

## ▶ AUTOTEX XE

**Polyester film is tougher and more durable than polycarbonate and PVC films. It offers enhanced chemical resistance and dramatically improved flex life. In common with polycarbonate and PVC films Autotype's standard textured polyester, Autotex, does not perform well in external environments.**

**Autotex XE has been developed specifically to resist yellowing and premature embrittlement for outdoor applications.**

### 1. PRODUCT DESCRIPTION

Autotex XE is a high quality textured polyester film, consisting of a base polyester and a flexible chemically bonded, UV cured textured coating. This product has been chemically modified to improve its UV resistance. It is available in sheets or rolls.

#### Product range:

Autotex XE Velvet      Velvet texture  
V150, V200              150 and 200 micron

Autotex XE Fine        Fine texture  
F200                        200 micron

#### Primer:

Autotex XE has the same ink adhesion primer on the reverse surface as Autotex. This primer confers excellent adhesion to a wide range of graphic inks.

#### Windows:

Windotex is not a UV resistant product and is therefore not recommended for prolonged use outdoors. Due to the stabilising chemistry used in Autotex XE, the adhesion of Windotex to the

surface may be impaired. Contact Autotype for further information.

### 2. PRODUCT APPLICATIONS

Autotex XE may be used as a substrate in the following markets:

#### Markets

Membrane switch overlays  
Facia panels  
Signage  
Nameplates  
Labels/Product marking

#### Major Benefits

- ▶ Increased UV resistance compared to standard Autotex
- ▶ Increased scratch resistance
- ▶ Consistent textured surface
- ▶ Attractive appearance

### 3. Chemical Properties

Property	Autotex XE	Test Method
Coefficient of hygroscopic expansion <sup>1</sup>	MD $8 \times 10^{-6}$ (per 1% RH) TD $7 \times 10^{-6}$ (per 1% RH)	DuPont Teijin Films Method <sup>1</sup> Between 40-80% RH
Moisture vapour transmission rate (MVTR) <sup>1</sup>	3.57g/m <sup>2</sup> /24 hours	ASTM F372-73
Oxygen transmission rate <sup>1</sup>	8.2ml/m <sup>2</sup> /24 hours	ASTM D1434-82 @ 25°C, 77% RH
Chemical Resistance	See Autotex XE Solvent Resistance and Environmental data	

<sup>1</sup> Data derived from DuPont Teijin Films literature for 125µ Melinex OD. The Autotex XE coating slightly enhances most properties.

## 4. Electrical Properties

Property	Autotex XE	Test Method
Dielectric strength <sup>1</sup> 125μ 175μ	125kV/mm 105kV/mm	ASTM D149-81 6.35mm electrodes in dry air @ 25°C
Dissipation factor <sup>1</sup>	0.005	ASTM D150-70
Surface resistivity	>10 <sup>13</sup> /sq 500Vd.c	ASTM D257-83 @ 20°C/54% RH
Volume resistivity <sup>1</sup>	10 <sup>15</sup> m 100 Vd.c	ASTM D257-83 @ 25°C/1000s

<sup>1</sup> Data derived from DuPont Teijin Films literature for 125μ Melinex OD. The Autotex XE coating slightly enhances most properties.

## 5. Mechanical Properties

Property	Autotex XE	Test Method
Elastic modulus (1% secant) 175μ	4-5.5 GPa	ASTM D882-83 23°C, @ 50% RH. Strain rate, 10%/minute
Elongation at break 175μ	MD 125% TD 80%	ASTM D882-83 23°C, @ 50% RH. Strain rate, 50%/minute
MIT fold durability	>10,000 folds TD	ASTM D2176-69
Switch life	>5 million flexes	Autotype Method <sup>3</sup>
Tensile strength at break 175μ	160-250 MPa (160-250N/mm <sup>2</sup> )	ASTM D882-83
Yield point	6%	ASTM D882-83
Yield strength	95-140 MPa TD	ASTM D882-83

<sup>1</sup> Data derived from DuPont Teijin Films literature for Melinex OD <sup>2</sup> Adapted to Autotype Method, see Test method manual

<sup>3</sup> See Test method manual

## 6. Optical Properties

Property	Autotex XE	Test Method
Gardner Haze Velvet	69% ±5%	ASTM D1003-77 <sup>1</sup>
Gloss Level (60°)	3.6% ±0.4%	ASTM D2457-70 <sup>1</sup>
Texture profile Ra Rtm	2.6 ±0.2μ 13.4μ ±2μ	Autotype method <sup>2</sup>
Total luminous transmission	91% ±2%	ASTM D1003-77 <sup>1</sup>
UV transmission density	0.7 ±0.2	Autotype method <sup>2</sup> 365nm narrowpass filter
Yellowness index	6.0 ±1.0	ASTM D1925-70

<sup>1</sup> Adapted to Autotype method, see Test method manual <sup>2</sup> See Test method manual

## 7. Physical Properties

Property	Autotex XE	Test Method
Relative density <sup>1</sup>	1.40	ASTM D1505-85 modified to DuPont Teijin Films method at 23°C
Pencil hardness	3H	Autotype Method <sup>2</sup>
Thicknesses V150 V200	150µ ± 10% 200µ ± 10%	

<sup>1</sup> Data derived from DuPont Teijin Films literature for Melinex OD <sup>2</sup> See Test method manual

## 8. Thermal Properties

Property	Autotex XE	Test Method
Coefficient of thermal expansion <sup>1</sup>	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 Method between 20-50°C
Dimensional stability	<0.2% at 120°C MD maximum shrinkage	Autotype Method <sup>2</sup>
Maximum and minimum use temperatures	Maximum high humidity (85% RH) 85°C <sup>3</sup> Low humidity (<10%RH) 85°C Minimum temperature -40°C (-40°F)	Autotype Method <sup>2</sup>

<sup>1</sup> Data derived from DuPont Teijin Films literature for 125µ Melinex OD <sup>2</sup> See Test method manual

<sup>3</sup> Tested for a period of 10 continuous days without degradation

## 9. UV RESISTANCE

The testing of Autotex XE has incorporated three separate techniques, one of which is detailed below.

**9.1 Accelerated ageing using an Atlas UVCON accelerated ageing cabinet utilising fluorescent sun lamps**

### 9.1.1 Test Conditions

Apparatus: Atlas UVCON Accelerated ageing cabinet

Lamps: 8 Phillips UVA 340 sun lamps

Cycle: Alternating cycle of 4 hours UV, 4 hours condensation

Temperature: 50°C throughout

## 9.1.2 Results

Product	Yellowness Index		Flexibility
	Initial	After 1200 hour UVCON cycle	
Autotex	2.6	26.3*	16mm (5/8"), Poor
Autotex XE	5.0	9.1	Material can be folded completely back on itself (180°) without cracking, Very Good

Typical results for 200 $\mu$  product

\*Flaking of the coating occurs between 1000 and 1200 hours with standard Autotex

## 9.1.3 Switch life testing, see section 9.4 for test conditions

After a 1600 hour cycle switch life testing of Autotex XE on a non-embossed panel exceeded 5 million actuations with no adverse effect on the product.

## 9.2 Accelerated ageing by focusing direct sunlight onto test samples

**Test method:** Samples are subjected to Arizona (USA) sunlight (total UV 290-385nm) concentrated via mirrors/lenses into the target area.

## 9.2.1 Test Conditions

**Apparatus:** The South Florida Tests Service Sun Accelerated Weathering Device

**Test method:** Samples are subjected to Arizona (USA) sunlight (total UV 290-385nm) concentrated via mirrors/lenses into the target area.

No temperature control is performed other than the use of a localised fan. Samples are subjected to a water spray (8 min/ hour of active sunlight) to simulate rain.

The samples were exposed to 333 mJ/m<sup>2</sup> (total UV) which is calculated to simulate one year's real time exposure in Arizona.

## 9.2.2 Results

Product	Yellowness Index		Flexibility
	Initial	Final	
Autotex	2.8	10.6	9.5mm (3/8"), Poor
Autotex XE	5.2	7.5	Material can be folded completely back on itself (180°) without cracking, Very Good

Typical results for 200 $\mu$  product

## 9.2.3 Switch life testing, see section 9.4 for test conditions

After exposure, switch life testing of Autotex XE on a non-embossed panel exceeded 5 million actuations with no adverse effect on the product.

## 9.3 Real time continuous exposure in Houston, Texas

### 9.3.1 Test Conditions

**Apparatus:** South facing 45° angled mounting frame in Houston, Texas, USA.

**Test method:** Samples of Autotex XE were subjected to real time ageing in Texas continuously for 15 months.



## 9.3.2 Results

Product	Yellowness Index		Flexibility
	Initial	Final	
Autotex	2.7	9.4	32mm (1 1/4"), Very Poor
Autotex XE	5.0	8.2	Material can be folded completely back on itself (180°) without cracking, Very Good

Typical results for 200µ product

### 9.3.3 Switch life testing see, section 9.4 for test conditions

Upon completion of the test a non-embossed panel of Autotex XE was switch life tested to 5 million actuations with no signs of material failure.

## 9.4 Switch Actuation Testing

### 9.4.1 Test Conditions

Apparatus: Itronic Fuchs Pneumatic A8274 PS/IEC system with A8274 ZB cylinders rated at 10N at 6 Bar (6.08 x 10<sup>5</sup> Nm<sup>-2</sup>)

Actuator finger: 8.5mm diameter, 45° Shore D hardness rubber.

Actuation rate: 120 per minute

All testing is performed on a flat panel with a total spacer thickness of 200µ and a spacer hole diameter of 13mm.

Depending on the nature of the emboss and the level of exposure to sunlight, switch life is likely to be reduced compared to an unembossed overlay due to the increased stresses experienced during actuation.

Although conclusions may be drawn it is important to note that any accelerated ageing technique is unique and cannot be related directly to real time performance.

The use of Windotex on Autotex XE is not recommended as it will yellow and embrittle when exposed to sunlight. Due to the stabilising chemistry used in Autotex XE the adhesion of Windotex to the surface may be impaired. Contact Autotype for further information.

All results published are offered in good faith but due to the variations in the weather they do not constitute a specification and no guarantee is given or implied. Customers are therefore encouraged to carry out their own tests to establish whether the product has sufficient durability for the proposed end use.

## 10. OZONE DEPLETING SUBSTANCES

EC Regulation 594/91 classifies ozone depleting substances into a number of different groups, I-VI. Autotex XE does 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.

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