

Selection of control private productions of the Control of Contro	Properties	Test methods	Units	Values	
	Productname	-	-	Semitron® ESd 225*	
Part	Color	-		beige	
Martin M		-	10 ⁶ g / mol		
Name	• '	150 1102 1	-	1 220	
Section Sect	•	150 1183-1	g / cm²	1,330	
Section Sect	• •				
23°C (1)	23°C (1)	ISO 62	mg	392 / 705	
Section 19		ISO 62	%	5 / 9	
Method Sender 15 (2)	at saturation in air of 23°C / 50% RH	-			
Method preparature (DSC, 10°Cmin)	at saturation in water of 23°C	-	%	10	
	THERMAL PROPERTIES (2)				
Promotic glass transition temperature + 180 3146 "C "C "W / K" m" 0,300					
Thermain Conductivity Lambda & at 23°C				-60	
**************************************		ISO 3146			
• average value between 23 and 60°C	,	-	W / (K ⋅ m)	0,300	
* average value between 23 and 100 °C				150 -05	
** severage value between 23 and 150°C	•				
Temperature of deflection under load * method & 1,13 MPs 150 75-1/-2 °C 88 ***Maximal allowable service temperature is is 100 306 °C °C 140 ***Maximal allowable service temperature is is 100 306 °C °C 140 ***Inching service temperature (S) °C °C °C °C °C °C °C °				150 x 10 ⁻⁶	
method & 1,8 Mp ISO 75-1/2 *C 88 Micele Freechungstemperatur - VST/RSD RSD 306 *C Maximal allowables service temperature in air *C 140 - confinosity: for 5.000 / 20.000 h (4) *C 140 - confinitial service temperature (5) *C *C *190 Elammality (6) *C *50 *50 Elammality (8) *C *M < 20 Elammality (8) *C *M *M Elammality (8) *C *M *M Elammality (8) *SO 527-1/2 *N *Mm* *SOS 7/38 Energie (8) + ** *SO 527-1/2 *N *Mm* *SO 527-1/2 *M * tensile strain at view (9) + ** *SO 527-1/2 *N *M *SO 527-1/2 *M <t< td=""><td>•</td><td>-</td><td>m / (m · K)</td><td></td><td></td></t<>	•	-	m / (m · K)		
So 306 *C		100 == - : -		20	
**************************************	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			88	
• for short periods (3)	• ,		°C		
**Continually: for 5.000 / 20.000 h (4)			0.0	140	
Alminal service temperature (5)					

• Oxygen-Index	•	-		-50	
* according to UIL 94 (3 / 6 mm thickness) - 1/(g · K) ***EXECTANICAL PROPERTIES AT 23'C (7) ****EXECTANICAL PROPERTIES AT 23'C (7) ****Ensile stress at yield / tensile stress at book provided (1 months) in the stress at yield / tensile stress at book provided (1 months) in the stress at yield / tensile stress at book provided (1 months) in the stress at yield / tensile stress at book provided (1 months) in the stress at yield / tensile stress at book provided (1 months) in the stress at yield / tensile stress at book provided (1 months) in the stress (2 months) in the stress (3 months) in the stress (4 months		ISO 4589-1/-2	9/6	< 20	
	according to UL 94 (3 / 6 mm	-	-		
No.			1/(a . K)		
Formation test (8) b. tensile stress at yield / tensile stress at pick / tensile stress at yield / tensile strength (9) + SO 527-1/-2 N / mm² 38 • tensile strength (9) + ISO 527-1/-2 % 15/ > 25 • tensile strain at yield (9) + ISO 527-1/-2 % 15/ > 25 • tensile strain at break / elongation at break / elongation at break (9) + ISO 527-1/-2 % 15/ > 25 • tensile strain at break / elongation at break / elongation at break (9) + ISO 527-1/-2 % 15/ > 25 • tensile modulus of elasticity (10) + ISO 527-1/-2 N / mm² 1500 • tensile modulus of elasticity (10) + ISO 527-1/-2 N / mm² 1500 • tensile modulus of elasticity (10) + ISO 527-1/-2 N / mm² 150, 150 • tensile strain at break / elongation at break (9) + ISO 604 N / mm² 150, 150 • tensile strain at break / elongation at break (9) + ISO 604 N / mm² 150, 150 • tensile strain at break / elongation at break (9) + ISO 604 N / mm²		. 64) / (g · k)		
So 527-1/-2					
So 227-1/2 N / mm² So 27-1/2					
break (9) ++ ISO 527-If-2 N / mm² 38 • tensile strain at yield (9) + ISO 527-If-2 % 15 /> 25 • tensile strain at yield (9) + ISO 527-If-2 % 15 /> 25 • tensile strain at break / elongation at break / elongation at break (9) ++ ISO 527-If-2 % 15 /> 25 • tensile strain at break / elongation at break / elongation at break (9) ++ ISO 527-If-2 N / mm² 1500 • tensile modulus of elasticity (10) + ISO 527-If-2 N / mm² 1500 • tensile modulus of elasticity (10) ++ ISO 527-If-2 N / mm² 1500 • tensile modulus of elasticity (10) ++ ISO 527-If-2 N / mm² 12,5 / 22 /- Compression test (11) • compressive stress at 1/2/5 % nominal strain (12) + ISO 604 N / mm² 12,5 / 22 /- • treep test in tension (8) • stress to produce 1% strain (a 1/1000) ISO 899-1 N / mm² 12,5 / 22 /- • stress to produce 1% strain (a 1/1000) ISO 899-1 N / mm² • Br. • Br. • charpy impact strength - Notched (12) ISO 179-1/12eA Is/ Jm² 8 • Br. • char	break (9) +		<u>'</u>	USP / 38	
tensile strain at yield (9) + 150 527-1/-2 % tensile strain at break / elongation at e	break (9) ++				
So 527-1/-2 % 15 / > 25				38	
break (9) + 150 327-17-2 % 157 23 • tensile strain at break / elongation at break (9) ++ 150 527-17-2 % • tensile modulus of elasticity (10) + 150 527-17-2 N / mm² 1500 • tensile modulus of elasticity (10) ++ 150 527-17-2 N / mm² 1500 • tensile modulus of elasticity (10) ++ 150 527-17-2 N / mm² 12.5 / 22 / - • tensile modulus of elasticity (10) ++ 150 604 N / mm² 12.5 / 22 / - • tensile modulus of elasticity (10) ++ 150 604 N / mm² 12.5 / 22 / - • tensile modulus of elasticity (10) ++ 150 604 N / mm² 12.5 / 22 / - • tensile modulus of elasticity (10) ++ 150 604 N / mm² 12.5 / 22 / - • tensile modulus of elasticity (10) ++ 150 604 N / mm² 12.5 / 22 / - • tensile modulus of elasticity (10) ++ 150 604 N / mm² 0 . Br. • tensile modulus of elasticity (10) ++ 150 89-1 N / m² 8 • tensile modulus of elasticity (10) ++ 150 89-1 N / m² 8 • tensile modulus of elasticity (10) ++ 150 80 79-1<		ISO 527-1/-2	%		
+ tensile modulus of elasticity (10) + 150 527-1/-2 N / mm² 1500 + tensile modulus of elasticity (10) + 150 527-1/-2 N / mm² - tensile modulus of elasticity (10) + 150 527-1/-2 N / mm² - compression test (11) - compression test (11) - compression test in tension (8) - stress to produce 1% strain 150 899-1 N / mm² - stress to produce 1% strain (11000) 150 899-1 N / mm² - stress to produce 1% strain (11000) 150 899-1 N / mm² - charpy impact strength - Unnotched (12) 150 179-1/1eU K / m² - charpy impact strength - Notched 150 179-1/1eA K / m² - charpy impact strength (15° V-notched, 150 11542-2 K / m² - cod impact strength - Notched + 180/2A K / m² - cod		ISO 527-1/-2	%	15 / > 25	
+ tensile modulus of elasticity (10) ++ ISO 527-1/-2 N / mm² Compression test (11) - 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 Charpy impact strength - Unnotched (12) ISO 179-1/1eU k / m² Charpy impact strength - Notched ISO 179-1/1eA k / m² Charpy impact strength (15° V-notched, obth-sided) ISO 150 1542-2 k / m² and impact strength - Notched + 180/2A k / m² and impact strength - Notched ++ 180/2A k / m² cod impact strength - Notched ++ 180/2A k /		ISO 527-1/-2	%		
** compressive stress at 1/2/5 % nominal strain (12) +	• tensile modulus of elasticity (10) +	ISO 527-1/-2	N / mm²	1500	
* compressive stress at 1/2/5 % nominal strain (12) + Creep test in tension (8) * stress to produce 1% strain	• tensile modulus of elasticity (10) ++	ISO 527-1/-2	N / mm²		
Strain (12) + 150 004 N / mm² Creep test in tension (8) • stress to produce 1% strain ISO 899-1 N / mm² Stress to produce 1% strain (\alpha 1/1000) ISO 899-1 N / mm² 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, oth-sided) ISO 11542-2 kJ / m² 8 Zod impact strength - Notched + 180/2A kJ / m² 2 Zod impact strength - Notched ++ 180/2A kJ / m² 70 Rockwell hardness (13) 2039-1 N / mm² R 106 Rockwell hardness (134) ISO 2039-2 N / mm² R 106 Shore hardness D (3/15 s) ISO 868 N / mm²	Compression test (11)				
* stress to produce 1% strain ISO 899-1 N / mm² * stress to produce 1% strain (\(\sigma\) 1/1000) ISO 899-1 N / mm² * Charpy impact strength - Unnotched (12) ISO 179-1/1eU K / m² 0. Br. * Charpy impact strength - Notched ISO 179-1/1eA K / m² 8 * Charpy impact strength (15° V-notched, obth-sided) ISO 11542-2 K / m² * Sod impact strength - Notched + 180/2A K / m² * Sod impact strength - Notched ++ 180/2A K / m² * Sod impact		ISO 604	N / mm²	12,5 / 22 / -	
stress to produce 1% strain (σ 1/1000) ISO 899-1 N / mm² Charpy impact strength - Unnotched (12) ISO 179-1/1eU kJ / m² o. Br. Charpy impact strength - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, noth-sided) ISO 11542-2 kJ / m² 20d impact strength - Notched + 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength - Notched ++ 180/2A kJ / m² 20d impact strength	Creep test in tension (8)				
Charpy impact strenght - Unnotched (12) ISO 179-1/1eU kJ / m² o. Br. Charpy impact strenght - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, ISO 11542-2 kJ / m² zod impact strength - Notched + 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² Sall intentation hardness (13) 2039-1 N / mm² 70 Rockwell hardness (134) ISO 2039-2 N / mm² R 106 Shore hardness D (3 / 15 s) ISO 868 N / mm²	stress to produce 1% strain	ISO 899-1	N / mm²		
Charpy impact strength - Notched ISO 179-1/1eA kJ / m² 8 Charpy impact strength (15° V-notched, ISO 11542-2 kJ / m² zod impact strength - Notched + 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 180/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched +- 280/2A kJ / m² zod impact strength - Notched 280/2A kJ / m² zod impact strength - Notched 280/2A kJ / m² zod impact strength - Notched 280/2A kJ / m² zod impact strengt	stress to produce 1% strain (σ 1/1000)	ISO 899-1	N / mm²		
Charpy impact strength (15° V-notched, volth-sided) ISO 11542-2 kJ / m² zod impact strength - Notched + 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² Sall intentation hardness (13) 2039-1 N / mm² 70 Rockwell hardness (134) ISO 2039-2 N / mm² R 106 Shore hardness D (3 / 15 s) ISO 868 N / mm²	Charpy impact strenght - Unnotched (12)	ISO 179-1/1eU	kJ / m²	o. Br.	
SO 11342-2 KJ / III	Charpy impact strenght - Notched	ISO 179-1/1eA	kJ / m²	8	
zod impact strength - Notched + 180/2A kJ / m² zod impact strength - Notched ++ 180/2A kJ / m² Ball intentation hardness (13) 2039-1 N / mm² 70 Rockwell hardness (134) ISO 2039-2 N / mm² R 106 Shore hardness D (3 / 15 s) ISO 868 N / mm²		ISO 11542-2	kJ / m²		
zod impact strength - Notched ++ 180/2A kJ / m² Sall intentation hardness (13) 2039-1 N / mm² 70 Rockwell hardness (134) ISO 2039-2 N / mm² R 106 Shore hardness D (3 / 15 s) ISO 868 N / mm²		180/2A	kJ / m²		
Ball intentation hardness (13) 2039-1 N / mm² 70 Rockwell hardness (134) ISO 2039-2 N / mm² R 106 Shore hardness D (3 / 15 s) ISO 868 N / mm²					
Rockwell hardness (134) ISO 2039-2 N / mm² R 106 Shore hardness D (3 / 15 s) ISO 868 N / mm²				70	
Shore hardness D (3 / 15 s) ISO 868 N / mm ²					
DEDUCED IN SUBJECT OF 1001 (0.114)				0,18	



Sliding wear method Q (14) - µ / km
Sliding wear method Q (14) - µ / km





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	$\Omega \cdot cm$	10 ⁹ - 10 ¹¹
Volume resistivity ++	IEC 60093	$\Omega \cdot cm$	
Surface resistivity +	IEC 60093	Ω	10 ⁹ - 10 ¹¹
surface resistivity ++	IEC 60093	Ω	
Relative permittivity ε			
• at 100 Hz +	IEC 60250	-	
• at 100 Hz ++	IEC 60250	-	
• at 1 MHz +	IEC 60250	-	
• at 1 MHz ++	IEC 60250	-	
Dielectric dissipation factor tan Delta δ			
• at 100 Hz +	IEC 60250	<u>-</u>	
• at 100 Hz ++	IEC 60250	-	
• at 1 MHz +	IEC 60250	-	
• at 1 MHz ++	IEC 60250	-	
Comparative tracking index (CTI) +	IEC 60112	-	
Comparative tracking index (CTI) ++	IEC 60112	<u>-</u>	



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)

^{*} This material is a registered trademark of Mitsubishi Chemical Advanced Materials