Duratron® T4301 & T4501 PAI

QUADRANT ENGINEERING PLASTIC PRODUCTS

PRODUCT DATA SHEET

The addition of PTFE and graphite provides higher wear resistance and lower coefficient of friction compared to the unfilled **Duratron T4203 PAI** grade as well as a lower tendency to stick-slip. **Duratron T4301 PAI** also offers excellent dimensional stability over a wide temperature range. This extruded **Duratron PAI** grade excels in severe wear applications such as non-lubricated bearings, seals, bearing cages and reciprocating compressor parts. Compression moulded **Duratron T4501 PAI** is similar in composition to **Duratron T4301 PAI**, and is selected when larger shapes are required.

Physical properties (indicative values ▪)

PROPERTIES	Test methods	Units	VALUES (16)
Colour	-	-	black
Density	ISO 1183-1	g/cm³	1.45
Water absorption:			
- after 24/96 h immersion in water of 23 °C (1)	ISO 62	mg	26 / 48
	ISO 62	%	0.30 / 0.55
- at saturation in air of 23 °C / 50 % RH	-	%	1.9
- at saturation in water of 23 °C	-	%	3.8
Thermal Properties (2)			
Melting temperature (DSC, 10 °C/min)	ISO 11357-1/-3	°C	NA
Glass transition temperature (DSC, 20 °C/min) - (3)	ISO 11357-1/-2	°C	280
Thermal conductivity at 23 °C	-	W/(K.m)	0.54
Coefficient of linear thermal expansion:			
- average value between 23 and 100 °C	-	m/(m.K)	35×10^{-6}
- average value between 23 and 150 °C	-	m/(m.K)	35×10^{-6}
- average value above 150 °C	-	m/(m.K)	40×10^{-6}
Temperature of deflection under load:			
- method A: 1.8 MPa	ISO 75-1/-2	°C	280
Max. allowable service temperature in air:			
- for short periods (4)	-	°C	270
- continuously : for min. 20,000 h (5)	-	°C	250
Min. service temperature (6)	-	°C	-20
Flammability (7):			
- "Oxygen Index"	ISO 4589-1/-2	%	44
- according to UL 94 (1.5 / 3 mm thickness)	-	-	V-0 / V-0
Mechanical Properties at 23 °C (8)			
Tension test (9):			
- tensile stress at yield / tensile stress at break (10)	ISO 527-1/-2	MPa	NYP / 110
- tensile strength (10)	ISO 527-1/-2	MPa	110
- tensile strain at yield(10)	ISO 527-1/-2	%	NYP
- tensile strain at break (10)	ISO 527-1/-2	%	5
- tensile modulus of elasticity (11)	ISO 527-1/-2	MPa	5500
Compression test (12):			
- compressive stress at 1 / 2 / 5 % nominal strain (11)	ISO 604	MPa	39 / 72 / 130
Charpy impact strength - unnotched (13)	ISO 179-1/1eU	kJ/m²	45
Charpy impact strength - notched	ISO 179-1/1eA	kJ/m²	4
Ball indentation hardness (14)	ISO 2039-1	N/mm²	200
Rockwell hardness (14)	ISO 2039-2	-	M 106 (E 70)
Electrical Properties at 23 °C			
Electric strength (15)	IEC 60243-1	kV/mm	-
Volume resistivity	IEC 60093	Ohm.cm	$> 10^{13}$
Surface resistivity	ANSI/ESD STM 11.11	Ohm/sq.	$> 10^{13}$
Relative permittivity ε_r : - at 100 Hz	IEC 60250	-	6.0
- at 1 MHz	IEC 60250	-	5.4
Dielectric dissipation factor tan δ: - at 100 Hz	IEC 60250	-	0.037
- at 1 MHz	IEC 60250	-	0.042
Comparative tracking index (CTI)	IEC 60112	-	175

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

NA: not applicable

NYP: there is no yield point

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Legend:

(1) According to method 1 of ISO 62 and done on discs Ø 50 mm x 3 mm.
(2) The figures given for these properties are for the most part derived from raw material supplier data and other publications.
(3) Values for this property are only given here for amorphous materials and for materials that do not show a melting temperature (PBI & PI).
(4) Only for short time exposure (a few hours) in applications where no or only a very low load is applied to the material.
(5) 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.
(6) 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.
(7) 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 Duratron T4301 PAI & T4501 PAI stock shapes.
(8) Most of the figures given for the mechanical properties of the extruded materials are average values of tests run on dry test specimens machined out of rod Ø 40 - 60 mm. Except for the hardness tests, the test specimens were then taken from an area mid between centre and outside diameter, with their length in longitudinal direction of the rod (parallel to the extrusion direction).
(9) Test specimens: Type 1 B
(10) Test speed: 5 mm/min [chosen acc. to ISO 10350-1 as a function of the ductile behaviour of the material (tough or brittle)]
(11) Test speed: 1 mm/min.
(12) Test specimens: cylinders Ø 8 mm x 16 mm
(13) Pendulum used: 4 J.
(14) Measured on 10 mm thick test specimens (discs), mid between centre and outside diameter.
(15) Electrode configuration: ∅ 25 mm / ∅ 75 mm coaxial cylinders ; in transformer oil according to IEC 60296 ; 1 mm thick test specimens.
(16) It has to be noted that the property values of compression moulded Duratron T4501 PAI stock shapes can significantly differ from those given in this table for extruded Duratron T4301 PAI stock shapes. They have to be considered on an individual shape and dimension related basis. Please consult us.

▪ 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.**

It has to be noted that these filled materials show an anisotropic behaviour (properties differ when measured parallel and perpendicular to the extrusion or compression direction).

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