

Material: ZX-410VMT

EN 1.0

Properties	Symbol	Unit	Standard	Value
Information				
Material code	-	-	Internal Standard	106
Colour	-	-	-	Black
Density	ρ	kg/dm ³	ISO 1183	1,48
Mechanical				
Compressive modulus	E_c	MPa	DIN EN ISO 604	-
Elastic limit	σ_{el}	MPa	Internal Standard	79
Compressive stress at yield	σ_y	MPa	DIN EN ISO 604	-
Compressive strength	σ_M	MPa	DIN EN ISO 604	108
Compressive stress at 3,5% strain	$\sigma_{3,5\%}$	MPa	DIN EN ISO 604	66
Compressive strength (0,01 h)	σ_M	MPa	Internal Standard	-
Compressive strength (100 h)	σ_M	MPa	Internal Standard	-
Compressive strength (10000 h)	σ_M	MPa	Internal Standard	-
Compressive stress at break	σ_B	MPa	DIN EN ISO 604	103
Elastic compression limit	ϵ_{el}	%	Internal Standard	4,35
Nominal compressive yield strain	ϵ_{cy}	%	DIN EN ISO 604	-
Nominal compressive strain at compressive strength	ϵ_{cM}	%	DIN EN ISO 604	23,8
Nominal compressive strain at break	ϵ_{cB}	%	DIN EN ISO 604	25,7
Modulus in tension (tensile modulus)	E_t	MPa	DIN EN ISO 527	9900
Elastic limit	σ_{el}	MPa	Internal Standard	-
Tensile stress at yield	σ_y	MPa	DIN EN ISO 527	-
Tensile strength	σ_M	MPa	DIN EN ISO 527	-
Tensile stress at break	σ_B	MPa	DIN EN ISO 527	105
Elastic yield point	ϵ_{el}	%	Internal Standard	-
Yield strain	ϵ_y	%	DIN EN ISO 527	-
Elongation at maximum force	ϵ_M	%	DIN EN ISO 527	-
Tensile elongation at break	ϵ_B	%	DIN EN ISO 527	1,3
Modulus in flexure	E_f	MPa	DIN EN ISO 178	7000
Outer fibre stress at 3,5% outer fibre strain	$\sigma_{f3,5}$	MPa	DIN EN ISO 178	-
Flexural strength	σ_{fM}	MPa	DIN EN ISO 178	-
Flexural stress at break	σ_{fB}	MPa	DIN EN ISO 178	-
Elongation at flexural yield stress	ϵ_M	%	DIN EN ISO 178	-
Flexural elongation at break	ϵ_B	%	DIN EN ISO 178	-
Creep modulus at 1% deformation after 1000h	E	N/mm ²	DIN 53444	-
Stress at 1% deformation after 1000h	$\sigma_{1\%}$	N/mm ²	DIN 53444	-
Creep resistance	-	-	Relative value	-
Ball indentation hardness H358/30 (H132/30) [H49/30]	HB	N/mm ²	DIN 2039	180
Shore A hardness	-	Shore	DIN 53505	>103
Shore D hardness	-	Shore	DIN 53505	84,2
Impact strength Charpy not notched	-	kJ/m ²	EN ISO 179/1eU	19
Impact strength Charpy notched	-	kJ/m ²	EN ISO 179/1eA	4,5
Loss tangent (1Hz)	$\tan\delta$	1	Internal Standard	0,1
Fatigue strength at 20°C, 106 stress cycles, 1 Hz	-	MPa	Internal Standard	-
Thermal				
Continuous operating temperature (long term)	RTi	°C	UL 746B	-
Short term operating temperature (3 h)	-	°C	Internal Standard	-
Maximum RTi temperature for bushings when pressed	-	°C	Internal Standard	150
Melting temperature	T_m	°C	DSC	390
Glass transition temperature	T_g	°C	DSC	225
Coefficient of thermal expansion up to 100°C	α	10 ⁻⁵ /K	ISO E 830	4
Coefficient of thermal expansion up to 150°C	α	10 ⁻⁵ /K	ISO E 831	4,1
Heat distortion temperature HDT/A 1,8 MPa	HDT(A)	°C	DIN EN ISO 75	220
Thermal conductivity	λ	W/(m*K)	DIN 52612	-
Specific heat capacity	c_p	kJ/(kg*K)	DSC	-
Fire behaviour (3,2mm) UL94	-	-	UL 94 HB	V-0
Limiting oxygen index (LOI)	%	LOI	DIN EN ISO 4589	-

Properties	Symbol	Unit	Standard	Value
Electrical				
Volume resistivity	R_D	$\Omega \cdot \text{cm}$	IEC 60093	8500
Surface resistance	R_C	Ω	IEC 60093	4E03
Penetration resistance	E	kV/mm	IEC 243	8
Tracking resistance	-	V	IEC 112	-
Dielectric constant (110Hz)	-	1	IEC 250	-
Dissipation factor (110Hz)	$\tan\delta$	1	IEC 112	-
PV values				
Max. surface pressure v=1m/min	p_{zul}	N/mm ²	Internal test radial bushing	9,03
Max. surface pressure v=10m/min	p_{zul}	N/mm ²		4,90
Max. surface pressure v=100m/min	p_{zul}	N/mm ²		0,20
Max. surface pressure v=200m/min	p_{zul}	N/mm ²		0,10
Evolution of heat with v=1m/min	-	°C		57
Evolution of heat with v=10m/min	-	°C		132
Evolution of heat with v=100m/min	-	°C		165
Evolution of heat with v=200m/min	-	°C		131
Friction				
μ static 20° C dry operation	μ_{stat}	1	Internal Standard inclined plane	0,24
μ dynamic 20° C dry operation	μ_{dyn}	1		0,14
μ dynamic 100° C dry operation	μ_{dyn}	1		0,16
Wear				
Wear factor at 20°C	-	mm/100 km	Internal test periodic transla-tive movement under load	0,09
Wear factor at 100°C	-	mm/100 km		0,02
Wear factor at 200°C	-	mm/100 km		0,13
Wear factor at 240°C	-	mm/100 km		-
Available as				
Tubes (hollow rods) up to ϕ (de)	-	-	-	-
Sheets up to max. thickness	-	-	-	-
Rods up to ϕ (de)	-	-	-	-
Plastic granules	-	-	-	✓
Injection moulded parts	-	-	-	✓
Machined parts	-	-	-	✓
Precision				
Dimensional stability with moisture absorption	-	-	Relative value	-
Water absorption 23°C / RMC 93%	-	%	DIN EN ISO 62	1,5
Water absorption until an equilibrium moisture content	-	%	DIN EN ISO 62	0,5
Dimensional stability with temperature variation	-	-	Relative value	⊗
High precision bushings (negative clearance)	-	-	-	-
Alignment adjustment	-	-	Relative value	-
Environmental influences				
Suitable for use in water	-	-	-	-
Resistance against hot water	-	°C	-	-
Resistance against dust, dirt, abrasive substances	-	-	Relative value	-
UV rays resistance	-	-	Relative value	-
Suitable for outdoor use	-	-	Relative value	-
Resistance to chemicals	-	-	Relative value	-
FDA compliant	-	-	-	-
Suitable for vacuum	-	-	-	-
Rate of desorption	a_{in}	mbar*1/(s/cm ²)	-	-
ROHS / WEEE	-	-	-	-
Free from silicone	-	-	-	✓
Free from PTFE	-	-	-	x
Sterilization				
Resistant against disinfectant	-	-	-	-
Moist heat sterilization	-	-	Relative value	-
Gamma-rays radiation sterilization	-	-	Relative value	-
Chemical sterilization	-	-	Relative value	-
UV-sterilization	-	-	Relative value	-



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Legal Information

All the tests are been made with a standard conditioning atmosphere of 23°C (at the moment no other temperature is available). The specified values are established from average values of several tests and they correspond to our today's knowledge. They are only to be used as information about our products and as help for the material selection. With these values, we do not ensure specific properties, or the suitability for certain application, therefore we do not assume any legal responsibility for an improper usage. The used test pieces have been machined from extruded semi-finished material. Since the plastics' properties depend on the manufacturing process (extrusion, injection moulding), on the dimensions of the semi finished material and on the degree of crystallinity, the actual properties of a specific product may slightly deviate from the tested ones. For information about divergent properties do not hesitate to contact us. On request we advise you regarding the most appropriate component design and the definition of material specifications more suitable to your application data. Notwithstanding, the customer bears all the responsibility for the thorough examination of suitability, efficiency, efficacy and safety of the chosen products in pharmaceutical applications, medical devices or other end uses.

Legend

- Ⓛ Low
- Ⓜ High
- ✓ Applicable
- x Not applicable
- (✓) Limited
- k.Br. No break
- n.d. Not feasible
- Not determined
- n.v. Non-existent