

PES

Type of plastics: Amorphous Thermoplastic

Area of application: Industry

	Mat.	Test methods	Unit	Value
<b>Physical properties (indicative values)</b>				
Colour				Browntrans.
Density		ISO 1183-1	g/cm <sup>3</sup>	1.37
Water absorption		ISO 62	mg %	- 0.07
<b>Thermal properties (2)</b>				
Melting temperature (DSC, 10°C/min)		ISO 11357-1/-3	°C	227-238
Thermal conductivity at +23°C			W/(K.m)	0,18
Coefficient of linear thermal expansion		DIN 53752	10 <sup>-6</sup> K	55
• average value between +23°C and +100°C				
Temperature of deflection under load				
• method A: 1.8 MPa	+	ISO 75-1/-2	°C	203
Max. allowable service temperature in air				
• for short periods (a few hours) (4)			°C	220
• continuously: 5.000 / 20.000 h (5)			°C	180
Min. service temperature (6)			°C	-50
Flammability (7):				
• "Oxygen Index"		ISO 4589-1/-2	%	34-38
• according to UL 94 (3 / 6 mm thickness)		UL 94		V0/V0
<b>Mechanical properties at +23°C (8)</b>				
Tension test (9)				
• tensile stress at yield / stress at break (10)	+	ISO 527-1/2	MPa	90
	++	SO 527-1/2	MPa	-
• tensile strain at break (10)	+	ISO 527-1/2	%	15
	++	ISO 527-1/2	%	-
• tensile modulus of elasticity (11)	+	ISO 527-1/2	MPa	2700
Compression test (12)				
• compressive stress at 1 / 2 / 5 % nominal strain (11)	+	ISO 604	MPa	100-109
Charpy impact strength-unnotched (13)	+	ISO 179-1/1eU	kJ/m <sup>2</sup>	No break
Charpy impact strength-notched	+	ISO 179-1/1eA	kJ/m <sup>2</sup>	7
Ball indentation hardness (14)	+	ISO 2039-1	N/mm <sup>2</sup>	-
Hardness (14)	+	ISO 2039-2	D scale	85
<b>Electrical properties at +23°C</b>				
Electric strength (15)	+	IEC 60243-1	kV/mm	25
	++			-
Volume resistivity	+	IEC 60093	Ohm.cm	10E18
	++			-
Surface resistivity	+	IEC 60093	Ohm	10E14
	++			-
Relative permittivity $\epsilon_r$				
• at 50Hz	+	IEC 60250		3,9
	++			-
• at 1 MHz	+	IEC 60250		-
	++			-
Electric loss $\tan \delta$				
• vid 50 Hz	+	IEC 60250		0,002
	++			-
• at 1 MHz	+	IEC 60250		-
	++			-
Comparative tracking index (CTI)	+	IEC 60112		150
	++			-

**Legend:**

+ : values referring to dry material  
++ : values referring to material in equilibrium with the standard atmosphere 23°C / 50% RH (mostly derived from literature)

(1) According to method 1 of ISO 62 and done on discs Ø50 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 **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 unfavorable 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.

(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 Ø40-60 mm. Except for the hardness tests, the test specimens were then taken from an area mid between center and outside diameter, with their length in longitudinal direction of the rod.

(9) Test specimens: Type 1 B

(10) Test speed: 50 mm/min chosen acc. to ISO 10350-1 as a function of the ductile behavior of the material (tough or brittle)

(11) Test speed: 1 mm/min.

(12) Test specimens' cylinders Ø8 x 16 mm

(13) Pendulum used: 4 J

(14) Measured on 10 mm thick test specimens (discs), mid between center and outside diameter.

(15) Electrode configuration Ø25 / Ø75 mm coaxial cylinders in transformer oil according to IEC 60296; 1 mm thick specimens. The figure listed in the table refers to uncolored material. The electric strength for black or colored material can be considerably lower than the figure listed in the table.

**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.**