Duratron® T4301 PAI

MITSUBISHI CHEMICAL GROUP

PRODUCT DATASHEET

Polyamide-Imide

Duratron® T4301 PAI is a graphite-filled polyamide-imide offers a very low expansion rate and coefficient of friction, exhibiting little to no stick-slip. The addition of PTFE and graphite provides higher wear resistance compared to the unfilled Duratron® T4203 PAI grade, and also gives Duratron® T4301 PAI excellent dimensional stability capabilities over a wide temperature range. Duratron® T4301 PAI's flexural modulus of 1,000,000 psi is higher than most other advanced engineering plastics, which allows it to excel in severe service wear applications such as non-lubricated bearings, seals, bearing cages, and reciprocating compressor parts.

		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		ASTM D3418	°F	
	Glass transition temperature (DMA- Tan δ) (2)		°C	280		°F	527
	Thermal conductivity at 23°C (73°F)		W/(K.m)	0.54		BTU in./(hr.ft².°F)	3.7
	Coefficient of linear thermal expansion (-40 to 150 °C) (-40 to 300°F)				ASTM E-831 (TMA)	µin./in./°F	14
	Coefficient of linear thermal expansion (23 to 100°C) (73°F to 210°F)		µm/(m.K)	35			
	Coefficient of linear thermal expansion (23 to 150°C) (73°F to 300°F)		µm/(m.K)	35			
	Coefficient of linear thermal expansion (>150°C) (> 300°F)		µm/(m.K)	40			
	Heat Deflection Temperature: method A: 1.8 MPa (264 PSI)	ISO 75-1/-2	°C	280	ASTM D648	°F	534
	Continuous allowable service temperature in air (20.000 hrs) (3)		°C	250		°F	500
	Min. service temperature (4)		°C	-20		°F	
	Flammability: UL 94 (3 mm (1/8 in.)) (5)			V-0			V-0
	Flammability: Oxygen Index	ISO 4589-1/-2	%	45			
Mechanical Properties (6)	Tensile strength	ISO 527-1/-2 (7)	MPa	110	ASTM D638 (8)	PSI	15,000
	Tensile strain (elongation) at yield	ISO 527-1/-2 (7)	%		ASTM D638 (8)	%	6.6
	Tensile strain (elongation) at break	ISO 527-1/-2 (7)	%	5	ASTM D638 (8)	%	6.8
	Tensile modulus of elasticity	ISO 527-1/-2 (9)	MPa	5500	ASTM D638 (8)	KSI	900
	Shear Strength			113	ASTM D732	PSI	16,400
	Compressive stress at 1 / 2 / 5 % nominal strain	ISO 604 (10)	MPa	39 / 72 / 130			
	Compressive strength				ASTM D695 (11)	PSI	22,000
	Charpy impact strength - unnotched	ISO 179-1/1eU	kJ/m²	45			
	Charpy impact strength - notched	ISO 179-1/1eA	kJ/m²	4.0			
	Izod Impact notched				ASTM D256	ft.lb./in	0.80
	Flexural strength	ISO 178 (12)	MPa	155	ASTM D790 (13)	PSI	23,000
	Flexural modulus of elasticity	ISO 178 (12)	MPa		ASTM D790	KSI	800
	Rockwell M hardness (14)	ISO 2039-2			ASTM D785		106
	Rockwell R hardness (14)	ISO 2039-2			ASTM 2240		
Electrical Properties	Electric strength	IEC 60243-1 (15)	kV/mm		ASTM D149	Volts/mil	
	Volume resistivity	IEC 62631-3-1	Ohm.cm	10E12	ASTM D257	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		5.4	ASTM D150		6
	Dissipation factor at 1MHz	IEC 62631-2-1		0.042	ASTM D150		0.037
Miscellaneous	Colour			Black			Black
	Density	ISO 1183-1	g/cm³	1.45			
	Specific Gravity				ASTM D792		1.45
	Water absorption after 24h immersion in water of 23 °C (73°F)	ISO 62 (16)	%	0.30	ASTM D570 (17)	%	0.40
	Water absorption at saturation in water of 23 °C (73°F)		%	3.8	ASTM D570 (17)	%	1.5
	Wear rate	ISO 7148-2 (18)	µm/km	1	QTM 55010 (19)	In³.min/ft.lbs.hrX10-¹⁰	10
	Dynamic Coefficient of Friction (-)	ISO 7148-2 (18)		0.25-0.4	QTM 55007 (20)		0.2
	Limiting PV at 100 FPM				QTM 55007 (21)	ft.lbs/in².min	40,000
	Limiting PV at 0.1 / 1 m/s cylindrical sleeve bearings		MPa.m/s	1.1 / 0.69			
	Limiting PV at 0.5 m/s cylindrical sleeve bearings	QTM 55007 (21)	MPa.m/s				
	Chemical Resistance	www.mcam.com/en/support/chemical-resistance-information			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.

Duratron® is a registered trademark of Mitsubishi Chemical Advanced Materials

mcam.com

Distributed by

NYLAPLAS ENGINEERING LIMITED

MITSUBISHI CHEMICAL GROUP

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 – 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 40-60 mm when available, else out of plate 10-20mm. 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 (brittle 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: Φ 25 / Φ 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 ISO 7148-2, 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, depending on the material, to a maximum which lays between 212°F (100°C) and 482°F (250°C)

This product data sheet and any data and specifications presented on our website shall provide promotional and general information about the Engineering Plastic Products (the "Products") manufactured and offered by Mitsubishi Chemical Advanced Materials and shall serve as a preliminary guide. All data and descriptions relating to the Products are of an indicative nature only. Neither this data sheet nor any data and specifications presented on our website shall create or be implied to create any legal or contractual obligation.

Any illustration of the possible fields of application of the Products shall merely demonstrate the potential of these Products, but any such description does not constitute any kind of covenant whatsoever. Irrespective of any tests that Mitsubishi Chemical Advanced Materials may have carried out with respect to any Product, Mitsubishi Chemical Advanced Materials does not possess expertise in evaluating the suitability of its materials or Products for use in specific applications or products manufactured or offered by the customer respectively. The choice of the most suitable plastics material depends on available chemical resistance data and practical experience, but often preliminary testing of the finished plastics part under actual service conditions (right chemical, concentration, temperature and contact time, as well as other conditions) is required to assess its final suitability for the given application.

It thus remains the customer's sole responsibility to test and assess the suitability and compatibility of Mitsubishi Chemical Advanced Materials' Products for its intended applications, processes and uses, and to choose those Products which according to its assessment meet the requirements applicable to the specific use of the finished product. The customer undertakes all liability in respect of the application, processing or use of the aforementioned information or product, or any consequence thereof, and shall verify its quality and other properties.