AUTOFLEX AutoForm M

Product Data Sheet

FIM techniques are used for the cost effective manufacture of fascias, panels and casings in a variety of markets. MacDermid Autotype Limited films now offer advances in the durability of the film substrate, both in terms of chemical resistance and in terms of abrasion resistance

PRODUCT DESCRIPTION

The product is a formable hard-coated polycarbonate film available in 180µ and 250µ with a coating designed to allow shallow formability whilst retaining its abrasion resistant properties. The abrasion resistance and formability of the product is superior compared with conventional hardcoated polycarbonates.

Autoflex® Autoform™ M is designed for the lens market and is ideal for robot handling. The film has a hardcoated high gloss first surface and a matt second surface producing excellent slip characteristics when handled as the film is supplied without protective laminate on the second surface.

APPLICATIONS

The film is designed for in-mould decoration. The part is printed on the reverse, formed and trimmed to the shape required, and finally injection moulded on the reverse to give increased rigidity. The technique has applications in:

- Telecommunications - MobileTelephone/Pager lenses and body parts
- White goods - Home appliance fascias
- Brown Goods - Electronics fascias
- Automotive - Heater controls

PERFORMANCE BENEFITS

- Excellent cosmetic quality & durability
- Shallow formable by thermoforming or pressure forming.
- Matt surface becomes transparent when back moulded with PC resin.
- No sticking when stacked for robot feeding.
- No laminate to remove prior to printing.

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TYPICAL PROPERTY VALUES

PROPERTY	AUTOFLEX AutoForm M	TEST METHOD
Physical		
Thickness Grade 180 250	 180µ +/- 10.5% 250µ +/- 8.6%	ASTM D792
Density	1.2%	ASTM D1003
Haze	< 3.0*%	ASTM D1003
Light transmission	> 89	ASTM D1925
Yellowness index	<2.0	ASTM D570
Water absorption, equilibrium	0.4	168 hours @ 60°C, 95% RH
Resistance to humidity	No adhesion loss	
Gloss Backprinted – flat black 85 60 20 Gloss clear over white 85 60 20	 Gardner 99% 92% 64% Gardner 99% 93% 84%	ASTM D523
Mechanical (Base Film)		
Tensile Strength Break	60MPa	ISO1184 at 23°C
Elongatino at Break	100%	
Young's Modulus	2100MPa	
Tear Strength Initiation Propagation	 640 g/25µ 30 g/25µ	 ASTM D1004 ASTM D1922
UV Resistance		
Atlas Aging	Δ Trans -1.30 (to be confirmed) Δ YI 5.40 (to be confirmed) Δ Haze -.20 (to be confirmed) Adhesion (% Loss FLTM 0 (to be confirmed) Grey Scale 4.00 (to be confirmed)	SAE J1885 489 Kj/m^2
Thermal		
Heat Aging @ 168 hrs, 180°F	No adhesion loss or visible change	

*When back moulded – result will depend on tool quality. Coating will contribute <1% haze
These are typical properties and are not intended for specification purposes. Tests carried out on flat samples.
Mechanical data derives from that for Makrofol DE1-1

CHEMICAL PROPERTIES

CHEMICAL	RESULT
1 Hour Surface Exposure at 23°C	
Coffee	Passed
Top Job [3]	Passed
Fantastik [4]	Passed
Formula 409 [2]	Passed
Windex w/Ammonia D [5]	Passed
Wisk [1]	Passed
Downy [3]	Passed
Spray 'N Wash [4]	Passed
Clorox [2]	Passed
Mustard	Passed
Mr. Clean [3]	Passed
Ketchup	Passed
Tea	Passed

CHEMICAL	RESULT
1 Hour Surface Exposure at 50°C	
Tomato Juice	Passed
Lemon Juice	Passed
Grape Juice	Passed
Vinegar	Passed
Milk	Passed
Spic-N-Span [3]	Passed
Armor All [6]	Passed***
Pledge [7]	Passed***
WD-40 Oil [8]	Passed

* = A few small coating blisters ** = Slight haze *** = slight surface swelling
These are typical properties and are not intended for specification purposes. Test carried out on flat samples
1 Registered Trademark of Lever Brothers Company
2 Registered Trademark of the Clorox Company
3 Registered Trademark of Proctor & Gamble
4 Registered Trademark of Texize, Division of Norton Norwich Inc.
5 Registered Trademark of the Drackett Products Company
6 Registered Trademark of Armor All Products Corp.
7 Registered Trademark of SC Johnson Wax Inc.
8 Registered Trademark of the WD-40 Company

TABER ABRASION RESISTANCE

CONDITION	UNITS	TYPICAL VALUE
CS10F wheel, 500grams		
25 cycles	Change in % Haze	<5.0*
100 cycles	Change in % Haze	<5.0*

These are typical properties and are not intended for specification purposes. Tests carried out on backmoulded flat samples
*haze value will depend on tool quality. Coating abrasion will contribute <5% haze.

PROCESS OUTLINE

During the decoration steps, prior to forming, handle the film with care.

Printing/Decoration:
Second surface decoration can be achieved with a variety of suitable screen printing inks, including UV inks. The hardcoating will slightly retard drying of solvent inks. The IMD process requires thorough drying and in many cases baking of inks for optimum results. Ink manufacturers recommendations must be followed. The product is not compatible with the Aquatex FPH® range of texturing lacquers.

Forming:
Thermoforming or pressure forming by the Niebling process should be carried out after decoration. Do not attempt deep forming with the product. Forming may also be achieved during the injection moulding process. Overforming of the coating may cause micro-cracking. Thorough testing is advised on any new tooling.

Cutting:
Trimming of the formed part may be carried out with steel rule blades, but for optimum precision matched metal tooling is required.

Injection Moulding:
The printed, formed and trimmed part is then inserted into a suitably designed injection mould tool cavity and resin injected onto the printed side of the film. For further details contact the IMD Support Team.

HAZARDS & WARNINGS

ENSURE ALL USERS READ THIS INFORMATION

This product is solely intended for use as an industrial film substrate, which is screen printable on the non-coated side with the option to vacuum/thermoform or high pressure form the film. The formed part can then be back moulded using a suitable injection moulding resin. MacDermid Autotype Limited accepts no liability for use in any other way.

The main hazard associated with the film is the vapour produced when the film is exposed to heat prior to forming. Ensure that local exhaust extraction is in place to remove the vapour produced. See first aid instructions.

Ensure that light cotton gloves are worn throughout processing of the film. There is a minor possibility of irritation and/or sensitisation from the coating.

Do not touch the film while hot. Allow to cool before handling.

FIRE PRECAUTIONS

Extinguisher Media: Use water, foam, PCF, CO_2
Exposure Hazards: Toxic fumes CO, CO_2, NOx evolved during combustion.

SPILLAGE

N/A

FIRST AID

Inhalation of fumes during processing: Remove to fresh air. Give artificial respiration if necessary. Seek medical attention.
Ingestion: N/A
Eyes: N/A
Skin: Wash immediately with soap and water.

SHELF LIFE & STORAGE

This product should not deteriorate if stored in cool, dry conditions away from light and sources of UV, in the original sealed packaging. Use recommended within two years.

ENVIRONMENTAL & DISPOSAL

EC Regulation 594/91 classifies ozone depleting substances into a number of different groups, I-VI. This range of products do NOT contain any substance classified in groups I-VI nor have any of the substances been used by MacDermid Autotype during manufacture. For details of the content of each of the groups, please see separate ozone depleting substances document

EU Directives 2003/11/EC; 2002/95/EC; 2002/525/EC; 2006/122/EC (ROHS)

Restriction on use of	Pentabromodiphenyl ether CAS 32534-81-9
	Octabromodiphenyl ether CAS 32536-52-0
	Polybrominated biphenyls

Polybrominated diphenylether
Lead, Mercury, Cadmium, Chromium VI
Perfluorooctanesulphonate, Perfluorooctanic acid & related compounds

In relation to the above directive, this range of products does not contain polybrominated biphenyl & diphenyl ethers, brominated compounds, perfluoroctane derivatives or any flame retardant agents. MacDermid Autotype products are also free of the heavy metals specified in the above Directives (lead, mercury, cadmium, chromium VI).

EU Directive 2002/96/EC (WEEE) relates to the Disposal and Recycling of Waste Electronic and Electrical Equipment. MacDermid Autotype products are compliant with this directive and do not contain any materials identified in Directives 2003/11/EC & 2002/53/EC (also 2037/2000). MacDermid Autotype Limited has no responsibility for the compliance of finished equipment, which will contain materials from other suppliers.

This range of products comprises films with a chemically treated surface which renders them difficult to recycle in appropriate material recovery schemes. However, they contain no substances listed on the EC Black or Grey lists and may be safely disposed of in a landfill or by authorized incineration.

PACKAGING

Sheets: 100 sheets per pack,
Rolls: Maximum width 122cm on a 152.4mm (6") core.

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US 5,108,530
US 5,733,651
US 5,648,414

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