

MATERIAL DATASHEET

ZX-410



ZEDEX®
Tribological Polymer Solutions

Properties	Symbol	Unit	Standard
information			
material code	-	-	internal Standard A4A
colour	-	-	Gelb
density	ρ	kg/dm ³	ISO 1183 1,33
mechanical			
compressive modulus	E _c	MPa	DIN EN ISO 604 4700
elastic limit	σ_{yel}	MPa	internal Standard 111
compressive stress at yield	σ_{cy}	MPa	DIN EN ISO 604 142
compressive strength	σ_{cm}	MPa	DIN EN ISO 604 n.v.
compressive stress at 1% strain	$\sigma_{1\%}$	MPa	DIN EN ISO 604 -
compressive stress at 2% strain	$\sigma_{2\%}$	MPa	DIN EN ISO 604 -
compressive stress at 3,5% strain	$\sigma_{3,5\%}$	MPa	DIN EN ISO 604 135
compressive strength (0,01 h)	$\sigma_{M0,01}$	MPa	internal Standard 119
compressive strength (100 h)	σ_{M100}	MPa	internal Standard 99
compressive strength (10000 h)	σ_{M10000}	MPa	internal Standard 54
compressive stress at break	σ_{mb}	MPa	DIN EN ISO 604 k.Br.
elastic compression limit	ϵ_{yel}	%	internal Standard 1,8
nominal compressive yield strain	ϵ_{cy}	%	DIN EN ISO 604 2,7
nominal compressive strain at compressive strength	ϵ_{cm}	%	DIN EN ISO 604 n.v.
nominal compressive strain at break	ϵ_{cb}	%	DIN EN ISO 604 k.Br.
modulus in tension (tensile modulus)	E _t	MPa	DIN EN ISO 527 3368
elastic limit	σ_{yel}	MPa	internal Standard 71
tensile stress at yield	σ_y	MPa	DIN EN ISO 527 101
tensile strength	σ_m	MPa	DIN EN ISO 527 101
tensile stress at break	σ_b	MPa	DIN EN ISO 527 82
elastic yield point	ϵ_{yel}	%	internal Standard 1,5
yield strain	ϵ_y	%	DIN EN ISO 527 5,5
elongation at maximum force	ϵ_m	%	DIN EN ISO 527 5,5
tensile elongation at break	ϵ_b	%	DIN EN ISO 527 25
modulus in flexure	E _f	MPa	DIN EN ISO 178 2900
outer fibre stress at 3,5% outer fibre strain	$\sigma_{f3,5\%}$	MPa	
flexural strength	σ_{fm}	MPa	
flexural stress at break	σ_{fb}	MPa	
elongation at flexural yield stress	ϵ_{fm}	%	
flexural elongation at break	ϵ_{fb}	%	k.Br.
creep modulus at 1% deformation after 1000h	E	N/mm ²	DIN 53444 4015
stress at 1% deformation after 1000h	$\sigma_{1\%}$	N/mm ²	DIN 53444 40
creep resistance	-	-	relative value ①
ball indentation hardness H358/30 (H132/30) [H49/30]	HB	N/mm ²	DIN 2039 159
Shore A hardness	-	Shore	DIN 53505 98
Shore D hardness	-	Shore	
impact strength Charpy not notched	-	kJ/m ²	EN ISO 179/1eU k.Br.
impact strength Charpy notched	-	kJ/m ²	EN ISO 179/1eA 13,4
loss tangent (1Hz)	tan δ	1	internal Standard 0,055
fatigue strength at 20°C, 106 stress cycles, 1 Hz	-	MPa	internal Standard 33
thermal			
continuous operating temperature (long term)	RTi	°C	UL 746B 180
short term operating temperature (3 h)	-	°C	internal Standard 200
maximum RTi temperature for bushings when pressed	-	°C	internal Standard 150
melting temperature (DSC, 10°C/min)	T _m	°C	ISO 11357-1/-3 320
glass transition temperature (DSC, 20°C/min)	T _g	°C	ISO 11357-1/-2 210
coefficient of thermal expansion up to 100°C	α	10 ⁻⁵ /K	ISO E 830 4,0
coefficient of thermal expansion up to 150°C	α	10 ⁻⁵ /K	ISO E 831 5,8
heat distortion temperature HDT/A 1,8 MPa	HDT(A)	°C	DIN EN ISO 75 195
thermal conductivity	λ	W/(m·K)	DIN 52612 0,25
specific heat capacity	c _p	kJ/(kg·K)	DSC 1,85
fire behaviour (0,38-3,0mm)	-	-	UL 94 V-0
limiting oxygen index (LOI)	%	LOI	DIN EN ISO 4589 47

Properties	Symbol	Unit	Standard	
electrical				
volume resistivity	R _D	Ω*cm	IEC 93	>10E15
surface resistance	R _S	Ω	IEC 93	>10E15
penetration resistance	E	kV/mm	IEC 243	30
tracking resistance	-	V	IEC 112	150
dielectric constant (110Hz)	-	1	IEC 250	3,15
dissipation factor (110Hz)	tanδ	1	IEC 112	0,0005
PV values				
max. surface pressure v=1m/min	p _{sd}	N/mm²	"internal test radial bushing "	38,63
max. surface pressure v=10m/min	p _{sd}	N/mm²		9,80
max. surface pressure v=100m/min	p _{sd}	N/mm²		0,33
max. surface pressure v=200m/min	p _{sd}	N/mm²		0,04
evolution of heat with v=1m/min	-	°C		36
evolution of heat with v=10m/min	-	°C		35
evolution of heat with v=100m/min	-	°C		45
evolution of heat with v=200m/min	-	°C		85
friction				
μ static 20° C dry operation	μ _{stat.}	1	internal Standard inclined plane	0,2
μ dynamic 20° C dry operation	μ _{dyn.}	1		0,16
μ dynamic 100° C dry operation	μ _{dyn.}	1		0,23
wear				
wear factor at 20°C	-	mm³/100km	"internal test periodic translative movement under load"	0,23
wear factor at 100°C	-	mm³/100km		0,33
wear factor at 200°C	-	mm³/100km		0,30
wear factor at 240°C	-	mm³/100km		1,49
available as				
tubes (hollow rods) up to øe (de)	-	mm	-	✓
sheets up to max. thickness	-	mm	-	✓
rods up to øe (de)	-	mm	-	✓
plastic granules	-	-	-	✓
injection moulded parts	-	-	-	✓
machined parts	-	-	-	✓
precision				
dimensional stability with moisture absorption	-	-	relative value	①
water absorption 23°C / RMC 93%	-	%	DIN EN ISO 62	0,6
water absorption until an equilibrium moisture content	-	%	DIN EN ISO 62	1,4
dimensional stability with temperature variation	-	-	relative value	②
high precision bushings (negative clearance)	-	-	-	✓
alignment adjustment	-	-	relative value	③
envrionmental influences				
suitable for use in water	-	-	-	x
resistance against hot water	-	°C	-	125
resistance against dust, dirt, abrasive substances	-	-	relative value	④
UV rays resistance	-	-	relative value	⑤
suitable for outdoor use	-	-	relative value	⑥
resistance to chemicals	-	-	relative value	⑦
FDA compliant / EU 10/2011 compliant	-	-	-	-
suitable for vacuum	-	-	-	x
rate of desorption	a _{1h}	mbar"/(l/s/cm²)	-	-
ROHS / WEEE	-	-	-	✓
free from silicone	-	-	-	✓
free from PTFE	-	-	-	x
sterilization				
resistant against disinfectant	-	-	-	✓
moist heat sterilization	-	-	relative value	⑧
gamma-rays radiation sterilization	-	-	relative value	⑨
chemical sterilization	-	-	relative value	⑩
UV-sterilization	-	-	relative value	⑪

Legend	
①	low
⑪	high
✓	applicable
x	not applicable
(✓)	limited
k.Br.	no break
n.d.	not feasible
-	not determined
n.v.	non-existent

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.