PSU LSG

QUADRANT
ENGINEERING PLASTIC PRODUCTS

PRODUCT DATA SHEET

PSU LSG natural stock shapes are produced from selected batches of a specific polysulfone resin. This polymer shows a combination of very good mechanical, thermal and electrical properties combined with a good hydrolysis and chemical resistance. The composition of the resin used for the production of the PSU LSG natural stock shapes complies with the regulations that apply in the Member States of the European Union (Directive 2002/72/EC, as amended) and in the United States of America (FDA) for plastic materials and articles intended to come into contact with foodstuffs. PSU LSG natural stock shapes have also been successfully type tested for their compliance with both United States Pharmacopeia (USP) and ISO 10993-1 guideline requirements for Biocompatibility Testing of Materials, and they come with full traceability from resin to stock shape. These features, added to a good sterilizability by means of steam, dry heat, plasma, ethylene oxide and gamma irradiation, make PSU LSG natural stock shapes very suitable for applications in the medical, pharmaceutical and biotechnology markets.

Physical properties (indicative values ■)

PROPERTIES	Test methods ISO / (IEC)	Units	VALUES
Colour	-	-	natural (yellow, translucent)
Density	1183	g/cm³	1.24
Water absorption:			
- after 24 / 96h immersion in water of 23°C (1)	62	mg	19 / 38
	62	%	0.24 / 0.48
- at saturation in air of 23°C / 50% RH	-	%	0.30
- at saturation in water of 23°C	-	%	0.80
Thermal properties			
Glass transition temperature	-	°C	190
Thermal conductivity at 23°C	-	W/(K.m)	0.26
Coefficient of linear thermal expansion:			
- average value between 23 and 100°C	-	m/(m.K)	60.10^{-6}
- average value between 23 and 150°C	-	m/(m.K)	60.10^{-6}
Temperature of deflection under load:			
- method A: 1.8 MPa	75	°C	170
Max. allowable service temperature in air:			
- for short periods (2)	-	°C	180
- continuously: for min. 20,000 h (3)	-	°C	150
Min. service temperature (4)	-	°C	- 50
Flammability (5):			
- "Oxygen index"	4589	%	30
- according to UL 94 (1.5 / 3 mm thickness)	-	-	HB / HB
Mechanical Properties at 23°C (6)			
Tension test (7):			
- tensile stress at yield (8)	527	MPa	88
- tensile strength (8)	527	MPa	88
- tensile strain at yield (8)	527	%	5
- tensile strain at break (8)	527	%	10
- tensile modulus of elasticity (9)	527	MPa	2,850
Compression test (10):			
- compressive stress at 1 / 2 / 5% nominal strain (9)	604	MPa	25 / 49 / 101
Flexural test (11) (12):			
- flexural strength	178	MPa	120
- flexural strain at flexural strength	178	%	6.5
- flexural stress at conventional deflection	178	MPa	91
Charpy impact strength – unnotched (13)	179-1/1eU	kJ/m²	180
Charpy impact strength – notched	179-1/1eA	kJ/m²	3.5
Ball indentation hardness (14)	2039-1	MPa	115
Rockwell hardness (14)	2039-2	-	M 89
Electrical Properties at 23 °C			
Electric strength (15)	(60243)	kV/mm	30
Volume resistivity	(60093)	Ohm.cm	$> 10^{14}$
Surface resistivity	(60093)	Ohm	$> 10^{13}$
Relative permittivity ε_r: - at 100 Hz	(60250)	-	3.0
- at 1 MHz	(60250)	-	3.0
Dielectric dissipation factor tan δ: - at 100 Hz	(60250)	-	0.001
- at 1 MHz	(60250)	-	0.003
Comparative tracking index (CTI)	(60112)	-	150

Note: 1 g/cm³ = 1,000 kg/m³ ; 1 MPa = 1 N/mm² ; 1 kV/mm = 1 MV/m

Certifications on biocompatibility type testing
USP Class VI ; ISO 10993-4 (hemocompatibility) ; ISO 10993-5 (cytotoxicity) ; ISO 10993-10 (intra-cutaneous reactivity & sensitization) ; ISO 10993-11 (acute systemic toxicity)

Legend:

(1) According to method 1 of ISO 62 and done on discs ∅ 50 x 3 mm.

(2) Only for short time exposure (a few hours) in applications where no or only a very low load is applied to the material.

(3) Temperature resistance over a period of min. 20,000 hours. After this period of time, there is a decrease in tensile strength 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.

(4) Impact strength decreasing with decreasing temperature, the minimum allowable service temperature is practically mainly determined by the extent to which the material is subjected to impact. The value given here is based on unfavourable impact conditions and may consequently not be considered as being the absolute practical limit.

(5) These ratings - derived from raw material supplier data and other publications - are not intended to reflect hazards presented by the materials under actual fire conditions. There is no UL-yellow card available for PSU LSG natural stock shapes.

(6) The figures given for the mechanical properties are average values of tests run on test specimens machined out of rod Ø 50 mm. Unless otherwise specified, the test specimens were taken from the mid between center and outside diameter with their largest size taken in axial direction (parallel to the extrusion direction).

(7) Test specimens: Type 1 B

(8) Test speed: 50 mm/min (chosen acc. to ISO 10350-1 as a function of the ductile behaviour of the material)

(9) Test speed: 1 mm/min

(10) Test specimens: cylinders ∅ 8 x 16 mm

(11) Test specimens: bars 4 x 10 x 80 mm

(12) Test speed: 2 mm/min

(13) Pendulum used: 25 J

(14) Measured on 10 mm thick disks Ø 50 mm, mid between center and outside diameter.

(15) Electrode configuration: 25 / 75 mm coaxial cylinders ; in transformer oil according to IEC 60296 ; 1 mm thick test specimens.

■ This table is a valuable help in the choice of a material. The data listed here fall within the normal range of product properties. **However, they are not guaranteed and they should not be used to establish material specification limits nor used alone as the basis of design.**

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*, or as critical components of medical devices that are essential to the continuation of human life.

*: the period of **30 days** only applies to **KETRON® PEEK-CLASSIX™ LSG white**.

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