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What is PI Polyimide Tecasint 1011

PI Polyimide Tecasint® 1011 natural

Polyimide (PI), unfilled

PI Polyimide Tecasint® 1011 natural is an unfilled polyimide from the Tecasint 1000 series, distinguished within this family by particularly high strength and elongation at break. The material is naturally black and combines high thermal and mechanical load capacity with very good electrical insulation, low outgassing and high purity.

Material Character

Polyimides belong to the group of high-performance plastics with the highest continuous service temperatures on the market. Tecasint 1011 reaches a glass transition temperature of 383 °C and a heat distortion temperature of 368 °C – values that clearly exceed many other high-performance plastics.

The material has high creep resistance, very good resistance against high-energy radiation and is inherently flame retardant (UL 94 V0). Because of these properties, Tecasint 1011 is used where other plastics reach their thermal or mechanical limits.

Advantages and Limitations

Advantages

- Very high temperature resistance (glass transition 383 °C)
- High strength and stiffness, high creep resistance
- Very good electrical insulation properties
- Resistant against high-energy radiation
- Low outgassing in high vacuum (ECSS-Q-70-02) – suitable for vacuum and aerospace applications
- Inherently flame retardant (UL 94 V0)

Disadvantages

- Sensitive to hydrolysis at elevated temperatures
- Significant water uptake – pre-drying required before rapid heating above 200 °C
- Higher material cost than standard and many engineering plastics
- Not intended for medical or dental implants

Processing

Tecasint 1011 can be machined, but due to its water uptake it is sensitive to rapid heating. If parts are to be heated rapidly above 200 °C, they must be pre-dried beforehand (2 hours per 3 mm wall thickness at 150 °C) to avoid blistering or cracking.

Due to its high hardness and stiffness, machining with sharp, wear-resistant tools at moderate feed rates is recommended.

Typical Properties

- High thermal and mechanical load capacity
- Very good thermal stability
- Good chemical resistance
- Very good electrical insulation
- Resistance against high-energy radiation
- Low outgassing (ECSS-Q-70-02)
- High creep resistance

Product Examples

- Insulating and structural components in aerospace
- Components for cryogenic and vacuum technology
- Precision parts in mechanical and precision engineering
- Components for nuclear and semiconductor technology

Typical Industries

- Mechanical engineering
- Precision engineering
- Aircraft and aerospace technology
- Cryogenic engineering
- Electronics
- Electrical engineering
- Nuclear and vacuum technology
- Semiconductor technology

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	Test Method	Unit	Value
General Properties			
Chemical Designation			PI (Polyimide)
Colour			black
Density		g / cm³	1.34
Flammability	DIN IEC 60695-11-10	UL94	V0
Mechanical Properties			
Tensile strength (50 mm/min)	DIN EN ISO 527-1	MPa	116
Modulus of elasticity, tensile (1 mm/min)	DIN EN ISO 527-1	MPa	3600
Flexural strength (10 mm/min)	DIN EN ISO 178	MPa	170
Compressive strength (10 mm/min)	EN ISO 604	MPa	450
Shore hardness	DIN EN ISO 868	Shore D	90
Thermal Properties			
Glass transition temperature	DMA	°C	383
Heat distortion temperature (1.85 MPa)	DIN 53 461	°C	368
Thermal conductivity (40 °C)	ISO 8302	W / (K * m)	0.22
Electrical Properties			
Volume resistivity (23 °C)	DIN IEC 60093	Ω * cm	$>10^{15}$
Electric strength DC (23 °C)	ISO 60243-1	kV / mm	>35
Dielectric constant (1 kHz)	DIN 53483-1		3.9

The values stated are guideline values for material selection and are not guaranteed minimum or maximum values in the sense of a specification. Application-specific individual testing is recommended.

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