MAKROFOL® DE 1-4 000000

Characterization

Makrofol DE 1-4 000000 is an extrusion film based on Makrolon® polycarbonate.

Properties / Applications

Makrofol DE 1-4 000000 comprises all of the well known advantages of polycarbonate, such as excellent mechanical and optical properties.
Makrofol DE 1-4 000000 maintains accurate graphic registration regardless of the forming method due to low internal stress. Cost savings relative to gloss/gloss films are realized using this product as no masking is supplied in Makrofol DE 1-4 000000 's standard configuration.

Typical applications are automotive, labels, membrane switches, nameplates, and medical packaging. Makrofol DE 1-4 000000 is available in various standard thicknesses from 0.005 " to 0.030 " (125 microns to 750 microns). Other thicknesses are available on request. The surface combination of Makrofol DE 1-4 000000 is one side gloss and one side fine matte for printability. As with any product, use of Makrofol DE 1-4 000000 in a given application must be tested (including but not limited to field testing) in advance by the user to determine suitability.

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Document contains important information and must be read in its entirety.
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Typical Properties*

Property	Test Method	Unit	Value
General			
Specific Gravity	ASTM D 792		1.20
Conversion Factor		$ft^2/lb•mil$ | $m^2/kg•mm$	161 | 0.833
Gloss 60° top side black inked second surface	ASTM D 2457	gloss unit	> 90
Gloss 60° reverse side	ISO 2813	gloss unit	< 9
Roughness, R3z, top side	ISO 4287/88	µm	≤ 0.5
Roughness, R3z, reverse side	ISO 4287/88	µm	< 14
Surface			gloss/f.matte
Mechanical			
Tensile Strength, Yield	ASTM D 882	psi	9,100
Tensile Strength, Break	ASTM D 882	psi	10,500
Elongation at Break	ASTM D 882	%	125
Flexural Modulus	ASTM D 790	psi	330,000
Tear Strength, Initiation	ASTM D 1004	lb/in	1,100
Thermal			
Coefficient of linear thermal expansion parallel 20°C to 120°C	DIN 53752	$10^{-6}/K$	70
Coefficient of linear thermal expansion across 20°C to 120°C	DIN 53752	$10^{-6}/K$	70
Shrinkage, parallel 130°C, 1h	IEC 60674-2	%	< 0.4
Shrinkage, across 130°C, 1h	IEC 60674-2	%	< 0.4
Heat Deflection Temperature 1.82 MPa 0.45 MPa	ASTM D 648	°F	 270 288
Vicat Softening Temperature, Rate A	ASTM D 1525	°F	297
Flammability			
Burning Rate (FMVSS 302)	ISO 3795	mm/min	≤ 100
UL Listing	UL 94 V-2	min. thickness	0.015” (375 µm)
UL Listing	UL 94 VTM-2	min. thickness	0.005” (125 µm)
Optical			
Light Transmittance	ASTM D 1003	%	> 70 (> 20 mil) > 80 (> 20 mil)
Yellowness Index	ASTM E 313		1
Other			
Water Absorption (saturation)	ISO 62	%	0.20
Water Absorption (immersion at 73°F/24h)	ASTM D 570	%	0.33

**These items are provided as general information only. They are approximate values and are not part of the product specifications.*

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Health and Safety Information

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling this product. Before working with this product, you must read and become familiar with the available information on its risks, proper use, and handling. This cannot be overemphasized. Information is available in several forms, e.g., safety data sheets and product labels. For further information contact your Covestro LLC representative or the Product Safety and Regulatory Affairs Department in Pittsburgh, PA.

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether our products, technical assistance and information are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale which are available upon request. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with any claim of any patent relative to any material or its use. No license is implied or in fact granted under the claims of any patent.

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