PRODUCT DATA SHEET

Proteus® LSG HS PP

MITSUBISHI CHEMICAL ADVANCED MATERIALS

Polypropylene

Proteus® Life Science Grade (LSG) Heat Stabilized (HS) Polypropylene PP shapes have been formulated to provide improved stability, and a higher heat deflection temperature when compared to standard polypropylene grades. This enables Proteus® LSG HS PP components to be used in repeated steam sterilization cycles and autoclaves, and also makes them very resistant to cleaning agents, disinfectants, and various solvents. In addition to these unique capabilities, Proteus® LSG HH PP stock shapes are biocompatible according to ISO 10993-1 compliance standards, which is why this grade is often a favored solution within the medical, pharmaceutical, and biotechnology markets as surgical trays, caddies, and various device components.

		ISO*			ASTM*		
		Test methods	Units	Indicative Values	Test methods	Units	Indicative Values
Thermal Properties (1)	Melting temperature (DSC, 10°C (50°F) / min)	ISO 11357-1/-3	°C	165	ASTM D3418	°F	327
	Glass transition temperature (DSC, 20°C (68°F) / min) (2)	ISO 11357-1/-2	°C	-	ASTM D3418	°F	-
	Thermal conductivity at 23°C (73°F)	-	W/(K.m)		-	BTU in./(hr.ft2.°F)	
	Coefficient of linear thermal expansion (-40 to 150 °C) (-40 to 300°F)				ASTM E-831 (TMA)	µin./in./°F	60
	Coefficient of linear thermal expansion (23 to 100°C) (73°F to 210°F)	-	µm/(m.K)				
	Heat Deflection Temperature: method A: 1.8 MPa (264 PSI)	ISO 75-1/-2	°C	71	ASTM D648	°F	-
	Continuous allowable service temperature in air (20.000 hrs) (3)	-	°C	90	-	°F	180
	Min. service temperature (4)	-	°C	-	-	°F	-
	Flammability: UL 94 (3 mm (1/8 in.)) (5)	-	-	HB	-	-	HB
	Flammability: Oxygen Index	ISO 4589-1/-2	%				
Mechanical Properties (6)	Tensile strength	ISO 527-1/-2 (7)	MPa	38	ASTM D638 (8)	PSI	4900
	Tensile strain (elongation) at yield	ISO 527-1/-2 (7)	%	6			8
	Tensile strain (elongation) at break	ISO 527-1/-2 (7)	%	25	ASTM D638 (8)	%	
	Tensile modulus of elasticity	ISO 527-1/-2 (9)	MPa	1800	ASTM D638 (8)	KSI	117
	Shear Strength	ASTM D732	MPa		ASTM D732	PSI	
	Compressive stress at 1 / 2 / 5 % nominal strain	ISO 604 (10)	MPa	15/ 27/ 46			
	Compressive strength				ASTM D695 (11)	PSI	-
	Charpy impact strength - unnotched	ISO 179-1/1eU	kJ/m²	108,0			
	Charpy impact strength - notched	ISO 179-1/1eA	kJ/m²	6,4			
	Charpy impact strength - double 14° notched	ISO 11542-2	kJ/m²				
	Izod Impact notched				ASTM D256	ft.lb./in	
	Flexural strength	ISO 178 (12)	MPa	54	ASTM D790 (13)	PSI	-
	Flexural modulus of elasticity	ISO 178 (12)	MPa	-	ASTM D790	KSI	182
	Relative volume loss during wear test "sand-slurry" : TIVAR® 1000=100	ISO 15527	-	-			
	Shore hardness D (14)	ISO 868	-	-	ASTM D2240	-	77
Electrical Properties	Electric strength	IEC 60243-1 (15)	kV/mm	-	ASTM D149	Volts/mil	-
	Volume resistivity	IEC 62631-3-1	Ohm.cm		IEC 62631-3-1	Ohm.cm	
	Surface resistivity	ANSI/ESD STM 11.11	Ohm/sq.	10E12	ANSI/ESD STM 11.11	Ohm/sq.	10E12
	Dielectric constant at 1 MHz	IEC 62631-2-1	-	-	ASTM D150	-	-
	Dissipation factor at 1 MHz	IEC 62631-2-1	-	-	ASTM D150	-	-
Miscellaneous	Colour	-	-	White, Black	-	-	White, Black
	Density	ISO 1183-1	g/cm³	0.92			
	Specific Gravity				ASTM D792	-	0.92
	Water absorption after 24h immersion in water of 23°C (73°F)	ISO 62 (16)	%	< 0.1	ASTM D570 (17)	%	
	Water absorption at saturation in water of 23 °C (73°F)	-	%	< 0.1	ASTM D570 (17)	%	
	Wear rate	ISO 7148-2 (18)	µm/km	-	QTM 55010 (19)	In³.min/ft.lbs.hrx10^{-10}	-
	Dynamic Coefficient of Friction (-)	ISO 7148-2 (18)	-		QTM 55007 (20)	-	0.25
	Limiting PV at 100 FPM				QTM 55007 (21)	ft.lbs/in².min	-
	Limiting PV at 0.1 / 1 m/s cylindrical sleeve bearings	-	Mpa.m/s	- / -			
	Chemical Resistance	https://www.mcam.com/en/support/chemical-resistance-information/			https://www.mcam.com/en/support/chemical-resistance-information/		

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

NYP: there is no yield point

* This table, mainly to be used for comparison purposes, is a valuable help in the choice of a material. The data listed here fall within the normal range of product properties of dry material. However, they are not guaranteed and they should not be used to establish material specification limits nor used alone as the basis of design. See the remaining notes on the next page.

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NOTES, SEE DATASHEET ON PAGE 1

-1 The figures given for these properties are for the most part derived from raw material supplier data and other publications.

-2 Values for this property are only given here for amorphous materials and for materials that do not show a melting temperature (PBI & PI).

-3 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 (73°F)– 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 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.

-6 Most of the figures given for the mechanical properties are average values of tests run on dry test specimens machined out of rods 40-50 mm (1.5 - 2") when available, else out of plate 10-20mm (0.4 - 0.8"). All tests are done at room temperature (23° / 73°F)

-7 Test speed: either 5 mm/min or 50 mm/min [chosen acc. to ISO 10350-1 as a function of the ductile behaviour of the material (tough or brittle)] using type 1B tensile bars

-8 Test speed: either 0.2"/min or 2"/min or [chosen as a function of the ductile behaviour of the material (btittle or tough)] using Type 1 tensile bars

-9 Test speed: 1 mm/min, using type 1B tensile bars

-10 Test specimens: cylinders Ø 8 mm x 16 mm, test speed 1 mm/min

-11 Test specimens: cylinders Ø 0.5" x 1", or square 0.5" x 1", test speed 0.05"/min

-12 Test specimens: bars 4 mm (thickness) x 10 mm x 80 mm ; test speed: 2 mm/min ; span: 64 mm.

-13 Test specimens: bars 0.25" (thickness) x 0.5" x 5" ; test speed: 0.11"/min ; span: 4"

-14 Measured on 10 mm, 0.4" thick test specimens.

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

-16 Measured on discs Ø 50 mm x 3 mm.

-17 Measured on 1/8" thick x 2" diameter or square

-18 Test procedure similar to Test Method A: "Pin-on-disk" as described in ISO7148-2, Load 3MPa, sliding velocity= 0,33 m/s, mating plate steel Ra= 0.7-0.9 µm, tested at 23°C, 50%RH.

-19 Test using journal bearing system, 200 hrs, 118 ft/min, 42 PSI, steel shaft roughness 16±2 RMS micro inches with Hardness Brinell of 180-200

-20 Test using Plastic Thrust Washer rotating against steel, 20 ft/min and 250 PSI, Stationary steel washer roughness 16±2 RMS micro inches with Rockwell C 20-24

-21 Test using Plastic Thrust Washer rotating against steel, Step by step increase pressure, Test ends when plastic begins to deform or if temperature increases to 300°F.

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