CESTIDUR®

QUADRANT
ENGINEERING PLASTIC PRODUCTS

PRODUCT DATA SHEET

Molecular weight of about 6,000,000 g/mol.
The higher molecular weight and the particular manufacturing process of this material result in a PE-UHMW grade with superior wear and abrasion resistance.
CESTIDUR has proven to be able to deal with the toughest bearing and wear jobs in all kinds of industries.

Physical properties (indicative values•)

PROPERTIES	Test methods ISO/(IEC)	Units	VALUES
Colour	—	—	blue grey
Average molar mass (average molecular weight) (1)	—	10^6 g/mol	6
Density	1183	g/cm³	0.93
Water absorption at saturation in water of 23°C (2)	—	%	0.01
Thermal Properties (3)			
Melting temperature (DSC, 10°C/min)	11357	°C	130-135
Thermal conductivity at 23°C	—	W/(K·m)	0.40
Average coeff. of linear therm. exp. between 23 and 100°C	—	10^{-6} m/(m·K)	200
Temperature of deflection under load:			
– method A: 1.8 MPa	75	°C	42
Vicat softening temperature – VST/B50	306	°C	80
Max. allowable service temperature in air:			
– for short periods (4)	—	°C	120
– continuously: for 20,000 h (5)	—	°C	80
Min. service temperature (6)	—	°C	-200 (7)
Flammability (8):			
– "Oxygen Index"	4589	%	< 20
– according to UL 94 (1.6 mm thickness)	—	—	HB
Mechanical Properties at 23°C (9)			
Tension test (10):			
– tensile stress at yield (11)	527	MPa	19
– tensile strain at yield (11)	527	%	15
– nominal tensile strain at break (11)	527	%	> 50
– tensile modulus of elasticity (12)	527	MPa	710
Compression test (13):			
– compressive stress at 1/2/5% nominal strain (12)	604	MPa	4/7.5/13.5
Charpy impact strength – Unnotched (14)	179/1eU	kJ/m²	no break
Charpy impact strength – Notched (15)	179/1eA	kJ/m²	105 P
Charpy impact strength – Notched (double 15° notch) (16)	DIS 11542-2	kJ/m²	≥ 120
Ball indentation hardness	2039-1	N/mm²	35
Shore hardness D (3/15 s)	868	—	62/60
Relative weight loss (wear test in "sand/water-slurry"), CESTILENE HD 1000 = 100	internal test	—	90
Relative weight loss (wear test on "plastics pin on rotating steel disk"-tribo system); CESTILENE HD 1000 = 100 (17)	internal test	—	90
Electrical Properties at 23°C (3)			
Electric strength (18)	(60243)	kV/mm	45
Volume resistivity	(60093)	Ω·cm	> 10^{14}
Surface resistivity	(60093)	Ω	> 10^{13}
Relative permittivity ε_r: - at 100 Hz	(60250)	—	2.1
- at 1 MHz	(60250)	—	3
Dielectric dissipation factor tan δ: - at 100 Hz	(60250)	—	0.0004
- at 1 MHz	(60250)	—	0.0010
Comparative tracking index (CTI)	(60112)	—	600

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

Legend

(1) Calculated by means of the Margolies-equation M = 5.37 x 10^4 x $[\eta]^{1.49}$, with $[\eta]$ being the Staudinger index derived from a viscosity measurement using decahydronaphtalene as a solvent (concentration of 0.0003 g/cm³ for PE-UHMW).
(2) Measured on 1 mm thick test plates.
(3) The figures given for these properties are for the most part derived from raw material supplier data and other literature.
(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 20,000 hours. After this period of time, there is a decrease in tensile strength 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, as for all thermoplastics, 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) Because of its outstanding toughness, this material withstands even the temperature of liquid helium (-269°C) at which it still maintains a useful impact resistance without shattering.
(8) These estimated ratings, derived from raw material supplier data, are not intended to reflect hazards presented by the materials under actual fire conditions. There is no UL-yellow card available for CESTIDUR stock shapes.
(9) The figures given for these properties are average values of tests run on test specimens machined out of 20 mm thick plates.
(10) Test specimens: Type 1 B.
(11) Test speed: 50 mm/min.
(12) Test speed: 1 mm/min.
(13) Test specimens: cylinders Ø 12 x 30 mm.
(14) Pendulum used: 15 J.
(15) Pendulum used: 5 J.
(16) Pendulum used: 25 J.
(17) Test conditions: pressure: 3 MPa; sliding velocity: 0.33 m/s; surface roughness of the steel disk: Ra = 0.25 - 0.40 µm; total distance run: 28 km; unlubricated operation in normal environment (air, 23°C / 50% RH).
(18) Electrode configuration: Ø 25 / Ø 75 mm coaxial cylinders; in transformer oil according to IEC 60296; 1 mm thick natural coloured test specimens.

• This table 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.**

Availability

Round Rods: ∅ 20-240 mm - **Sheets/Plates:** Thicknesses 1-250 mm