

PEEK-OPTIMA™ Natural LT3 (Granules)

General Information

Product Description

High performance biocompatible thermoplastic material, PolyEtherEtherKetone (PEEK), semi crystalline. Granules for injection moulding and extrusion, easy flow, for use in long term human implantation. Colour natural/beige.

Typical Application Areas

For use in applications requiring high strength, high stiffness, and high ductility. Suitable for use in long-term implantable medical devices. Excellent sterilisation resistance. As PEEK is hygroscopic, drying before use is recommended. Further information is available upon request.

PEEK-OPTIMA™, known for its outstanding biocompatibility, chemical resistance, and mechanical strength. PEEK-OPTIMA™ Natural provides a reliable and versatile solution for short and long-term implants.

Material Properties

Physical	Nominal Value	Unit	Test Method
Density (23°C)	1.30	g/cm ³	ISO 1183
Melt Mass-Flow Rate (MFR) (400°C/2.16 kg)	35	g/10 min	Internal Method
Spiral Flow ¹	18.5	cm	Internal Method
Molding Shrinkage			ASTM D955
Flow	1.1	%	
Across Flow	1.4	%	
Water Absorption (Equilibrium, 23°C, 50% RH)	0.50	%	ISO 62
Crystallinity DSC	34.0	%	Internal Method
Mechanical	Nominal Value	Unit	Test Method
Tensile Modulus ² (23°C)	5400	MPa	ISO 527-1
Tensile Stress			ISO 527-2
Yield, 23°C ³	105	MPa	
Yield, 23°C ⁴	100	MPa	
Yield, 23°C ⁵	104	MPa	
Tensile Strain			ISO 527-2
Break, 23°C ³	15	%	
Break, 23°C ⁴	16	%	
Break, 23°C ⁵	33	%	
Flexural Modulus			ISO 178
23°C ³	3800	MPa	
23°C ⁴	4200	MPa	
23°C ⁵	3850	MPa	
Flexural Stress			
Yield, 23°C ³	163	MPa	ISO 178
Yield, 23°C ⁴	165	MPa	ISO 178
3.5% Strain, 23°C ⁵	126	MPa	ISO 178
Compressive Modulus ⁵ (23°C)	3360	MPa	ISO 604
Compressive Stress ⁵ (23°C)	142	MPa	ISO 604
Shear Modulus ⁵ (23°C)	990	MPa	ISO 15310
Shear Strength ⁵ (23°C)	88.3	MPa	ASTM D732

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Mechanical	Nominal Value	Unit	Test Method
Poisson's Ratio ⁵ (23°C)	0.36		ASTM D638
Impact	Nominal Value	Unit	Test Method
Notched Izod Impact Strength			ISO 180
23°C ³	4.8	kJ/m ²	
23°C ⁴	5.9	kJ/m ²	
23°C ⁵	5.2	kJ/m ²	
Hardness	Nominal Value	Unit	Test Method
Rockwell Hardness (M-Scale, 23°C)	99		ISO 2039-2
Thermal	Nominal Value	Unit	Test Method
Glass Transition Temperature (Onset)	143	°C	ISO 11357-2
Melting Temperature	344	°C	ISO 11357-3
CLTE			ASTM D696
Flow : 50 to 120°C	3.9E-5	cm/cm/°C	
Flow : 170 to 220°C	9.5E-5	cm/cm/°C	
Flow : 220 to 270°C	1.2E-4	cm/cm/°C	
Transverse : 50 to 120°C ⁶	5.4E-5	cm/cm/°C	
Transverse : 50 to 120°C	5.8E-5	cm/cm/°C	
Transverse : 170 to 220°C	1.4E-4	cm/cm/°C	
Transverse : 170 to 220°C ⁶	1.5E-4	cm/cm/°C	
Transverse : 220 to 270°C	1.7E-4	cm/cm/°C	
Transverse : 220 to 270°C ⁶	1.9E-4	cm/cm/°C	
Specific Heat			Internal Method
37°C ⁷	1700	J/kg/°C	
37°C ⁸	4010	J/kg/°C	
400°C ⁹	2110	J/kg/°C	
Recrystallization Temperature (Peak)	302	°C	ISO 11357-3
Fill Analysis	Nominal Value	Unit	Test Method
Melt Viscosity 1000 s ⁻¹ (400°C)	170	Pa·s	Internal Method
Melt Stability 1000 s ⁻¹ , 1 hr (400°C)	0.040	%	Internal Method
Shear Viscosity 100 s ⁻¹ (400°C)	233	Pa·s	ISO 11443
Shear Viscosity 1000 s ⁻¹ (400°C)	136	Pa·s	ISO 11443
Shear Viscosity 10000 s ⁻¹ (400°C)	49.7	Pa·s	ISO 11443
Shear Viscosity 200 s ⁻¹ (400°C)	211	Pa·s	ISO 11443
Shear Viscosity 2000 s ⁻¹ (400°C)	111	Pa·s	ISO 11443
Shear Viscosity 400 s ⁻¹ (400°C)	180	Pa·s	ISO 11443
Shear Viscosity 4000 s ⁻¹ (400°C)	79.5	Pa·s	ISO 11443

Typical Processing Information

Injection	Nominal Value	Unit
Drying Temperature	120 to 150	°C
Drying Time	3.0 to 5.0	hr
Suggested Max Moisture	0.020	%
Hopper Temperature	< 100	°C
Rear Temperature	350	°C
Middle Temperature	355	°C
Front Temperature	360	°C
Nozzle Temperature	365	°C

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Injection	Nominal Value	Unit
Mould Temperature	160 to 200	°C

Injection Notes

Drying Temperature / Time: 150°C / 3h or 120°C / 5h (residual moisture <0.02%)

Runner: Die / Nozzle >3 mm, Manifold >3.5 mm

Gate: >1 mm or 0.5 x part thickness

Important Notes:

1) Processing conditions quoted in our datasheets are typical of those used in our processing laboratories

- Data for mould shrinkage should be used for material comparison. Actual mould shrinkage values are highly dependent on part geometry, mould configuration, and processing conditions.
- Mould shrinkage differs for along flow and across flow directions. "Along flow" direction is taken as the direction the molten material is travelling when it exits the gate and enters the mould.
- Mould shrinkage is expressed as a percent change in dimension of a specimen in relation to mould dimensions.

2) Data are generated in accordance with prevailing national, international and internal standards, and should be used for material comparison.

Actual property values are highly dependent on part geometry, mould configuration and processing conditions. Properties may also differ for along flow and across flow directions.

Storage Requirements

Store in original packaging away from direct sunlight and extremes of temperatures. Do not use if sealing tab is broken prior to opening.

Development Material

During qualification activities NFHI (Not For Human Implantation) grades are available upon request.

Detailed data available on our website www.invibio.com or upon request.

Notes

¹ 1.00 mm

² 0.05 – 0.25%

³ 3-Cycles Steam

⁴ 75 kGy Gamma

⁵ As Moulded

⁶ Through Flow

⁷ Amorphous

⁸ Crystalline

⁹ Molten

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Victrex Technology Centre, Hillhouse International, Thornton-Cleveleys, Lancashire, FY5 4QD, UK

Tel: +44 (0)1253 898 000 Fax: +44 (0)1253 898 001 Email: info@invibio.com

Registered in England and Wales No. 4088050 at address above

www.invibio.com