

XtraForm™ M HCL

Product Data Sheet

FIM/IMD techniques are used for 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 250µ thickness with a gloss finish on the hard-coat side of the film, matt on the reverse. The hard-coat surface of the product is supplied with a protective laminate.

After forming to the shape required the product is designed to be UV cured to provide maximum scratch and chemical resistance. The product offers Taber resistance and solvent resistance comparable to conventional non-formable hardcoated polycarbonate. The weatherability performance of the product has been found to conform to the requirements of automotive interior trim specifications.

XtraForm M HCL is designed for deep draw 3D FIM/IMD applications and is ideal for robot handling. The 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 - Mobile Telephone/Pager lenses and body parts
- White goods - Home appliance fascias
- Brown Goods - Electronics fascias
- Automotive - Heater controls, fascias

PERFORMANCE BENEFITS

- High gloss finish
- Enhanced chemical resistance
- Scuff, scratch and gouge resistant
- Ability to form deep draw 3D parts



TYPICAL PROPERTY VALUES

Property	XtraForm M HCL	Test Method
Physical		
Thickness grade 250 μ	258 \pm 8%	
Specific Gravity	1.2	ASTM D792
Area Factor	160 ft ² /lb/mil 0.833 m ² /kg/mm	
Haze (processed film)	< 1.6%	ASTM D1003
Light transmission	89 %	ASTM D1003
Yellowness Index Uncured 250 μ Cured 250 μ	\leq 4 \leq 6	ASTM D1925
Water Absorption, Equilibrium	0.4 %	ASTM D570
Resistance to Humidity	No adhesion loss	72 hours @ 60°C,95% RH
Gloss (processed film) Back printed, Flat Black 85° 60° 20°	Gardner 100 92 85	ASTM D523
Mechanical (for base film)		
Tensile Strength Yield Elongation at break	\geq 60MPa/23°C \geq 100%/23°C	ASTM D882
UV Resistance		
Atlas Ageing Adhesion (% Loss) FLTM Grey Scale	0 5.00	SAE J1885 225 Kj/m ²
Thermal		
Heat Ageing ; 240 hrs @ 90°C	No adhesion loss or visible change	

These are typical properties and are not intended for specification purposes.

Tests carried out on unprocessed film or back-moulded flat samples; film fully cured with a 2J UV dose, using 240W/cm undoped H-type UV lamps giving a UV intensity of 1.5W/cm²



CHEMICAL RESISTANCE

Chemical	Result
1 Hour exposure at 23 °C	
Windex ⁵	Passed
Spic-N-Span ³	Passed
Armor All ⁶	Passed
Turtle Wax ⁹	Passed
Pledge ⁷	Passed
Vinyl Cleaner	Passed
Multi Cleaner	Passed
DPL	Passed
Dri Slide	Passed
WD-40 Oil ⁸	Passed
24 Hours exposure at 23 °C	
Petrol	Passed
Diesel	Passed
Sun cream	Passed

Chemical	Result
1 Hour Surface Exposure at 50 °C	
Bleach	Passed
Fantastik ⁴	Passed
Formula 409 ²	Passed
Windex ⁵	Passed
Wisk ¹	Passed
Downy ³	Passed
Grape Juice	Passed
Tomato Juice	Passed
Coffee	Passed
Milk	Passed
Lemon Juice	Passed
Water/IMS	Passed

These are typical properties and are not intended for specification purposes. Tests carried out on UV cured flat samples.

- 1 Registered Trademark of Lever Brothers 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
- 9 Registered Trademark of Turtle Wax Inc

Further chemical test results are available on request

TABER ABRASION RESISTANCE (ASTM D1044)

CONDITION	UNITS	TYPICAL VALUE
CS10F wheel, 500grams		
25 cycles	Change in % Haze	< 5.0
100 cycles	Change in % Haze	<15.0

These are typical properties and are not intended for specification purposes. Tests carried out on UV cured flat samples. The Taber haze result depends on the draw ratio of forming. Under ideal conditions the film can be drawn to 40% of the original thickness without cracking the coating, although for optimal abrasion resistance this should be limited to 66%

COSMETIC QUALITY

Before exposure to UV light, the Xtraform surface is uncured, and may be susceptible to marking through deformation of the surface. We strongly recommend that steps are taken to prevent damage to the surface during processing.

Some surface marks can be caused by gel-spots or bubbles under the laminate film, or by its delamination and re-lamination. In tests these have been shown to flow out and



disappear during heating in the forming process (please see forming guidance below). These minor markings have no effect on the quality of the finished part.

PROCESS OUTLINE

During the decoration steps, prior to forming, handle the film with care. The film must be handled in UV safe, preferably yellow light, conditions at every process stage until the UV cure is complete.

Full Processing guidelines for Printing, UV Curing and Forming are available and must be referred to in designing a process of use with this product. The following information is an outline guide only.

Printing/Decoration:

Second surface decoration can be achieved with a variety of suitable screen printing inks, excluding UV inks. The product is compatible with the Aquatex FPH range of texturing varnishes. The hard coating will slightly retard the drying of solvent inks. The FIM process requires thorough drying and in most cases baking of inks for optimum results. The Ink manufacturer's process recommendations must be used to develop production processes. We do not recommend that baking cycles, in the printing process, exceed 5 hours at 80 degrees Celsius.

Colour matching of the ink and film must be undertaken with the protective laminate removed from the top surface.

For more information, please refer to XtraForm (Laminate) Printing Guide

Forming:

It is essential that the laminate film on top of the hardcoat surface is removed prior to forming. The laminate must be removed in a constant smooth action. Use static control measures to prevent contamination. Thermoforming or pressure forming by the Niebling process must be carried out *after* decoration.

For more information, please refer to XtraForm (Laminate) Forming Guide

Curing:

The formed part must be UV cured immediately after forming to prevent any scratching during subsequent processing.

For more information, please refer to XtraForm (Laminate) Curing Guide

Cutting:

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

For more information, please refer to XtraForm (Laminate) Cutting Guide

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 more information, please refer to XtraForm (Laminate) Moulding Guide

IMDS ID-No 127637209



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.

There is a minor possibility of irritation and/or sensitisation from the coating. Ensure nitrile or rubber butyl gloves are worn throughout processing of the film. Light cotton gloves may be worn over the top to prevent any cosmetic damage.

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

FIRE PRECAUTIONS

Extinguisher Media: Use water, foam, PCF, CO₂

Exposure Hazards: Toxic fumes CO, CO₂, NO_x evolved during combustion.

SPILLAGE

N/A

FIRST AID

Inhalation of fumes during processing: Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

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. Material should be used within 6 months of manufacture. The shelf life properties of this product may be affected by prolonged storage of the product at temperatures in excess of 25°C, or prolonged storage in freezing conditions.

For more information, please refer to XtraForm (Laminate) Shelf Life Guide



For the storage of sheeted product, we advise the packs to be laid flat on a smooth flat surface, and that the stack to be no higher than 10 boxes.





Rolls should be stored in their original boxes, suspended from the core, as shown in the photograph.

PACKAGING

Sheets 100 or 300 sheets per pack sealed in black plastic and packed in MacDermid Autotype Limited logo board box

Rolls Maximum width 122cm on a 152.4mm (6") core.

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, perfluorooctane 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. The product contains no substances listed on the EC Black or Grey lists and may be safely disposed of in a landfill or by authorized incineration.

This product does not contain any chemicals on the EC Black or Grey lists.

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US 5,108,530

US 5,733,651

US 5,648,414

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