SIGMAGraF® UVJet Outdoor

Product Data Sheet

SIGMAGraF UVJet Outdoor is an industrial protective and image-receptive film all-in-one. It has been formulated for imaging on UV curing ink jet printers. SIGMAGraF UVJet Outdoor has been developed for applications where high or widely fluctuating temperatures, excessive humidity and strong levels of UV light are encountered, particularly outdoor or harsh industrial conditions.

PRODUCT DESCRIPTION

SIGMAGraF UVJet Outdoor comprises of specially constructed heat-stabilized polyester with exterior hard-coat on the top surface and UV curing ink jet receptive primer layer on the underside.

SIGMAGraF UVJet Outdoor is formulated to resist high UV light, moisture and wide variations in temperature and will not delaminate become brittle or flake under extreme conditions. The hard-coat top surface is resistant to harsh chemicals, solvents, scratches knocks and abrasion. The primer on the sub-surface bonds and flexes with the UV curing ink-jet inks to prevent cracking and crazing. No fillers or matting agents are used in the film manufacturing process making graphic and colour definition excellent

Product Range:
SIGMAGraF UVJet *Outdoor*

- Designed for extreme conditions
- Resistant to ultraviolet light, moisture and wide variations in temperature
- Resists the film going brittle or yellow in direct sunlight

Format and finish:

- Finish: Controlled Velvet textured matt
- Gauge: 150 micron – other thicknesses available upon request
- Size: 1230 mm x 50m rolls.
- Longer roll sizes and sheets available upon request

PRODUCT APPLICATIONS

- Signage
- Fascia, nameplates
- Durable and visually demanding graphics

For use in extreme weather and industrially demanding environments

Major Benefits:

- Resistant to high UV light, excessive temperature and humidity conditions
- Resistant to chemicals, solvents & household cleaners
- Resistant to scratches, abrasion and impacts
- Easily cleaned without surface damage
- Consistent surface finish
- Durable & lightweight and easy to handle
- Outstanding clarity for graphic and colour definition
- Global market leading technology

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PRODUCT PERFORMANCE

CHEMICAL PROPERTIES

Property	Data	Test Method
Chemical Resistance	Resistant to: Alcohols Dilute acids and alkalis Esters Hydrocarbons Ketones Household cleaning agents	DIN 42 115
Coefficient of hygroscopic expansion[1]	MD 8 x 10^{-6} (per 1% RH) TD 7 x 10^{-6} (per 1% RH)	DuPont Teijin Films Method[1] Between 40-80% RH
Moisture vapour transmission rate (MVTR)[1]	3.57g/m^2/24 hours	ASTM F372-73
Oxygen transmission rate[1]	8.2ml/m^2/24 hours	ASTM D1434-82 @ 25°C, 77% RH
Chemical Resistance	See SIGMAGraF Solvent Resistance and Environmental data	

[1] Data derived from DuPont Teijin Films literature for 125µ Melinex OD. [2] The Autotex XE coating slightly enhances most properties

OPTICAL PROPERTIES

Property	Data	Test Method
Gardner Haze	71% ±5%	ASTM D1003-77[1]
Gloss Level (60°)	4.3% ±0.5%	ASTM D2457-70[1]
Texture profile Velvet Ra Velvet Rtm Fine Ra Fine Rtm	 2.8µ ±0.2µ 13.4µ ±2µ 1.6µ ±0.2µ 8µ ±2µ	MacDermid Autotype Method[2]
Total luminous transmission	92% ±2%	ASTM D1003-77[1]
UV absorption	2.5 - 3	MacDermid Autotype Method[2] (370 nm)
Yellowness index	<5	ASTM D1925-70

[1] Adapted to MacDermid Autotype Method, see Test Method Manual [2] See Test Method Manual

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PHYSICAL PROPERTIES

Property		Data	Test Method
Density[1]		1.39g/cm3	ASTM D1505
Thicknesses	V150 V200 F200	150µ ±10% 200µ ±10% 200µ ±10%	

[1] Data derived from DuPont Teijin Films literature for Melinex OD. [2] See Test Method Manual

THERMAL PROPERTIES

Property	Data	Test Method
Coefficient of thermal expansion[1]	0.002% degree	DuPont Teijin Films Method
Coefficient of humidity expansion[1]	0.0009% RH	DuPont Teijin Films Method
Dimensional stability	<0.2% at 120 °C MD maximum shrinkage	MacDermid Autotype Method[2]
Maximum and minimum use temperatures	High humidity (85% RH) 85°C Low humidity (<10%RH) 85°C Minimum temperature -40°C	MacDermid Autotype Method[2]

[1] Data derived from DuPont Teijin Films literature for 125µ Melinex OD. [2] See Test Method Manual

MECHANICAL PROPERTIES

Property	Data	Test Method
Young's modulus[1]	3700N/mm2	ASTM D88[2]
Elongation at break	70%	ASTM D1505
Tensile strength at break	150N/mm2	ASTM D88[2]
Tensile strength at yield point	100N/mm2	ASTM D88[2]
Tensile strength at yield	100N/mm2	ASTM D88[2]
Tear strength	350N/mm2	ASTM D88[2]

[1] Data derived from DuPont Teijin Films literature for Melinex OD. [2] Adapted to MacDermid Autotype Method

WORKING INSTRUCTIONS

- Handle film at edge to avoid marking
- Reverse / flip your image before printing
- Do not stack or roll until image is completely cured
- Always run a print test to ensure optimum performance
- See SIGMAGraF instructions insert for comprehensive printing and cutting guidelines.

Printing and Processing Guidelines:

SIGMAGraF Film:	Sub surface print (in reverse) i.e. print on the underside
Film winding:	SIGMAGraF is wound print receptive side in; therefore the hard-coat side is on the outside of the roll

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UV curing ink jet ink laydown settings - for guidance only:
Specific trials need to be undertaken to determine best settings for printer, ink and substrate combination.

- 100% ink lay-down – for lamination to another film substrate after imaging
  e.g. FootPrint High Traffic White Adhesive
- 300% ink lay-down - for use as a Back-Lit film

Please Note: UV curing inks can take between 12 - 48 hours to reach maximum cure; i.e. optimum adhesion to the SIGMAGraF film.

TECHNICAL DATA

UV Resistance:
The testing of SIGMAGraF UVJet Outdoor has incorporated three separate techniques:

Test 1
Real time continuous exposure in Miami, Florida
Test Conditions
Apparatus: South facing 45° angled mounting frame in Miami, Florida, USA. Samples of SIGMAGraF UVJet Outdoor - were subjected to real time ageing in Florida continuously for 12 months.

RESULTS

Product	Yellowness Index		Flexibility
	Initial	Final	Minimum diameter of curvature to which material can be formed before cracking occurs (coating side outwards)
SIGMAGraF UVJet Outdoor	4.8	7.55	Material can be folded back on itself (180°) with only slight cracking. Good

Test completed on film without imaging as inks vary.

Test 2
Accelerated ageing using an Atlas UVCON accelerated ageing cabinet utilizing fluorescent sun lamps.
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: 40°C during condensation cycle
60248C during UV cycle

RESULTS

Product	Yellowness Index		Film Flexibility
	Initial	After 1600 hour UVCON cycle	Minimum diameter of curvature to which material can be formed before cracking occurs (coating side outwards)
SIGMAGraF UVJet Outdoor	4.8	8.1	Material can be folded completely back on itself (180°) without cracking, Very Good.

Test completed on film without imaging as inks vary.

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Test 3
The South Florida Tests Service Sun Accelerated Weathering Device
Test conditions
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 localized fan. Samples are subject to a water spray (8 min / hour of active sunlight) to simulate rain.

The samples were exposed to 333mJ/m² (total UV) which is calculated to simulate one year's real time exposure in Arizona.

RESULTS

Product	Yellowness Index		Flexibility
	Initial	Final	Minimum diameter of curvature to which material can be formed before cracking occurs (coating side outwards)
SIGMAGraF UVJet Outdoor	4.7	7.5	Material can be folded completely back on itself (180°) without cracking, Very Good

Test completed on film without imaging as inks vary.

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.

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 their proposed end use.

HAZARDS & WARNINGS
None associated with this product.

FIRE PRECAUTIONS
Polyester films will burn with difficulty. Extinguisher method: foam, water, CO_2 or PCF.

FIRST AID
No chemical related injury is anticipated from the use of this product.

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).

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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.

STORAGE

Store in original packaging, in a cool, dry place, away from direct sunlight / UV light source.

PACKAGING

Rolls: Standard roll length 50m, Maximum width 1232cm

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