

Autotex and Autoflex EB

Interface Technology Films

**Textured, Gloss and Antiglare
Hardcoated Film Substrates
for Membrane Switch Applications**





MacDermid Autotype Inc. is part of MacDermid Incorporated, a worldwide manufacturer of proprietary specialty chemical products and materials for the electronics, metal finishing and graphic arts industries. MacDermid Autotype specializes in the development, manufacture and distribution of films and chemicals for traditional printing and digital imaging markets and for high-tech industrial and optical applications.

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Autotex & Autoflex EB Overview

Electronic displays are now incorporated into thousands of different products - with more on the drawing board at any given time. Membrane switches are used both indoors and outdoors, from the protected environment of our homes to military aircraft and ocean-going vessels. Almost all applications require a tough, durable display, capable of operating reliably in a range of conditions. Additionally, a membrane switch must confer excellent cosmetic quality to the finished product. The specifications for materials that are designed into membrane switches are, understandably, very rigid.

Interface Technology Film Substrates from **MacDermid Autotype** are proven and reliable performers in membrane switch technology for over 20 years. They have effectively proved to the industry that a polyester overlay can add millions of actuations to the life of the switch. The switch life of the films can exceed five million actuations, even when embossed, ensuring the switch will work throughout the lifetime of the equipment.

Autotex

Autotex is a range of textured and hardcoated polyester films offered in two textures, fine and velvet, in thicknesses ranging from 6 to 10 mil. Autotex has excellent resistance to chemicals and abrasion. The second surface is ink receptive for solvent-based or UV curable inks.

To print clear windows on the textured first surface of Autotex films, use Windotex, a screen printable, UV-curable coating, available from MacDermid Autotype. See page 8 for detailed information.

Autoflex EB

Autoflex is a range of hardcoated polyester films offered in gloss and antiglare finishes (first surface) in film thickness ranging from 5 to 10 mils. Autotex and Autoflex films provide excellent chemical and scratch resistance and an ink receptive second surface for solvent-based or UV-curable inks.

For selective texturing of Autoflex, MacDermid Autotype offers Fototex, a screen printable UV-curable texturing coating. Fototex is available for use with conventional UV curing equipment or nitrogen UV curing units. See details on page 9.



Typical Data for Autotex and Autoflex EB

Environmental Data

Minimum use temperature: -40°C (-40°F);

Maximum use temperature:

High humidity environments (>80% RH): at 40° C / 104° F.

Moderate humidity environments (10 - 80% RH): at 60° C / 140° F.

Low humidity environments (<10% RH): at 85° C / 185° F.

Solvent Resistance Data

Autotex and Autoflex EB withstand exposure to the following chemicals, without significant visible change, for more than 24 hours duration under DIN 42 115 Part 2:

- Ajax / Vim in solution
- Alkalicarbonate solution¹
- Ammonia (<40%)¹
- Acetic acid (<50%)
- Ariel powder in solution¹
- Bleach¹
- Castor oil
- Caustic soda (<40%)¹
- Cutting oil
- Cyclohexanol
- Diacetone alcohol
- Diesel
- Downey / Lenor¹
- Ethanol
- Glycerine
- Glycol
- Gumption¹
- Hydrochloric acid (<36%)
- Linseed oil
- Methanol
- Nitric acid (<10%)
- Paraffin oil
- Persil powder in solution¹
- Petroleum spirit¹
- Phosphoric acid (<30%)
- Potassium ferricyanide
- Potassium hydroxide (<30%)
- Pure Turpentine
- SBP 60/95¹ of
- Sulfuric acid (<10%)
- Tomato ketchup
- Trichloroacetic acid (<50%)
- White Spirit
- Windex¹
- Wisk

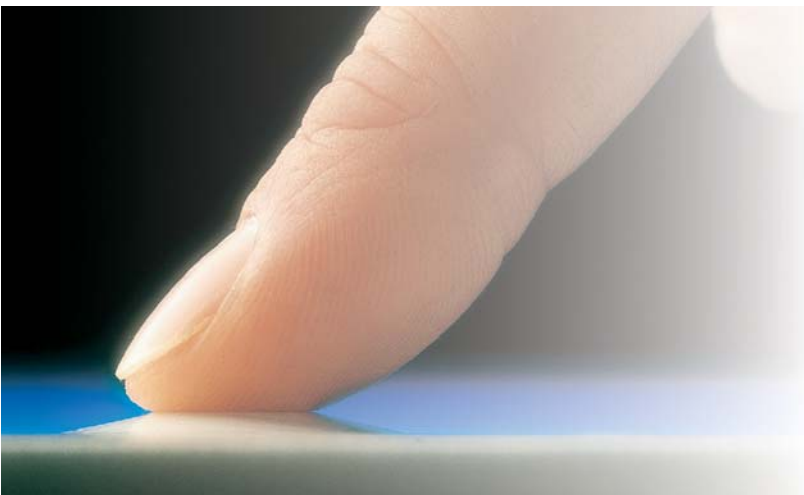
¹Extremely faint glossing of the texture was noted.

Autotex and Autoflex EB are *not* resistant to the following. For full details, see the MacDermid Autotype Industrial Films Technical Manual:

Concentrated mineral acids
Concentrated caustic solution
High pressure steam at over 100°C

Benzyl alcohol
Methylene chloride
Dimethylformamide

Tetrahydrofuran



Autotex & Autoflex EB Optical Properties

Property	Autotex		Autoflex		Test Method
	Fine	Velvet	Gloss	Antiglare	
BYK Gardner Haze	55% ± 5%	71% ± 5%	1.0% ± 0.5%	11% ± 2%	ASTM D1003-77 ¹
Gloss Level (60°)	7.0% ± 0.5%	4.3% ± 0.5%	96% ± 2%	60% ± 6%	ASTM D2457-70 ¹
Texture Profile	Ra 1.6μ ± 0.2μ Rtm 8μ ± 2μ	Ra 2.8μ ± 0.2μ Rtm 13.4μ ± 2μ	Not Applicable		MacDermid Autotype Method ²
Total Luminous Transmission	92% ± 2%	92% ± 2%	92% ± 2%	92% ± 2%	ASTM D1003-77 ¹
Yellowness Index ³	<3	<3	<3.5	<3.5	ASTM D1925-70

1 Adapted to MacDermid Autotype method, see Test Method Manual.

2 See Test Method Manual.

3 Typical result on 150μm product tested using X-Rite SP68 spectrophotometer.

Autotex & Autoflex EB Physical Properties

Property	Autotex	Autoflex EB	Test Method
Relative Density ¹	1.40 g/cm ³	1.40 g/cm ³	ASTM D1505-85 modified to Dupont Teijin Films method at 23° C.
Pencil Hardness	Fine: 2H Velvet: 2H	Gloss: 3H Antiglare: 3H	MacDermid Autotype Method ²
Film thicknesses			N/A
0.005"	N/A	130μ ± 10%	
0.006"	150μ ± 10%	N/A	
0.007"	N/A	180μ ± 10%	
0.008"	200μ ± 10%	N/A	
0.010"	280μ ± 10%	250μ ± 10%	

1 Data derived from Dupont Teijin Films literature

2 See Test Method Manual.

Typical Data for Autotex and Autoflex EB

Autotex & Autoflex EB Mechanical Properties

Property	Autotex & Autoflex EB	Test Method
Burst strength ¹	1.75Mpa	ASTM D774-67
Elastic modulus (1% secant) 0.008", 200μ	4 - 5.5 Gpa	ASTM D882-83 23° C. @ 50% RH. Strain rate - 10%/minute
Elongation at break 0.008", 200μ	70 - 80%	ASTM D882-83 23° C. @50% RH Strain rate - 50%/minute
MIT fold durability	>20,000 folds TD	ASTM D2176-69 ²
Switch life	>5 million flexes	MacDermid Autotype Method ³
Tensile strength at break: 200μ	160 - 250 Mpa (160-250N/mm ²)	ASTM D882-83; Strain rate 50%/min.
Yield point	6%	ASTM D882-83

- 1 Data derived from Dupont Teijin Films literature
- 2 Adapted to MacDermid Autotype Method, see Test Method Manual
- 3 See Test Method Manual

Autotex & Autoflex EB Chemical Properties

Property	Autotex & Autoflex EB	Test Method
Coefficient of hygroscopic expansion ¹	MD 8x10 ⁻⁶ (per 1% RH) TD 7x10 ⁻⁶ (per 1% RH)	DuPont Teijin Films Method ¹ Between 40-80% RH
Moisture vapor transmission rate (MVTR) ¹	2.6 - 3.6 g/m ² /24 hours	ASTM F372--73
Oxygen transmission rate ¹	5.3 - 8.2 ml/m ² / 24 hours	ASTM D1434-82 @ 25° C. / 77° F. 77% RH

- 1 Data derived from Dupont Teijin Films literature

RoHS Compliance (EU)

Autotex and Autoflex EB are compliant with the following EU directives regarding the use of polybrominated biphenyl and diphenyl ethers as flame retardant additives. Autotex and Autoflex EB also are free of heavy metals specified in the noted Directives (Lead, Mercury, Cadmium and Chromium VI). For further information on handling and safe disposal, please see the Material Safety Data Sheet for each product.

EU Directives 2003/11/EC, 2002/95/EC

Octabromodiphenyl Ether CAS 32536-52-0

Polybrominated Diphenylether

Restriction on use of: Pentabromodiphenyl Ether CAS 32534-81-9

Polybrominated Biphenyls

Lead, Mercury, Cadmium, Chromium VI

EU Directive 2002/96/EC related to waste electrical and electronic equipment is not applicable to Autotex and Autoflex EB.

Registration, Evaluation, Authorisation and restriction of Chemicals (REACH)

MacDermid Autotype Industrial films or liquids do not use any of the substances on the Candidate List of Substances of Very High Concern in their manufacture and do not knowingly contain them.

Autotex & Autoflex EB Thermal Properties

Property	Autotex & Autoflex EB	Test Method
Coefficient of thermal expansion ¹	MD $19 \times 10^{-6} \text{ cm cm}^{-1} \text{ }^{\circ}\text{C}^{-1}$ TD $16 \times 10^{-6} \text{ cm cm}^{-1} \text{ }^{\circ}\text{C}^{-1}$	Dupont Teijin Films Test Method ¹ between 20-50°C
Dimensional stability	<0.3% at 120°C MD maximum shrinkage [Typical result <0.2%]	MacDermid Autotype Method ²
Maximum and minimum use temperatures	See Environmental Data	MacDermid Autotype Method ²

1 Data derived from Dupont Teijin Films literature

2 See Test Method Manual

Autotex & Autoflex EB Electrical Properties

Property	Autotex & Autoflex EB	Test Method
Dielectric strength ¹ 0.006", 150μ 0.008", 200μ	125kV/mm 105kV/mm	ASTM D149-81 6.35mm electrodes in dry air @ 25° C.
Dissipation factor ¹	0.005	ASTM D150-70
Surface resistivity	$>10^{13} \Omega/\text{sq}$ 500Vd.c	ASTM D257-83 @ 20° C./54% RH
Volume resistivity ¹	$10^{15} \Omega\text{m}$ 100 Vd.c	ASTM D257-83 @ 25°C/1000s

1 Data derived from Dupont Teijin Films literature

Ozone Depleting Substances

EC Regulation 594/91 classifies ozone depleting substances into a number of different groups, I-VI. Autotex and Autoflex do NOT contain any substance classified in groups I-VI nor have any of the substances been used by Autotype during manufacture.

For details of the content of each of the groups, please see separate Ozone Depleting Substances document.

Windotex

For Producing Clear Windows on Autotex

Product Description and Applications

Windotex is a UV-curable lacquer, designed to be screen printed onto areas of Autotex (see Autotex product data sheet) to produce transparent windows. For specific application data, handling procedures and health & safety information, refer to the Windotex product information sheet included with the product.

Windotex Product Range

Windotex Gloss: >90% gloss level

Windotex Antiglare: 75-90% gloss level

Windotex Gloss and Antiglare can be mixed to obtain a wide range of finishes between these two gloss levels* (see Windotex processing recommendations).

*Gloss levels are measured with black print.

Windotex Optical Properties

Property	Gloss	Antiglare	Test Method
Gardner Haze	<8%	10 - 30%	ASTM D1003-77 ¹
Gloss Level (60%)	>90%	75 - 90%	ASTM D2457-70 ¹
Total Luminous Transmission (TLT)	91% ± 2%	91% ± 2%	ASTM D1003-77 ¹
Yellowness Index ¹	1.5 - 3.0	1.5 - 3.0	ASTM D1925-70

1 Adapted to MacDermid Autotype Method, see Test Method Manual

2 MacDermid Autotype Method, see Test Method Manual

Windotex Physical Properties

Property	Gloss	Antiglare	Test Method
Abrasive Resistance	< 10% haze	N/A	ASTM D1044-82, 50 cycles, 250g load CS 10F wheels
Adhesion to Texture	100%		MacDermid Autotype Method ¹
Density (uncured)	1.1g/cm ²	1.2g/cm ²	Gravimetric
Pencil Hardness	F	F	MacDermid Autotype Method ²

1 See Test Method Manual

2 MacDermid Autotype Method, see Test Method Manual

Fototex

For Selective Texturing of Autoflex EB

Product Description and Applications

Fototex texturing varnishes are designed for use with Autoflex for producing selective textures. This provides a simple and cost effective way of producing high quality textured finishes, and extremely durable scratch resistant windows.

Fototex also produces excellent results when used with pre-treated polyester and polycarbonate films (see Fototex processing and safety recommendations).

Fototex is designed to be screen printed onto Autoflex (see Fototex processing and safety recommendations) to produce selectively textured areas for use in applications

such as membrane switch overlays, fascia panels, automotive displays, nameplates and product markings.

Fototex N Supermatte has been specifically designed to produce a deadfront finish for polycarbonate automotive displays. This product is not recommended for use with Autoflex hardcoat, where adhesion may be compromised.

Fototex Product Range

Fototex N Supermatte, Fototex N Matte:

For Linde type UV/Nitrogen curing units

Fototex UV Matte:

For use with conventional UV curing equipment.

Fototex Optical Properties

Property	Fototex N		Fototex UV	Test Method
Gardner Haze	95% ± 5%	80% ± 5%	78% ± 5%	ASTM D1003-77 ¹
Gloss Level (60%)	0.7 - 1.0%	3 - 4%	4 - 6%	ASTM D2457-70 ¹
Total Luminous Transmission (TLT)	97% ± 2%	92% ± 2%	87% ± 2%	ASTM D1003-77 ¹
UV Transmission Density	0.4	0.2	0.4	MacDermid Autotype Method ²
Yellowness Index ¹	< 6	< 4.5	< 6	ASTM D1925-70

1 Adapted to MacDermid Autotype Method, see Test Method Manual

2 MacDermid Autotype Method, see Test Method Manual

Fototex Physical Properties

Property	Fototex N		Fototex UV	Test Method	
Density (cured)	1.2g/cm ²	1.2g/cm ²	0.95g/cm ²	Gravimetric	
Pencil Hardness	2B - B	H	2H	MacDermid Autotype Method ¹	
Texture Profile	Ra Rtm	2.6µ ± 0.3% 15.7µ ± 1.0%	2µ ± 0.3% 11.3µ ± 1.0%	3.8µ ± 0.3% 17.7µ ± 1.0%	MacDermid Autotype Method ¹

1 See Test Method Manual

Autotex and Autoflex EB Product Range

Autotex and **Autoflex EB** comprise of a range of hard coated, thermally stabilized polyester films for use in membrane switches and in touchscreens where the second surface requires a screen printed graphic.

Autotex is available in a Fine or Velvet texture finish and **Autoflex EB** is available in a Gloss or Antiglare finish on the

first surface. The second surface provides excellent adhesion properties for screen printing inks. Both Autotex and Autoflex EB offer high optical clarity and a flexible hardcoated surface that combines excellent solvent and abrasion resistance. They are designed specifically for applications where enhanced chemical resistance and switch longevity is required.

Autotex Product Range

Product	First Surface		Second Surface (ink receptive coating)	
	Finish	Film Gauge	Solvent Based Ink	UV
Autotex F150	Textured, Fine	6 mil (150µ)	☒	
Autotex F157	Textured, Fine	6 mil (150µ)	☒	☒
Autotex F200	Textured, Fine	8 mil (200µ)	☒	
Autotex F207	Textured, Fine	8 mil (200µ)	☒	☒
Autotex F280	Textured, Fine	10 mil (280µ)	☒	
Autotex V150	Textured, Velvet	6 mil (150µ)	☒	
Autotex V157	Textured, Velvet	6 mil (150µ)	☒	☒
Autotex V200	Textured, Velvet	8 mil (200µ)	☒	
Autotex V207	Textured, Velvet	8 mil (200µ)	☒	☒
Autotex V280	Textured, Velvet	10 mil (280µ)	☒	

Autoflex EB Product Range

Product	First Surface		Second Surface (ink receptive coating)	
	Finish	Film Gauge	Solvent Based Ink	UV
Autoflex EBG130L	Gloss	5 mil (130µ)	☒	
Autoflex EBG180L	Gloss	7 mil (180µ)	☒	
Autoflex EBG187L	Gloss	7 mil (180µ)	☒	☒
Autoflex EBG250L	Gloss	10 mil (250µ)	☒	
Autoflex EBG137L	Gloss	5 mil (130µ)	☒	☒
Autoflex EBG257L	Gloss	10 mil (250µ)	☒	☒
Autoflex EBA130L	Antiglare	5 mil (130µ)	☒	
Autoflex EBA180L	Antiglare	7 mil (180µ)	☒	
Autoflex EBA187L	Antiglare	7 mil (180µ)	☒	☒
Autoflex EBA250L	Antiglare	10 mil (250µ)	☒	

Films for Specialized Applications

As markets and end-use requirements change, so does the face of the MacDermid Autotype range of Interface Technology Films. These specialized versions of Autotex and Autoflex possess all of the performance features of the originals -- as well as enhanced features for very specific applications.

Autotex XE for Outdoor Use

As with most other plastics, Autotex has limited longterm resistance to UV light and is therefore not recommended for extended outdoor exposure. To overcome the issue of outdoor durability, MacDermid Autotype has developed Autotex XE, a UV-resistant version of Autotex. A separate Product Data Sheet for Autotex XE is available.



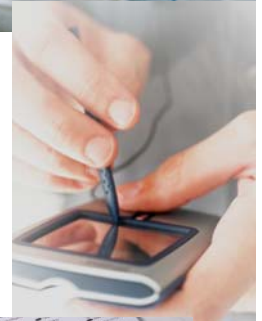
Autotex AM (Anti-Microbial)

For end-use applications where cleanliness counts, MacDermid Autotype now offers Autotex AM with Microban® antimicrobial protection. Autotex AM is the first film substrate of its kind to include Microban protection, which inhibits the growth of bacteria, mold and mildews that can cause odors, stains and product degradation.



Autoflex NP for Touchscreens

Autoflex NP hardcoated polyester films are designed specifically for display and touchscreen applications and offer excellent cosmetic quality and clarity. Autoflex NP is offered in gloss and antiglare finishes and offers two-sided functionality. The hardcoated side offers maximum resistance to solvents, chemicals and abrasion, but is also flexible for embossing. The second surface is unprimed, conferring excellent adhesion of transparent conductive coatings, such as indium tin oxide.



Autoflex AP for Appliance Applications

Autoflex AP is available in gloss and antiglare hardcoated finishes and was developed specifically for the appliance markets, where a combination of abrasion resistance, chemical resistance and switch life, must be achieved in a film in which clarity and color brilliance is also a prerequisite.



Autoflex DP and Autotex DP for Digital Offset

The high performance and reliability of Autoflex and Autotex polyester films are now available for use with HP Indigo 1000 and 2000 digital printing presses. These films meet all the rigid specifications of the HP Certified Media Program and put Autoflex and Autotex into the production of short-run jobs and prototyping.



Reliable Performance, Service and Support

For nearly twenty years, film substrates from MacDermid Autotype have been specified for use in the manufacture of membrane switches, fascia panels, nameplates, touchscreens and other critical industrial screen printing applications.

As end-use technology and customer requirements have evolved, so has the family of Interface Technology Films, which now includes film substrates for use in extreme outdoor environments, films developed for appliance applications, and antimicrobial films for situations where cleanliness is a key concern.

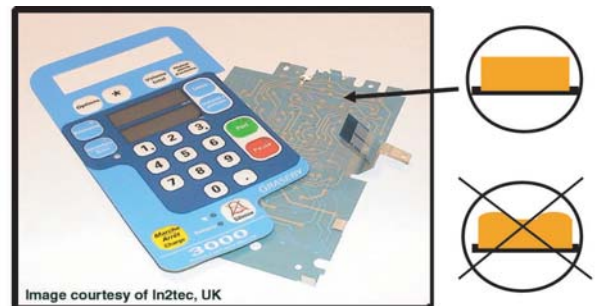
For sales and technical on the full offering of Interface Technology Films from MacDermid Autotype, visit our website at www.macdermidautotype.com/.



Autotype Capillex: The Ideal Stencil Material for Industrial Screen Printing Applications

For critical industrial screen printing applications where image acuity and ink deposit are equally important, MacDermid Autotype has developed Autotype Capillex CX. This unique 'controlled profile' stencil film makes it easy for printers to produce stencils with the optimum balance of stencil profile (EOM) and surface roughness (Rz value).

For detailed information on Autotype Capillex CX, visit our website at www.macdermidautotype.com, or request a printed copy by phoning Customer Service at (800) 323-0632.



Autotype Capillex CX is the ideal stencil material when product functionality and aesthetics are critically important.

YES WE CAN SM

It takes more than innovative, high performance products and superior technical service to help our customers compete and win in today's global marketplace. It takes a total commitment to understanding their needs and the ability to provide the right solutions—every time.

When success is your only goal, trust the company that says "Yes We Can."

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