



VICTREX® PEEK FILM TECHNOLOGY

## APTIV® 2000 Series Films

### Description

APTIV® 2000 series films are the unfilled amorphous films made from VICTREX® PEEK polymer. The film provides a material solution for engineers in ultra-high performance applications.

APTIV films are a comprehensive range of versatile, high-performance films, the use of which can facilitate reduced systems costs, improved performance and enhanced design freedom.

APTIV 2000 has a unique combination of properties providing high temperature performance, lightweight, mechanical strength, durability, excellent radiation, hydrolysis and chemical resistance, electrical insulation, wear and abrasion resistance, excellent barrier properties with high purity, good flammability without the use of flame retardants, low toxicity of combustion products, and low moisture absorption in a film format. Inherently halogen-free and ease of processing makes APTIV films a technology enabler for our customers and end users.

**Please note** – APTIV 2000 will crystallise if taken above the  $T_g$  [143°C (289°F)] in either secondary processes or end use application. The crystallisation is not reversible back to the amorphous phase without re-melting the material. Consideration of the temperature range during processing and end use application needs to be included if selecting APTIV 2000.

### Availability

The films are available in thickness of 6 microns up to 300 microns.

### Applications

- Aerospace insulation
- Electrical insulation
- Acoustic speaker diaphragms
- Thermoforming of thin wall parts
- Composites

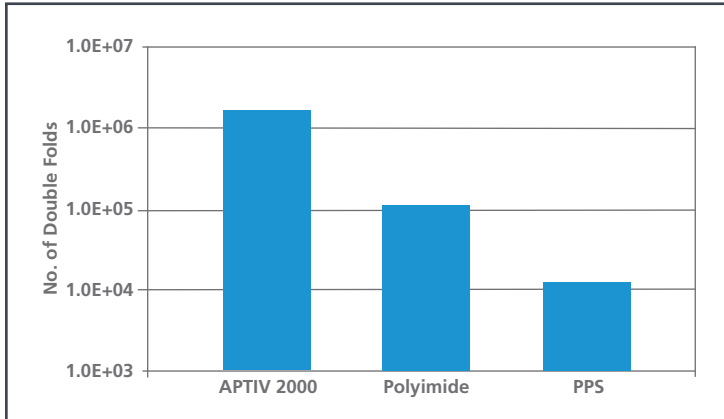
### Certification

APTIV film is FDA and EU approved for food contact and is RoHS and 3A Sanitary Standards compliant.

### Features

- High heat resistance
- Excellent flexural fatigue properties
- Broad chemical resistance
- Low moisture absorption
- High strength and toughness
- Stable, excellent electrical insulation properties
- Good flammability performance without use of flame retardant additives
- Inherently halogen-free
- Radiation resistance
- Low smoke and toxic gas emission
- Excellent hydrolysis resistance
- Excellent barrier properties
- Excellent acoustic properties
- High purity
- Lightweight
- Recyclable
- Easy to process – can be laminated to other materials, thermoformed, metallised, coated, printed, stamped and die cut, welded and heat sealed and coated.

**Figure 1: MIT Folding Endurance at 23°C (73°F) for APTIV 2000, 50 microns (MD)**



### Standard Thicknesses and Widths

The standard width for film is 610mm (approx. 24in) – widths up to 1455mm (approx. 55in) available upon request.

Standard thicknesses available (in microns) — 6, 9, 12, 16, 18, 20, 25, 30, 38 and 100. Please enquire about other thicknesses up to 300 microns.

Standard thickness tolerance is better than +/-7% for all grades except under 10 microns which is better than +/-1.0 micron.

### Surface Finishes

Standard surface finish is matt/gloss, although gloss/gloss is available on request. Typical Ra values can be supplied on request.

### Custom Finishing (Slitting and Surface Treatment)

The slitter capability in the APTIV film facility allows custom lengths and widths down to 50mm (approx. 2in) to be produced. Widths below 50mm (approx. 2in) are available on request. Surface treatment by atmospheric plasma process of the film is also available by request taking the surface energy of the treated APTIV film surface to greater than 55 dynes/cm. [A minimum order quantity or value applies.]

### Mechanical Properties at Various Thicknesses

ISO 527 at 23°C (73°F)

Property	Test Method	Test Condition	Units	25µm		50µm		100µm	
				MD	TD	MD	TD	MD	TD
Tensile Modulus	ISO527	23°C (73°F)	GPa (kpsi)	1.8 (261)	1.8 (261)	1.8 (261)	1.8 (261)	1.6 (232)	1.6 (232)
Tensile Strength (at break)	ISO527	23°C (73°F)	MPa (kpsi)	130 (18.9)	130 (18.9)	120 (17.4)	120 (17.4)	120 (17.4)	120 (17.4)
Tensile Elongation (at break)	ISO527	23°C (73°F)	%	>200	>200	>200	>200	>200	>200

### Electrical Properties at Various Thicknesses

ATSM D149, 23°C (73°F), 6.25mm (0.25in) electrode

		25µm	50µm	100µm
Dielectric Strength	kV/mm (V/mil)	270 (6858)	190 (4826)	120 (3048)
Breakdown Voltage	kV	6.75	9.5	15

APTIV 2000 acts as an excellent electrical insulator across a wide range of temperatures and electrical frequencies.

### Packaging and Storage

APTIV film is supplied in roll form on high quality, resin coated and polished fibre cores with an inner diameter of 76mm (approx. 3in) or 152mm (approx. 6in). These cores are a Class A standard core. APTIV film is very stable and will retain its properties for several years when stored in the original packaging in a frost free environment up to 50°C (122°F). APTIV film is unaffected by humidity and is unaffected by moisture. The rolls should be stored in a weathertight facility so that the packaging is not damaged.

### Disposal

APTIV film is classed as a non-hazardous material and can be disposed of by landfill.

### Labelling of Products

All products are packaged using robust and purpose designed packaging, and are fully labelled to comply with national and international standards. Labels indicating grade, unique batch number, roll length, roll width, product thickness, and net weight will be affixed to the outer packaging and the core.

### Units of Sale

Orders for APTIV film should be placed in kilograms or imperial pounds.

Property	Test Method	Test Condition	Units	2000-050	
				MD	TD
Tensile Modulus	ISO 527	23°C (73°F)	GPa (kpsi)	1.8 (261)	1.8 (261)
Tensile Strength (at break)	ISO 527	23°C (73°F)	MPa (kpsi)	120 (17.4)	120 (17.4)
Tensile Elongation (at break)	ISO 527	23°C (73°F)	%	>200	>200
Puncture Strength	Def Stan 81-75	23°C (73°F)	kJ/m <sup>2</sup> (cal/ft <sup>2</sup> )	40 (888)	
Tear Strength	ISO 6383-1	23°C (73°F)	N/mm (lb/in)	6 (34)	6 (34)
Shrinkage	TM-VX-84	200°C (392°F)	%	<10	<5
Water Absorption (50% RH)	ISO 62	23°C (73°F), 24h	%	0.21	
Specific Gravity	ISO 1183	23°C (73°F)		1.26	
Coefficient of Linear Thermal Expansion	ASTM D696	MD, below T <sub>g</sub>	ppm/°C	60	
Dielectric Strength	ASTM D149 6.35mm (0.25in) electrode	23°C (73°F)	kV/mm (V/mil)	190 (4826)	
Dielectric Constant	ASTM D150	23°C (73°F), 10 MHz		3.3	
Loss Tangent	ASTM D150	23°C (73°F), 10 MHz		0.003	
Volume Resistivity	ASTM D257	23°C (73°F), 100V	Ohm cm	2.00E +16	

## Compliances

APTIV 2000 film is approved for Food Contact Use:

- APTIV 2000 film is compliant with the compositional requirements of FDA 21 CFR 177.2415.
- APTIV 2000 film is compliant with the framework regulation (EC) No. 1935/2004/EC and commission directive 2002/72/EC and the amendments up to 2005/79/EC.
- APTIV 2000 film is fully compliant with the 3-A Sanitary Standards.

APTIV film 2000 complies with the requirements of RoHS European Directive 2002/95/EC and can be used to manufacture products compliant with the same directive.

APTIV 2000 film is inherently halogen-free in accordance with IEC61249-2-21.

## Secondary Processes

APTIV 2000 film can easily be subjected to a range of secondary process operations, which allow designers and engineers to obtain the benefits of APTIV film properties in a variety of forms.

- Surface treatment
- Adhesion
- Coatings
- Heat welding and heat sealing
- Metallisation
- Laser marking and machining
- Slitting
- Die cutting and stamping
- Thermal lamination
- Thermoforming
- Printing

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Victrex Polymer Solutions, a division of Victrex plc, is the world's leading manufacturer of Polyaryletherketones, high performance polymers, which are sold under the brand names VICTREX® PEEK polymer, VICOTE® Coatings, APTIV® films and VICTREX Pipes™. With production facilities in the UK backed by sales and distribution centres serving more than 30 countries worldwide, our global market development, sales, and technical support services work hand-in-hand with OEMs, designers and processors offering assistance in the areas of processing, design and application development to help them achieve new levels of cost savings, quality, and performance.

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