

ERTALYTE® (Polyethlen Terephthalate - PET)

The specific properties of this virgin crystalline PET make it especially suitable for the manufacture of mechanical precision parts which have to sustain high loads and/or are subject to wear.

Physical properties (indicative values [■])

PROPERTIES	Test methods	Units	VALUES (16)
Colour	-	-	natural (white)/ black
Density	ISO 1183-1	g/cm ³	1.39
Water absorption:			
- after 24/96 h immersion in water of 23°C (1)	ISO 62	mg	6/13
	ISO 62	%	0.07/0.16
- at saturation in air of 23°C / 50% RH	-	%	0.25
- at saturation in water of 23°C	-	%	0.50
Thermal Properties (2)			
Melting temperature (DSC, 10°C/min)	ISO 11357-1/-3	°C	245
Glass transition temperature (DSC, 20°C/min) - (3)	ISO 11357-1/-2	°C	-
Thermal conductivity at 23°C	-	W/(K.m)	0.29
Coefficient of linear thermal expansion:			
- average value between 23 and 60°C	-	m/(m.K)	60 x 10 ⁻⁶
- average value between 23 and 100°C	-	m/(m.K)	80 x 10 ⁻⁶
Temperature of deflection under load:			
- method A: 1.8 MPa	+ ISO 75-1/-2	°C	80
Max. allowable service temperature in air:			
- for short periods (4)	-	°C	160
- continuously : for 5,000 / 20,000 h (5)	-	°C	115/100
Min. service temperature (6)	-	°C	-20
Flammability (7):			
- "Oxygen Index"	ISO 4589-1/-2	%	25
- according to UL 94 (3 / 6 mm thickness)	-	-	HB / HB
Mechanical Properties at 23°C (8)			
Tension test (9):			
- tensile stress at yield / tensile stress at break (10)	+ ISO 527-1/-2	MPa	90 / -
	++ ISO 527-1/-2	MPa	90 / -
- tensile strength (10)	+ ISO 527-1/-2	MPa	90
- tensile strain at yield (10)	+ ISO 527-1/-2	%	4
- tensile strain at break (10)	+ ISO 527-1/-2	%	15
	++ ISO 527-1/-2	%	15
- tensile modulus of elasticity (11)	+ ISO 527-1/-2	MPa	3500
	++ ISO 527-1/-2	MPa	3500
Compression test (12):			
- compressive stress at 1 / 2 / 5 % nominal strain (11)	+ ISO 604	MPa	26 / 51 / 103
Creep test in tension (9):			
- stress to produce 1% strain in 1000 h ($\sigma_{1/1000}$)	+ ISO 899-1	MPa	26
	++ ISO 899-1	MPa	26
Charpy impact strength - Unnotched (13)	+ ISO 179-1/1eU	kJ/m ²	50
Charpy impact strength - Notched	+ ISO 179-1/1eA	kJ/m ²	2
Izod impact strength - Notched	+ ISO 180/A	kJ/m ²	2
	++ ISO 180/A	kJ/m ²	2
Ball indentation hardness (14)	+ ISO 2039-1	N/mm ²	170
Rockwell hardness (14)	+ ISO 2039-2	-	M 96
Electrical Properties at 23 °C			
Electric strength (15)	+ IEC 60243-1	kV/mm	22
	++ IEC 60243-1	kV/mm	22
Volume resistivity	+ IEC 60093	Ohm.cm	> 10 ¹⁴
	++ IEC 60093	Ohm.cm	> 10 ¹⁴
Surface resistivity	+ IEC 60093	Ohm	> 10 ¹³
	++ IEC 60093	Ohm	> 10 ¹³
Relative permittivity ϵ_r : - at 100 Hz	+ IEC 60250	-	3.4
	++ IEC 60250	-	3.4
- at 1 MHz	+ IEC 60250	-	3.2
	++ IEC 60250	-	3.2
Dielectric dissipation factor tan δ : - at 100 Hz	+ IEC 60250	-	0.001
	++ IEC 60250	-	0.001
- at 1 MHz	+ IEC 60250	-	0.014
	++ IEC 60250	-	0.014
Comparative tracking index (CTI)	+ IEC 60112	-	600
	++ IEC 60112	-	600

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

AVAILABILITY

Round Rods: Ø 10-210 mm - **Sheets/Plates:** Thicknesses 2-100 mm - **Tubes:** O.D. 20-200 mm

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Legend:

- + : values referring to dry material
- ++ : values referring to material in equilibrium with the standard atmosphere 23°C/50% RH

- (1) According to method 1 of ISO 62 and done on discs Ø 50 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 not for semi-crystalline ones.
- (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 5,000/20,000 hours. After these periods of time, there is a decrease in tensile strength - measured at 23°C - of about 50% as compared with the original value. The temperature values given here are 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 the ERTALYTE stock shapes.
- (8) The figures given for the properties of dry material (+) are for the most part average values of tests run on test specimens machined out of rods 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).
Considering the very low water absorption of ERTALYTE, the values for the mechanical and electrical properties of this material can be considered as being practically the same for dry (+) and moisture conditioned (++) test specimens.
- (9) Test specimens: Type 1 B
- (10) Test speed: 50 mm/min [chosen acc. to ISO 10350-1 as a function of the ductile behaviour of the material (tough or brittle)].
Test speed: 1 mm/min
- (11) Test specimens: cylinders Ø 12 x 30 mm
- (12) Pendulum used: 15 J
- (13) Measured on 10 mm thick test specimens (discs), mid between centre and outside diameter.
- (14) Electrode configuration: Ø 25 / Ø 75 mm coaxial cylinders ; in transformer oil according to IEC 60296 ; 1 mm thick test specimens.
Please note that the electric strength of black ERTALYTE can be considerably lower than the figure listed in the table which refers to natural material.
- (15) The property-values given below do not apply to the 2 - 6 mm thick ERTALYTE sheets.

■ 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. **However, they are not guaranteed and they should not be used to establish material specification limits nor used alone as the basis of design.**