## Description

APTIV® 1100 series films are the mineral filled semi-crystalline 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 1100 has a unique combination of properties providing high temperature performance, mechanical strength, durability, excellent radiation, hydrolysis and chemical resistance, electrical insulation, 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. APTIV 1100 series provides a higher modulus and lower coefficient of linear thermal expansion over the APTIV 1000 series.

## Availability

The films are available in thicknesses from 12 microns up to 125 microns.

## Applications

- Electrical insulation
- Printed circuit substrates
- High temperature labels
- Flexible surface heaters
- Pressure sensor membranes
- Acoustic speaker diaphragms
- Proven temperature resistance to use of lead free solders

## Certification

APTIV film is FDA and EU approved for food contact and is RoHS compliant.

## Features

- High heat resistance
- Broad chemical resistance
- Excellent barrier properties
- 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 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.
- Improved thermal conductivity over APTIV 1000 film
Thermal Conductivity
Mineral filled PEEK shows higher thermal conductivity than unfilled PEEK. The thermal conductivity of moulded tensile bars representing the APT IV grades shown below were measured to ASTM E-1461.

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>APTIV 1000</th>
<th>APTIV 1102</th>
<th>APTIV 1103</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Plane</td>
<td>W/(m-K)</td>
<td>0.32</td>
<td>0.91</td>
<td>1.30</td>
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<tr>
<td>Through Plane</td>
<td>W/(m-K)</td>
<td>0.29</td>
<td>0.43</td>
<td>0.61</td>
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</tbody>
</table>

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.

Mechanical Properties at Various Thicknesses
ISO 527 at 23°C (73°F)
Compliances
APTIV 1100 film is approved for Food Contact Use:
• APTIV 1100 film is compliant with the compositional requirements of FDA 21 CFR 177.2415.
• APTIV 1100 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 1100 film complies with the requirements of RoHS European Directive 2002/95/EC and can be used to manufacture products compliant with the same directive.

APTIV 1100 film is inherently halogen-free in accordance with IEC61249-2-21.

Secondary Processes
APTIV 1100 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

### Property Test Method Test Condition Units 1102-050M 1103-050M MD TD MD TD

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Test Condition</th>
<th>Units</th>
<th>1102-050M MD</th>
<th>1102-050M MD</th>
<th>1103-050M MD</th>
<th>1103-050M MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Modulus</td>
<td>ISO 527</td>
<td>23°C (73°F)</td>
<td>GPa (ksi)</td>
<td>4.8 (696)</td>
<td>4.3 (624)</td>
<td>5.5 (798)</td>
<td>4.5 (653)</td>
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<tr>
<td>Tensile Strength (at break)</td>
<td>ISO 527</td>
<td>23°C (73°F)</td>
<td>MPa (ksi)</td>
<td>100 (14.5)</td>
<td>80 (11.6)</td>
<td>90 (13.1)</td>
<td>90 (13.1)</td>
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<tr>
<td>Tensile Elongation (at break)</td>
<td>ISO 527</td>
<td>23°C (73°F)</td>
<td>%</td>
<td>&gt;100</td>
<td>&gt;10</td>
<td>&gt;10</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Puncture Strength</td>
<td>Def Stan 81-75</td>
<td>23°C (73°F)</td>
<td>kJ/m² (cal/ft²)</td>
<td>5 (111)</td>
<td>5 (111)</td>
<td>4 (89)</td>
<td>4 (89)</td>
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<tr>
<td>Tear Strength</td>
<td>ISO 6383-1</td>
<td>23°C (73°F)</td>
<td>N/mm (lb/in)</td>
<td>6 (34)</td>
<td>7 (39)</td>
<td>5 (28)</td>
<td>6 (34)</td>
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<tr>
<td>Shrinkage</td>
<td>TM-VX-84</td>
<td>200°C (392°F)</td>
<td>%</td>
<td>≤0.5</td>
<td>≤0.5</td>
<td>≤0.5</td>
<td>≤0.5</td>
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<tr>
<td>Water Absorption (50% RH)</td>
<td>ISO 62</td>
<td>23°C (73°F), 24h</td>
<td>%</td>
<td>0.08</td>
<td>0.09</td>
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<tr>
<td>Specific Gravity</td>
<td>ISO 1183</td>
<td>23°C (73°F)</td>
<td></td>
<td>1.45</td>
<td>1.54</td>
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<tr>
<td>Coefficient of Linear Thermal Expansion</td>
<td>ASTM D696</td>
<td>MD, below Tg</td>
<td>ppm/°C</td>
<td>35</td>
<td>18</td>
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<tr>
<td>Dielectric Strength</td>
<td>ASTM D149</td>
<td>6.25mm (0.25in) electrode</td>
<td>23°C (73°F)</td>
<td>kV/mm (V/mil)</td>
<td>200 (5080)</td>
<td>200 (5080)</td>
<td></td>
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<tr>
<td>Dielectric Constant</td>
<td>ASTM D150</td>
<td>23°C (73°F), 10 MHz</td>
<td></td>
<td>3.6</td>
<td>3.5</td>
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<tr>
<td>Loss Tangent</td>
<td>ASTM D150</td>
<td>23°C (73°F), 10 MHz</td>
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<td>0.001</td>
<td>0.001</td>
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<td></td>
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<tr>
<td>Volume Resistivity</td>
<td>ASTM D257</td>
<td>23°C (73°F), 100V</td>
<td>Ohm cm</td>
<td>1.00E +16</td>
<td>1.00E +16</td>
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<td></td>
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</tbody>
</table>
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