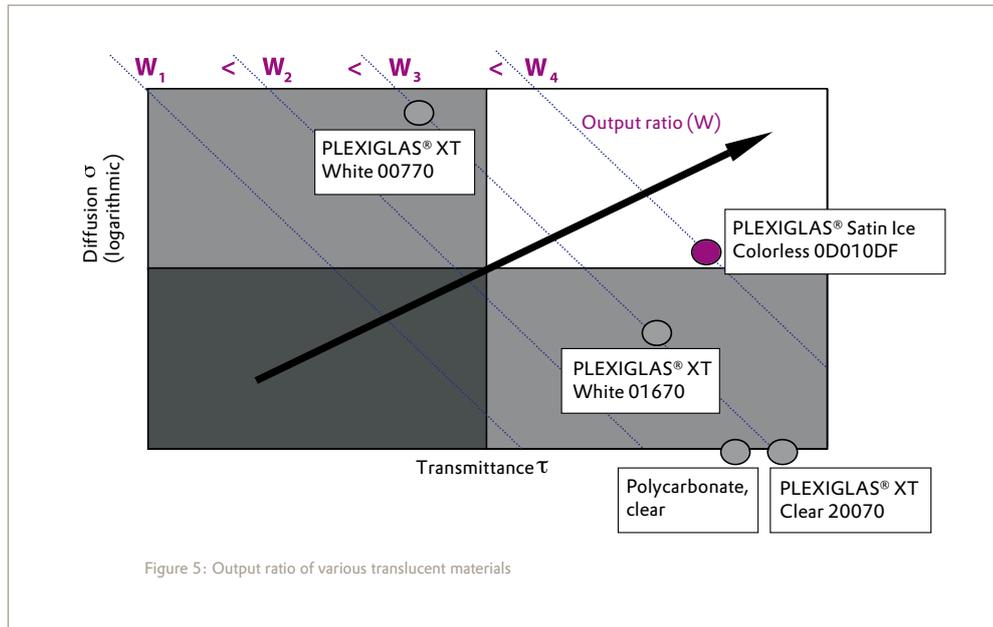
Figure 4: Polar diagram of luminance as a function of angle

For many illuminated advertising and P-O-S displays, luminous elements etc., the required glazing material must offer **optimum light transmission** combined with **high diffusion**.

The extraordinary **output ratio** of PLEXIGLAS® Satin Ice Ice can also be illustrated by a matrix of diffusion versus transmission according to Fig. 5. The correct reading of the schematic is that products in the dark-gray zone would be unsuitable for the stated applications. In the light-gray zones,

increasingly dense or bright white grades are presented from top to bottom, down to clear or colorless smooth grades along the bottom edge offering no diffusion at all. The lighting behavior does not reach its optimum until the light-colored zone in the top right-hand corner, i.e. the output ratio, increases from W1 to W4.

Among other materials for the same application, PLEXIGLAS® Satin Ice comes closest to the tip of the arrow, i.e. **closest to the ideal**.



The use of translucent sheets for **backlit screens** calls for materials through which the human eye cannot detect the light source concealed behind them. The **lamp filament** test offers further proof of the outstanding diffusion effect of PLEXIGLAS® Satin Ice in this context. The result is shown by the

three pictures in Fig. 6. As compared with a bright and a dense translucent white grade of PLEXIGLAS® XT, one can clearly see **how much more light PLEXIGLAS® Satin Ice transmits without the lamp filament being recognizable**.



Fabricating

PLEXIGLAS® Satin Ice is **just as easy to fabricate** as the basic grades of PLEXIGLAS® XT.

Given conditions that suit the material, it can be sawn, **drilled, routed and ground with perfect results**.

The edges can be gloss-polished with a felt polishing band or a buffing wheel. The sheets can be **laser-cut** (semi-gloss edge) and **cut by water jet** (matte edge).

PLEXIGLAS® Satin Ice **can be bonded with very good results** – both along the edge and on its surface – by means of the solvent adhesives ACRIFIX® 116 and 117, and the gap-filling polymerization adhesives ACRIFIX® 190 and 192. The bonded joints are glossy against the matte DF surface.

PLEXIGLAS® Satin Ice can be **thermoformed** in the rubbery-elastic range between 150 °C and 160 °C. The advantage of DF as compared with sheets with an embossed texture is that the **matte surface remains intact** (Fig. 2)! There is no need for predrying prior to thermoforming, provided the sheets are stored properly, covered with their PE surface masking.

PLEXIGLAS® Satin Ice sheets can also be installed **cold-curved**, provided the minimum cold-bending radius $R = 330 \times$ thickness is not undershot.

Painting and screening of PLEXIGLAS® Satin Ice can be performed as with PLEXIGLAS® XT basic grades. However, we recommend that you perform prior tests in every case to see the effect of the coating on the DF surface.

Hints for Application

PLEXIGLAS® is generally **easy to clean and easy-care**. Do not rub dry or use abrasive agents. Dusty surfaces can be wiped down with warm water, to which some dishwashing liquid has been added, and a soft cloth or sponge. The "Antistatischer Kunststoffreiniger + Pfleger (AKU)" from Burnus GmbH, Darmstadt, is highly suitable for cleaning PLEXIGLAS® Satin Ice .

When used outdoors, the material shows the outstanding resistance to weathering and aging typical of PLEXIGLAS®, which is unusual for a plastics material. The perfectly smooth surface of PLEXIGLAS® Satin Ice is largely cleaned by the rain. Should cleaning nevertheless be necessary, it is usually sufficient to hose down the surface with water.

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Ref. No. 231-2 February 2008
XX/0208/09513 (en)

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