



Film specification

CAS-Specialty Films EMEA/LA

Makrofol ID 6-2 000000

Range thickness: 30 - 750 microns

Makrofol ID 6-2 000000 is an extruded polycarbonate film.

Specified Properties

Property	Standard	Value	Unit	Notes
* Nom. thickness ≤ 50 microns >50 - <100 microns 100 - <175 microns 175 - <475 microns ≥ 475 microns	according to ISO 4593	± 5,0 ± 7,5 ± 5,0 % ± 3,0 % ± 2,5 %	µm µm	23°C valid for 99,7 % of all measured data
* Roughness R3z <u>6-side</u> 50 - <100 microns 100 - <475 microns ≥ 475 microns <u>2-side</u> <100 microns 100 - <250 microns ≥ 250 microns	according to ISO 4287/88	10,50 - 17,00 13,00 - 17,00 11,00 - 17,00 9,00 - 17,00 4,00 - 9,00 4,00 - 9,00 2,00 - 9,00	microns	Lm 12,5 mm, lc 2,5 mm average over 3-5 measurements in traverse direction
* Gloss level <u>6-side</u> 50 - <100 microns 100 - <475 microns ≥ 475 microns <50 microns <u>2-side</u> <100 microns 100 - <250 microns ≥ 250 microns	following ISO 2813	1,8 - 4,2 3,0 - 4,5 3,0 - 6,2 1,8 - 11,5 1,0 - 50,0 1,0 - 50,0 1,0 - 50,0	digits	Angle 60° measured value over 3-5 measurements in traverse direction printed black on the opposite side
Flatness	internal no. 35006	≤3,0	mm	For sheets only sheet size 500mm x 600mm
Density	following ISO 1183	1,20 ± 0,02	g/cm³	Method C 20°C
Surface tension	according to DIN ISO 8296	36 - 44	mN/m	Sherman pencil

Edition 2 dated 04.10.2013. Valid until 18.01.2019

* Data shown in CoA. Further data on request.



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CAS-Specialty Films EMEA/LA

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Range thickness: 30 - 750 microns

Specified Properties (cont.)

Tensile strength @ break	following ISO 527-1,-3	≥50,0	MPa	room temperature 100mm/min specimen 1B tested at films
Elongation @ break	following ISO 527-,-3	≥50,0	%	room temperature 100mm/min specimen 1B tested at films
Young's modulus	following ISO 527-,-3	≥2000	MPa	room temperature 100mm/min specimen 1B tested at films
Shrinkage machine direction traverse direction	according to IEC 60674-2	≤0,3 ≤0,3	%	1h, 130°C, shrinkage on talcum
Vicat distortion temperature	following ISO 306	147,0 ± 2	°C	VST/B/50 pressed board in oil
Light transmission	ISO 13468-2	≥80	%	O/D standard light C2
Visible inclusions 100 - 350 µm size >350 - 635 µm size >635 µm size	Internal no 35001	≤10 ≤5 ≤2	per 1,0 m² per 1,0 m² per 1,0 m²	Optical evaluation: black specs, gels, etc.
Roller defects 6-side 2-side	Internal no. 35001	≤1 ≤3	per m²	Size of defect max. 1mm diameter or length and a height of max. 30 microns

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Makrofol ID 6-2 000000

Range thickness: 30 - 750 microns

Specified Properties (cont.)

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Please refer to the relevant safety data sheet

i.v. H. Wieser

Technical Product Management

i.v. A. Pinter

Quality Management

Edition 2 dated 04.10.2013, Valid until 18.01.2019

* Data shown in CoA, Further data on request.



Film specification

CAS-Specialty Films EMEA/LA

Makrofol ID 6-2 750061

Range thickness: 75 - 680 microns

Makrofol ID 6-2 750061 is a laserable extrusion film based on Polycarbonate.

Specified Properties

Property	Reference	Value	Unit	Notes
* Nom. thickness 75 - <100 microns 100 - <175 microns 175 - <475 microns ≥ 475 microns	according to ISO 4593	± 7,5 ± 5,0 % ± 3,0 % ± 2,5 %	µm	23°C Valid for 99,7% of measured data
* Roughness R3z 6-side 75 - <100 microns 100 - <475 microns ≥ 475 microns 2-side <100 microns 100 - <250 microns ≥ 250 microns	according to ISO 4287/88	10,50 - 17,00 13,00 - 17,00 11,00 - 17,00 4,00 - 9,00 4,00 - 9,00 2,00 - 9,00	microns	Lm 12,5 mm, lc 2,5 mm average over 3-5 measurements in traverse direction
* Gloss level 6-side 75 - <475 microns ≥ 475 microns 2-side <100 microns 100 - <250 microns ≥ 250 microns	following ISO 2813	1,8 - 4,2 3,0 - 6,2 1,0 - 15,0 1,0 - 15,0 1,0 - 20,0	digits	Angle 60° measured value over 3-5 measurements in traverse direction printed black on the opposite side
Flatness	internal no. 35006	≤3,0	mm	For sheets only sheet size 500mm x 600mm
Density	following ISO 1183	1,20 ± 0,02	g/cm³	Method C 20°C
Surface tension	according to DIN ISO 8296	36 - 44	mN/m	Sherman pencil
Tensile strength @ break	following ISO 527-1,-3	≥50,0	MPa	room temperature 100mm/min specimen 1B tested at films

Edition 2 dated 04.10.2013. Valid until 18.01.2019

* Data shown in CoA. Further data on request.



Makrofol® ID 4-4 white

Description and Application Information

Makrofol® ID 4-4 white is available in different colour grades (010170, 010207) and is the top choice inlay-material in cards. The surface structure of Makrofol® ID 4-4 is both sides fine matte.

It is available in various standard thicknesses between 70 microns to 620 microns, other thicknesses on request. Available as roll and sheets.

Typical applications are identity cards, credit cards, driving licences and passports.

Guide data*

General properties			
Property	Value	Unit of measurement	Method
Density	1,34	g/cm ³	ISO 1183, 20°C method C
Gloss, 60° top side	≤ 25	Digits	ISO 2813
Gloss, 60° reverse side	≤ 25	Digits	ISO 2813
Mechanical properties			
Property	Value	Unit of measurement	Method
Tensile Modulus	≥ 2000	MPa	ISO 527-1,-3
Tensile strength at break, parallel	≥ 50	MPa	ISO 527-1,-3
Tensile strength at break, across	≥ 50	MPa	ISO 527-1,-3
Elongation at break, parallel	≥ 10	%	ISO 527-1,-3
Thermal properties			
Property	Value	Unit of measurement	Method
Shrinkage, parallel 130°C, 1 h	< 0,3	%	following IEC 60674-2
Shrinkage, across 130°C, 1 h	< 0,3	%	following IEC 60674-2

* These values provide general information and are not part of the product specification.

Labeling and REACH applications

This product data sheet is only valid in conjunction with the latest edition of the corresponding Safety Data Sheet.

Any updating of safety-relevant information – in accordance with statutory requirements – will only be reflected in the Safety Data Sheet, copies of which will be revised and distributed. Information relating to the current classification and labeling, applications and processing methods and further data relevant to safety can be found in the currently valid Safety Data Sheet.



Makrofol® ID 4-4 white

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, information and recommendations 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 Covestro. 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.

This product is not designated for the manufacture of a medical device (1) or of intermediate products for medical devices. This product is also not designated for Food Contact (2), including drinking water, or cosmetic applications. If the intended use of the product is for the manufacture of a medical device or of intermediate products for medical devices, for Food Contact products or cosmetic applications Covestro must be contacted in advance to provide its agreement to sell such product for such purpose. Nonetheless, any determination as to whether a product is appropriate for use in a medical device or intermediate products for medical devices, for Food Contact products or cosmetic applications must be made solely by the purchaser of the product without relying upon any representations by Covestro.

(1) Please see the "Guidance on Use of Covestro Products in a Medical Application" document.

(2) As defined in Commission Regulation (EU) 1935/2004.

Editor: CAS Specialty Films
Covestro AG
Kaiser-Wilhelm-Allee 60
D-51373 Leverkusen
www.films.covestro.com
films@covestro.com

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Replaces edition dated 2013-11-12

 **Makrofol®**
Product Datasheet



NATIONAL RESEARCH CENTRE
AL-BUHOUTH ST. DOKKI, CAIRO- EGYPT

المركز القومي للبحوث

الدقى - القاهرة - جمهورية مصر العربية



تقرير عن تحليل ودراسة عينة حبيبات معاد تدويرها

ورد الى وحدة التحاليل والاستشارات - مجال نفاذيه الغازات لأفلام التعبئة والتغليف بالمركز القومى للبحوث عدد (1) عينة عبارة عن حبيبات بولى كربونات معاد تدويرها من شركة المستقبل للتوريدات (م/ لطفى سعيد) وذلك بتاريخ 2024/11/27 بغرض تحديد خواصها الميكانيكية والحرارية بعد اعادة تدويرها.

وبعمل ألواح من الحبيبات وذلك لتحديد الخواص الميكانيكية ومقارنتها بتلك الخامات الجديدة وجد ما يلى كما هو موضح بالجدول:

Properties الخواص	Test Method	Recycled sample	Virgin sample
Specifuc gravity (gm/cm ³)	ASTM D 792	1.286	1.2
Water absorption [%]	ASTM D 570	0.25	0.15
Tensile strength, Ultimate [MPa]	ASTM D 638	50	65
Tensile strength at yield[MPa]	ASTM D 638	48	62
Tensile Modulus [MPa]	ASTM D 638	930	2344
Elongation [%]	ASTM D 638	63	110
Rockwell hardness	R	90	118
Heat deflection temperature[°C]		80 at 1.8 MPa	132

وهذه النتائج تمثل العينات الموردة منكم للمركز دون أدنى مسئولية على المركز القومى للبحوث عن التوريد.

القائم بالتحليل

ك. اسلام ابراهيم النجار

أ. د. احمد محمود يوسف

الباحث الرئيسى

أ.د. ابو الفتوح عبد المنعم عبد الحكيم

أ. د. احمد محمود يوسف



NATIONAL RESEARCH CENTRE
AL-BUHOUTH ST.DOKKI,CAIRO-EGYPT

المركز القومي للبحوث
الدقى - القاهرة - جمهورية مصر العربية



Report on Study of Recycled Granules Sample

The analysis and consulting unit at National Research Centre, Field of Permeability of Packaging films received **recycled granules sample** from **Almustaqbal Supplies and General Contracting Company** For the purpose of determining their mechanical and thermal properties after recycling that in 27/11/2024.

By preparing sheets from the granules sample in order to determine the mechanical properties and compare it with this virgin material, It was found the following as shown in the table:

Properties	Test Method	Recycled sample	Virgin sample
Specific gravity (gm/cm ³)	ASTM D 792	1.286	1.2
Water absorption [%]	ASTM D 570	0.25	0.15
Tensile strength, Ultimate [MPa]	ASTM D 638	50	65
Tensile strength at yield[MPa]	ASTM D 638	48	62
Tensile Modulus [MPa]	ASTM D 638	930	2344
Elongation [%]	ASTM D 638	63	110
Rockwell hardness	R	90	118
Heat deflection temperature[°C]		80 at 1.8 MPa	132

The above-mentioned result represents the sample delivered from **Almustaqbal Supplies and General Contracting Company** without any responsibility and/or legal liabilities of National Research Centre, Cairo, Egypt

The work was carried out by
Chemist/ Islam El-Nagar
Prof. Dr. Ahmed Youssef

Supervisor
Prof. Dr. Abou El- Fetouh A. Abd El-Hakim

A. A. Abdelhakim



NATIONAL RESEARCH CENTRE
AL-BUHOUTH ST.DOKKI,CAIRO-EGYPT

المركز القومي للبحوث
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By preparing sheets from the granules sample in order to determine the mechanical properties and compare it with this virgin material, it was found the following as shown in the table:

Properties	Test Method	Sample
Specific gravity (gm/cm ³)	ASTM D 792	1.286
Water absorption [%]	ASTM D 570	0.25
Tensile strength, Ultimate [MPa]	ASTM D 638	50
Tensile strength at yield[MPa]	ASTM D 638	48
Tensile Modulus [MPa]	ASTM D 638	930
Elongation [%]	ASTM D 638	63
Rockwell hardness	R	90
Heat deflection temperature[°C]	at 1.8 MPa	85

The above-mentioned result represents the sample delivered from **Almustaqbal Supplies and General Contracting Company** without any responsibility and/or legal liabilities of National Research Centre, Cairo, Egypt



The work was carried out by
Chemist/ Islam El-Nagar
Islam El-Nagar
Prof. Dr. Ahmed Youssef
Ahmed Youssef

Supervisor

Prof. Dr. Abou El- Fetouh A. Abd El-Hakim

A. A. Abdelhakim
16/12/2024

Manufacturing breakage of panels



Recycled



