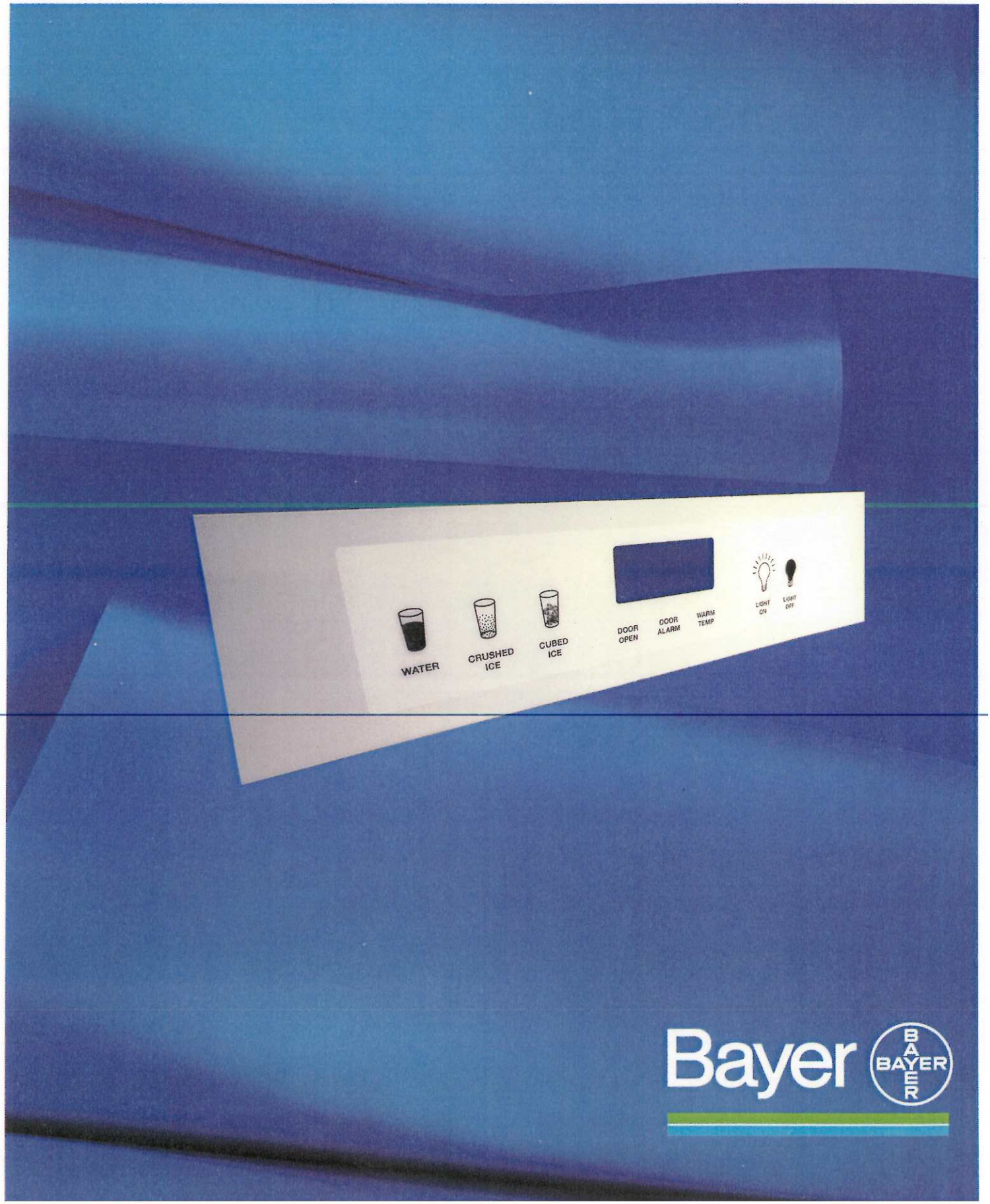
Marnot® XL

Kratzfest beschichtete Folien / Hardcoated Films



Bayer

BAYER

Applications

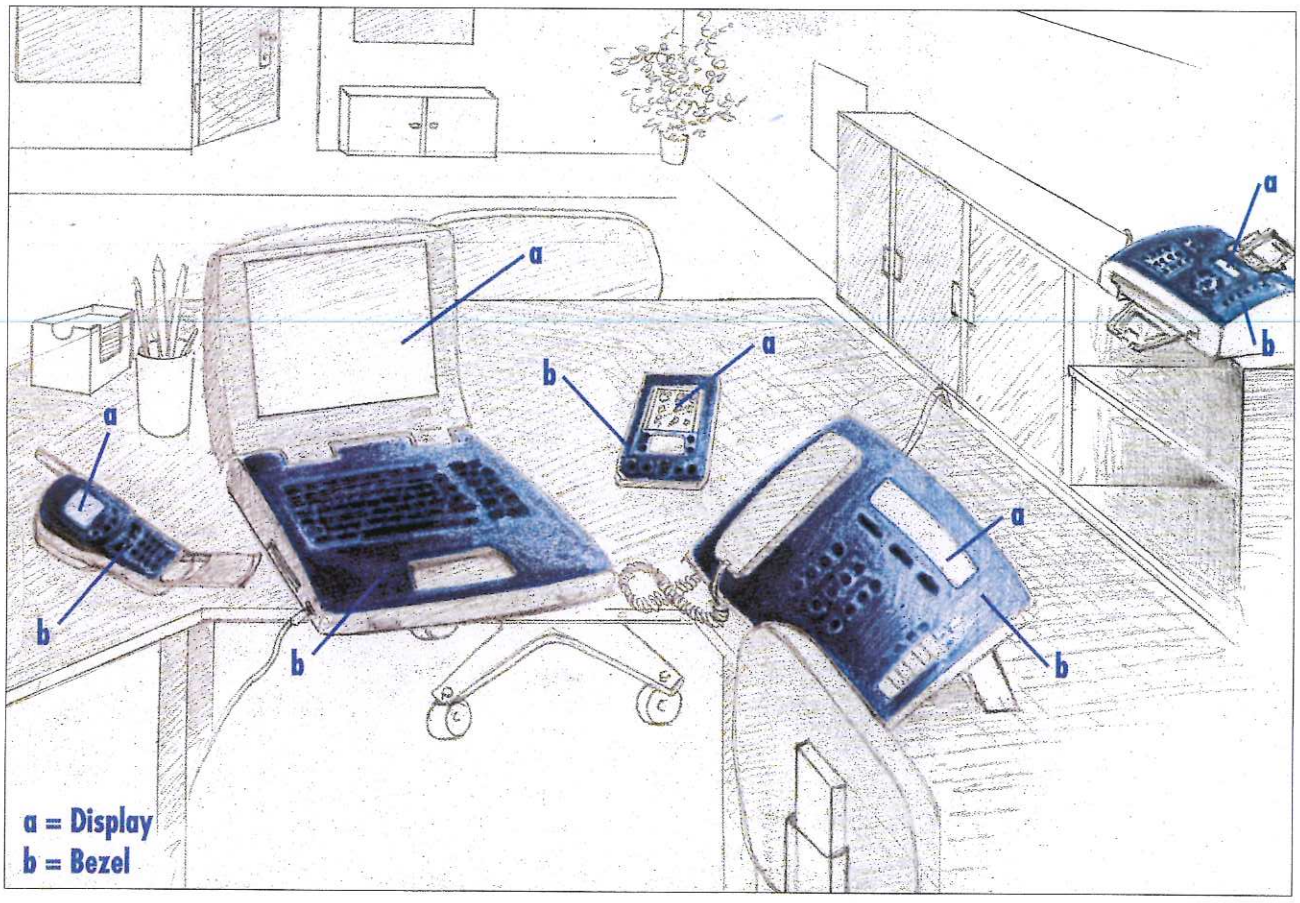
Typical applications include printed and, in some cases, transilluminated screen surrounds and display units for:

- Domestic appliances
- Consumer electronics
- Automotive interiors
- Office equipment
- Industrial control panels
- Medical equipment [1)]

– There is considerable interest in the telecommunications sector for windows lenses, decorative elements and screen surrounds.

- Flat membrane switches are another possible application.

In view of the fact that any printing is usually done on the reverse of the film, characters and symbols cannot be wiped or scratched off or damaged in any way. The option of printing on the front of the film opens up additional scope for design.



1) see liability clause medical products, ATI 1001

Printing

Thanks to their excellent optical properties, Marnot® XL films are particularly suitable for reverse-side printing. Conventional acrylate or PVC-based inks and/or paints based on aqueous dispersions, which have a good track record in the printing of polycarbonates, are used in a screen-printing process. Noriphan heat-resistant screen-printing inks developed jointly by Bayer and Pröll have proved suitable for use in insert mold decoration, where a thermoplastic resin is injected behind the film.

In addition to the option of reverse-side printing, the front surface of Marnot XL film can also be selectively printed using UV curing inks to obtain different surface finishes.

Cutting

Marnot XL films cut cleanly to produce sharp contours. Depending on the required cut quality, Marnot XL film is cut either using strip steel cutting tools or with full-thickness cutting equipment (upper and lower die).

Thermoforming

Cold forming and embossing
Marnot XL film can be embossed up to a thickness of 2.5 times the thickness of the film.

Thermoforming
Marnot XL film cannot be thermoformed.

Bonding

Transfer adhesives, self-adhesive films coated on both sides or screen-printable adhesives can be used to bond the film to a backing. The use of polyurethane-based reaction adhesives is recommended at high ambient temperatures.

Mechanical properties

The mechanical properties of Makrolon®, the basic material, are not impaired by the coating process.

Chemical properties

The coating on Marnot® XL films provides resistance against many chemicals and household cleaning agents.

Thermal properties

Short-term heat peaks of up to 130 °C may be applied but practical trials should be conducted before subjecting the films to high temperatures for longer periods.

Scratch resistance

Conventional methods for assessing scratch resistance include the Taber test and pencil hardness test (see Fig. 1). Examples of typical values are shown in the Table on page 15.

Figure 1: Taber test

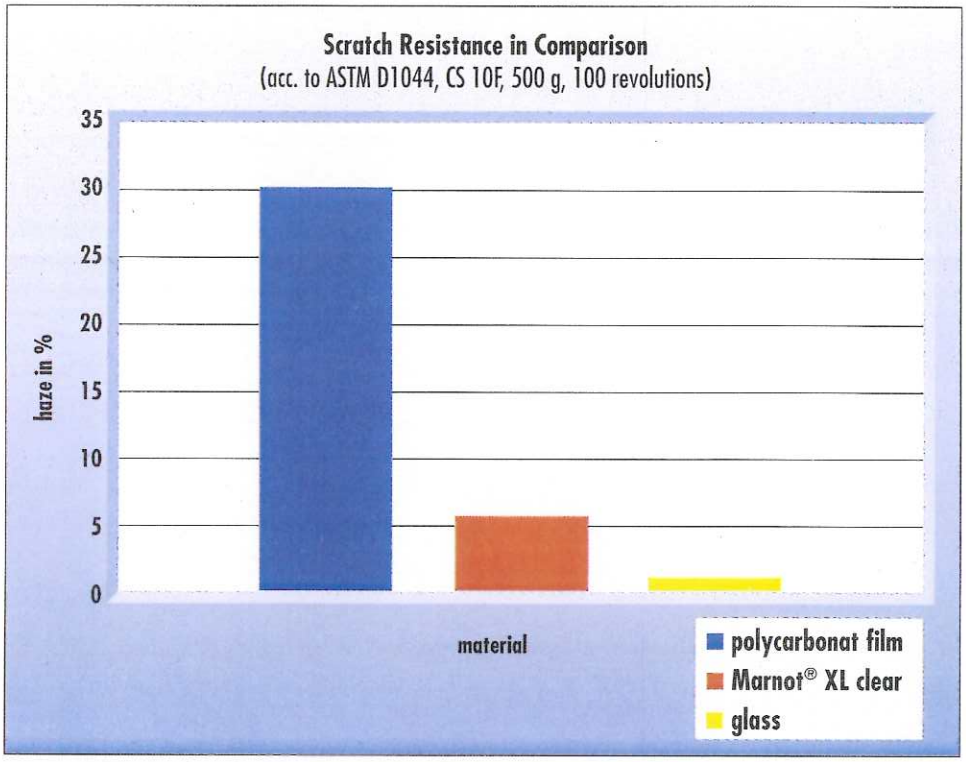


Figure 2: Scratch resistance

Optical properties

The excellent optical properties of Makrofol®, the basic material, are not significantly impaired by the protective coating.
Marnot offers a high degree of light transmission of approximately 90 % (Marnot® XL clear) coupled with low haze (see Fig. 3).

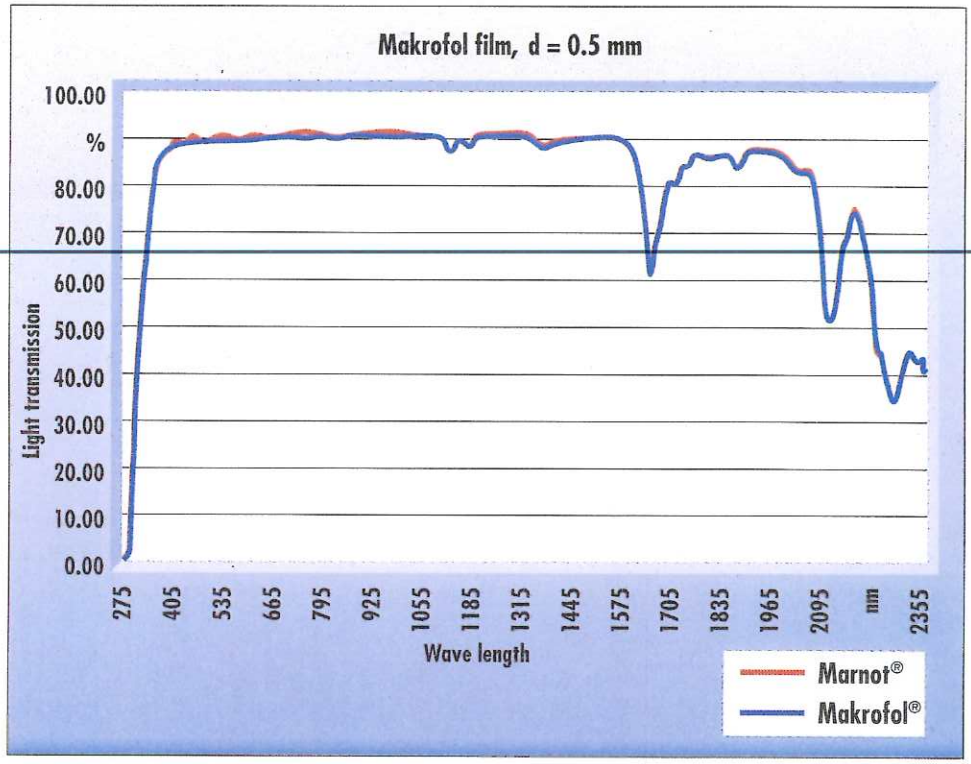


Figure 3: Light transmission

Reference Data [1]				
Property	**Test Specification**	**Guide Data**	**Unit**	**Test Conditions**
Density	ISO 1183	**1.2**	g/cm^3	20 °C, Method C
Ultimate tensile strength	ISO 1184	**70**	N/mm^2	23 °C
Tensile strain at break	ISO 1184	**120**	%	23 °C
Young's modulus	ISO 1184	**2600**	N/mm^2	23 °C
Pencil hardness	ASTM D3363	**3 H**	No scratches	
Taber test	ASTM D1044	**Clear –5.5** **GU 20–47** **GU 35–30** **GU 55–17** **GU 75–14** **GU 90–13**	%	CF10F, 500 grams, 100 cycles
Coefficient of linear thermal expansion	based on DIN 53752	**70**	$10^6\ K^{-1}$	
Dimensional stability	based on IEC 674	**< 0.2**	%	
Water absorption	based on ISO 62	**< 0.5**	%	
Light transmission		**> 90** **for XL clear only**	%	
Haze	ASTM D1003	**Clear –> 0,4** **GU 20–55** **GU 35–29** **GU 55–16** **GU 75–10** **GU 90– 8**		
Gloss level	ASTM D523	**Clear –> 90** **GU 20–11** **GU 35–22** **GU 55–32** **GU 75–45** **GU 90–55**		

1) see back page