

## PEI – Polyether Imide

### Facts:

PEI, Polyether Imide is an amorphous, amber to transparent engineering thermoplastic used in applications that require high physical strength, thigh temperature stability, excellent electrical insulation properties and flame retardant.

PEI also has a very low coefficient of thermal expansion, and when filled, is similar to that of steel and lower than either Zinc of Aluminium.

### Applications:

Automotive interior, exterior appliance housings, medical devices, bearings and metal replacement.

### Limitations:

- Notch Sensitive
- High processing temperatures required
- Attached by strong bases and partially halogenated solvents
- Limited colourability

# ULTEM\* 1000 Resin

## Polyether Imide

### SABIC Innovative Plastics



Prospector

#### Product Description

Transparent, standard flow Polyetherimide (Tg 217°C). ECO Conforming, UL94 V0 and 5VA listing. US FDA and EU Food Contact compliant, NSF 51 listing, compliant in natural color. Effective June, 2007 this grade will no longer be supported with biocompatibility information and should not be used for medical applications which require biocompatibility. Alternative grade HU1000.

#### General

Material Status	• Commercial: Active
Availability	• North America
Features	• ECO Compliant • Food Contact Acceptable
Agency Ratings	• EU Eco • FDA Food Contact, Unspecified Rating • EU Food Contact, Unspecified Rating • NSF 51
Appearance	• Clear/Transparent
Processing Method	• Extrusion Blow Molding • Injection Molding
Multi-Point Data	<ul style="list-style-type: none"> <li>• Coefficient of Thermal Expansion vs. Temperature (ASTM E831)</li> <li>• Compressive Stress vs. Strain (ASTM D695)</li> <li>• Elastic Modulus vs Temperature (ASTM D4065)</li> <li>• Flexural DMA (ASTM D4065)</li> <li>• Instrumented Impact (Energy) (ASTM D3763)</li> <li>• Instrumented Impact (Load) (ASTM D3763)</li> <li>• Pressure-Volume-Temperature (PVT - Zoller Method)</li> <li>• Shear DMA (ASTM D4065)</li> <li>• Specific Heat vs. Temperature (ASTM D3417)</li> <li>• Tensile Creep (ASTM D2990)</li> <li>• Tensile Fatigue</li> <li>• Tensile Stress vs. Strain (ASTM D638)</li> <li>• Thermal Conductivity vs. Temperature (ASTM E1530)</li> <li>• Viscosity vs. Shear Rate (ASTM D3835)</li> </ul>

Physical	Nominal Value Unit	Test Method
Specific Gravity	1.27 g/cm <sup>3</sup>	ASTM D792
Melt Mass-Flow Rate (MFR) (337°C/6.6 kg)	9.0 g/10 min	ASTM D1238
Molding Shrinkage - Flow (3.20 mm)	0.50 to 0.70 %	Internal Method
Water Absorption		ASTM D570
24 hr	0.25 %	
Equilibrium, 23°C	1.3 %	

Mechanical	Nominal Value Unit	Test Method
Tensile Modulus <sup>2</sup>	3590 MPa	ASTM D638
Tensile Strength <sup>3</sup> (Yield)	110 MPa	ASTM D638
Tensile Elongation <sup>3</sup>		ASTM D638
Yield	7.0 %	
Break	60 %	
Flexural Modulus <sup>4</sup> (100 mm Span)	3520 MPa	ASTM D790
Flexural Strength <sup>4</sup> (Yield, 100 mm Span)	165 MPa	ASTM D790
Poisson's Ratio	0.36	ASTM D638
Taber Abrasion Resistance		ASTM D1044
1000 Cycles, 1000 g, CS-17 Wheel	10.0 mg	

Impact	Nominal Value Unit	Test Method
Notched Izod Impact (23°C)	53 J/m	ASTM D256
Unnotched Izod Impact (23°C)	1300 J/m	ASTM D4812
Reverse Notch Izod Impact (3.20 mm)	1300 J/m	ASTM D256
Gardner Impact (23°C)	36.6 J	ASTM D3029

Hardness	Nominal Value Unit	Test Method
Rockwell Hardness (M-Scale)	109	ASTM D785

Thermal	Nominal Value Unit	Test Method
Deflection Temperature Under Load		ASTM D648
0.45 MPa, Unannealed, 6.40 mm	210 °C	
1.8 MPa, Unannealed, 6.40 mm	201 °C	
Vicat Softening Temperature	219 °C	ASTM D1525 <sup>5</sup>

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The information presented on this datasheet was acquired by IDES from the producer of the material. IDES makes substantial efforts to assure the accuracy of this data. However, IDES assumes no responsibility for the data values and strongly encourages that upon final material selection, data points are validated with the material supplier.

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Thermal	Nominal Value Unit	Test Method
CLTE		ASTM E831
Flow: -20 to 150°C	0.000056 cm/cm/°C	
Transverse: -20 to 150°C	0.000054 cm/cm/°C	
Thermal Conductivity	0.22 W/m/K	ASTM C177
Electrical	Nominal Value Unit	Test Method
Volume Resistivity	1.0E+17 ohm-cm	ASTM D257
Dielectric Strength		ASTM D149
1.60 mm, in Air	33 kV/mm	
1.60 mm, in Oil	28 kV/mm	
3.20 mm, in Oil	20 kV/mm	
Dielectric Constant		ASTM D150
100 Hz	3.15	
1 kHz	3.15	
Dissipation Factor		ASTM D150
100 Hz	0.0015	
1 kHz	0.0012	
2.45 GHz	0.0025	
Arc Resistance (PLC) <sup>6</sup>	PLC 5	ASTM D495
Flammability	Nominal Value Unit	Test Method
Oxygen Index	47 %	ASTM D2863
NBS Smoke Density (Flaming, Ds, 4 min)	0.700	ASTM E662
UL 746	Nominal Value Unit	Test Method
RTI Str	170 °C	UL 746
RTI Imp	170 °C	UL 746
RTI Elec	170 °C	UL 746
Comparative Tracking Index (CTI) (PLC)	PLC 4	UL 746
High Voltage Arc Tracking Rate (HVTR) (PLC)		UL 746
--	PLC 2	
Hot-wire Ignition (HWI) (PLC)	PLC 1	UL 746
High Amp Arc Ignition (HAI) (PLC)	PLC 3	UL 746
Injection	Nominal Value Unit	
Drying Temperature	149 °C	
Drying Time	4.0 to 6.0 hr	
Drying Time, Maximum	24 hr	
Suggested Max Moisture	0.020 %	
Suggested Shot Size	40 to 60 %	
Rear Temperature	332 to 399 °C	
Middle Temperature	338 to 399 °C	
Front Temperature	343 to 399 °C	
Nozzle Temperature	343 to 399 °C	
Processing (Melt) Temp	349 to 399 °C	
Mold Temperature	135 to 163 °C	
Back Pressure	0.345 to 0.689 MPa	
Screw Speed	40 to 70 rpm	
Vent Depth	0.025 to 0.076 mm	
Extrusion	Nominal Value Unit	
Drying Temperature	138 to 149 °C	
Drying Time	4.0 to 6.0 hr	
Suggested Max Moisture	0.010 to 0.020 %	
Cylinder Zone 1 Temp.	324 to 349 °C	
Cylinder Zone 2 Temp.	329 to 357 °C	
Cylinder Zone 3 Temp.	329 to 357 °C	
Cylinder Zone 4 Temp.	329 to 357 °C	

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Extrusion	Nominal Value Unit
Cylinder Zone 5 Temp.	329 to 357 °C
Adapter Temperature	329 to 357 °C
Die Temperature	327 to 357 °C

**Extrusion Notes**

Drying Time (Cumulative): 24 hrs  
Head - Zone 6 - Top Temperature: 329 - 357 °C  
Head - Zone 7 - Bottom Temperature: 329 - 357 °C  
Melt Temperature (Parison): 321 - 357 °C  
Mold Temperature: 66 - 177 °C  
Screw Speed: 10 - 70 rpm

**Notes**

- <sup>1</sup> Typical properties: these are not to be construed as specifications.
- <sup>2</sup> 5.0 mm/min
- <sup>3</sup> Type I, 5.0 mm/min
- <sup>4</sup> 2.6 mm/min
- <sup>5</sup> Rate B (120°C/h), Loading 2 (50 N)
- <sup>6</sup> Tungsten Electrode

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