Kuhn
Kunststoff-Fertigteile

Properties	Test methods	Units	Values
Productname	-	-	TIVAR® CleanStat (weiß)*
Color	-	-	white
Average molar mass (average molecular weight)	-	10^6 g / mol	5,00
Density	ISO 1183-1	g / cm^3	0,952
Water apsorption			
• after 24/96 h immersion in water of 23°C (1)	ISO 62	mg	
• after 24/96 h immersion in water of 23°C (1)	ISO 62	%	
• at saturation in air of 23°C / 50% RH	-	%	
• at saturation in water of 23°C	-	%	< 0,1
THERMAL PROPERTIES (2)			
Melting temperature (DSC, 10°C/min)	ISO 11357-1/-3	°C	137
Dynamic glass transition temperature +	ISO 3146	°C	
Dynamic glass transition temperature ++	ISO 3146	°C	
Thermal conductivity Lambda λ at 23°C	-	W / (K · m)	0,400
Coefficient of linear thermal expansion			
• average value between 23 and 60°C	-	m / (m · K)	
• average value between 23 and 100°C	-	m / (m · K)	200 x 10^{-6}
• average value between 23 and 150°C	-	m / (m · K)	
Temperature of deflection under load			
• method A: 1,8 MPa	ISO 75-1/-2	°C	40
Vicat-Erweichungstemperatur - VST/B50	ISO 306	°C	80
Maximal allowable service temperature in air			
• for short periods (3)	-	°C	120
• continously: for 5.000 / 20.000 h (4)	-	°C	- / 80
Minimal service temperature (5)	-	°C	-200
Flammability (6)			
• Oxygen-Index	ISO 4589-1/-2	%	< 20
• according to UL 94 (3 / 6 mm thickness)	-	-	HB / HB
Specific heat capacity	-	J / (g · K)	
MECHANICAL PROPERTIES AT 23°C (7)			
Tension test (8)			
• tensile stress at yield / tensile stress at break (9) +	ISO 527-1/-2	N / mm^2	18 / -
• tensile stress at yield / tensile stress at break (9) ++	ISO 527-1/-2	N / mm^2	
• tensile strength (9) +	ISO 527-1/-2	N / mm^2	
• tensile strain at yield (9) +	ISO 527-1/-2	%	11
• tensile strain at break / elongation at break (9) +	ISO 527-1/-2	%	> 50 / -
• tensile strain at break / elongation at break (9) ++	ISO 527-1/-2	%	
• tensile modulus of elasticity (10) +	ISO 527-1/-2	N / mm^2	580
• tensile modulus of elasticity (10) ++	ISO 527-1/-2	N / mm^2	
Compression test (11)			
• compressive stress at 1/2/5 % nominal strain (12) +	ISO 604	N / mm^2	5,8 / 9,7 / 15,9
Creep test in tension (8)			
• stress to produce 1% strain	ISO 899-1	N / mm^2	
stress to produce 1% strain (σ 1/1000)	ISO 899-1	N / mm^2	
Charpy impact strenght - Unnotched (12)	ISO 179-1/1eU	kJ / m^2	no break
Charpy impact strenght - Notched	ISO 179-1/1eA	kJ / m^2	
Charpy impact strength (15° V-notched, both-sided)	ISO 11542-2	kJ / m^2	20
Izod impact strength - Notched +	180/2A	kJ / m^2	
Izod impact strength - Notched ++	180/2A	kJ / m^2	
Ball intentation hardness (13)	2039-1	N / mm^2	27
Rockwell hardness (134)	ISO 2039-2	N / mm^2	
Shore hardness D (3 / 15 s)	ISO 868	N / mm^2	- / 60

Coefficient of sliding friction m (14)	-	-
Sliding wear method E (14)	-	µ / km
Sliding wear method Q (14)	-	µ / km

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ELECTRICAL PROPERTIES AT 23°C			
Electric strength (15)	IEC 60243-1	kV / mm	
Electric strength (15) ++	IEC 60243-1	kV / mm	
Volume resistivity +	IEC 60093	Ω · cm	10^{10} - 10^{11}
Volume resistivity ++	IEC 60093	Ω · cm	
Surface resistivity +	IEC 60093	Ω	10^{9} - 10^{10}
Surface resistivity ++	IEC 60093	Ω	
Relative permittivity ε			
• at 100 Hz +	IEC 60250	-	
• at 100 Hz ++	IEC 60250	-	
• at 1 MHz +	IEC 60250	-	2,49
• at 1 MHz ++	IEC 60250	-	
Dielectric dissipation factor tan Delta δ			
• at 100 Hz +	IEC 60250	-	
• at 100 Hz ++	IEC 60250	-	
• at 1 MHz +	IEC 60250	-	0,028
• at 1 MHz ++	IEC 60250	-	
Comparative tracking index (CTI) +	IEC 60112	-	
Comparative tracking index (CTI) ++	IEC 60112	-	

Legend

1. Following the ISO 62 written procedures Ø 50 x 3 mm.
2. The values listed for properties are largely taken from the material sheets supplied by raw material suppliers and other publications.
3. The properties listed are all values for semi-crystalline materials, and not amorphous materials.
4. Valid for just a few hours of thermal stress for applications where there is little or no mechanical stress.
5. Quoted thermal stability over 5,000 / 20,000 hours. Beyond this period, the tensile strength decreases to around 50% of the initial value. As with all thermoplastics, the maximum permissible operating temperature is in many cases primarily dependent on the duration and magnitude of the mechanical stress which occurs during exposure to heat.
6. In view of the reduction in impact strength with decreasing temperature, the lower service temperature limit is in practice particularly determined by the magnitude of the impact stress applied to the material. The values listed here are based on adverse shock loads and should not be considered an absolute practical limit.
7. It should be noted that these values, which have been estimated from the material sheets provided by raw material suppliers, must under no circumstances be taken as a guide to behaviour or reaction when the material is subject to fire. There are no "UL Yellow Cards" for these semi-finished products.
8. The data given for dry material (+) are mostly average values of tests carried out on test specimens consisting of round bars Ø40 - 60 mm. Considering the very low water absorption of POM, PET and PC, the values for the mechanical and electrical properties of dry (+) and damp (++) specimens of these materials can be considered almost equal.
9. Test piece: Type 1 B
10. Test speed: 20 mm/min. (5 mm/min for PA6.6 + GF, POM-C + PTFE and PET TX)
11. Test speed: 1 mm/min.
12. Test specimen: cylinder (Ø 12 x 30mm)
13. Pendulum used: 15 J.
14. Measured on 10-mm thick test specimens
15. Electrode configuration: two cylinders Ø 25 / Ø 75 mm; in transformer oil according to IEC 296; measured on 1-mm thick natural specimens. It is important to know that the dielectric strength of black extruded material (PA6, PA6.6, POM and PET) can be up to 50% lower than that of natural-coloured material. A possible microporosity in the centre of POM semi-finished products also results in a significant reduction in dielectric strength. This table is intended to assist you in selecting materials. The values listed here are within the usual range of product properties. However, they are not guaranteed property values and should not be used as the sole basis for construction. It should be noted that PA6.6 + GF is a fibre-reinforced material which is therefore considered anisotropic (properties are different dependent upon whether the fibres are parallel or perpendicular to the extrusion direction)

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