PEEK-OPTIMA™ Natural LT1 (Granules)

General Information

Product Description

High performance biocompatible thermoplastic material, PolyEtherEtherKetone (PEEK), semi crystalline. Granules for injection moulding and extrusion, standard 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™ is 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/cm³	ISO 1183
Melt Mass-Flow Rate (MFR) (400°C/2.16 kg)	3.7	g/10 min	Internal Method
Spiral Flow [1]	11.5	cm	Internal Method
Molding Shrinkage			ASTM D955
Flow	1.3	%	
Across Flow	1.6	%	
Water Absorption (Equilibrium, 23°C, 50% RH)	0.50	%	ISO 62
Crystallinity DSC	30.0	%	Internal Method
Mechanical	**Nominal Value**	**Unit**	**Test Method**
Tensile Modulus [2] (23°C)	5940	MPa	ISO 527-1
Tensile Stress			ISO 527-2
Yield, 23°C [3]	104	MPa	
Yield, 23°C [4]	100	MPa	
Yield, 23°C [5]	96.9	MPa	
Tensile Strain			ISO 527-2
Break, 23°C [3]	29	%	
Break, 23°C [4]	34	%	
Break, 23°C [5]	28	%	
Flexural Modulus			
23°C [3]	4100	MPa	ISO 178
23°C [5]	3800	MPa	ISO 178
Flexural Stress			ISO 178
Yield, 23°C [3]	168	MPa	
Yield, 23°C [4]	164	MPa	
Yield, 23°C [5]	156	MPa	
3.5% Strain, 23°C [5]	122	MPa	
Compressive Modulus [5] (23°C)	3970	MPa	ISO 604
Compressive Stress [5] (23°C)	130	MPa	ISO 604
Shear Modulus [5] (23°C)	1150	MPa	ISO 15310
Shear Strength [5] (23°C)	91.2	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]	6.7	kJ/m²	
23°C [4]	7.3	kJ/m²	
23°C [5]	7.2	kJ/m²	
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)	145	°C	ISO 11357-2
Melting Temperature	340	°C	ISO 11357-3
CLTE			ASTM D696
Flow : 50 to 120°C	4.1E-5	cm/cm/°C	
Flow : 170 to 220°C	1.2E-4	cm/cm/°C	
Flow : 220 to 270°C	1.5E-4	cm/cm/°C	
Transverse : 50 to 120°C [6]	3.5E-5	cm/cm/°C	
Transverse : 50 to 120°C	6.5E-5	cm/cm/°C	
Transverse : 170 to 220°C [6]	8.5E-5	cm/cm/°C	
Transverse : 170 to 220°C	1.3E-4	cm/cm/°C	
Transverse : 220 to 270°C [6]	1.1E-4	cm/cm/°C	
Transverse : 220 to 270°C	1.6E-4	cm/cm/°C	
Specific Heat			Internal Method
37°C [7]	1170	J/kg/°C	
37°C [8]	2630	J/kg/°C	
400°C [9]	1400	J/kg/°C	
Recrystallization Temperature (Peak)	294	°C	ISO 11357-3
Fill Analysis	**Nominal Value**	**Unit**	**Test Method**
Melt Viscosity 1000 s^-1 (400°C)	440	Pa·s	Internal Method
Melt Stability 1000 s^-1, 1 hr (400°C)	1.0	%	Internal Method
Shear Viscosity 100 s^-1 (400°C)	958	Pa·s	Internal Method
Shear Viscosity 1000 s^-1 (400°C)	353	Pa·s	Internal Method
Shear Viscosity 10000 s^-1 (400°C)	96.9	Pa·s	Internal Method
Shear Viscosity 200 s^-1 (400°C)	734	Pa·s	Internal Method
Shear Viscosity 2000 s^-1 (400°C)	246	Pa·s	Internal Method
Shear Viscosity 400 s^-1 (400°C)	534	Pa·s	Internal Method
Shear Viscosity 4000 s^-1 (400°C)	170	Pa·s	Internal Method

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	355	°C
Middle Temperature	360 to 365	°C
Front Temperature	370	°C
Nozzle Temperature	375	°C

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Injection	Nominal Value	Unit
Mould Temperature	180 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.

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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