

Column	Properties	Test methods	Units	Values	
Name	Productname	-	-	PA 4.6	
Section Sect	Color	-	-	red brown	
Water appoint Interest on In water of	Average molar mass (average molecular weight)	-	10 ⁶ g / mol		
Make Paper	Density	ISO 1183-1	g / cm³	1,180	
2001 1907	Water apsorption		.		
**************************************		ISO 62	mg	90 / 180	
######################################		ISO 62	%	1,3 / 2,6	
Meding torpecture (IDSC, 10°Clmin)	at saturation in air of 23°C / 50% RH	-	%	2,8	
Meting turnstation temperature \$0.31387-1/3 °C 290	at saturation in water of 23°C	-	%	9,5	
Oynamic glass transition temperature + 180 3146 "C 75 Oynamic glass transition temperature + 180 3146 "C "C Temmal conductory Junto 2, J	THERMAL PROPERTIES (2)				
Opymanic glass transition temperature + 1 ISO 3146 "C Thermal conductively Lamida & all 22°C - W/ (6 cm) 0,300 Confidency for Image Value between 23 and 10°C - m / (7 m · K) 80 × 10° - average value between 23 and 10°C - m / (7 m · K) 90 × 10° - average value between 23 and 10°C - m / (7 m · K) Temperature of deflection under lead - - - membed A1 & BM M9 150 75 ½ 2 °C 160 ViceLE-Eventhumpstemperature - VST/R500 150 300 °C 200 ViceLE-Eventhumpstemperature - VST/R500 150 300 °C 200 - continuous/r for 5,000 / 20,000 h 14 - °C 200 - continuous/r for 5,000 / 20,000 h 14 - °C 200 - Elaminature (150) - °C 200 - seconding to 10, 94 (3 / 6 mm) - 9 / (9 k) 24 - seconding to 10, 94 (3 / 6 mm) - 9 / (9 k) 2 Eleminature series at yield / tensile stress a	Melting temperature (DSC, 10°C/min)	ISO 11357-1/-3	°C	290	
Thermal conductivity Lambda \ \(\alpha \) 23°C \ \(\text{W} \) (\(\text{W} \) \(\text{W} \) (\(\text{W} \) \(\text{W} \) (\(\text{W} \) \(\text{W}	Dynamic glass transition temperature +	ISO 3146	°C	75	
Security Conficient of linear thermal expansion	Dynamic glass transition temperature ++	ISO 3146	°C		
- average value between 23 and 50°C	Thermal conductivity Lambda λ at 23°C	-	W / (K ⋅ m)	0,300	
* average value between 23 and 100°C	Coefficient of linear thermal expansion				
*** owerage value between 23 and 150°C		-	m / (m · K)	80 x 10 ⁻⁶	
** average value between 23 and 150°C		-	m / (m · K)	90 x 10 ⁻⁶	
Temperature of deflection under load * method A. 1.8 MPa 150 75-1/2 °C 160 * (macE-travelinduspengeratur - VST/950 150 306 °C 200 * Continuously for 5,000 / 20,000 h (4) °C 150 / 130 130 / 130 Minimal sorvice temperature (5) °C 40 40 Hammability (6) *S 24 40 * - according to UL 94 (3 / 6 mm 150 4589 1/2 % 24 * - according to UL 94 (3 / 6 mm 150 4589 1/2 % 24 * - according to UL 94 (3 / 6 mm 150 4589 1/2 % 24 * - according to UL 94 (3 / 6 mm 150 4589 1/2 % 24 * - according to UL 94 (3 / 6 mm 150 527 1/2 % 105 / 6 * Specific heart capacity 5 0 527 1/2 % 105 / 5 * Facellas triess at yield / female stress at 1 seed (3 / 4 mm) \$50 527 1/2 % 105 / 5 * Facellas triess at yield / female stress at 1 seed (3 / 4 mm) \$50 527 1/2 % 18 18 * Facellas triess at yield / female stress at 1 seed (3 / 4 mm) \$50 527 1/		-	m / (m · K)		
• method A: 1,8 MPa	-				
Maximal allowable service temperature in air		ISO 75-1/-2	°C	160	
• for short periods (3)	Vicat-Erweichungstemperatur - VST/B50	ISO 306	°C		
• continously: for 5.000 / 20.000 h (4)	Maximal allowable service temperature in	air			
Minimal service temperature (5)	• for short periods (3)	-	°C	200	
Flammability (6) Ouygen-Index 150 4589-1/-2 % 24 ***according but 94 (3 / 6 mm) 150 4589-1/-2 % 148 / HB Specific heat capacity 7.	• continously: for 5.000 / 20.000 h (4)	-	°C	150 / 130	
• Oxygen-Index	Minimal service temperature (5)	-	°C	-40	
** according to UL 94 (3 / 6 mm thickness) ** according to UL 94 (3 / 6 mm thickness) ** beclific heat capacity ** Tension test (8) ** Exemise stress at yield / tensile stress at break (9) + ** tensile stress at yield / tensile stress at break (9) + ** tensile stress at yield / tensile stress at break (9) + ** tensile stress at yield / tensile stress at break (9) + ** tensile stress at yield / tensile stress at break (9) + ** tensile stress at yield / tensile stress at break (9) + ** tensile stress at yield / tensile stress at break / 9) + ** tensile stress at pried (9) + ** tensile strain at pried (9) + ** tensile strain at pried (9) + ** tensile strain at break / elongation at br	Flammability (6)				
thickness)	Oxygen-Index	ISO 4589-1/-2	%	24	
Name		-	-	HB / HB	
* tensile stress at yield / tensile stress at pield / tensile stress a	Specific heat capacity	-	J / (g · K)	2,1	
• tensile stress at yield / tensile stress at break (9) + Iso 527-1/-2 N / mm² 105 / - • tensile stress at yield / tensile stress at break (9) ++ Iso 527-1/-2 N / mm² 55 / - • tensile strength (9) + Iso 527-1/-2 N / mm² 105 • tensile strain at yield (9) + Iso 527-1/-2 % 18 • tensile strain at yield (9) + Iso 527-1/-2 % 25 / - • tensile strain at break / elongation at break (9) ++ Iso 527-1/-2 % > 100 / - • tensile strain at break / elongation at break (9) ++ Iso 527-1/-2 N / mm² 3400 • tensile modulus of elasticity (10) + Iso 527-1/-2 N / mm² 3400 • tensile modulus of elasticity (10) + Iso 527-1/-2 N / mm² 23 / 45 / 94 Iso 604 N / mm² 23 / 45 / 94 Iso 899-1 N / mm² 22 Stress to produce 1% strain (0 1/1000) Iso 899-1 N / mm² 7,50 Charpy impact strength - Unnotched (12) Iso 199-1/124 k / m² 8	MECHANICAL PROPERTIES AT 23°C (7)	233			
Standard	Tension test (8)				
break (9) ++ ISO 527-I/-2 N / mm² 105 t ensile strength (9) + ISO 527-I/-2 N / mm² 105 t ensile strain at yield (9) + ISO 527-I/-2 % 18 * tensile strain at break / elongation at break (9) + ISO 527-I/-2 % 25 / - * tensile strain at break / elongation at break (9) ++ ISO 527-I/-2 % > 100 / - * tensile modulus of elasticity (10) + ISO 527-I/-2 N / mm² 3400 * tensile modulus of elasticity (10) ++ ISO 527-I/-2 N / mm² 1350 Compression test (11) * tensile modulus of elasticity (10) ++ ISO 527-I/-2 N / mm² 3400 * tensile modulus of elasticity (10) ++ ISO 527-I/-2 N / mm² 1350 * tensile modulus of elasticity (10) ++ ISO 527-I/-2 N / mm² 23 / 45 / 94 * tensile modulus of elasticity (10) ++ ISO 604 N / mm² 22 3 / 45 / 94 * tensile modulus of elasticity (10) ++ ISO 604 N / mm² 22 3 / 45 / 94 * tensile modulus of elasticity		ISO 527-1/-2	N / mm²	105 / -	
• tensile strain at yield (9) + ISO 527-I/-2 % 18 • tensile strain at break / elongation at break (9) + ISO 527-I/-2 % 25 / - • tensile strain at break / elongation at break (9) + ISO 527-I/-2 % > 1000 / - • tensile strain at break / elongation at break (9) + ISO 527-I/-2 N / mm² 3400 • tensile modulus of elasticity (10) + ISO 527-I/-2 N / mm² 1350 Compression test (11) • tensile modulus of elasticity (10) ++ ISO 604 N / mm² 23 / 45 / 94 Compression test (12) • compression stress at 1/2/5 % nominal strain (12) + ISO 604 N / mm² 23 / 45 / 94 Creep test in tension (8) • stress to produce 1% strain (10 I/1000) ISO 899-1 N / mm² 22 stress to produce 1% strain (10 I/1000) ISO 899-1 N / mm² 7,50 Charpy impact strength - Notched ISO 179-I/LeU Is/ m² 8 Charpy impact strength - Notched ISO 11542-2 Is/ m² 8 Lood impact strength - Notched + 180/2A Is/ m² 8 <td></td> <td>ISO 527-1/-2</td> <td>N / mm²</td> <td>55 / -</td> <td></td>		ISO 527-1/-2	N / mm²	55 / -	
• tensile strain at break / elongation at break (9) + ISO 527-1/-2 % 25 / - • tensile strain at break / elongation at break (9) ++ ISO 527-1/-2 % > 100 / - • tensile modulus of elasticity (10) + ISO 527-1/-2 N / mm² 3400 • tensile modulus of elasticity (10) ++ ISO 527-1/-2 N / mm² 1350 Compression test (11) • compressive stress at 1/2/5 % nominal strain (12) + ISO 604 N / mm² 23 / 45 / 94 Creep test in tension (8) • stress to produce 1% strain ISO 899-1 N / mm² 22 stress to produce 1% strain (σ 1/1000) ISO 899-1 N / mm² 7,50 Charpy impact strength - Unnotched (12) ISO 179-1/1eU kJ / m² 8 Charpy impact strength - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, block) ISO 11542-2 kJ / m² 8 Lized impact strength - Notched + 180/2A kJ / m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² M 92 Shore hardness D (3/15 s) ISO 868	• tensile strength (9) +	ISO 527-1/-2	N / mm ²	105	
break (9) + SO 327-1/-2 % 257-1 • tensile strain at break / elongation at break (9) ++ ISO 527-1/-2 % > 100 / - • tensile modulus of elasticity (10) + ISO 527-1/-2 N / mm² 3400 • tensile modulus of elasticity (10) ++ ISO 527-1/-2 N / mm² 1350 Compressive stress at 1/2/5 % nominal striain (12) + Compressive stress at 1/2/5 % nominal striain (12) + ISO 604 N / mm² 23 / 45 / 94 Creep test in tension (8) • stress to produce 1% strain of 1/1000) ISO 899-1 N / mm² 2 • stress to produce 1% strain (0 1/1000) ISO 899-1 N / mm² 7,50 Charpy impact strength - Unnotched (12) ISO 179-1/1eV k/ m² 8 Charpy impact strength 15° V-notched, both-sided) ISO 179-1/1eA k/ m² 8 Charpy impact strength - Notched + 180/2A k/ m² 8 Izo d impact strength - Notched + 180/2A k/ m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² M 92 Shore hardness D (3/15 s) ISO 868 <td>tensile strain at yield (9) +</td> <td>ISO 527-1/-2</td> <td>%</td> <td>18</td> <td></td>	tensile strain at yield (9) +	ISO 527-1/-2	%	18	
• tensile modulus of elasticity (10) + ISO 527-1/-2 N / mm² 3400 • tensile modulus of elasticity (10) + ISO 527-1/-2 N / mm² 1350 Compression test (11) • compressive stress at 1/2/5 % nominal strain (12) + Stress to produce 1% strain (12) + Stress to produce 1% strain (12) + Stress to produce 1% strain (10) ISO 899-1 N / mm² 22 stress to produce 1% strain (α 1/1000) ISO 899-1 N / mm² 7,50 Charpy impact strength - Unnotched (12) ISO 179-1/1eU IS/ J m² no break Charpy impact strength - Notched ISO 179-1/1eA ISO 11542-2 ISO		ISO 527-1/-2	%	25 / -	
+ tensile modulus of elasticity (10) ++ ISO 527-1/-2 N / mm² 1350 Compression test (11) - compressive stress at 1/2/5 % nominal strain (12) + - compressive stress at 1/2/5 % nominal strain (12) + Creep test in tension (8) - stress to produce 1% strain (σ 1/1000) ISO 899-1 N / mm² 22 stress to produce 1% strain (σ 1/1000) ISO 899-1 N / mm² 7,50 Charpy impact strength - Unnotched (12) ISO 179-1/1eU k/ m² no break Charpy impact strength - Notched ISO 179-1/1eA k/ m² 8 Charpy impact strength (15° V-notched, both-sided) Lizod impact strength · Notched + I80/2A k/ m² 8 Izod impact strength · Notched + I80/2A k/ m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² 165 Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²		ISO 527-1/-2	%	> 100 / -	
Compression test (11) • compressive stress at 1/2/5 % nominal strain (12) + ISO 604 N / mm² 23 / 45 / 94 Creep test in tension (8) • stress to produce 1% strain ISO 899-1 N / mm² 22 stress to produce 1% strain (σ 1/1000) ISO 899-1 N / mm² 7,50 Charpy impact strenght - Unnotched (12) ISO 179-1/1eU kJ / m² 8 Charpy impact strenght - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, both-sided) ISO 11542-2 kJ / m² 8 Izod impact strength - Notched + 180/2A kJ / m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² 165 Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²	• tensile modulus of elasticity (10) +	ISO 527-1/-2	N / mm²	3400	
• compressive stress at 1/2/5 % nominal strain (12) + ISO 604 N / mm² 23 / 45 / 94 Creep test in tension (8) • stress to produce 1% strain ISO 899-1 N / mm² 22 stress to produce 1% strain (σ 1/1000) ISO 899-1 N / mm² 7,50 Charpy impact strenght - Unnotched (12) ISO 179-1/1eU kJ / m² no break Charpy impact strenght - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, both-sided) ISO 11542-2 kJ / m² 8 Izod impact strength - Notched + 180/2A kJ / m² 8 Izod impact strength - Notched + 180/2A kJ / m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² M 92 Shore hardness (134) ISO 2039-2 N / mm² M 92	• tensile modulus of elasticity (10) ++	ISO 527-1/-2	N / mm²	1350	
Strain (12) + 150 004 N / mm² 23 / 43 / 34 / 34 Creep test in tension (8) • stress to produce 1% strain (σ 1/1000) ISO 899-1 N / mm² 7,50 Charpy impact strenght - Unnotched (12) ISO 179-1/1eU kJ / m² no break Charpy impact strength - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, both-sided) ISO 11542-2 kJ / m² 8 Izod impact strength - Notched + 180/2A kJ / m² 8 Izod impact strength - Notched ++ 180/2A kJ / m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² 165 Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²	Compression test (11)				
• stress to produce 1% strain		ISO 604	N / mm²	23 / 45 / 94	
stress to produce 1% strain (σ 1/1000) ISO 899-1 N / mm² 7,50 Charpy impact strenght - Unnotched (12) ISO 179-1/1eU kJ / m² no break Charpy impact strenght - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, both-sided) ISO 11542-2 kJ / m² 8 Izod impact strength - Notched + 180/2A kJ / m² 8 Izod impact strength - Notched ++ 180/2A kJ / m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² 165 Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²	Creep test in tension (8)				
Charpy impact strenght - Unnotched (12) ISO 179-1/1eU kJ / m² no break Charpy impact strength - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, both-sided) ISO 11542-2 kJ / m² Izod impact strength - Notched + 180/2A kJ / m² 8 Izod impact strength - Notched ++ 180/2A kJ / m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² 165 Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²	• stress to produce 1% strain	ISO 899-1	N / mm²	22	
Charpy impact strength - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, both-sided) ISO 11542-2 kJ / m² Izod impact strength - Notched + 180/2A kJ / m² 8 Izod impact strength - Notched ++ 180/2A kJ / m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² 165 Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²	stress to produce 1% strain (σ 1/1000)	ISO 899-1	N / mm²	7,50	
Charpy impact strength (15° V-notched, both-sided) ISO 11542-2 kJ / m² Izod impact strength - Notched + 180/2A kJ / m² 8 Izod impact strength - Notched ++ 180/2A kJ / m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² 165 Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²	Charpy impact strenght - Unnotched (12)	ISO 179-1/1eU	kJ / m²	no break	
both-sided)	Charpy impact strenght - Notched	ISO 179-1/1eA	kJ / m²	8	
Izod impact strength - Notched ++ 180/2A kJ / m² 25,00 Ball intentation hardness (13) 2039-1 N / mm² 165 Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²		ISO 11542-2	kJ / m²		
Ball intentation hardness (13) 2039-1 N / mm² 165 Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²	Izod impact strength - Notched +	180/2A	kJ / m²	8	
Rockwell hardness (134) ISO 2039-2 N / mm² M 92 Shore hardness D (3 / 15 s) ISO 868 N / mm²	Izod impact strength - Notched ++	180/2A	kJ / m²	25,00	
Shore hardness D (3 / 15 s) ISO 868 N / mm ²	Ball intentation hardness (13)	2039-1	N / mm²	165	
	Rockwell hardness (134)	ISO 2039-2	N / mm²	M 92	
Coefficient of sliding friction m (14) - 0,4 - 0,6	Shore hardness D (3 / 15 s)	ISO 868	N / mm²		
	Coefficient of sliding friction m (14)	-	-	0,4 - 0,6	



Sliding wear method O (14)

μ/km

μ/km

18

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ELECTRICAL PROPERTIES AT 23°C Electric strength (15) Electric strength (15) ++				
	IEC 60243-1	kV / mm	25	
LICCUIC SUCHULI (13) TT	IEC 60243-1	kV / mm	15,00	
Volume resistivity +	IEC 60093	Ω·cm	> 10 ¹⁴	
Volume resistivity ++	IEC 60093	$\Omega \cdot cm$	> 1012	
Surface resistivity +	IEC 60093	Ω	> 10 ¹³	
Surface resistivity ++	IEC 60093	Ω	> 10 ¹²	
Relative permittivity ε		-	- 20	
• at 100 Hz +	IEC 60250	-	3,80	
• at 100 Hz ++	IEC 60250	-	7,40	
• at 1 MHz +	IEC 60250	-	3,4	
• at 1 MHz ++	IEC 60250	-	3,80	
Dielectric dissipation factor tan Delta δ			-/	
• at 100 Hz +	IEC 60250	-	0,0090	
• at 100 Hz ++	IEC 60250	-	0,1300	
• at 1 MHz +	IEC 60250	-	0,019	
• at 1 MHz ++	IEC 60250	-	0,0600	
Comparative tracking index (CTI) +	IEC 60112	-	400	
Comparative tracking index (CTI) ++	IEC 60112	-	400	



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)