

Quadrant's Proteus® LSG HS PP is a heat stabilized Polypropylene that exhibits a higher heat deflection temperature compared to the standard PP allowing it to be used in applications that demands repeated steam- and autoclave sterilization cycles. Quadrant's Proteus® LSG HS PP is tested and validated for biocompatibility per ISO10993-5 (cytotoxicity test on the stock shapes).

**Physical properties (indicative values <sup>1)</sup>)**

PROPERTIES	Test methods	Units	VALUES	Test methods	Units	VALUES
Colour	-	-	White/ Black	-	-	White/ Black
Density	ISO 1183-1	g/cm <sup>3</sup>	NT	-	-	-
Specific Gravity				ASTM D792	-	0.92
- after 24/96 h immersion in water of 23 °C (73°F)	ISO 62	%	NT	ASTM D570	%	-
- at saturation in air of 23 °C (73°F)/ 50 % RH	-	%	-	-	-	-
- at saturation in water of 23 °C (73°F)	-	%	-	ASTM D570	%	< 0.01
<b>Thermal Properties (1)</b>						
Melting temperature (DSC, 10 °C(50 °F)/min)	ISO 11357-1/3	°C	NT	ASTM D3418	°F	327
Glass transition temperature (DSC, 20 °C(68°F)/min) - (2)	-	-	-	-	-	-
Thermal conductivity at 23 °C (73°F)	-	W/(K.m)	0.22	-	BTU in./hr.ft <sup>2</sup> .°F	1.53
Coefficient of linear thermal expansion:						
- average value between -40 and 148 °C (-40°F to 300°F)	ASTM E-831 (TMA)	m/(m.K)	11 x 10 <sup>-5</sup>	ASTM E-831 (TMA)	in./in./°F	6 x 10 <sup>-5</sup>
- average value between 23 and 150 °C (73°F to 302°F)	-	-	-	-	-	-
- average value above 150 °C (302°F)	-	-	-	-	-	-
Temperature of deflection under load:						
- method B: 0.45 MPa (66 psi)	ISO 75-1/2	°C	NT	ASTM D648	°F	>300
Max. allowable service temperature in air:						
- for short periods	-	-	-	-	-	-
- continuously : for min. 20,000 h (3)	-	°C	82	-	°F	180
Flammability (4):						
- "Oxygen Index"	ISO 4589-1/2	%	<20	ISO 4589-1/2	%	<20
- according to UL 94 (3.1 mm (1/8 in.) thickness)	-	-	HB	-	-	HB
<b>Mechanical Properties at 23 °C (73°F) (5)</b>						
Tension test :						
- tensile stress at yield / tensile stress at break	ISO 527-1/2 /1B	MPa	NT	ASTM D638	psi	NT
- tensile strength	ISO 527-1/2 /1B	MPa	NT	ASTM D638	psi	4,900
- tensile strain at yield	ISO 527-1/2 /1B	%	NT	ASTM D638	%	8
- tensile strain at break	ISO 527-1/2 /1B	%	NT	ASTM D638	%	NT
- tensile modulus of elasticity	ISO 527-1/2 /1B	MPa	NT	ASTM D638	psi	117,000
Compression test:						
- compressive stress at 1 / 2 % nominal strain	ISO 604	MPa	NT	ASTM D695	psi	NT / 3500
- compressive modulus of elasticity	ISO 604	MPa	NT	ASTM D695	psi	214,000
Flexural test :						
- flexural strength	ISO 178	MPa	NT	ASTM D790	psi	NT
- flexural modulus of elasticity	ISO 178	MPa	NT	ASTM D790	psi	NT
Charpy impact strength - unnotched	ISO 179-1/1eA	kJ/m <sup>2</sup>	NT	-	-	-
Charpy impact strength - notched	ISO 179-1/1eA	kJ/m <sup>2</sup>	NT	-	-	-
Izod impact	-	-	-	ASTM D256 Type "A"	ft.lb./in.	0.5
Shore hardness D	ISO 868	-	NT	ASTM D2240	-	D77
Rockwell hardness	ISO 2039-2	-	NT	ASTM D785	-	R 113
<b>Electrical Properties at 23 °C (73°F)</b>						
Electric strength	IEC 60243-1	kV/mm	NT	ASTM D149	Volts/mil	NT
Volume resistivity	IEC 60093	Ohm.cm	NT	IEC 60093	Ohm.cm	NT
Surface resistivity	ANSI/ESD STM 11.11	Ohm/sq.	> 10 <sup>13</sup>	ANSI/ESD STM 11.11	Ohm/sq.	> 10 <sup>13</sup>
Relative permittivity ε <sub>r</sub> : - at 100 Hz	IEC 60250	-	NT	ASTM D150	-	NT
- at 1 MHz	IEC 60250	-	NT	ASTM D150	-	NT
Dielectric dissipation factor tan δ : - at 100 Hz	IEC 60250	-	NT	ASTM D150	-	NT
- at 1 MHz	IEC 60250	-	NT	ASTM D150	-	NT
Comparative tracking index (CTI)	IEC 60112	-	600	IEC 60112	-	600
<b>Certifications on biocompatibility type testing</b>						
ISO 10993-5 (cytotoxicity test on the stock shapes); USP-Physicochemical Tests for Plastics.						

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NT: Not Tested

**Legend:**

- The figures given for these properties are for some part derived from raw material supplier data and other publications.
- Values for this property are only given here for amorphous materials and for materials that do not show a melting temperature (PBI & PI).
- Temperature resistance over a period of min. 20,000 hours. After this period of time, there is a decrease in tensile strength – measured at 23 °C – of about 50 % as compared with the original value. The temperature value given here is thus based on the thermal-oxidative degradation which takes place and causes a reduction in properties. Note, however, that the maximum allowable service temperature depends in many cases essentially on the duration and the magnitude of the mechanical stresses to which the material is subjected.
- These estimated ratings, derived from raw material supplier data and other publications, are not intended to reflect hazards presented by the material under actual fire conditions. There is no 'UL File Number' available for these stock shapes.
- Most of the figures given for the mechanical properties of the materials (stock shapes) are average values of tests run on dry test samples

Quadrant's Life Science Grades should not be used for applications involving medical devices that are intended to remain implanted in the human body continuously for a period exceeding 24 hours (30 days\*), or are intended to remain in contact with internal human tissue or bodily fluids for more than 24 hours (30 days\*). They should not be used either for the manufacture of critical components of medical devices that are essential to the continuation of human life.

\*: '30 days' applies to Ketron® CLASSIX™ LSG PEEK white only.

All statements, technical information and recommendations contained in this publication are presented in good faith based upon tests believed to be reliable and practical field experience. The reader is cautioned, however, that QUADRANT Engineering Plastic Products cannot guarantee the accuracy or completeness of this information, and it is the customer's responsibility to determine the suitability of Quadrant's products in any given application.