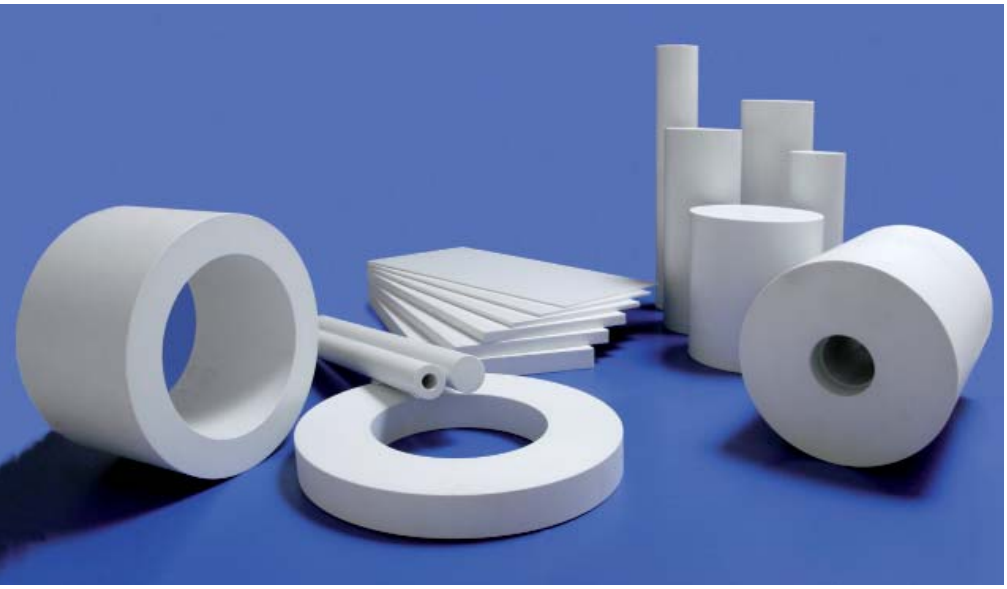
ZEDEX®

Tribological Polymer Solutions



Semi-finished products
Plastic granules
Special compounds

EN 09/10

Index

ZEDEX® basic types

The ZEDEX® materials are located in families with the same material basis. For each basic type are also other special modified types available.

Nomenclature

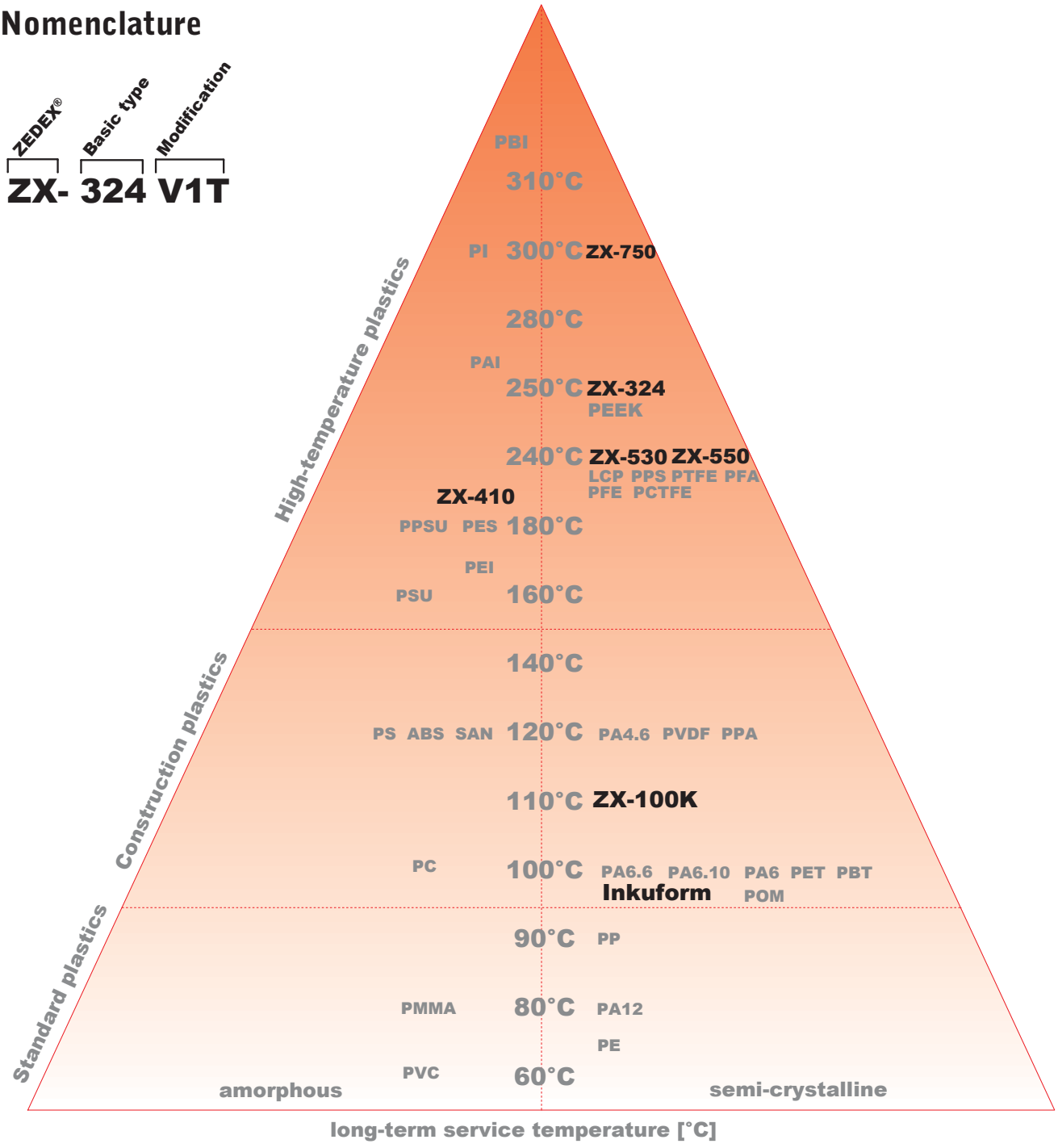


Figure 1: long-term service temperature of the ZEDEX® basic types

Thermal limitation usage of ZEDEX® materials

All plastics react to temperature variations with strong mateiral´s proprieties modification. Up to the glass transition temperature, the characteristics variation is relative low. Over the glass transition temperature, proprieties variations should be considered. A 20 % overstepping of the glass transition temperature could involve a reduction of 80% of the characteristics. At this point the material´s characteristics, determined at 20 °C, are not longer valid.

Continuous service temperature (long term)

...or UL 746B Relative Temperature Index (RTI) represents a material characteristic. It dipends on the thermoxidative stability of the polymer. During a long-term overstepping, the plastic reacts with severe properties modification, as e.g. colour change, and embrittlement to the complete chain destruction. This happens even without the action of factors as, e.g. pressure, friction, chemicals.

Glass transition temperature

...is the temperature, at which the amorphous structures of the polymers lose their stability. The mechanical characteristics of the amorphous polymers have a strong decay. Whereas the crystalline structure of the semi-crystalline polymers has still got interconnections. If the temperature increases again, the crystalline structures lose their strong interconnections and the characteristics strong decay.

Short term service temperature

...may be temporarily admitted, however an early characteristics changes has to be expected. The time length depends on the operating conditions (e.g. atmosphere) and it lasts from 3 to max. 100 hours.

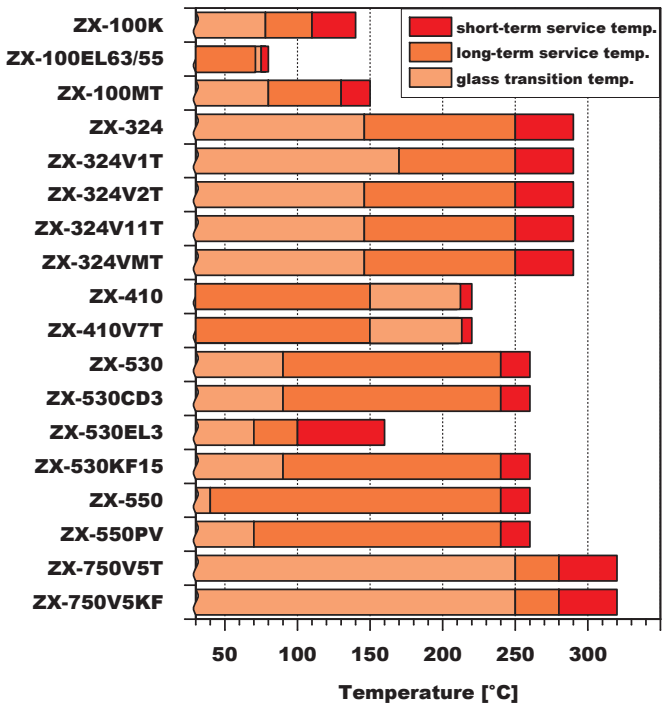


Figure 2: temperature limit use of the ZEDEX® plastics

Characteristics of the ZEDEX® basic types

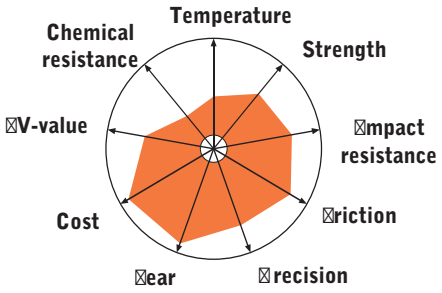
Spider diagram

To describe a plastic without images or numbers is difficult. A method for a good rapresentation is the spider diagram. On the circumference lie always the characteristics and the arrows show the quality of these characteristics. The more the arrow outward-filled is, the better the characteristic is. For example, the strength: the more the arrow outward-filled is, the better (higher) the strength is. **About the costs, a wide-outward-filled arrow rapresents a positive cost, therefore a low cost.**

Allround-material

Materials with balanced characteristics are Allround-materials. The ZX-100K is up to 110 °C long-term service temperature an Allround-material. The material´s characteristics are till this temperature, part of a higher-than-average level.

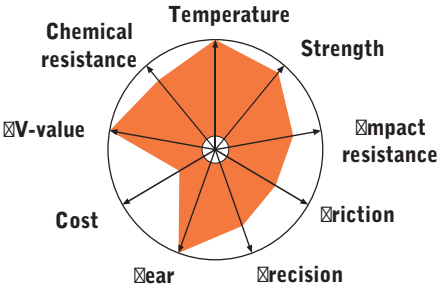
Example: ZX-100K



Optimal material

The optimal material would fill the arrows completely. The ZX-750V5T, omitting the cost-arrow, would be that.

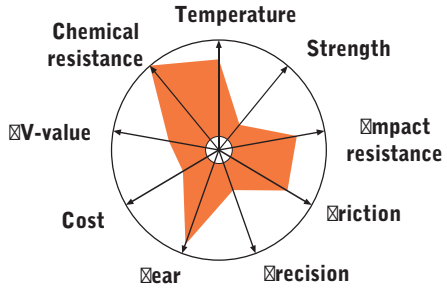
Example: ZX-750V5T



Extreme material

Same materials as, for example, the ZX-550 are extreme materials. This material has got a serrated characteristics profile. In this case, the material has been intentionally modified, insofar as some characteristics are extremly good. That means as well, that other characteristics have been reduced.

Example: ZX-550



Comparison of the relative characteristics

	Temperature	Strength	Impact resistance	Friction	Precision	Wear	Cost	PV-value	Chemical	fatigue strenght
Stainless steel 1.4301	9	10	5	2	10	3	8	1	8	-
Inkuform CFK2	2	5	8	8	5	8	7	5	3	3
Ceramic Al_2O_3	10	10	1	10	10	4	3	5	9	-
PAI	8	7	6	4	8	5	4	7	6	5
PA 4.6	4	7	7	4	2	4	9	4	3	3
PA6	2	5	7	3	4	7	10	4	3	2
PA6.6	2	6	7	3	3	4	10	4	3	2
PA6G	2	5	7	4	3	4	10	4	4	-
PA12	3	3	9	6	3	4	9	3	3	-
PBT	3	6	6	5	2	4	10	3	3	4
PEEK	8	6	7	5	7	4	3	6	8	6
PE UHMW	2	2	9	9	1	8	10	3	6	4
PEI	6	6	8	5	8	3	6	2	4	2
PET	3	6	7	4	6	4	10	4	3	4
PI	8	7	7	4	7	9	2	8	7	5
POM	2	6	6	7	3	6	10	4	3	3
PPS	6	7	3	6	8	2	6	2	9	2
PTFE	8	2	9	9	3	2	8	1	10	5
PTFE + 60%Bz	8	2	5	6	3	4	6	3	2	1
PVDF	5	4	8	6	3	7	7	3	7	3
Sintered bronze	8	10	5	5	10	4	6	2	1	-
TPi	8	6	6	5	7	4	3	6	7	-
ZX-100K	4	6	7	8	7	9	9	6	3	5
ZX-100A	1	5	7	7	5	9	9	6	3	1
ZX-100EL55/63	1	1	8	5	3	4	9	1	3	1
ZX-100MT	4	7	6	8	8	8	9	5	3	4
ZX-324	8	7	5	8	7	4	3	6	8	6
ZX-324V1T	8	8	4	8	7	3	3	6	8	7
ZX-324V2T	8	6	3	7	7	4	3	7	8	5
ZX-324V11T	7	7	4	6	8	4	4	8	6	6
ZX-324VMT	8	8	3	8	9	9	2	7	8	10
ZX-410	8	7	4	6	9	7	4	8	5	3
ZX-410V7T	8	8	3	6	10	9	4	8	6	6
ZX-530	8	6	5	6	7	9	5	9	9	4
ZX-530CD3	8	6	3	9	8	10	4	7	9	2
ZX-530KF15	8	6	3	6	8	6	4	7	9	4
ZX-530EL3	5	3	5	8	6	8	4	4	5	1
ZX-550	8	2	7	7	3	9	3	4	10	1
ZX-550PV	8	2	8	9	3	9	4	4	10	1
ZX-750V5T	10	9	7	6	7	10	3	10	8	3
ZX-750V5KF	10	10	5	7	10	10	3	8	8	3

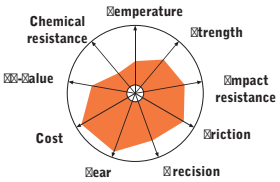
Table 1: comparison of the relative characteristics

To choose a material or to compare a ZEDEX® material to other polymers. The highest value indicates the best characteristic. The lowest value indicates the worst. ■

(1 = bad; 10 = good)

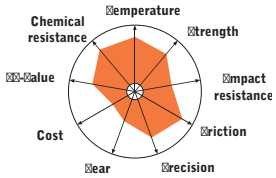
allround up to 110 °C

ZX-100K



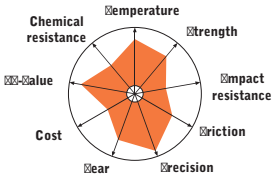
allround up to 250 °C

ZX-324



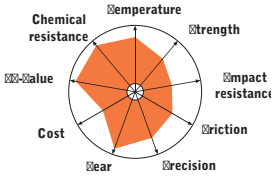
low-cost stiff precise

ZX-410



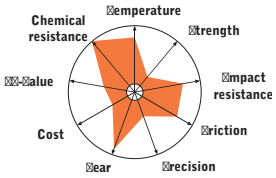
application with chemicals

ZX-530



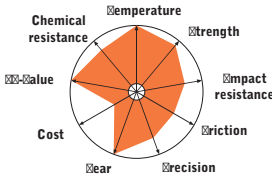
low friction

ZX-550



long-term up to 300 °C

ZX-750V5T

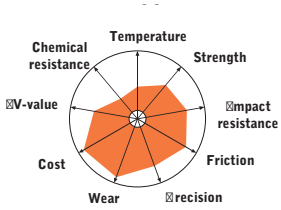


Basic type ZX-100K

Characteristics

– hard, stiff, tough
– high fatigue strength
– good resistance to weathering
– resistance to stress cracking
– good machinability
– bondable and weldable
– FDA compliant, LABS compliant
– PTFE- and Silicone-Free
– KTW approved
– low-outgassing
– notch-sensitive

ZX-100K



Resistance

UV-radiation
(1000 hours Xenon DIN 53597)
tensile strength: –25 %,
elongation at break: –43 %
Gamma-radiation
limit absorbed dose 1200 kGy
Chemicals, resistant
aromatic and aliphatic hydrocarbons, weak acids and alkalis
Chemicals, not resistant
strong acids and alkalis, phenols, cresols
Lubricants and fuels
resistant
Water
max. water absorption: 0,3 %
dimensional changes: 0,1 %
up to max. 80 °C resistant
Fire behavior
oxygen index (LOI): 24 %,
classification: HB (UL94)

Operational parameters*

Temperature (T)
–100 °C to +110 °C (+140 °C)
surface pressure (p)
max. 35 (75) MPa
Sliding speed (v)
max. 100 m/min
Fatigue (S)
tensile fatigue strength at 20 °C and 10^6 stress cycles,
1 Hz = 52 MPa

Impacts, vibrations, edge loading, outdoor use, underwater use.
Allround-plastic up to 110°C.

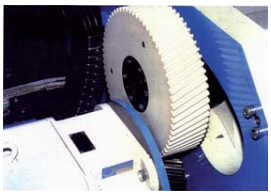
Available as:

– plastic granules
– rods
– tubes
– sheets
– machined parts
– plain bearing bushes according to DIN

Examples of usage

A trapezoidal thread nut (TR40) carries more than 5t, for Kfz-lifting platforms. ZX-100K is placed without backlash in actuating units.

Glue can be easily removed from the ZX-100K mould wiper.



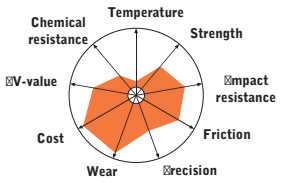
ZX-100K, with a modulus (m) =5 mm, transmits 38 kW in a dry running condition.

ZX-100K drives plungers with a peak load of 120MPa and with 1µm thickness tolerance. It is used as main bearing of the measuring devices.

ZX-100K is mounted on water-use-pumps up to 1000 kW, chassis of trucks and excavators, and it works in a rough and dirty condition.

Modified ZX-100

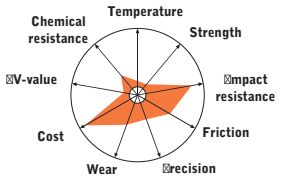
ZX-100A



Strong amorphous structure
tougher, more elastic, softer, only injection moulding possible, reduced precision.

T: –100 °C to +55 °C (+75 °C)
p: max. 20 (60) MPa
v: max. 40 m/min
S = 40 MPa
low-cost solution for large-scale manufacturing, with low precision and temperature requirements.

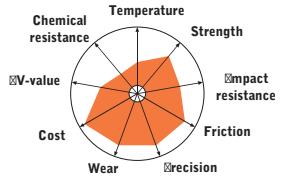
ZX-100EL55
ZX-100EL63



Elastomer-modified
rubbery, grip,
soft elongation >300 %, high impact absorption, high impact resistant
ZX-100EL63 (63 Shore D)
ZX-100EL55 (55 Shore D).

T: –50 °C to +55 °C (+75 °C)
p: max. 3 (10) MPa
v: max. 10 m/min
S = 9 MPa
solution for stressed parts subject to strong abrasive wear and erosive wear.

ZX-100MT



Mineral-reinforced
stiffer, harder, ultra-high strength, no fibre reinforcement.

T: –40 °C to +80 °C (+130 °C)
p: max. 28 (85) MPa
v: max. 150 m/min
S = 42 MPa
low-cost solution for heavy-stressed parts up to 80 °C and low sliding speed.

*Values in the brackets, are valid for shot-term service

Substitution examples

Which material can replace the ZX-100K?

Bronze/Sintered bronze
up to 60 °C universal replaceable; the strength must be tested
Targets: cost reduction, friction and wear reduction, dry running condition, corrosion prevention.

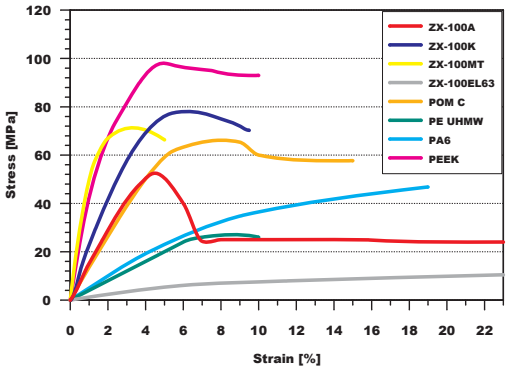
PEEK
taking into account the temperature and the chemical resistant required, replaceable.
Targets: cost reduction,wear reduction, increment of the PV-value.

Polyamide
Targets: friction and wear reduction, load increment, increment of the resistance to atmospheric and chemical corrosion. Prevention of strength decrements and volume variations through the moisture absorption.

POM
Targets: friction and wear reduction, load increment, increment of the resistance to weathering, prevention of volume variations through the moisture absorption. It prevents the outgassing of the formaldehyde in case of fire.

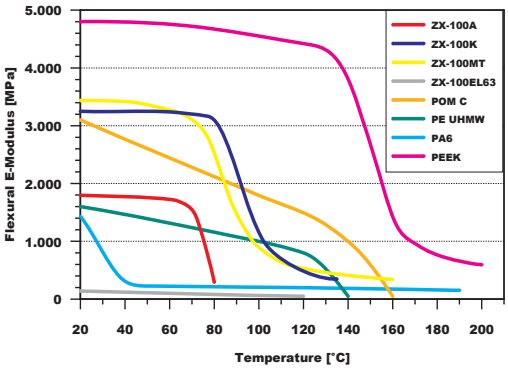
PE UHMW
with strong abrasive wear not replaceable
Targets: wear reduction, load increment, stiffness increment, increment of the operating temperature range.

Stress/Strain (ISO 527)



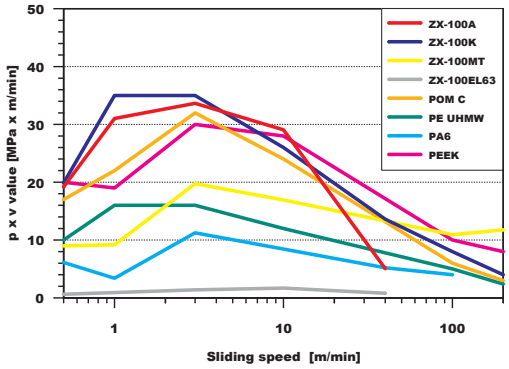
ZX-100K is stiffer and stronger than POM, PA oder PE UHMW, similar elongation at break as PEEK. ZX-100MT reacts up to 60 MPa like PEEK.

Flexural E-Modulus (ISO 178)



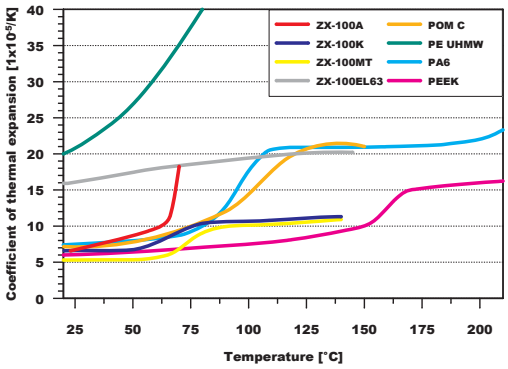
ZX-100K loses, up to 90 °C, just a little part of its stiffness. The stiffness decrement of the plastic materials, during elevated temperature, must be taken into consideration.

Admissible PV-value



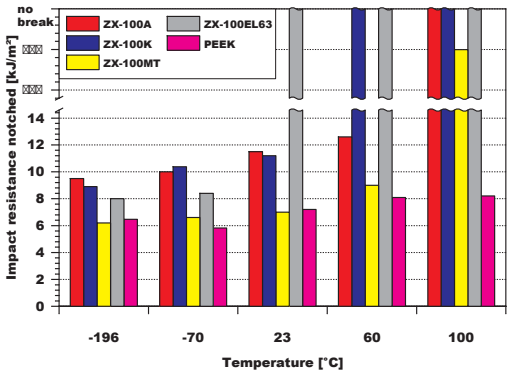
ZX-100K, up to 10 m/min sliding speed, has got a higher PV-value than PEEK. PEUHMW, PA6 are for applications with dynamic friction less appropriated.

Thermal expansion coefficient (ISO E830)



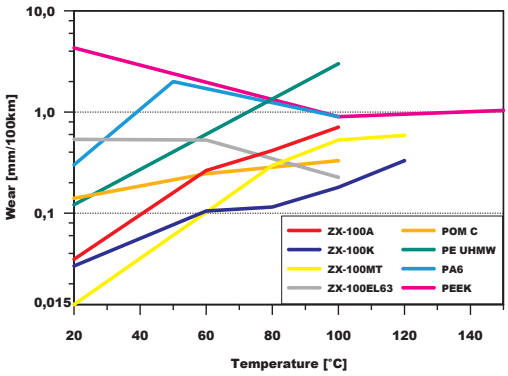
The thermal expansion coefficient of the ZX-100K is smaller than the one of POM, PE UHMW and PA6. Precision applications are possible.

Impact resistance notched (ISO179/1eA)



Elastomer modified ZX-100EL63 has got the highest Charpy v-notch test result. ZX-100K and ZX-100MT lie in the same level of PEEK.

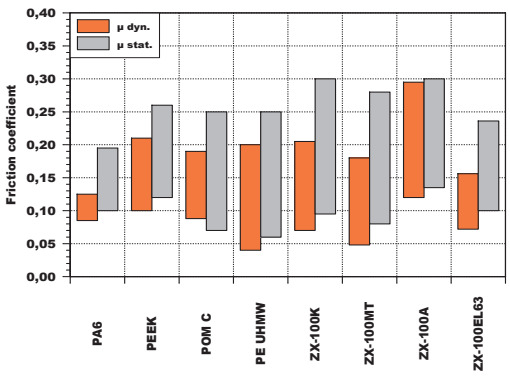
Wear



ZX-100K, depending on temperature, is 3 up to 100 times more wear resistant than PEEK. The bearing type POM C9021 SW is 2 to 3 times worse than ZX-100K.

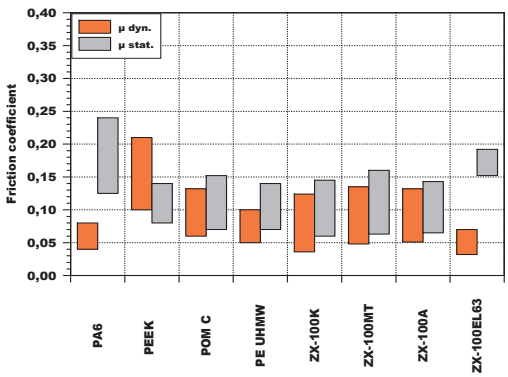
Coefficient of friction in dry running

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa



Coefficient of friction with oil lubrication

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa, oil: OL-J46 DIN 51502

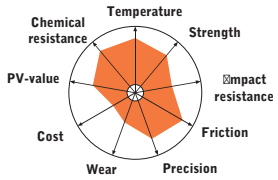


Basic type ZX-324 (PEEK)

Characteristics

– hard, stiff, tough
– high fatigue strength
– good hydrolysis resistance
– enough UV resistance and resistance to weathering
– resistence to stress cracking (except with acetone)
– flame resistant (low toxicity of flue gases)
– good machinability
– bondable and weldable
– FDA compliant, LABS compliant
– PTFE- and Silicone-Free
– vacuum suitable

ZX-324 (PEEK)



Resistance

UV-radiation
use of modified types in case of strong UV-radiation!
Gamma-radiation
limit absorbed dose 12000 kGy
Chemicals, resistant
universal resistant
Chemicals, not resistant
concentrated acids, sulfuric and nitric acid, bromic, sulfonic and chromium acids, halogenated hydrocarbons, sodium, chlorine, fluorine, bromine
Lubricant and fuels
resistant
Water
max. water absorption: 0,5 %
dimensional changes: 0,15 %
up to max. 200 °C resistant
Fire behavior
oxygen index (LOI): 35 %
classification: V-0 (UL94)

Operational parameters*

Temperature (T)
–50 °C to +250 °C (+260 °C)
Surface pressure (p)
max. 41 (125) MPa
Sliding speed (v)
max. 40 m/min
Fatigue (S)
tensile fatigue strength at 20 °C and 10^6 stress cycles,
1 Hz = 60 MPa

Impacts, vibrations, edge loading, gamma rays in hot and cold water.

Available as:

– plastic granules
– rods
– tubes
– sheets
– machined components
– injection moulded parts
– plain bearing bushes according to DIN

Examples of usage

ZX-324 supports the main chassis of the world's largest excavator. Spherical diameter 1000 mm.

ZX-324, with a spherical diameter of 60 mm, supports a weight of 30 t subject to a strong impact stress in a dirty work condition. Here as thickwalled injection moulded part.

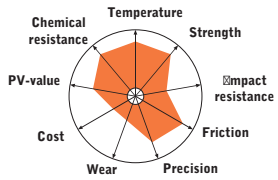
ZX-324V2T takes the toes, through a high load-bearing capacity, elasticity and a low-friction, again in the right position.

ZX-324V11T is used as main bearing in hydraulic pumps, thanks to the high dimensional stability and wear resistance.

ZX-324VMT is used in injection moulding. In this application, the materal, injected onto a steel hub, transmits high power up to a temperature of 150 °C.

Modified ZX-324

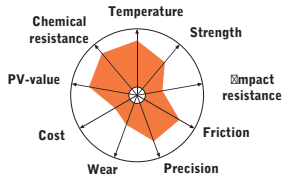
ZX-324V1T



PEEK polymer-fortified
high elastic recovery, high elasticity, little permanent deformation, high strength with temperature over 140 °C.

T: –100 °C to +250 °C (+260 °C)
p: max. 41 (120) MPa
v: max. 100 m/min
S = 70 MPa

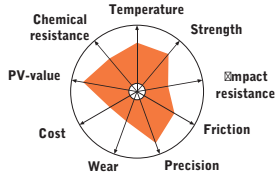
ZX-324V2T



PEEK-, PTFE-modified
reduced friction, high wear resistance, high PV-value, high elasticity.

T: –50 °C to +250 °C (+260 °C)
p: max. 40 (85) MPa
v: max. 200 m/min
S = 56 MPa

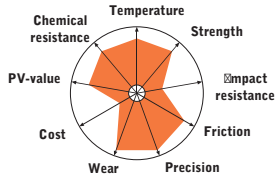
ZX-324V11T



PEEK polymer-fortified
despite high stiffness still high elongation at break, high Charpy v-notch test value down to –196 °C. High PV-value with a slow sliding speed.

T: –200 °C to +250 °C (+260 °C)
p: max. 50 (110) MPa
v: max. 100 m/min
S = 65 MPa

ZX-324VMT



PEEK fibre-reinforced, PTFE
highest stiffness, very good wear resistance, low Stick-Slip tendency, hardened reverse-rotation-coupling part is required.

T: –50 °C to +250 °C (+260 °C)
p: max. 57 (150) MPa
v: max. 100 m/min
S = 105 MPa

*Values in the brackets, are valid for shot-term service

Substitution examples

Which material can replace the ZX-324?

PEEK

Targets: ZX-324 matches for 98 % the PEEK material. The properties correspond to those of natural PEEK. Due to new processing characteristics and the use of the most suitable semi-finished materials (e.g. tubes), a large cost reduction can be archived with the use of ZX-324.

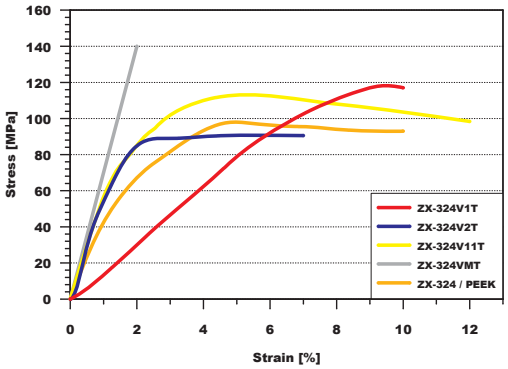
The ZX-324V1T or the ZX-324V11T materials are recommended to improve the yield stress and the resilience.

To improve the PV-value, we suggest the ZX-324V2T and ZX-324V11T materials.

ZX-324V1T und ZX-324V11T have got a higher (30 °C) glass transition temperature. This permits to increase the component stiffness over 140 °C, without adding abrasive fibres. In addition can be archieved a cost reduction.

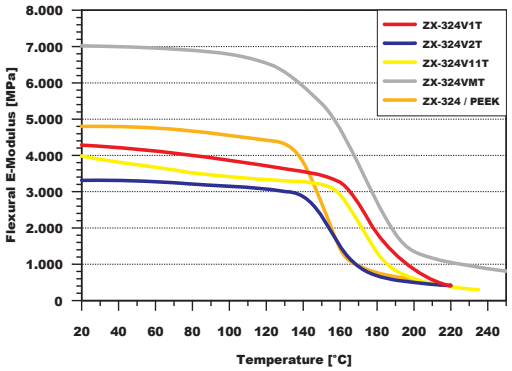
All the modified ZX-324 have got a higher wear resistance and PV-value than the natural PEEK.

Stress/Strain (ISO 527)



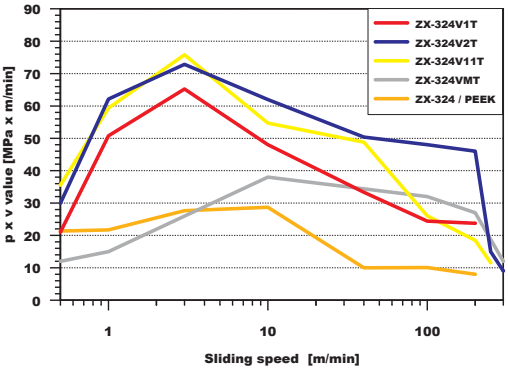
ZX-324V1T has got a high yield stress and elongation similar to the polyketone. ZX-324V11T, despite a high elongation at break, is also very stiff.

Flexural E-Modulus (ISO 178)



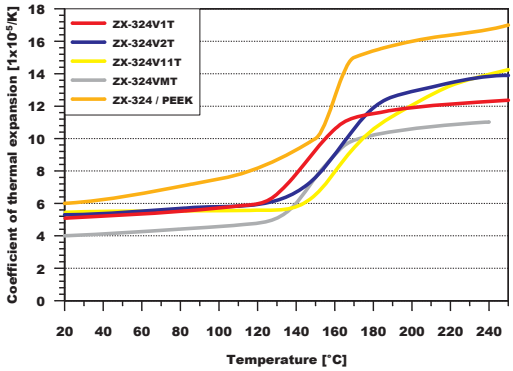
At 145 °C the ZX-324V1T is stiffer than PEEK. ZX-324VMT, thanks to the fibre reinforcement, has got the highest elastic modulus.

Admissible PV-value



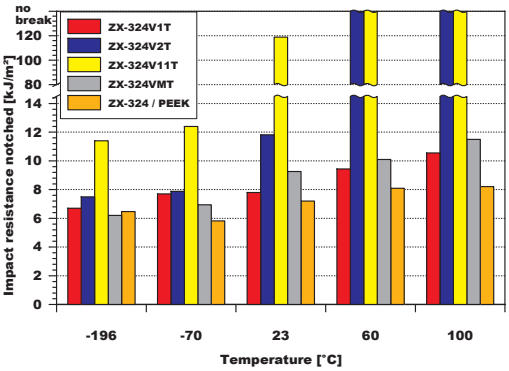
ZX-324V2T and ZX-324V11T have got a PV-value approx. 500 % better than PEEK. ZX-324VMT, despite a fibre reinforcement, has got just a small PV-value.

Thermal expansion coefficient (ISO E830)



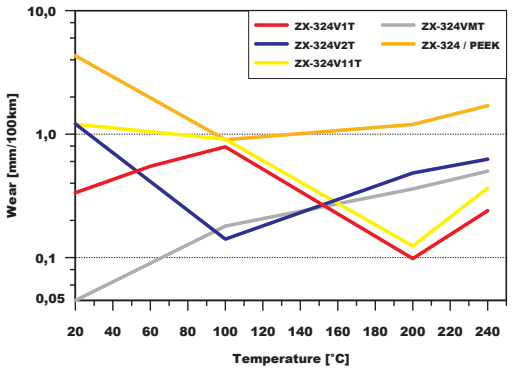
ZX-324V11T has got the highest dimensional stability from 140 °C, the ZX-324VMT, thanks to the fibre reinforcement, is dimensionally stable.

Impact resistance notched (ISO179/1eA)



ZX-324V11T, even at low temperatures, has got a higher impact resistance than PEEK and fibre reinforced PEEK (ZX-324VMT).

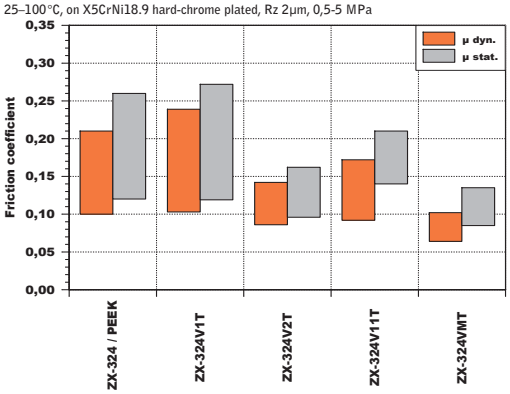
Wear



All the modified PEEK are better wear resistant than natural PEEK. Up to 160 °C, the ZX-324VMT is the best. Beyond 160 °C, the ZX-324V1T and ZX-324V11T are better.

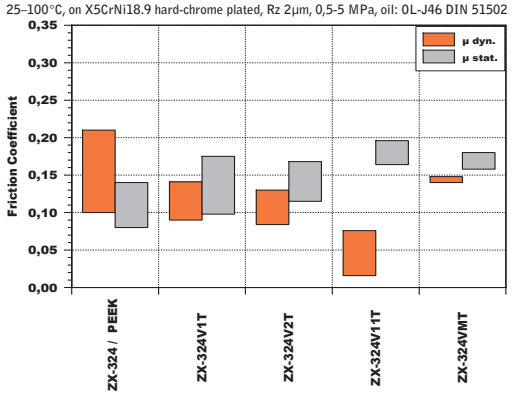
Coefficient of friction in dry running

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa



Coefficient of friction with oil lubrication

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa, oil: OL-J46 DIN 51502



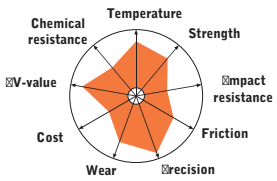
Low cost, stiff, precise up to 180 °C ZX-410 family

Basic type ZX-410

Characteristics

– up to 180 °C hard, stiff, tough
– mechanical properties, wear and PV-value better than the PEEK´s ones
– high dimensional stability
– high chemical resistance
– high hydrolysis resistance, except with basic substances
– very high UV and y radiation resistance
– flame resistant (low toxicity of flue gases)
– resistance to stress cracking
– good machinability
– cheaper than PEEK

ZX-410



Resistance

UV-radiation
(1000 hours Xenon DIN 53597)
tensile strength: –43 %
Gamma-radiation
limit absorbed dose 9000 kGy
Chemicals, resistant
mineral acids, salt solutions, aqueous alkali pH< 9, alcohols, ethers, sulfuric acid 50 %
Chemicals, unstable
ketones, chloroform, MEK, ethyl acetate, methylene dichloride, trichloroethane, hydraulic oil, dichloromethane
Lubricants and fuels
limited resistance
Water
max. water absorption: 0,6 %
dimensional changes: 0,25 %
up to 125 °C resistant
Fire behavior
oxygen index (LOI): 47 %
classification: V-0 (UL94)
low flue gas emission

Operational parameters*

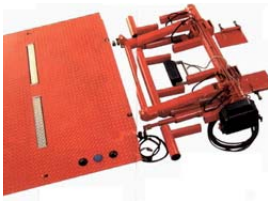
Temperature (T)
-70°C to +180°C (+200°C)
Surface pressure (p)
max. 48 (142) MPa
Sliding speed (v)
max. 100 m/min
Fatique (S)
tensile fatique strength at 20 °C and 10^6 stress cycles,
1 Hz = 33 MPa

Impacts, vibrations, edge loading, gamma rays in hot and cold water.

Available as:

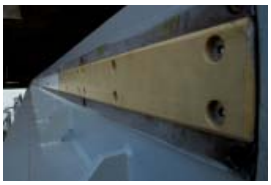
– plastic granules
– rods
– tubes
– sheets
– machined parts
– injection moulded parts
– plain bearing bushes according to DIN

Examples of usage



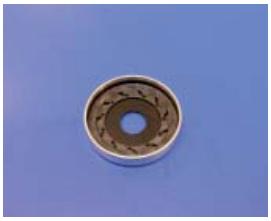
In the field of stroke kinematics of hydraulic platforms, bushings, made of ZX-410, tolerate surface pressures up to 125 MPa and at the same time, edges pressure and impacts.

A thrust bearing used in oxygen fittings, made of ZX-410, tolerate a long-term Hertzian contact stress up to 500 MPa.



Slide rails and stop bars integrated in a lock gate.

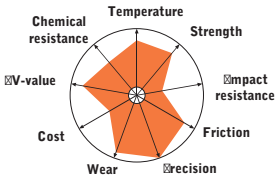
ZX-410, thanks to the long-term stability, is used as bearing application for lock gates, in water and not.



ZX-410V7T, thanks to the high wear resistance and the dimensional stability, is used as iris diaphragm in High-Tech cameras.

Modified ZX-410

ZX-410V7T



Fibre-reinforced, sliding-modified
very high stiffness up to 180 °C (higher than a fibre-rinforced PEEK), very low thermal expansion coefficient, low friction, high wear resistance up to 200 °C.

T: –100 °C to +190 °C (+200 °C)
p: max. 41 (125) MPa
v: max. 300 m/min
S = 59 MPa

*Values in the brackets, are valid for shot-term service

Substitution examples

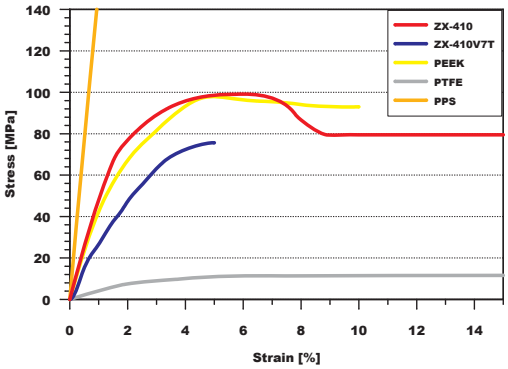
Which material can replace the ZX-410?

Bronze / Sintered bronze
up to 170 °C, taking into account the strength required, replaceable.
Targets: cost reduction, friction and wear reduction, dry running condition, corrosion prevention, weight reduction.

PEEK
taking into account the temperature and the chemical resistance required, replaceable.
Targets: cost reduction,wear reduction, increment of the PV-value, improvement of the mechanical properties, dimensional stability and improvement of the fire behaviour.

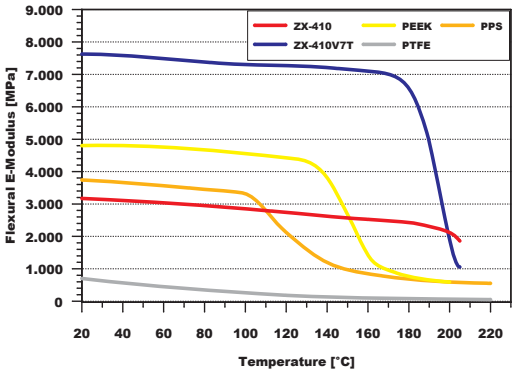
Aluminium
taking into account the strength required, replaceable.
Targets: cost reduction through injection moulding. A cost reduction, also with tight tolerances, is possible with the material ZX-410V7T as well. Dry running condition, friction and wear reduction, increment of the resistance to weathering and chemicals.

Stress/Strain (ISO 527)



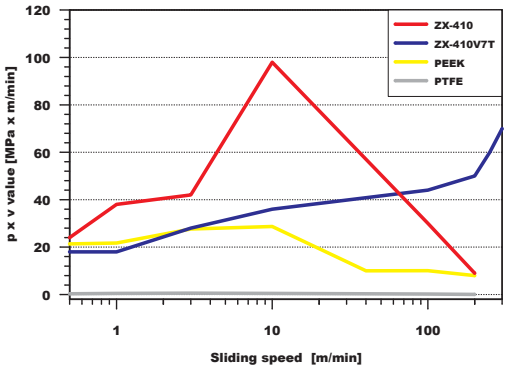
ZX-410 has got the same strength, yield stress and elongation as the natural PEEK, but a much higher (many times over) elongation at break.

Flexural E-Modulus (ISO 178)



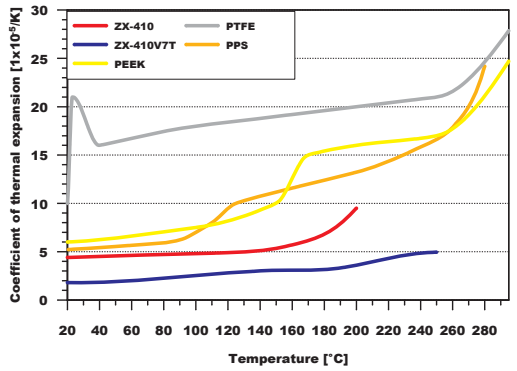
ZX-410 loses strength, first at 50°C higher temperature than PEEK (natural). ZX-410V7T is stiffer than the fibre reinforced PEEK.

Admissible PV-value



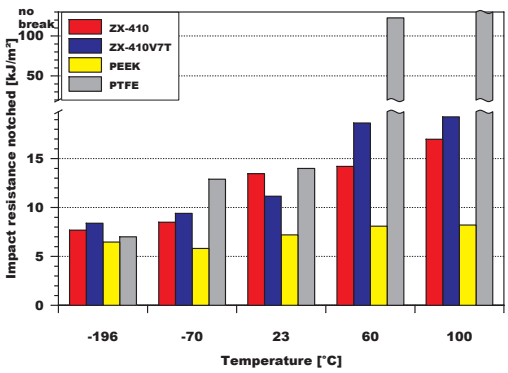
The ZX-410 PV-value is considerably (max. 300 %) higher than PEEK (natural). ZX-410V7T has got over 60 m/min a high PV-value.

Thermal expansion coefficient (ISO E830)



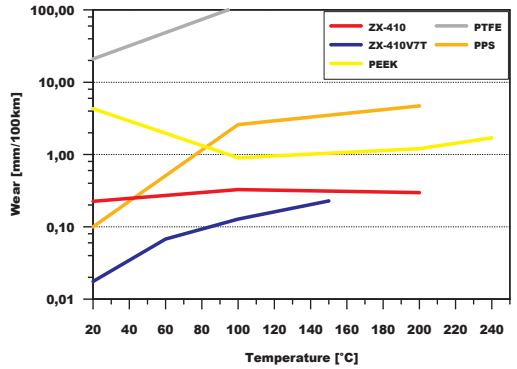
The thermal expansion coefficient of the ZX-410V7T is up to 140 °C similar to the aluminium´s one. All ZX-410 types are more dimensionally stable than PEEK.

Impact resistance notched (ISO179/1eA)



The Charpy v-notch test, of the ZX-410, is in the same level or in a better one than the PEEK (natural).

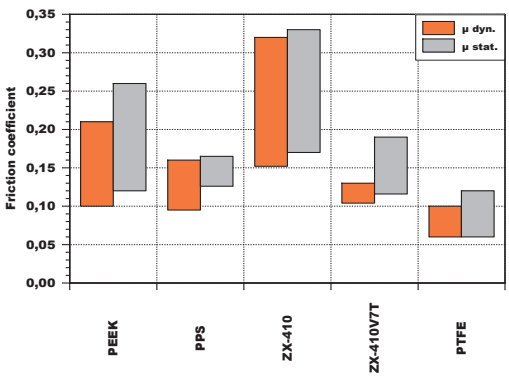
Wear



The wear resistance of all the types of ZX-410 is better than the PEEK. ZX-410V7T has got, up to 150 °C, a extreme good value of wear resistance.

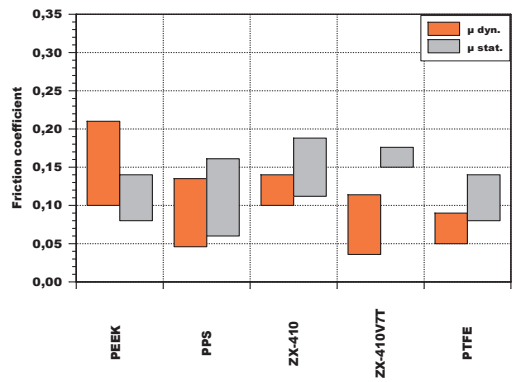
Coefficient of friction in dry running

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa



Coefficient of friction with oil lubrication

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa, oil: OL-J46 DIN 51502

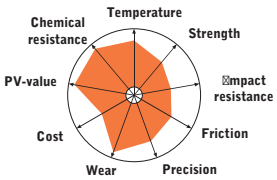


Basic type ZX-530

Characteristics

– low tendency to creep
– hydrolysis resistance
– low moisture absorption
– flame resistant
– low contaminant ions
– resistence to stress cracking
– good machinability
– bondable and weldable
– FDA, LABS compliant
– extreme low generation of outgassing
– cheaper than PEEK

ZX-530



Resistance

UV-radiation
(500 hours Xenon DIN 53597)
tensile strength: –16 %
(after 600 Std. rapid drop)
elongation at break: +5 %
colour changing possible
Gamma-radiation
limit absorbed dose 1000 kGy
Chemicals, resistant
insoluble in organic solvents and chemicals
Chemicals, unstable
chlorosulfonic acid, hydrochloric acid, nitric acid, nitrobenzene, concentrated sulfuric acid
Lubricants and fuels
resistant
Water
max.water absorption: 0,01 %
up to max. 140 °C resistant
Fire behavior
oxygen index (LOI): 47 %
Classification: V-0 (UL94)

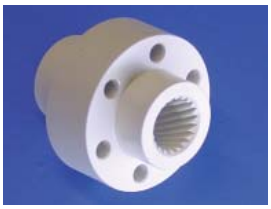
Operational parameters*

Temperature (T)
–100 °C to +240 °C (+260 °C)
Surface pressure (p)
max. 25(74) MPa
Sliding speed (v)
max. 300 m/min
Fatique (S)
tensile fatigue strength at 20 °C and 10^6 stress cycles,
1 Hz = 40 MPa

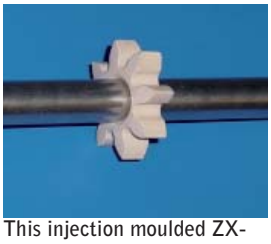
Available as:

– plastic granules
– rods
– tubes
– sheets
– machined parts
– injection moulding parts
– plain bearing bushes according to DIN

Examples of usage



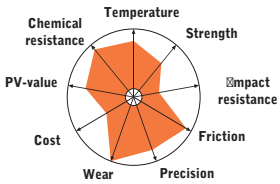
ZX-530, due to the high PV-value and the high wear resistance, is used especially as spindle nut with high spindle speeds.



This injection moulded ZX-530, thanks to a very high chemical and wear resistance, is used in the circuit board industry as a B

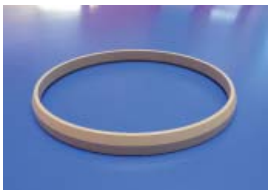
Modified ZX-530

ZX-530CD3



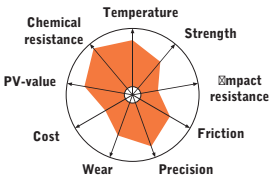
Fibre- und PTFE-modified
extreme low wear up to 100 °C and up to 200 °C very good values. Stiff and dimensinally stable.

T: –100 °C to +240 °C (+260 °C)
p: max. 20 (56) MPa
v: max. 300 m/min
S = 19 MPa



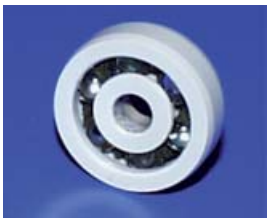
ZX-530 is used, till over 180°, as sealing ring in ball valves. This thanks to the outstanding endurance strength and good anti-friction properties, compared to PTFE.

ZX-530KF15



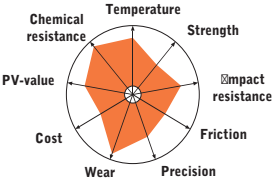
Carbon fibre reinforced
low thermal strain, high stiffness, high yield stress and yield strain values. High wear resistance, low friction.

T: –50 °C to +240 °C (+260 °C)
p: max. 50 (120) MPa
v: max. 100 m/min
S = 41 MPa



Bearings, as well as inner cages and outer cages of anti-friction bearings, are made of ZX-530 because of the extreme chemical resistance, wear resistance and high PV-value.

ZX-530EL3



Polymer reinforced
high elongation at break und Charpy v-notch test values.

T: –100 °C to +220 °C (+240 °C)
p: max. 25 (71) MPa
v: max. 50 m/min
S = 6 MPa

*Values in the brackets, are valid for shot-term service

Substitution examples

Which material can replace the the ZX-530?

PEEK
taking into account the permissible operation temperature and the strength required, replaceable
Targets: cost reduction, wear and friction reduction, increment of the chemical resistance and of the PV-value.

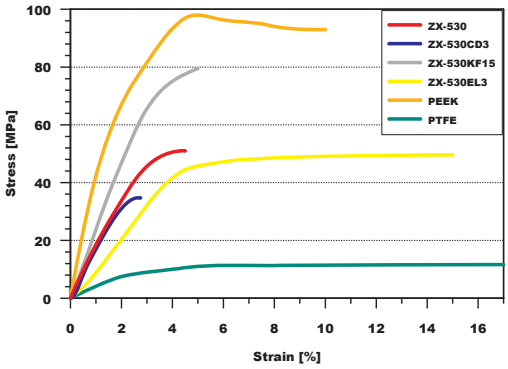
PTFE and PTFE Compounds
no replaceable in circumstance of concentrated sulfuric, nitric, and chlorosulfonic acid and where, an extremely high requirement of friction coefficient reduction, is requested.
Targets: wear reduction, improvement of the stiffness and precision. Reduction of the plastic deformation especially with high temperature, cost reduction through injection moulding. Increment of the PV-value.

PVDF
Targets: improvement of the chemical resistance, increment of the thermal application limit. Wear reduction and increment of the stiffness and hardness.

PCTFE, ETFE
Targets: improvement of the chemical resistance, increament of the thermal application limit, stiffness and hardness. Cost reduction through injection moulding.

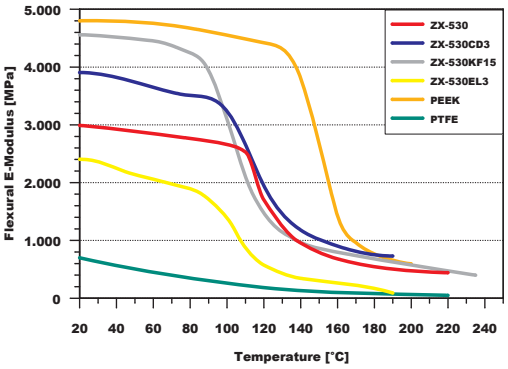
Ceramic
taking into account the operating temperature range, hardness and chemical resistance required, replaceable.
Targets: increment of the heat shock resistance and brittleness, reduction of the project outlay, reduction of the sensitivity to edge pressure, cost reduction.

Stress/Strain (ISO 527)



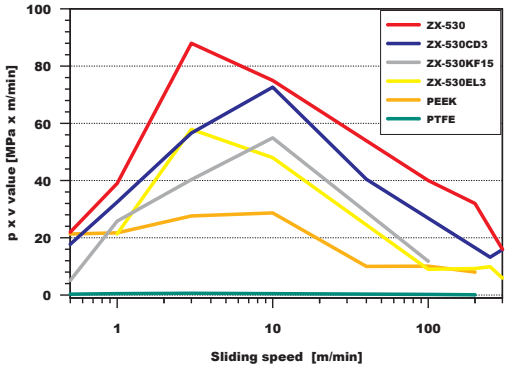
Defiance a fibre reinforcement, ZX-530KF15 has got an elongation at break of 5 %. The polymer reinforced ZX-530EL3 has got an elogation at break of 15 %.

Flexural E-Modulus (ISO 178)



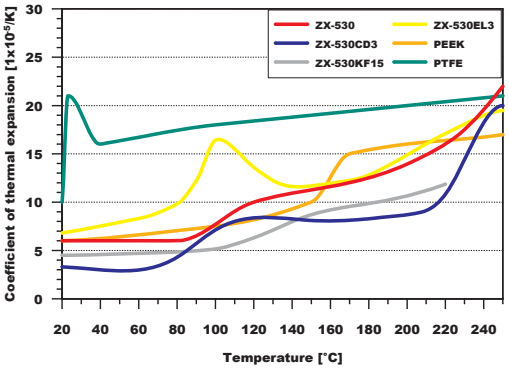
From 90 °C, the modulus in flexure of the ZX-530 declines and from 180 °C, is at the same level of PEEK. ZX-530EL3 has got a low modulus in flexure.

Admissible PV-value



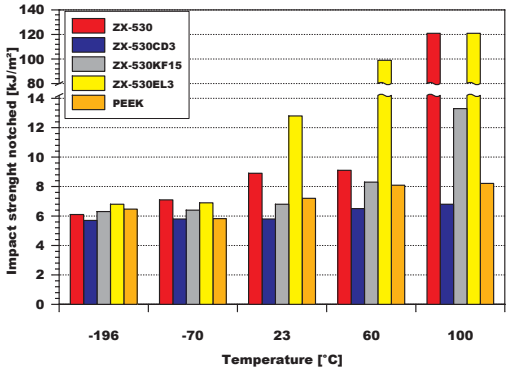
The PV-values of all the types of ZX-530 are significantly higher than the PEEK´s ones. PTFE offers a maximum PV-value of 2 MPa m/min.

Thermal expansion coefficient (ISO E830)



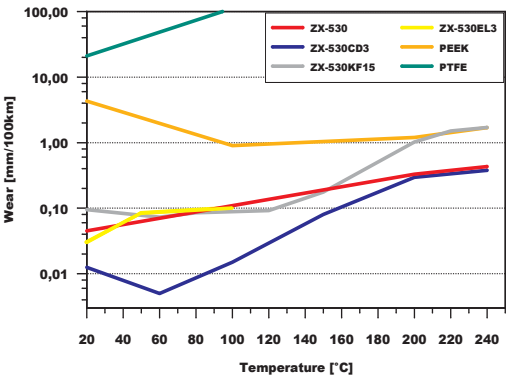
ZX-530KF15 and ZX-530CD3 are more dimensionally stable than PEEK and equally good as the ZX-530.

Impact resistance notched (ISO179/1eA)



ZX-530EL3 has got the highes Charpy v-notch test value. ZX-530 is at the level of PEEK.

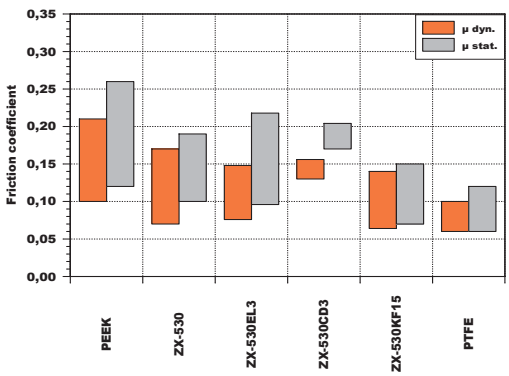
Wear



ZX-530CD3 offers up to 100 °C an extreme high wear resistance. Even polyimide, PAI or strong reinforced plastics are worse.

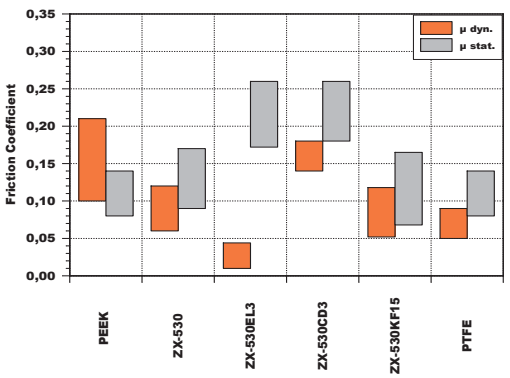
Coefficient of friction in dry running

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa



Coefficient of friction with oil lubrication

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa, oil: OL-J46 DIN 51502

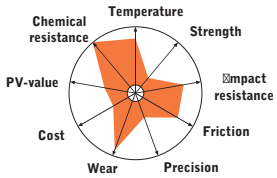


Basic type ZX-550

Characteristics

– low Stick-Slip tendacy
– strong anti-adhesive
– low tendancy to creep
– hydrolysis resistance
– weathering resistant
– no water absorption
– resistence to stress cracking
– good machinability
– bondable with pre-treatment
– strong viscoelastic

ZX-550



Resistance

UV-radiation
(1000 hours Xenon DIN 53597)
tensile strength: –1 %
elongation at break: no alteration
Gamma-radiation
limit absorbed dose 50 kGy
Chemicals, resistant
insoluble in organic solvents and chemicals
Chemicals, unstable
elemental fluorine, chlorine trifluoride, molten alkali metals
Lubricants and fuels
resistant
Water
max. water absorption: 0 %
up to 250 °C resistant
Fire behavior
oxygen index (LOI): 90 %
classification: V-0 (UL94)

Operational parameters*

Temperature (T)
–250 °C to +240 °C (+260 °C)
surface pressure (p)
max. 8 (12) MPa
Sliding speed (v)
max. 250 m/min
Fatique (S)
tensile fatigue strength at 20 °C and 10^6 stress cycle,
1 Hz = 7 MPa

Available as:

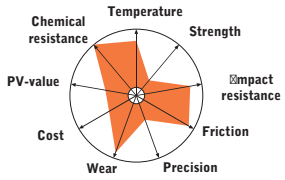
– sheets
– machined parts
– plain bearing bushes according to DIN

Examples of usage

Due to the low friction, a good Stick-Slip behaviour and a low tendency to creep, the ZX-550 is used as sliding guide of the patient support in operating tables.

Modified ZX-550

ZX-550PV



Friction and wear modified
reduction of wear from temperatures of 100 °C. Higher PV-value from 20 m/min. Tougher and softer.

T: –270 °C to +240 °C (+250 °C)
p: max. 4 (8) MPa
v: max. 150 m/min
S = 4 MPa

*Values in the brackets, are valid for shot-term service

Substitution examples

Which material can replace the ZX-550?

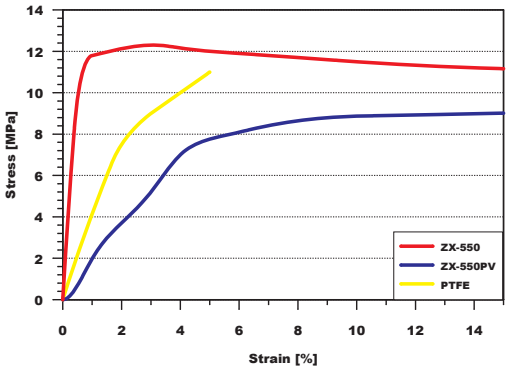
PTFE

Targets: increment of the stiffness and hardness, improvement of the creep behavior and reduction of the extention coefficient. Increasing of the PV-value and reduction of the wear.

PTFE Compounds

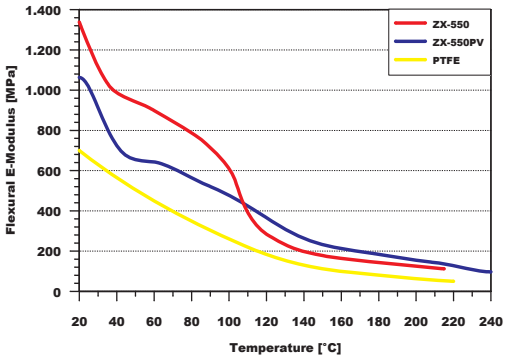
Targets: cost reduction, wear reduction and PV-value increment. Not replaceable where a low static friction is required in combination with oil lubrication up to a temperature of 70 °C.

Stress/Strain (ISO 527)



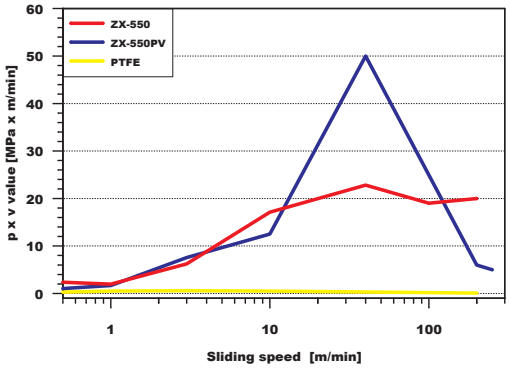
ZX-550 offers the same yield stress value as PTFE. ZX-550PV has got a higher elongation at break and elongation than ZX-550 und PTFE.

Flexural E-Modulus (ISO 178)



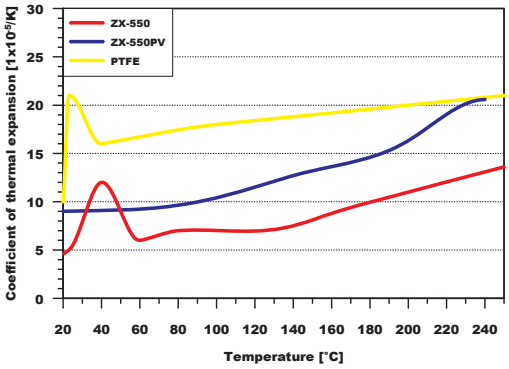
The flow of the flexural modulus of ZX-550PV is similar to the PTFE´s one. The flexural modulus of ZX-550 is ca. 30 % higher than the PTFE´s one.

Admissible PV-value



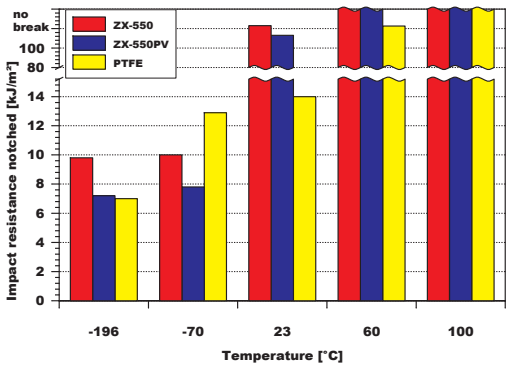
ZX-550PV has got at 40 m/min a 5000 % higher PV-value than PTFE. ZX-550 and ZX-550PV are in all the sliding speeds superior than PTFE.

Thermal expansion coefficient (ISO E830)



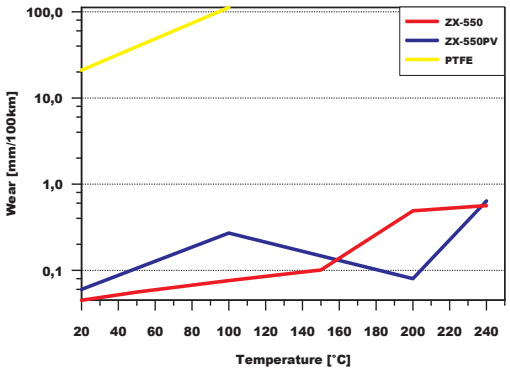
For the ZX-550PV, the PTFE characteristic decay in the flaw of the extention coefficient at 23 °C is suppressed. The production is more precise.

Impact resistance notched (ISO179/1eA)



Both ZX-550-types, from 23 °C, have got a higher Charpy v-notch test value than PTFE.

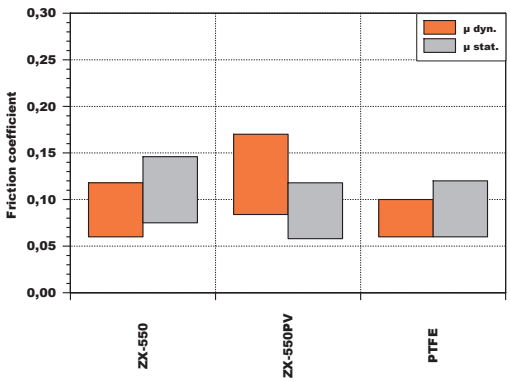
Wear



ZX-550 und ZX-550PV have got a 1000 % better wear resistance than PTFE.

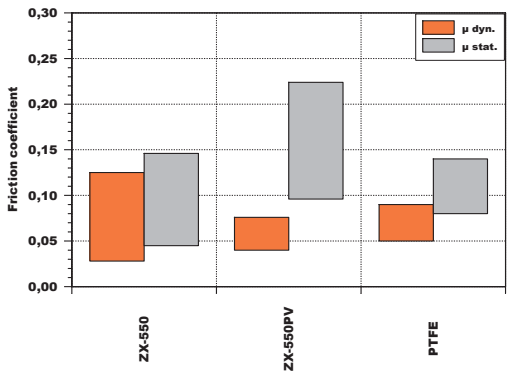
Coefficient of friction in dry running

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa



Coefficient of friction with oil lubrication

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa, oil: OL-J46 DIN 51502



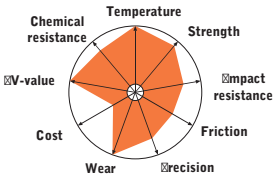
Long-term up to 300 °C ZX-750 family

Basic type ZX-750V5T

Characteristics

– hard, stiff, tough
– high dimensional stability
– high fatigue strength
– high weathering resistance
– good fire behavior (low generation of flue gases)
– resistence to stress cracking
– vacuum suitable
– good machinability
– bondable and weldable
– contains PTFE

ZX-750V5T



Resistance

UV-radiation
(1000 hours Xenon DIN 53597)
tensile strength: no alteration
elongation at break: –30 %
Gamma-radiation
limit absorbed dose 8000 kGy
Chemicals, resistance
solvent, dilute acids and alkalis
Chemicals, unstable
strong acids and alkalis, oxidizing agents
Lubricants and fuels
resistant
Water
max. water absorption: 0,7 %
dimensional changes: 0,4 %
up to 120 °C resistant
Fire behavior
oxygen index (LOI): 52 %
classification: V-0 (UL94)

Operational parameters*

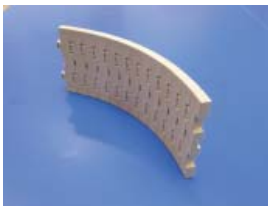
Temperature (T)
–250 °C to +300 °C (+320 °C)
surface pressure (p)
max. 41 (125) MPa
Sliding speed (v)
max. 350 m/min
Fatigue (S)
tensile creep strength at 20 °C and 10^6 stress cycle,
1 Hz = 35 MPa

Available as:

– plastic granules
– rods
– tubes
– sheets
– machined parts
– plain bearings bushes according to DIN

Examples of usage

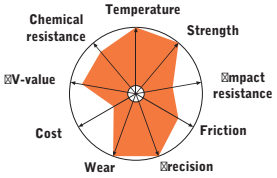
Friction bearings, made of ZX-750V5T, meet the extreme requirements of the artificial knee joints. Thanks to a high surface pressure and high wear resistance, a max. backlash of 0,05 mm will not be exceeded.



This segmental bushing, made of ZX-750V5T (Ø 700 mm), guides and leads into water the floating weight of 28 t in a deep-sea hammer. This extreme stress subjected part operates in unlubricated conditions, with a 50 Hz impact frequency and a drop height of 1 m.

Modified ZX-750

ZX-750V5KF



fibre reinforced
high stiffness up to 250 °C, high elongation at break and yield stress values, low thermal elongation, impact resistant down to –196 °C.

T: –250 °C to +280 °C (+320 °C)
p: max. 41 (125) MPa
v: max. 350 m/min
S = 55 MPa

The existing sliding guide of a chipboard press, is converted from a grease lubrication condition to a dry running condition. Thanks to the extreme high PV-value and the high wear resistance of the ZX-750V5T, the chipboard press now works just in dry running conditions.

*Values in the brackets, are valid for shot-term service

Substitution examples

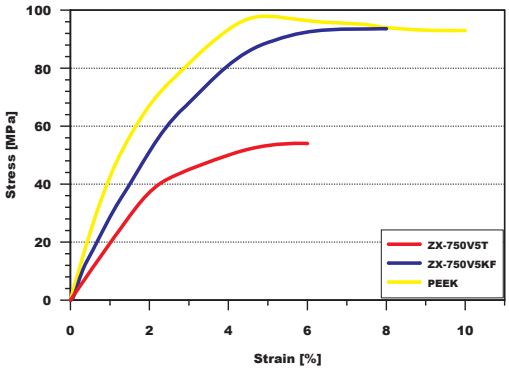
Which material can replace the ZX-750V5T?

PI
taking into account the long-term service temperature required, replaceable
Targets: cost reduction, friction and wear reduction.

PEEK
taking into account of chemical resistance required, replaceable.
Targets: wear reduction, increment of the PV-value, increment of the mechanical strength and of the dimensional stability. Increment of the long-time service temperature and precision.

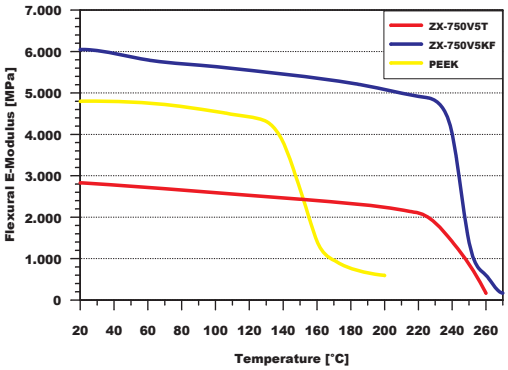
The ZX-750V5T material should always be used, in those applications in which an operational temperature increment of 100 °C, applied load, lifetime and dimensional stability have to be improve.

Stress/Strain (ISO 527)



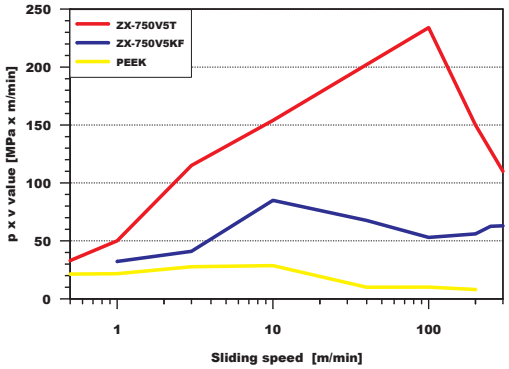
ZX-750V5KF has got the same yield stress value as PEEK (natural), however it still offers a high elongation.

Flexural E-Modulus (ISO 178)



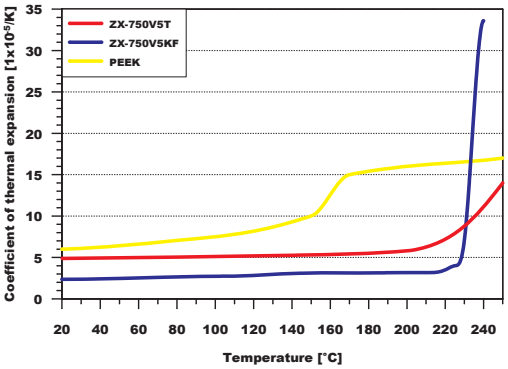
The elastic modulus of both ZX-750 types, strongly decrease over 220 °C. This decay temperature is 80 °C higher than the PEEK´s one.

Admissible PV-value



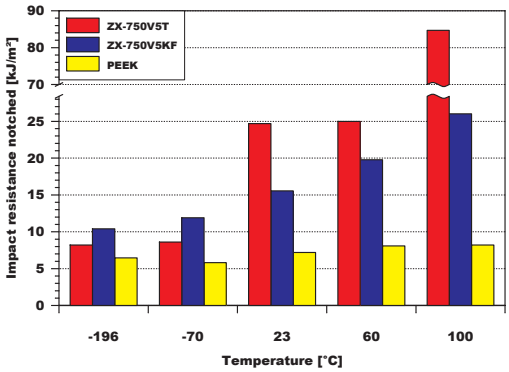
The PV-value of the ZX-750V5T is 1000 % higher than the PEEK´s one. PEEK in combination with a oil lubrication has got lower resistance.

Thermal expansion coefficient (ISO E830)



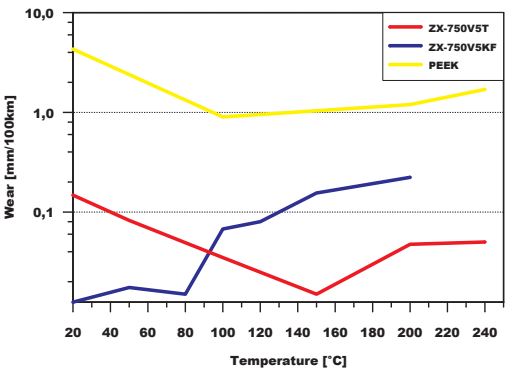
The thermal expansion coefficient of the ZX-750V5KF is up to 220 °C at the same level of aluminium.

Impact resistance notched (ISO179/1eA)



ZX-750V5T has got a 500 % better Charpy v-notch test value than PEEK (at 23 °C). The fibre reiforced ZX-750V5KF is more impact resistant than natural PEEK.

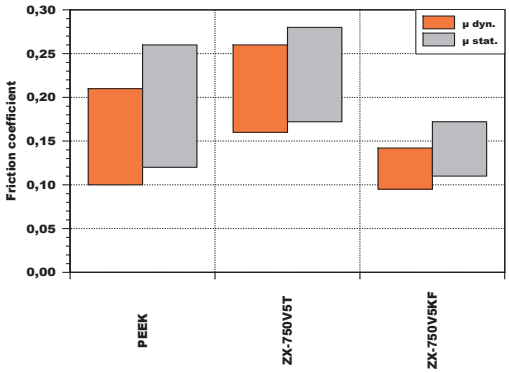
Wear



So far, from 100 °C, the ZX-750V5T offers the best measured wear resistance. ZX-750V5T is from 2000 % to 8000 % more wear resistant than PEEK (natural).

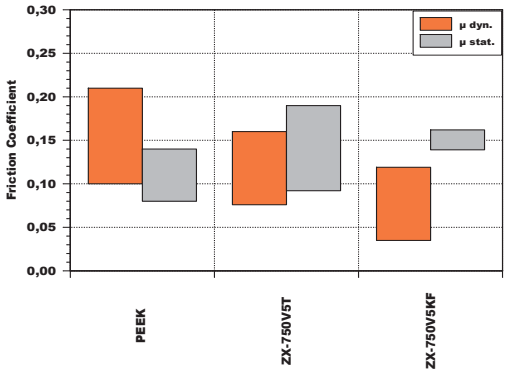
Coefficient of friction in dry running

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa



Coefficient of friction with oil lubrication

25–100 °C, on X5CrNi18.9 hard-chrome plated, Rz 2µm, 0,5-5 MPa, oil: OL-J46 DIN 51502



Comparison table of the ZEDEX® materials

	Properties	Symbol	Unit	Standard	ZX-100K	ZX-100EL63	ZX-100EL55	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324V11T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530KF15	ZX-530EL3	ZX-550	ZX-550PV	ZX-750V5T	ZX-750V5KF
	material code			internal Standard	A1K	A1G	A1F	A1T	A3A	A3H	A3F	A3L	A3B	A4A	A4T	A5D	031	A5M	066	A5L	A7A	A9T	055
	colour				white	black	black	white	beige	beige	beige	black	anthracite	yellow	black	beige	anthracite	grey	beige	brown	green	ocker	green
	density	ρ	kg/dm³	ISO 1183	1,35	1,23	1,2	1,49	1,30	1,33	1,33	1,34	1,48	1,33	1,42	1,51	1,67	1,47	1,30	2,06	1,86	1,44	1,53
mechanical	compressive modulus	Ec	MPa	DIN EN ISO 604	3150	390	334	4570	4270	3700	2540	2850	5454	4700	6300	3500	2600	3500	1748	1490	1150	4011	4950
	elastic limit	σ_{el}	MPa	internal Standard	75	20	14	86	120	119	76	122	123	111	100	71	56	70	50,4	16	11	95	101
	compressive stress at yield	σ_Y	MPa	DIN EN ISO 604	n.v.	42	n.v.	n.v.	n.v.	145	103	146	n.v.	142	135	109	n.v.	n.v.	n.v.	n.v.	n.v.	115	n.v.
	compressive strength	σ_M	MPa	DIN EN ISO 604	n.v.	n.v.	n.v.	n.v.	n.v.	n.v.	103	n.v.	n.v.	n.v.	135	109	77	150	n.v.	n.v.	n.v.	115	147
	compressive stress at 3,5% strain	$\sigma_{3,5\%}$	MPa	DIN EN ISO 604	30	15	6	97	32	145	80	36	95	135	129	29	52	46	40,5	16	19	59	83
	compressive strength (0,01 h)	σ_M	MPa	internal Standard	75	22	15	92	120	127	81	130	131	119	108	76	59	75	54	15	10	102	108
	compressive strength (100 h)	σ_M	MPa	internal Standard	60	17	12	78	107	102	67	103	109	99	96	37	108	60	43	12	8	86	95
	compressive strength (10000 h)	σ_M	MPa	internal Standard	30	8,5	5,5	45	58	43	35	40	60	54	70	25	22	30	19	1,0	0,8	48	61
	compressive stress at break	σ_B	MPa	DIN EN ISO 604	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	133	92	77	150	k.Br.	k.Br.	k.Br.	112	147
	elastic compression limit	ε_{el}	%	internal Standard	6	6,2	7,1	3,1	8,8	1,7	3,3	8,8	4,8	1,8	2,2	6,5	3,8	5	4,5	3,5	1,4	6	4,4
	nominal compressive yield strain	ε_{cv}	%	DIN EN ISO 604	n.v.	28	n.v.	n.v.	3,2	2,5	5,4	12,5	n.v.	2,7	5,2	31	n.v.	7,2	n.v.	n.v.	n.v.	9,9	n.v.
	nominal compressive strain at compressive strength	ε_{cM}	%	DIN EN ISO 604	n.v.	n.v.	n.v.	n.v.	6,9	n.v.	5,4	n.v.	n.v.	n.v.	5,2	31	11	30	n.v.	n.v.	n.v.	9,9	10,9
	nominal compressive strain at break	ε_{cB}	%	DIN EN ISO 604	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	28	39	11	30	k.Br.	k.Br.	k.Br.	k.Br.	10,9
	modulus in tension (tensile modulus)	E_t	MPa	DIN EN ISO 527	2900	310	200	4854	3600	3500	3500	4400	7800	3368	5499	3500	3340	3940	1500	800	850	3100	2480
	elastic limit	σ_{el}	MPa	internal Standard	65	5	4	53	81	74	76	78	64	71	42,4	47	31,8	50,6	38	9,8	6,8	35,8	61
	tensile stress at yield	σ_Y	MPa	DIN EN ISO 527	78	19	14	-	110	-	92	113	120	101	-	-	-	-	-	12,7	-	-	-
	tensile strength	σ_M	MPa	DIN EN ISO 527	78	38	37	67	110	117	92	113	142	101	71	50	32	79	50	12,7	12	45	93,1
	tensile stress at break	σ_B	MPa	DIN EN ISO 527	70	35	30	65	84	117	90	98	2,7	82	71	50	32	79	50	10,8	12	45	93,1
	elastic yield point	ε_{el}	%	internal Standard	1,6	1,5	2	-	4,2	5	1,5	1,3	-	1,5	1,8	1,3	0,7	2,1	3,4	1,3	4,2	2,1	2,4
	yield strain	ε_y	%	DIN EN ISO 527	4	16	20	1,1	7	-	6,9	5	-	5,5	-	-	-	-	-	2,3	-	-	-
	elongation at maximum force	ε_M	%	DIN EN ISO 527	6	>300	>300	3	7	10,1	6,9	5	3,9	5,5	4,5	4,5	2,2	5	19,9	2,3	192	3,1	6,8
	tensile elongation at break	ε_B	%	DIN EN ISO 527	9,5	>300	>300	5,3	12,6	10,1	23,9	9	4,5	25	4,5	4,5	2,2	5	19,9	92	192	3,1	6,8
	modulus in flexure	E_f	MPa	DIN EN ISO 178	3300	400	350	3955	4000	3900	3900	2937	7000	2900	5545	3000	4030	4356	2320	1170	1190	3320	8830
	outer fiber stress at 3,5% outer fiber strain	$\sigma_{f3,5}$	MPa		96	12	11	103	126	117,5	110	119	150	89	129	74	×	114	63	19	15	103	177
	flexural strength	σ_{fM}	MPa		117	17	17	113	168	143	127	159	210	126	138	81	50	116	70	18,9	15	68	182
	flexural stress at break	σ_{fB}	MPa		k.Br.	k.Br.	k.Br.	113	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	136,4	80	50	116	k.Br.	k.Br.	k.Br.	68	182
	elongation at flexural yield stress	ε_M	%		6,1	8	9	4,5	6,3	6,2	5,7	6,6	-	7,3	4,8	4,9	1,6	3,7	5,6	4,2	3,3	2,2	4,3
	flexural elongation at break	ε_B	%		k.Br.	k.Br.	k.Br.	4,5	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	k.Br.	5,4	5,2	1,6	3,7	k.Br.	k.Br.	k.Br.	2,2	4,3
	creep modulus at 1% deformation after 1000h	E	N/mm²	DIN 53444	2000	625	400	2900	4300	3040	2500	2780	4560	4015	5260	1900	1760	2180	1300	60	61	3200	4320
	stress at 1% deformation after 1000h	$\sigma_{1\%}$	N/mm²	DIN 53444	22	6,3	4	33	43	32	26	29	44	40	51	19	16	22	14	0,8	0,6	35	44
	creep resistance			relative value	❸	❷	❷	❹	❻	❺	❺	❺	❼	❻	❼	❹	❻	❼	❷	❶	❶	❸	❻
	ball indentation hardness H358/30 (H132/30) [H	HB	N/mm²	DIN 2039	136	(35)	[49]	153	174	175	175	190	231	159	146	134	116	157	107	(36)	(32)	110	160
	Shore A hardness		Shore	DIN 53505	>100	>100	>100	98	93	>100	100	>100	>100	98	>100	>100	>100	>100	>100	>100	>100	>100	>100
	Shore D hardness		Shore		84	64	56	885	81	86	87	85	88	85	90	83	79	86	81	65	60	86	90
	impact strength Charpy not notched		kJ/m²	EN ISO 179/1eU	54	k.Br.	k.Br.	53	k.Br.	k.Br.	k.Br.	k.Br.	23	k.Br.	30	28	8,9	13	k.Br.	k.Br.	k.Br.	k.Br.	59
	impact strength Charpy notched		kJ/m²	EN ISO 179/1eA	6,0	k.Br.	k.Br.	3,2	8,0	6,3	6,3	6,2	9,3	13,4	11,2	9,17	7,3	5,5	23,50	123	113	24,7	15,6
	loss tangent (1Hz)	tanδ	1	internal Standard	0,077	0,146	0,141	0,091	0,052	0,061	0,061	0,053	0,061	0,055	0,083	0,055	0,074	0,064	0,110	0,103	0,175	0,078	0,080
	fatigue strength at 20°C , 10^6 stress cycles 1 Hz		MPa	internal Standard	52	9	7	42	60	70	56	65	105	33	59	40	19	41	6	7	4	35	55
thermal	continuous operating temperature (long term)	RTi	°C	UL 746B	110	75	75	130	250	250	250	250	250	180	190	240	240	240	170	240	240	280	280
	short term operating temperature (3 h)		°C	internal Standard	140	80	80	150	260	260	260	260	260	200	200	290	260	260	160	260	260	320	320
	maximum temperature for pressed bushings		°C	internal Standard	65	50	50	65	100	140	115	140	140	150	150	90	95	90	70	40	70	250	250
	melting point	T_m	°C	DSC	250	212	207	250	340	340	340	340	340	320	315	320	320	320	320	327	323	390	390
	glass transition temperature	T_g	°C	DSC	78	-60	-64	80	146	170	146	146	146	210	211	110	100	90	90	-20	-20	240	240
	coefficient of thermal expansion up to 100°C	α	10^{-5}/K	ISO E 830	8	14	16,7	7,1	5,1	4,7	6,2	5,8	3,6	4,0	2,3	6	3,8	3,8	6	12	14,4	4	2,7
	coefficient of thermal expansion up to 150°C	α	10^{-5}/K	ISO E 831	12	16,3	16,2	10,7	5,9	5,9	6,5	5,8	3,8	5,8	2,5	9	4,6	5,0	6,7	16	19,2	4,7	2,9
	heat distortion temperature HDT/A 1,8 MPa	HDT(A)	°C	DIN EN ISO 75	75	110	110	95	160	170	171	165	270	195	206	135	225	260	117	-	-	250	290
	thermal conductivity	λ	W/(m*K)	DIN 52612	0,24	-	-	0,28	0,25	-	-	0,24	0,24	0,25	-	-	-	-	-	0,24	0,24	-	-
	specific heat capacity	c_p	kJ/(kg*K)	DSC	1,06	1,23	1,75	1,15	1,35	1,09	1,05	0,9	1,06	1,85	0,87	0,89	1,03	0,84	1,81	0,76	0,93	1,18	1,06
	fire behaviour (3,2mm) UL94			UL 94 HB	94HB	94HB	94HB	94HB	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	-	V-0	V-0	V-0	V-0
	oxygen index	%	LOI	DIN EN ISO 4589	24	-	-	-	35	16	-	-	43	47	-	47	-	-	-	95	75	52	-

Comparison table of the ZEDEX® materials

electrical	volume resistivity	R_D	Ω*cm	IEC 93	2E14	1E14	2E14	2E14	5E16	5E16	6E16	4E15	3E4	>10E15	3,6E6	4,5E16	5,8E4	7,1E4	1E13	10E18	10E17	1E16	5E6
	surface resistance	R_O	Ω	IEC 93	6E10	4E12	4E12	1E15	2,8E12	3,2E12	6,8E12	7,8E11	1,9E4	>10E15	3,0E6	4,4E16	5,7E4	6,9E4	6,5E12	5,5E12	>10E12	5E12	3,0E6
	penetration resistance	E	kV/mm	IEC 243	21,5	22	21	21,5	22,5	25	27	26	0,1	30	0,1	24	0,1	0,1	21,5	14	21	21	0,1
	tracking resistance		V	IEC 112	305	-	-	-	150	-	-	-	-	150	-	130	-	-	130	-	42	22	-
	dielectric constant (110Hz)		1	IEC 250	3,4	3,8	4,4	3,4	3,2	3,1	3,3	3,0	3,3	3,15	3,3	4,1	4,4	4,3	4,1	2,7	2,7	3,1	3,4
	dissipation factor (110Hz)	tanδ	1	IEC 112	0,015	0,011	0,011	0,015	0,003	0,002	0,002	0,002	0,004	0,0005	0,0007	0,02	0,025	0,025	0,03	0,0003	0,0003	0,0008	0,0009
PV-values	max. surface pressure v=1m/min	p_{zul}	N/mm²	internal test radial bushing	35	1,09	0,84	10,00	19,12	50,73	62,13	60	15	38,63	18,00	37,44	32,46	25,80	21,35	2,08	1,67	50,00	32,93
	max. surface pressure v=10m/min	p_{zul}	N/mm²		2,59	0,17	0,17	2,90	2,88	2,10	4	5,5	3,81	9,80	3,60	7,56	7,26	5,49	5,80	1,71	1,25	15,40	8,49
	max. surface pressure v=100m/min	p_{zul}	N/mm²		0,08	0,00	0,00	0,10	0,1	0,24	0,28	0,20	0,21	0,33	0,30	0,40	0,28	0,12	0,09	0,19	0,26	2,34	0,53
	max. surface pressure v=200m/min	p_{zul}	N/mm²		0,04	0,00	0,00	0,04	0,05	0,12	0,15	0,09	0,14	0,04	0,50	0,12	0,08	0,02	0,05	0,07	0,03	0,75	0,28
	evolution of heat with v=1m/min		°C		42	32	34	45	84	61	65	39	65	36	85	34	39	61	41	27	26	45	73
	evolution of heat with v=10m/min		°C		60	35	40	78	158	47	95	45	74	35	89	63	100	106	74	38	21	125	89
	evolution of heat with v=100m/min		°C		35	n.d.	n.d.	59	153	109	120	60	110	45	140	59	111	94	65	68	52	141	183
	evolution of heat with v=200m/min		°C		64	n.d.	n.d.	61	83	115	104	110	152	85	129	85	83	80	93	53	48	125	169
friction	μ static 20° C dry operation	$\mu_{stat.}$	1	internal Standard inclined plane	0,11	0,25	0,25	0,12	0,09	0,11	0,13	0,18	0,12	0,2	0,23	0,18	0,22	0,18	0,21	0,12	0,17	0,19	0,19
	μ dynamic 20° C dry operation	$\mu_{dyn.}$	1		0,08	0,2	0,2	0,11	0,07	0,13	0,16	0,14	0,10	0,16	0,16	0,17	0,16	0,16	0,13	0,11	0,10	0,17	0,16
	μ dynamic 100° C dry operation	$\mu_{dyn.}$	1		0,15	0,08	0,08	0,07	0,06	0,2	0,09	0,21	0,08	0,23	0,17	0,11	0,17	0,15	0,08	0,07	0,1	0,20	0,11
wear	amount of wear at 20°C		mm/100km	internal test periodic translative movement under load	0,07	0,54	0,54	0,11	1,15	0,34	1,21	1,20	0,04	0,23	0,02	0,05	0,03	0,10	0,03	0,05	0,06	0,15	0,01
	amount of wear at 100°C		mm/100km		0,21	0,23	0,23	0,53	0,89	0,14	0,14	0,91	0,18	0,33	0,09	0,11	0,02	0,05	0,10	0,06	0,27	0,04	0,07
	amount of wear at 200°C		mm/100km		n.d.	n.d.	n.d.	n.d.	0,53	0,10	0,48	0,12	0,36	0,30	0,10	0,33	0,15	0,43	n.d.	0,49	0,08	0,05	0,22
	amount of wear at 240°C		mm/100km		n.d.	n.d.	n.d.	n.d.	0,66	0,24	0,64	0,37	0,52	1,49	n.d.	0,42	0,21	0,77	n.d.	0,56	0,64	0,05	0,29
available as	tubes (hollow rods) up to $ø_e$ (de)		mm		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	✓	✓	✓	✓	×	×	✓	✓
	sheets up to max. thickness		mm		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	rods up to $ø_e$ (de)		mm		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	plastic granules				(✓)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓	✓
	injection moulded parts				(✓)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓	✓
	machined parts				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
precision	dimensional stability with moisture absorption			relative value	❼	❽	❽	❽	❿	❾	❾	❾	❿	❹	❻	❿	❿	❿	❿	❿	❿	❹	❺
	water absorption 23°C / RMC 93%		%	DIN EN ISO 62	0,3	0,2	0,2	0,2	0,05	0,1	0,1	0,05	0,05	0,6	0,4	0,01	0,01	0,01	0,01	0,01	0,02	0,2	0,2
	water absorption until an equilibrium moisture content		%	DIN EN ISO 62	0,5	0,6	0,65	0,5	0,5	0,5	0,5	0,1	0,1	1,4	1,2	0,05	0,05	0,05	0,05	0,02	0,04	0,5	0,4
	dimensional stability with thermal expansion			relative value	❸	❷	❷	❹	❻	❺	❺	❺	❼	❻	❾	❹	❼	❼	❺	❶	❶	❾	❿
	high precision bushings (negative clearance)				✓	✓	✓	✓	✓	✓	✓	✓	-	✓	-	✓	-	-	-	✓	✓	×	×
	alignment adjustment			relative value	❺	❿	❿	❹	❹	❹	❹	❹	❶	❹	❷	❷	❷	❷	❺	❷	❷	❹	❸
envrionmental influences	suitable for use in water				✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓	✓	✓	×	✓	✓	×	×
	resistance against hot water		°C		80	70	70	80	200	140	200	200	200	125	130	140	140	140	140	250	150	120	120
	resistance against dust, dirt, abrasive substances			relative value	❻	❽	❽	❼	❼	❼	❼	❼	❿	❼	❼	❻	❹	❻	❼	❷	❷	❺	❺
	UV rays resistance			relative value	❾	❽	❽	❾	❾	❾	❾	❾	❾	❾	❾	❽	❽	❽	❽	❾	❾	❾	❾
	suitable for outdoor use			relative value	❽	❼	❼	❽	❻	❼	❼	❼	❻	❽	❽	❼	❼	❼	❼	❿	❿	❾	❾
	resistance to chemicals			relative value	❼	❺	❺	❼	❾	❼	❾	❽	❽	❻	❺	❿	❽	❾	❺	❿	❾	❺	❺
	FDA compliant				✓	✓	✓	-	✓	-	✓	-	-	-	-	✓	-	-	✓	-	-	-	-
	suitable for vacuum				✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓	✓	✓	✓	✓	✓	✓	✓
	rate of desorption	a_{1h}	mbar*l/(s/cm²)		1,83E-6 α=0,44	-	-	-	-	-	-	-	-	-	-	2,8E-7 α=0,44	-	3,12E-7 α=0,49	-	-	-	-	-
	ROHS / WEEE				✓	-	-	-	✓	-	✓	✓	✓	✓	-	✓	-	-	-	✓	-	✓	✓
	free from silicone				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	free from PTFE				✓	✓	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×
sterilization	resistant against disinfectant				✓	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	moist heat sterilization			relative value	❻	❻	❻	❻	❿	❿	❿	❿	❼	❽	❼	❼	❽	❻	❼	❿	❿	❻	❻
	gamma-rays radiation sterilization			relative value	❸	❸	❸	❸	❿	❿	❼	❿	❼	❼	❼	❹	❹	❹	❹	×	×	❼	❼
	chemical strilization			relative value	❼	×	×	❼	❿	❼	❿	❿	❿	❼	❹	❿	❿	❿	❿	❿	❿	❿	❿
	UV-sterilization			relative value	❼	×	×	❼	❼	❼	❼	❼	❿	❿	❿	❼	❼	❼	❼	❼	❼	×	×

❶	low	❿	high
✓	applicable	×	not applicable
(✓)	limited	-	not determined
k.Br.	no break	**n.v.**	non-existent
n.d.	not feasible		

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 severa 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.

Updated: September 2010

Post heat treatment

The plastic is subjected to a heat treatment, and it will be quoted as annealing. The annealing target is to reduce the tension and increase the crystallinity of the component. All the ZEDEX® high performance plastics are anneal treated, in order to reduce the processing-related inner tension. When the interference-fit temperature of pressed plain bearing bushes should be increased, two annealing at the operating temperature range are advisable. However, the admissible long-term service temperature can not be exceeded.

When is an annealing process advisable?

In the following cases, we suggest an additional annealing process and/or an intermediate annealing between machining and the final machining:

- when tight tolerances are required
- when an asymmetrical material removal or a big chip removal is required
- with a big walls´ thickness variation on the end products
- when sharp corners and edges must be machined
- when the end product have got a cross-section discontinuity

Realization of the annealing process

The annealing should take place in a circulating air drying oven. The temperature in the oven follows a ramp function (see figure 3). The heating rate is 20 °C per hour, whereas the cooling rate 10 °C per hour. Higher heating and cooling rates should be avoided. The holding period depends on the maximum wall thickness of the workpiece and can be taken from the figure 4. The holding temperarture depends on the material and can be taken from the table 2 (page 23). The annealing process is completed, when the final temperature is reached. From this point on, the oven can be turned off. The workpiece should be removed from the oven only when its temperature matches with the room´s one.

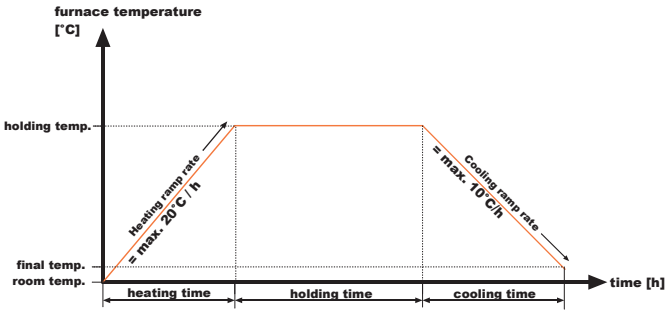


Figure 3: annealing ramp rate

Hints regarding the annealing process

An adequate large allowance must be provided before annealing. The use of a support during the annealing process reduces deflection and deformation. The annealing process could form oxide layers on the surfaces, thus their colour affect. These layers reach, in the semi-finished products, a maximum thickness of 0,2 mm, and, normally, they are removed through machining.

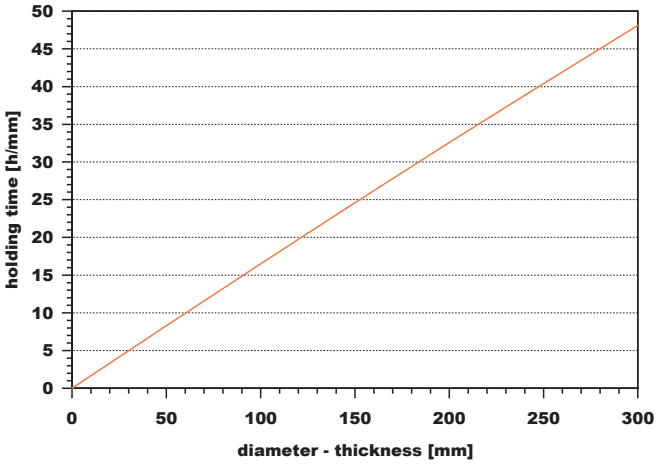


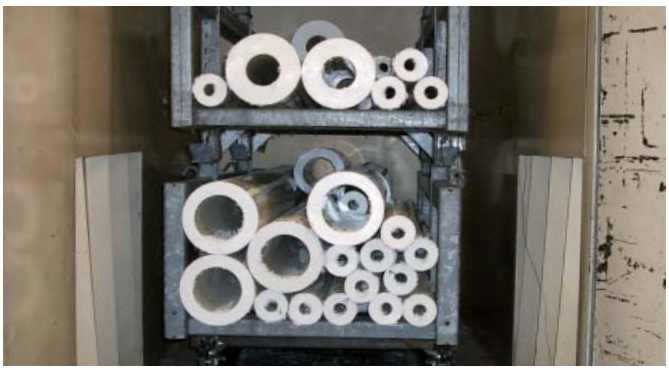
Figure 4: holding time related to material thickness

Tensions

Processing (extrusion and injection moulding) induces technologically the chains orientation, generated in the polymers structure. The plastic structure, after the melding process, starts to solidify in a "forced position", which causes a strong restoring force and produces an internal tension in the plastic. Now if additional external stresses are added, e.g. through machining, the overlapping of the internal and external stresses, could overstep the material strength resistance and create tears and even the break of the semi-finished products.

Stress relaxation, warping

Semi-finished and end-products, during a long-term storage, reduce the existing tensions, thanks to the stress relaxation. Besides, the tensions are reduced because of the warping effect. This can also arise during the use of the end-product. Through a plastic storage, with a temperature closed to the heat distortion temperature, the chains mobility increases and the stress relaxation accelerates. In this case, the stress relaxation and the associated warping are faster and more intensive. If the semi-finished products are subjected to a annealing process, the warping is partially anticipated.



Annealing to reduce tensions

Material identification	Max. heating ramp rate [°C / h]	Holding temperature [°C]	Max. cooling ramp rate, [°C / h]	Cooling to [°C]	Structure	Cold crystallization temperature [°C]
ZX-100K	20	150	10	40	semi-crystalline	> 140
ZX-100EL55/63	20	50	10	40	semi-crystalline	-
ZX-100MT	20	150	10	40	semi-crystalline	> 140
ZX-324	20	250	10	60	semi-crystalline	> 300
ZX-324V1T	20	250	10	60	semi-crystalline	> 300
ZX-324V2T	20	250	10	60	semi-crystalline	> 300
ZX-324V11T	20	250	10	60	semi-crystalline	> 300
ZX-324VMT	20	250	10	60	semi-crystalline	> 300
ZX-410	20	200	10	60	amorphous	-
ZX-410V7T	20	200	10	60	amorphous	-
ZX-530	20	160	10	40	semi-crystalline	> 110
ZX-530CD3	20	160	10	40	semi-crystalline	> 110
ZX-530EL3	20	160	10	40	semi-crystalline	> 110
ZX-530KF15	20	160	10	40	semi-crystalline	> 110
ZX-550	-	-	-	-	semi-crystalline	-
ZX-550PV	-	-	-	-	semi-crystalline	-
ZX-750V5T	20	265	10	60	semi-crystalline	290
ZX-750V5KF	20	265	10	60	semi-crystalline	290

Table 2: annealing parameters

Degree of crystallinity

Semi-crystalline polymers have the tendency to crystallize partially. At the end of the annealing process, the material cross-section crystallinity is not uniform. In the same way, there are differences about the degree of crystallinity of thick-walled and thin-walled semi-finished products. Through a following warm-up of the semi-finished products, over the cold crystallization temperature, and a slow cooling, the degree of crystallinity increases and reaches a homogeneous level. However, this cold crystallization doesn't reach a high degree of crystallinity as a slow cooling directly after the melting process. The semi-finished products, through the cold and post-crystallization, are subjected to a warping and the change of the following properties:

– lower elongation at break
– higher density
– higher stiffness
– higher strength
– higher chemical resistance
– higher permeability
– higher wear resistance due to sliding friction
– higher PV-value
– higher thermal conductivity
– higher melt temperature
– increasing of the interference fit temperature for pressed plain bearing bushes (twice annealing at operating temperature range necessary).

Before the shipping, the ZEDEX® high performance semi-finished products are subjected to a second thermal treatment, by doing so, during a standard annealing process, the user can have just a little increment of the degrees of crystallinity. Please contact us, if a higher crystallization degree is required. ■

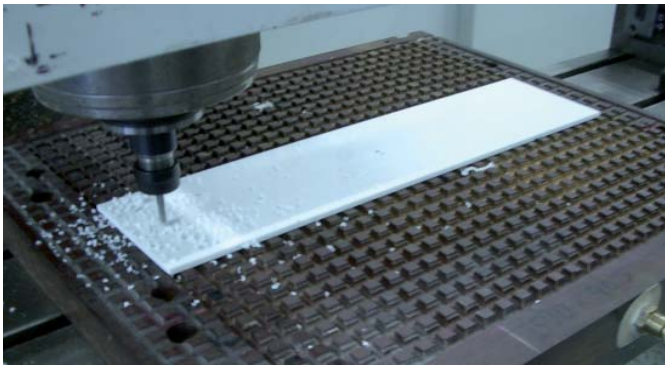
Machining

Dimensional stability

Because of a high strain coefficient, it is advisable to make a dimensional control when the room temperature is reached. The chosen plastic manufacturing tolerances have to be bigger than the metals´ ones. Similar attention must be paid to the dimensional changes induced by the temperature. These can differ, respect the metals' ones, by a factor of 10. Dimensionally precise parts should be made of low-stress semi-finished product (see "Post heat treatment"). Sometimes these parts should be annealed before the production. If a big and uneven chip removal is required, we recommend, taking into consideration the tolerance desired, to make a rough adjustment of the workpiece, and wait 24-hour relaxation storing or make an intermediate annealing process, before beginning the final machining. Please notice, that by annealing or 24-hour relaxation storing a shrinkage of the workpieces and a corresponding oversize must be scheduled.

Clamping

When the workpiece is clamped, its warping due to an excessive clamping pressure must be avoided. Furthermore also a long-term clamping must be avoided, because the workpiece could have a dimensional variation and thus a reduction of the clamping pressure. Workpieces can be fastened by vacuum chuck technology or with double-sided tapes.

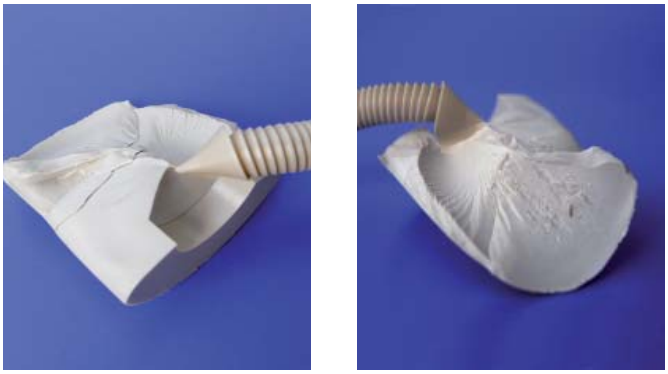


Vacuum clampling devices

Machining error

Internal stress and an additional imperfect machining, can lead to the formation of tears or to successive dimensional variations. Usually, the reasons are:

– use of worn tools, that generates, additional to the internal stress, other machining stress
– production of strong cross-section variations and sharp edges, which concentrates the internal tension on small areas
– large chip removal, could lead the part to the break, through a sudden internal stress balance disturbance and a warping speed increment.

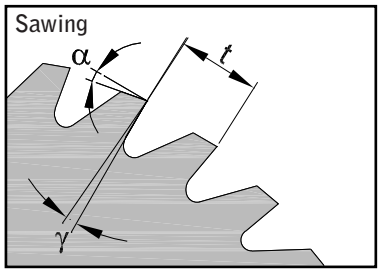


Rupture due to large chip removal

Prevention of tears during machining

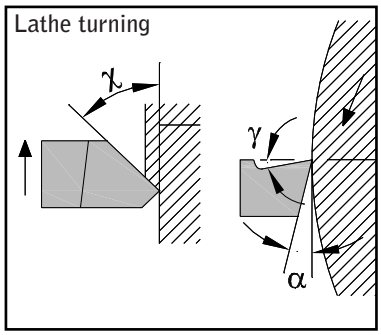
Some of the ZEDEX® high performance plastics, need to be warmed up and machined, when they are still warm. Hints are in the table 3 on the next page.

Machining guideline

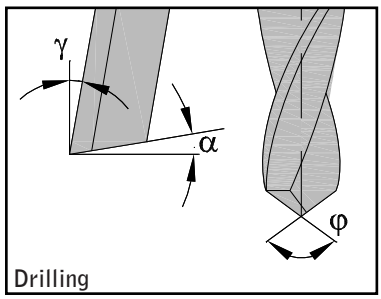


		ZX-100K	ZX-100EL63	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324V11T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5T	ZX-750V5KF
α	min.	15	20	15	15	15	15	15	15	15	15	15	15	15	15	20	20	5	5
	max.	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	10	10
γ	min.	5	2	5	0	0	0	0	10	0	10	0	0	0	0	5	5	0	0
	max.	8	5	8	5	5	5	5	15	4	15	5	5	5	5	8	8	3	3
V	min.	300	500	300	500	500	500	500	200	500	300	500	500	500	500	300	300	800	800
	max.				800	800	800	800	300			800	800	800	800			900	900
t	min.	3	3	3	3	3	3	3	3	2	3	3	3	3	3	2	2	10	10
	max	8	8	8	5	5	5	5	5	5	5	5	5	5	5	5	5	14	14

Temperature required during machining [°C]																			
	>Ø 60mm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	>Ø 80mm	-	-	50	100	100	100	120	-	-	100	50	50	-	100	-	-	100	150
	>Ø 120mm	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

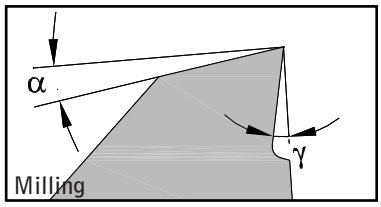


		ZX-100K	ZX-100EL63	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324V11T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5T	ZX-750V5KF
α	min.	5	6	5	6	6	6	6	6	6	6	6	6	6	6	10	10	2	2
	max.	10	10	10	8	8	8	8	8		8	8	8	8	8			5	5
γ	min.	0	0	0	0	0	0	0	2	0	2	0	0	0	0	5	5	0	0
	max.	5	5	5	5	5	5	5	8		8	5	5	5	5	8	8	5	5
χ	min.	45	45	45	45	45	45	45	45	45	45	45	45	45	45	10	10	7	7
	max.	60	60	60	60	60	60	60	60	60	60	60	60	60	60	150	250	10	10
V	min.	300	250	300	250	250	250	250	150	350	150	250	350	350	350			100	100
	max.	400	500	400	500	500	500	500	200	400	200	500	40	40	40	500	500	120	120
s	min.	0,2	0,1	0,2	0,1	0,1	0,1	0,1	0,1	0,21	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,05	0,05
	max.	0,4	0,5	0,4	0,5	0,5	0,5	0,5	0,5	0,3	0,3	0,5	0,3	0,3	0,3	0,3	0,3	0,08	0,08



		ZX-100K	ZX-100EL63	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324V11T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5T	ZX-750V5KF
α	min.	5	5	5	5	5	5	5	6	3	6	5	5	5	5	10	10	5	5
	max.	10	15	10	10	10	10	10		10	6	10	10	10	10	16	16	10	10
γ	min.	10	10	10	10	10	10	10	5	10	5	10	10	10	10	5	6	5	5
	max.	20	20	20	30	30	30	30	10	20	10	30	30	30	30	20	20	10	10
φ		90	90	90	90	90	90	90	120	90	120	90	90	90	90	130	130	120	120
V	min.	50	50	50	50	50	50	50	80	20	80	50	50	50	50	150	150	80	80
	max.	100	150	100	200	200	200	200	100	80	100	200	20	20	20	200	200	100	100
S	min	0,2	0,1	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,02	0,02
	max.	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,1	0,1

Temperature required during machining [°C]																			
	>Ø 60mm	-	-	80	-	-	-	120	120	-	100	100	100	-	100	-	-	-	150
	>Ø 80mm	80	-	120	120	120	-	-	-	100	-	-	-	-	-	-	-	150	-



		ZX-100K	ZX-100EL63	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324V11T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5T	ZX-750V5KF
α	min.	5	10	5	5	5	5	5	15	2	15	5	5	5	5	5	5	2	2
	max.	15	20	15	15	15	15	15	30	10	30	15	15	15	15	15	15	5	5
γ	max.	5	5	5	6	6	6	6	6	1	6	6	6	6	6	5	5	0	0
	max.	15	15	15	10	10	10	10	10	5	10	10	10	10	10	15	15	5	5
V	min.	250	250	250	250	250	250	250	80	250	80	250	250	250	250	250	250	90	90
	max.	500	500	500	500	500	500	500	100	500	500	500	500	500	500	500	500	100	100

Tools made of tungsten carbide, diamond, ceramic				X							X							X	X
No use water-soluble coolants *										X	X								

* If the use of cooling emulsions can not be renounced, the workpieces, after machining, should be cleaned with the use of isopropanol and subsequent rinsing with water.

α [°] (End) clearance angle
γ [°] (Back) rake angle
χ [°] Toll cutting-edge angle
φ [°] Point angle
t [mm] Pitch
S [mm^{-1}] Feed
V [m/min] Cutting speed

Table 3: machining guideline

Machines

When machining the ZEDEX® high performance plastic, very low specific cutting forces are to be used. To machine the ZEDEX® high performance plastic, a smaller input of power than a similar metal part is required. The wood and light metal high-speed machines, can be used to machine the ZEDEX® high performance plastic. These machines permit a high processing speed with low feed rate and large rake angle. In the plastic processing, these parameters are required, to avoid the break and to keep as low as possible the heat transfer.

Tool to cut thin-walled parts off

Tools

All tools used in the plastic processing, must be very sharp and smooth and have a large machining angle. However the sharpness shouldn't be too accented. With tools with too narrow rake angle and without a sufficiently large relief angle, the shavings tend to melt and to hang on the components. Steel tools are not suitable for the ZEDEX® high performance plastic. To reach an economical working time, we recommend tools made of HSS (High Speed Steel). If big quantities are produced, it is recommended to use tools made of HM (carbide tipped). Very tight tolerances in a large-scale manufacturing, can be reached by the use of diamond tools. Fibre reinforced ZEDEX® high performance polymers should always worked with diamond tools.

Tool selection guide:

– SS Class EV 4,
– EV 4 Co,
– E Mo 5 V3
– HM from K 10 to K 40

The tools, that have previously worked on metals, are basically to re-sharpen, before using them with a ZEDEX® high performance polymer.

Milling tools for the plastic processing

Cooling

If the ZEDEX® high performance plastics are warmed through an excessive heat, this may generate spreading or burning of the workpiece, or the overheating of tools. Therefore, during the machining of the workpieces, the heat should be dissipated. The best dissipation of heat is achieved over the chip. In addition a jet of compressed air, that also pulls the shavings away, can be used. With conventional soluble oils, a higher feed rate and better surfaces quality can be achieved. Material from the ZEDEX® 410 family, cannot be cooled by the use of emulsions, but just with air and water. If the use of cooling emulsions can not be renounced, its residue must be completely removed after the machining. At best this can be done, with the use of isopropanol and subsequent rinsing with water. To avoid a subsequent deburring process, it is recommended to round the tools´ edges off.

Sawing

The band saw cut speed should be between 8–25 m/s, to avoid, with a lower speed, the creation of frayed cuttings.

As tool material only metal or carbide tipped circular, for saw blades with a large enough tooth set, should be used. The cleanest cut surfaces are obtained, when

Carbide tipped saw blade

the saw blade protrudes just few millimetres over the ZEDEX® high performance polymer sheet and when its process is rapid. To avoid tears, with some of the ZEDEX® high performance polymer, it is necessary to warm-up both the polymer and the saw blade (see table 3, page 26). To obtain a better cut, it is recommended to use, a saw blade with a pitch from 4 to 6 mm.

Grinding, polishing

Generally the ZEDEX® high performance polymers can be grinded and polished. Attention have to be paid, to do not operate too high contact pressure and thus a high frictional heat on the surface. To grind a workpiece can be used commercial abrasive belts and grinding discs, possible with a coarse grain size. A sufficient quantity of coolant should be used to avoid that the plastic particles close the workpiece´s pores. However, it is always better using grinding discs with a coarse grain.

Drilling

To drill a ZEDEX® high performance polymer is suitable a HSS (High Speed Steal)-drill bits according to DIN 1412, which is also valid in the metal processing.

To avoid heat accumulation, spreading of material and cracks in doing deep holes, the drill bit should be cooled, often ventilated and the shavings should be removed. A guided pin twist-drill is used for holes bigger than 30 mm. A circle cutter can be used just for thin sheets.

It is recommended to pre-drill (ca. 10–20 mm) the sheets, if a big hole is required. To make holes in full material, it is necessary to use a properly sharpened drill and a warmed-up plastic. The warm-up temperatures and times are in the table 3 on page 26. Non-observance of these parameters leads to a risk of injury and breaks.

Deep holes, over 50 mm in diameter, are at best executed pre-drilling the workpiece, and then using a spotfacing and counterboring tool of the company "Rasmuc" e.g., or with a drill head of the company "Wohlhaupter".

Precision drilling holes are obtainable with two drill operations; that means pre-drill, cooling, and make the end drill hole.

HSS twist drills

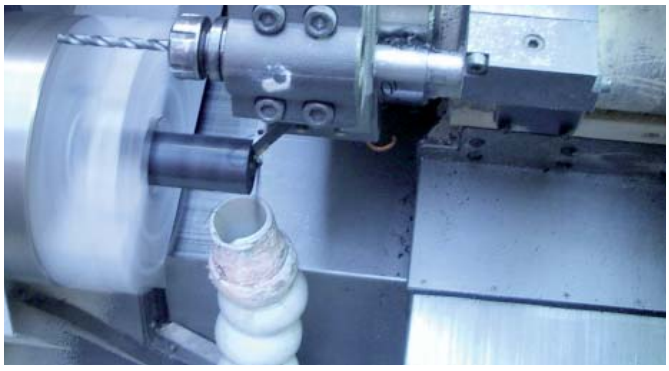
Lathe turning

Continuous chip during lathe turning

During the lathe turning process the ZEDEX® high performance polymers should be worked with a large chip cross section removal and high feed rate speed. To obtain a high quality surface, the cutting should be done in one operation.

Therefore, the workpiece outline and the surface quality should be obtained in one operation. To make internal bores, the normal internal boring tools of metal are usable. Care should only be taken in the creation of a continuous nozzle chip. For high quality internal bores, special drill bits, with a helix angle of 15° are prefered.

When cutting a thin-walled workpiece a flat ground blade tool should be used. A continuous chip, created from the most of ZEDEX® high performance polymers, is to be removed with an industrial vaccuum system provide of a pre-filter. When a big lathe turning length is required, the workpiece should be cuted by a lathe steady rest.



A flexible vacuum hose

Cutting

Sheets made of ZEDEX® high performance polymer are cutable with a plate shear.

Milling

To dissipate the milling machining overheat, it is suggestible to choose the largest possible milling stressed cross section. This process is obtainable with a high feed rate, a large depth and a not to high cutting speed.

In peripheral milling, the surface quality of the ZEDEX® high performance polymers, depends on the main cutting edge. This is influenced by the cutting geometry and especially by the feed rate. The greatest surface quality is achievable with a single-edged cutter tool. The more cut edges a multi-edge cutting tool has got, the more comma-shaped chips have to be eliminate. To obtain injection moulding gears with a high teeth quality, must be used a hob cutter in the final process.

Filing, rasping, scraping

Filing with rough-hewn wood rasps is well-tried, but filing with a file blades represents an advantage. They have got holes on their surface, that permit the shavings to escape from the workpiece surface. Thus, the lubrication of the workpiece's surface is prevented. Thanks to its design, to remove the shavings from the file blade, it is enough to tap it.

To obtain a smooth workpiece surface, it is better to use a card scraper than a file or a rasp. With a card scraper is also possible to eliminate sharp edges from the plastic workpiece. A necking tool or a three cornered scraper will be used as scraper tool, to prepare the workpiece for welded joints. To scrape fillet welds, a tool with a minimum radius of 2 mm is recommended; so as to avoid the generation of notch stresses.

Reaming

Very tight bore tolerances are obtainable by reaming with a reamer according to DIN 206, DIN 212, DIN 219. A minimum machining allowance of 0.1 mm has to be planned, because of the plastic elastic behaviour. If the machining allowance is too low, when the workpieces are reamed, no material will be removed and the workpiece will be warped. After a certain time the workpiece will return to the original shape, because during machining the yield strength will not be exceed.

Planing

Thickness planing machine

The ZEDEX® high performance polymers can be machined by woodworking machinery, e.g. a surface and a thickness planer, and as well by metalworking machinery, e.g. a shaping and a planing machine. In any case coarse grinding wheels should be used.

Thread cutting

Tap drill holes for screw threads up to M8 and bigger than M10, should have respectively a diameter dimension ca. 0,1 mm and ca. 0,2 mm, bigger than the metal´s one. Is also possible thread cutting with "taps and dies".

Thread cutting with a threading tap

The metal taps can be used with our polymers. To reinforce eventual connection threads, metal inserts should be placed into the workpiece by screwing it or by ultrasounds.

The thread of a motion screw, should be made with the reachable smoothest surface. In this case is recommended to use a tool bit on a lathe as last processing operation, with a low cutting-step of ca. 0,05 mm.

Knurling

Radial or axial wheel or double-wheel tools, can be used to knurl the ZEDEX® high performance polymers.

Stamping (Hot forming)

Only thin-walled workpieces, up to 1,5 mm, can be stamped. A warm-up of the workpiece is necessary.

Burr removing

The burrs can be removed by a sharp pipecutter, or by a nitrogen burr removal machine.

Burr removing using a burring blade

With a large-scale manufacturing is a nutshell as abrasive material suitable, for a trumbel finishing.

Tolerances for machined finished parts

Plastics are subject to different physical laws respect the metals. Thermal expansion up to 10 times bigger, lower stiffness, moisture absorption, anisotropy, post- shrinkage and warping due to stress relaxation, lead to higher manufacturing tolerances. Generally the IT-tolerance from 9 to 12 are used. The IT-tolerance ranges of 7 and 8 are available in special cases.

General tolerances (for dimensions without individual tolerance designations)

For mechanical engineering technical parts have to be chosen the red tolerance classes in the table 4. In special cases can be used also a higher tolerance grade. However, we recommend to adapt the general tolerance to the table.

Permissible deviations for external radii and chamfer heights

Tolerance class	Ranges of nominal lengths [mm]		
	0,5 to 3	over 3 to 6	over 6
f (fine) m (medium)	± 0,2	± 0,5	± 1,0
c (coarse) v (very coarse)	± 0,4	± 1,0	± 2,0

Permissible deviations of angular dimensions

Tolerance class	Permissible deviations for ranges of nominal lengths of the shorter side of the angle concerned [mm]				
	to 10	over 10 to 50	over 50 to 120	over 120 to 400	over 400
f (fine) m (medium)	± 1°	± 30‘	± 20‘	± 10‘	± 5‘
c (coarse)	± 1° 30‘	± 1°	± 30‘	± 15‘	± 10‘
v (very coarse)	± 3°	± 2°	± 1°	± 30‘	± 20‘

General tolerances on straightness and flatness

Tolerance class	Ranges of nominal lengths [mm]					
	to 10	over 10 to 30	over 30 to 100	over 100 to 300	over 300 to 1000	over 1000 to 3000
H	0,02	0,05	0,1	0,2	0,3	0,4
K	0,05	0,1	0,2	0,4	0,6	0,8
L	0,1	0,2	0,4	0,8	1,2	1,6

Permissible deviations for linear dimensions except for broken edges

Tolerance class	Ranges of nominal lengths [mm]							
	0,5 to 3	over 3 to 6	over 6 to 30	over 30 to 120	over 120 to 400	over 400 to 1000	over 1000 to 2000	over 2000 to 4000
f (fine)	± 0,05	± 0,05	± 0,1	± 0,15	± 0,2	± 0,3	± 0,5	-
m (medium)	± 0,1	± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2,0
c (coarse)	± 0,15	± 0,2	± 0,5	± 0,8	± 1,2	± 2,0	± 3,0	± 4,0
v (very coarse)	-	± 0,5	± 1,0	± 1,5	± 2,5	± 4,0	± 6,0	± 8,0

Table 4: permissible deviations and general tolerances

Achievable lathe turning and milling tolerances

Depending on the production complexity, there are differences between normal, accurate and precise manufacturing. The diagrams in figure 5, shows the achievable tolerances by turning and milling. The achievable tolerances of the normal manufacturing are generally enough for mechanical engineering technical parts. The accurate manufacturing increases the machining costs of ca. 200 %. The precise manufacturing tolerances are to be applied only in exceptional cases, because they increase the processing costs of 800 % and they are, generally, not necessary. A continuous observance of the precision manufacturing tolerances, implies multiple intermediate annealing processes, relaxation storing, fully air-conditioned production equipment und these operations must be done only by expert operators. The ZEDEX® high performance polymers are classified into four tolerance categories. Materials of the category A, can be machined with more precision than the materials of the category D.

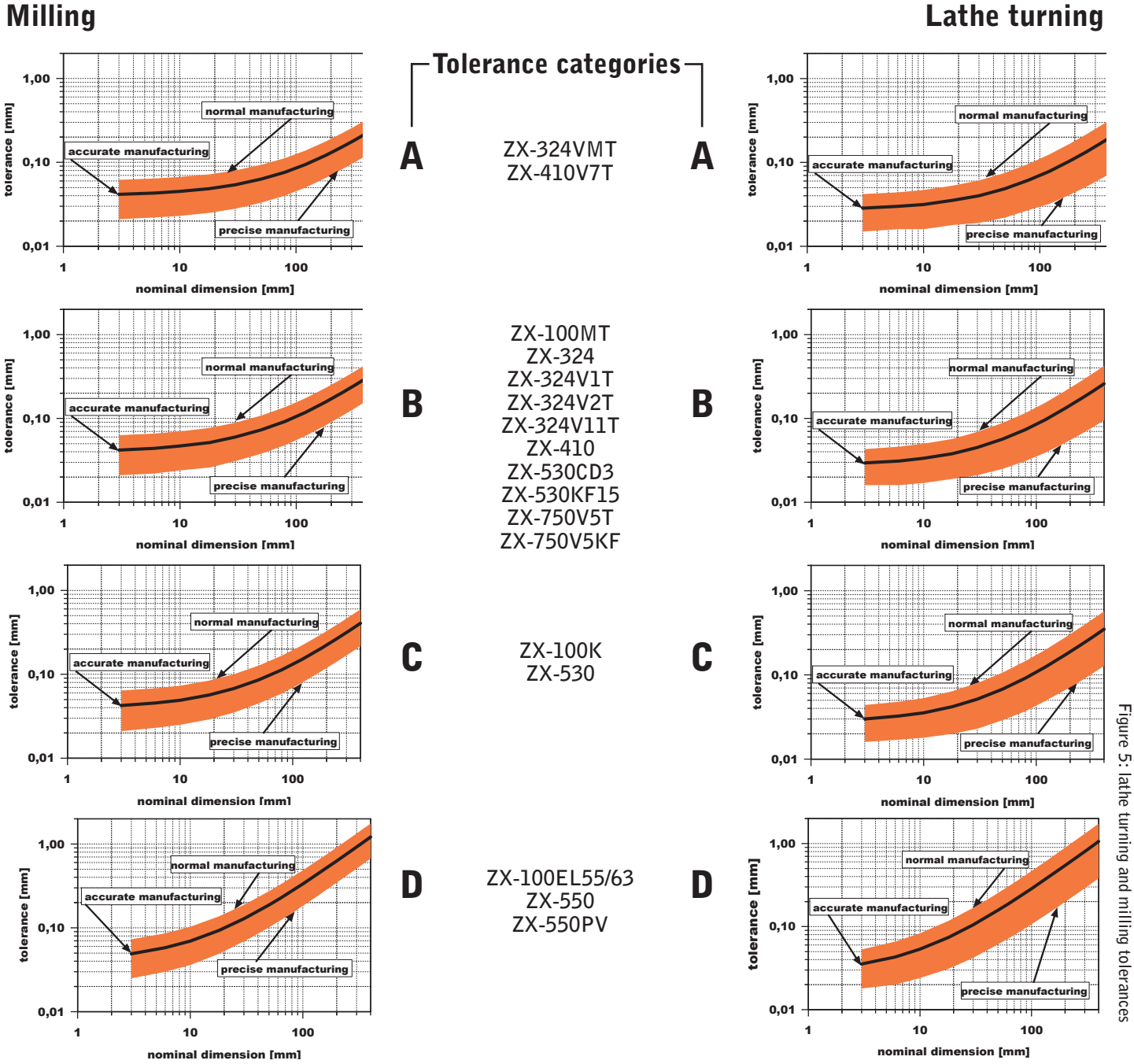
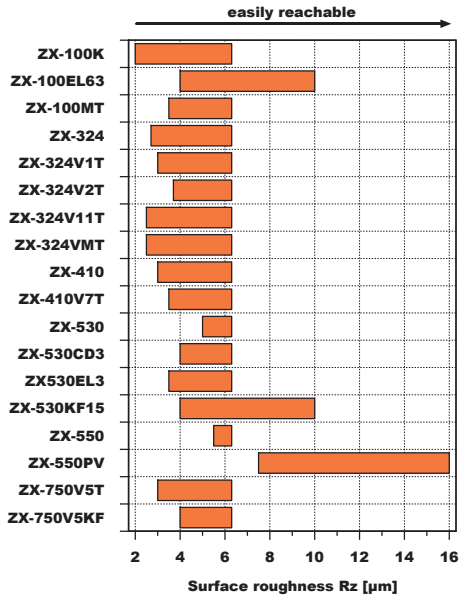


Figure 5: lathe turning and milling tolerances

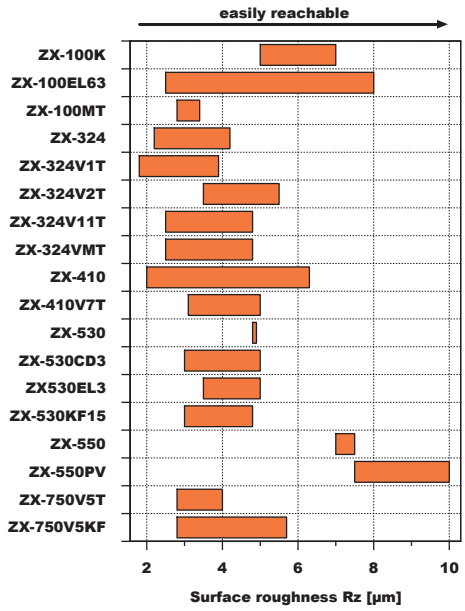
Achievable surface roughness

The achievable surface roughness depends on the machining and on the material properties as well. For mechanical engineering technical parts, generally the simply achievable surface roughness, is suitable. The tighter achievable surface roughness, obtainable with special procedures and equipments, should be used only in exceptional cases. From a tribological point of view, a metal sliding partner surface roughness should be smoother than a polymer´s one. An eventual lubrication would not have much effect on polymers surfaces roughness. To reduce the friction and the wear, the sliding parts should both have the direction of lay of the cutting blade, parallel to the orientation of the sliding movement. The plastics surfaces roughness have normally got a sufficient Rz value of 10 µm, and a value of 6,3 µm for the high-quality surfaces. Tighter values only in special cases. ■

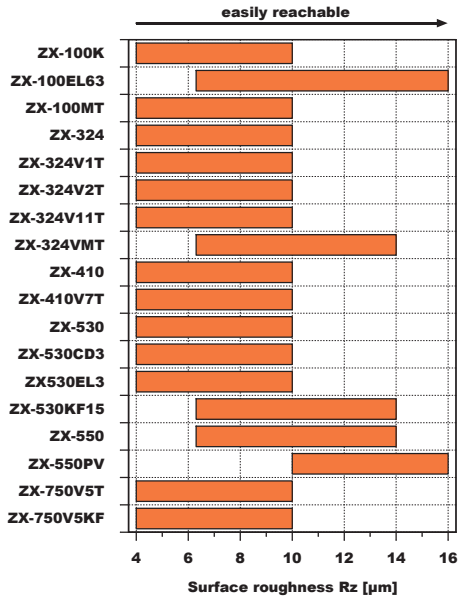
Lathe turning



Polishing



Milling



Planing/Sawing

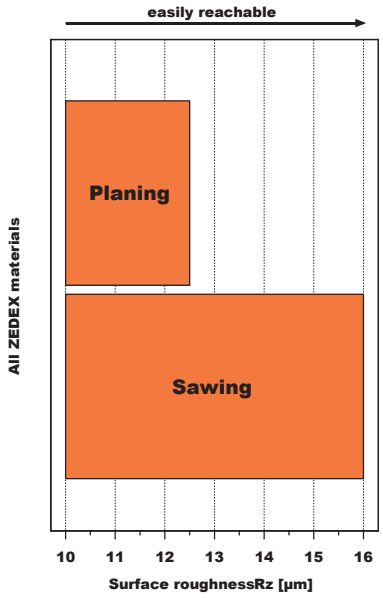


Figure 6: roughness as a fuction of the machining process

Shipping overview

Shipping overview of plastic granules

Standard Compounds

The following ZEDEX® Standard Compounds are suitable for injection moulding and are normally in stock.

Materia identification	Material code			Colour	Melt temperature [°C]	Shrinkage values [%]	
						length-wise	cross-wise
ZX-100A*	A	1	A	white	250	0,37	0,37
ZX-100EL55	A	1	F	black	210	1,73	1,84
ZX-100EL63	A	1	G	black	210	1,89	1,93
ZX-100MT	A	1	T	white	250	2,23	1,84
ZX-324	A	3	A	beige	340	0,43	0,82
ZX-324V1T	A	3	H	beige	340	0,69	0,45
ZX-324V2T	A	3	F	beige	340	1,22	1,52
ZX-324V11T	A	3	L	black	340	0,5	0,54
ZX-324VMT	A	3	B	anthracite	340	0,43	0,76
ZX-410	A	4	A	yellow	320	0,67	0,7
ZX-410V7T	A	4	T	black	315	0,13	0,26
ZX-530	A	5	D	beige	320	0,5	0,5
ZX-530CD3	A	5	I	anthracite	320	0,5	0,61
ZX-530EL3	0	6	6	beige	320	0,91	1,0
ZX-530KF15	A	5	M	grey	320	0,32	0,41
ZX-750V5T	A	9	T	yellow	390	1,24	1,28
ZX-750V5KF	0	5	5	green	390	0,07	0,19

Table 5: shipping overview - Standard compounds

The granules are available in sacks of 5kg , 10kg, 25kg and also 500Kg. Other quantities on request.
Attention is to be paid for existing moulds, in fact the different processing parameters and the material shrinkage must be taken into account.
Generally, for this process a hopper and an excellent material dryer is required. Ask for our guide for the injection moulding process.

Construction of the item number (order number)

Granules	Material code see Tab.6	general final digits
G R N	A 4 A	E 0 1

Example: plastic granules of ZX-410

Special Compounds

We produce special compounds based on PEEK, PPS, PEI, TPi or PEK polymers, following your formulation or the material's characteristics desired. When the material's properties are not known, we analyze the service conditions of your components and we prepare the suitable formulation. In most of the cases we can manufacture, as test piece for the first tests, semi-finished products or machined prototypes, before proceeding to the realization of the mould. When injection mould prototypes are required, we can manufacture a pre-production with aluminium moulds. Thanks to our experience, we can specifically influence the base polymers in their properties and test their changes by laboratory tests.

Through the property changes, we can

– improve friction and wear behaviour
– increase stiffness and strength, especially at high temperatures
– improve the precision by reducing the thermal expansion coefficient
– increase elasticity and mechanical damping
– improve the diffusion resistance
– increase the thermal and / or electrical conductivity (antistatic modified)
– achieved antibacterial effect
– set up the colour
– reduce the costs.

*only for injection moulding, usage with restrictions

Shipping overview of semi-finished products

Material identification	Material code			Colour	Delivery time	Minimum quantities not in stock products		Sheets	Rods
					Just in time products	minimum length	minimum weight	see page	see page
ZX-100K	A	1	K	white	2–3 weeks	2 m	40 kg	38	42–43
ZX-100EL55	A	1	F	black	2–3 weeks	2 m	40 kg	38	44–45
ZX-100EL63	A	1	G	black	2–3 weeks	2 m	40 Kg	39	46–47
ZX-100MT	A	1	T	white	2–3 weeks	2 m	40 kg	39	48–49
ZX-324	A	3	A	beige	2 weeks	2 m	10 kg	39	50–51
ZX-324V1T	A	3	H	beige	2 weeks	2 m	10 kg	39	52–53
ZX-324V2T	A	3	F	beige	2 weeks	2 m	10 kg	39	54–55
ZX-324V11T	A	3	L	black	2 weeks	2 m	10 kg	on request	56–57
ZX-324VMT	A	3	B	anthracite	4–6 weeks	2 m	10 kg	on request	58–59
ZX-410	A	4	A	yellow	2–3 weeks	2 m	15 kg	40	60–61
ZX-410V7T	A	4	T	black	4–6 weeks	2 m	15 kg	on request	62–63
ZX-530	A	5	D	beige	2–3 weeks	2 m	15 kg	40	64–65
ZX-530CD3	0	3	1	anthracite	4–6 weeks	2 m	15 kg	on request	66–67
ZX-530EL3	0	6	6	beige	4–6 weeks	2 m	15 kg	40	68–69
ZX-530KF15	A	5	M	grey	4–6 weeks	2 m	15 kg	on request	70–71
ZX-550	A	5	L	brown	2–3 weeks	-	5 kg	40	on request
ZX-550PV	A	7	A	green	2–3 weeks	-	5 kg	40	
ZX-750V5T	A	9	T	yellow	4–6 weeks	4 m	10 kg	on request	72–73
ZX-750V5KF	0	5	5	green	4–6 weeks	4 m	10 kg	on request	74–75

Table 6: material code, delivery time, minimum order quantity

Not in stock products, are just in time manufactured. To produce, a minimum order quantity is required. This consists of a minimum length [m] and a minimum weight [kg].

$$\text{minimum order quantity [m]} = \text{minimum length [m]} + \frac{\text{minimum weight [kg]}}{\text{weight per meter [kg/m]}}$$

Please extract the weight per meter from our "Size list of rods and tubes" from page 42!

Example:
ZX-100K , tube Ø 65/35 mm,
minimum quantities (table 6) = 2 m + 40 kg
weight per meter (size list of rods and tubes) (S.42–75) = 3,5 kg/m
minimum order quantity [m] = 2 m + 40 kg/3,5 kg/m = 13,4 m

Construction of the item number (order number)

Rod

Rod			Material code see table 6			Outer diameter in mm x 2		
H	Z	S	A	1	K	0	4	4

Example: rod made of ZX-100K, Ø 22 mm

Tube

Tube			Material code see table 6			Outer diameter [mm]			Inner diameter [mm]		
H	Z	R	A	1	K	1	3	0	0	4	0

Example: rod made of ZX-100K, Ø outer 130 mm , Ø inner 40 mm

Sheet

Sheet			Material code see table 6			Thickness in mm x 2			Width 02 = 120 mm 03 = 390 mm 06 = 600 mm 01 = 1000 mm 05 = 1500 mm		Length 1=1000 mm 2=2000 mm 3=1500 mm
H	Z	P	A	1	K	0	0	8	0	1	2

Example: sheets made of ZX-100K, thickness 4 mm, width 1000 mm, length 2000 mm

Size list of sheets

Dimensions types

Product in stock
Normally available in stock

Just in time product
Available from 2011

Material	Thickness [mm]			Width [mm]			Length [mm]			Theo-retical weight	Item number
Identifica-tion	nominal size	minimum	maximum	nominal size	minimum	maximum	nominal size	minimum	maximum	[kg/ piece]	
Beispiel 1	15	15,3	17	625	630	640	2000	2000	2015	29,1	HZPA1K030062
Beispiel 2	20	20,3	22	625	630	640	2000	2000	2015	38,1	HZPA1K040062
Beispiel 3	20	20,3	22	1000	1000	1030	2000	2000	2015		
Beispiel 4	25	25,3	27	610	615	625	2000	2000	2015	44,6	HZPA1K050062
Beispiel 5	25	25,3	27	1000	1000	1030	2000	2000	2015		
Beispiel 6	30	30,5	33	610	615	625	2000	2000	2015	55,3	HZPA1K060062
Beispiel 7	30	30,5	33	1000	1000	1030	2000	2000	2015		
Beispiel 8	35	35,5	38	610	615	625	2000	2000	2015	65,8	HZPA1K070062
Beispiel 9	40	40,5	43	610	615	625	2000	2000	2015	71,2	HZPA1K080062
Beispiel 10	40	40,5	43	1000	1000	1030	2000	2000	2015		
Beispiel 11	45	45,5	48	610	615	625	2000	2000	2015	81,9	HZPA1K090062
			53	610	615	625			2015	88,2	HZPA1K100062

Example size list, extract from "Size list of sheets"

Length tolerance

Length	Length tolerance
≤ 1500 mm	+0 bis + 10 mm
≤ 2000 mm	+ 0 bis + 15 mm

Perpendicularity

The sheets are cutted perpendicular and have got smooth cut surfaces. The admissible tolerance for ranges of nominal lengths of the shorter side is 1,5 mm per 1000 mm.

Special sizes

Cut-to-size pieces, as well as special sizes and additional machining are on request available (see also page 76). Sheets with a length of 3000 mm are available on request.

Size list of sheets

Material	Thickness [mm]			Width [mm]			Length [mm]			Theo-retical weight	Item number
Identifica-tion	nominal size	minimum	maximum	nominal size	minimum	maximum	nominal size	minimum	maximum	[kg/ piece]	
ZX-100K	2	1,8	2,2	1000	1000	1030	2000	2000	2015	5,7	HZPA1K004012
ZX-100K	2,5	2,3	2,7	1000	1000	1030	2000	2000	2015	7,4	HZPA1K005012
ZX-100K	3	2,8	3,2	1000	1000	1030	2000	2000	2015	8,7	HZPA1K006012
ZX-100K	4	3,8	4,2	1000	1000	1030	2000	2000	2015	11,9	HZPA1K008012
ZX-100K	5	4,75	5,2	1000	1000	1030	2000	2000	2015	14,7	HZPA1K010012
ZX-100K	6	5,7	6,3	1000	1000	1030	2000	2000	2015	17,6	HZPA1K012012
ZX-100K	8	8,2	8,9	1000	1000	1030	2000	2000	2015	25,1	HZPA1K016012
ZX-100K	10	10,2	11,2	625	630	640	2000	2000	2015	20,5	HZPA1K020062
ZX-100K	12	12,3	14	625	630	640	2000	2000	2015	25,9	HZPA1K024062
ZX-100K	15	15,3	17	625	630	640	2000	2000	2015	29,1	HZPA1K030062
ZX-100K	20	20,3	22	625	630	640	2000	2000	2015	38,1	HZPA1K040062
ZX-100K	20	20,3	22	1000	1000	1030	2000	2000	2015	54,0	HZPA1K040012
ZX-100K	25	25,3	27	610	615	625	2000	2000	2015	44,6	HZPA1K050062
ZX-100K	25	25,3	27	1000	1000	1030	2000	2000	2015	67,5	HZPA1K050012
ZX-100K	30	30,5	33	610	615	625	2000	2000	2015	55,3	HZPA1K060062
ZX-100K	30	30,5	33	1000	1000	1030	2000	2000	2015	81,0	HZPA1K060012
ZX-100K	35	35,5	38	610	615	625	2000	2000	2015	65,8	HZPA1K070062
ZX-100K	40	40,5	43	610	615	625	2000	2000	2015	71,2	HZPA1K080062
ZX-100K	40	40,5	43	1000	1000	1030	2000	2000	2015	108,0	HZPA1K080012
ZX-100K	45	45,5	48	610	615	625	2000	2000	2015	81,9	HZPA1K090062
ZX-100K	50	50,5	53	610	615	625	2000	2000	2015	88,2	HZPA1K100062
ZX-100K	60	60,5	63,5	610	615	625	2000	2000	2060	111,7	HZPA1K120062
ZX-100K	70	70,5	73,5	610	615	625	2000	2000	2060	129,3	HZPA1K140062
ZX-100K	80	80,5	85	610	615	625	2000	2000	2060	146,9	HZPA1K160062
ZX-100K	90	90,5	95	610	615	625	2000	2000	2060	166,26	HZPA1K180062
ZX-100K	100	101	105	610	615	625	2000	2000	2060	181,9	HZPA1K200062
ZX-100K	120	120	125	320	320	325	1000	1000	1030	51,84	HZPA1K240011
ZX-100EL55	6	5,7	6,3	370	370	380	2000	2000	2015	5,3	HZPA1F012032
ZX-100EL55	8	8,2	8,9	370	370	380	2000	2000	2015	7,1	HZPA1F016032
ZX-100EL55	10	10,3	11,5	370	370	380	2000	2000	2015	8,9	HZPA1F020032
ZX-100EL55	15	15,3	11,5	370	370	380	2000	2000	2015	13,3	HZPA1F030032
ZX-100EL55	20	20,3	22	370	370	380	2000	2000	2015	17,8	HZPA1F040032
ZX-100EL55	24	24,3	26	120	120	125	2000	2000	2015	6,9	HZPA1F048022
ZX-100EL55	26	26,5	28	370	370	380	2000	2000	2015	23,1	HZPA1F052032
ZX-100EL55	32	32,5	35	370	370	380	2000	2000	2015	28,4	HZPA1F064032

Product in stock
Just in time product

Size list of sheets

Material	Thickness [mm]			Width [mm]			Length [mm]			Theo-retical weight	Item number
Identification	nominal size	minimum	maximum	nominal size	minimum	maximum	nominal size	minimum	maximum	[kg/ piece]	
ZX-100EL63	6	5,7	6,3	370	370	380	2000	2000	2015	5,5	HZPA1G012032
ZX-100EL63	8	8,2	8,9	370	370	380	2000	2000	2015	7,3	HZPA1G016032
ZX-100EL63	10	10,3	11,5	370	370	380	2000	2000	2015	9,1	HZPA1G020032
ZX-100EL63	15	15,3	11,5	370	370	380	2000	2000	2015	13,7	HZPA1G030032
ZX-100EL63	20	20,3	22	370	370	380	2000	2000	2015	18,2	HZPA1G040032
ZX-100EL63	24	24,3	26	120	120	125	2000	2000	2015	7,1	HZPA1G048022
ZX-100EL63	26	26,5	28	370	370	380	2000	2000	2015	23,7	HZPA1G052032
ZX-100EL63	32	32,5	35	370	370	380	2000	2000	2015	29,1	HZPA1G064032
ZX-100MT	6	5,7	6,3	370	370	380	2000	2000	2015	6,6	HZPA1T012032
ZX-100MT	8	8,2	8,9	370	370	380	2000	2000	2015	8,8	HZPA1T016032
ZX-100MT	10	10,3	11,5	370	370	380	2000	2000	2015	11,0	HZPA1T020032
ZX-100MT	15	15,3	11,5	370	370	380	2000	2000	2015	16,5	HZPA1T030032
ZX-100MT	20	20,3	22	370	370	380	2000	2000	2015	22,1	HZPA1T040032
ZX-100MT	24	24,3	26	120	120	125	2000	2000	2015	8,6	HZPA1T048022
ZX-100MT	26	26,5	28	370	370	380	2000	2000	2015	28,7	HZPA1T052032
ZX-100MT	32	32,5	35	370	370	380	2000	2000	2015	35,3	HZPA1T064032
ZX-324	6	5,7	6,3	370	370	380	2000	2000	2015	5,8	HZPA3A012032
ZX-324	8	8,2	8,9	370	370	380	2000	2000	2015	7,8	HZPA3A016032
ZX-324	10	10,3	11,5	370	370	380	2000	2000	2015	9,7	HZPA3A020032
ZX-324	15	15,3	11,5	370	370	380	2000	2000	2015	14,5	HZPA3A030032
ZX-324	20	20,3	22	370	370	380	2000	2000	2015	19,4	HZPA3A040032
ZX-324	24	24,3	26	120	120	125	2000	2000	2015	7,5	HZPA3A048022
ZX-324	26	26,5	28	370	370	380	2000	2000	2015	25,2	HZPA3A052032
ZX-324	32	32,5	35	370	370	380	2000	2000	2015	31,0	HZPA3A064032
ZX-324V1T	6	5,7	6,3	370	370	380	2000	2000	2015	5,9	HZPA3H012032
ZX-324V1T	8	8,2	8,9	370	370	380	2000	2000	2015	7,9	HZPA3H016032
ZX-324V1T	10	10,3	11,5	370	370	380	2000	2000	2015	9,8	HZPA3H020032
ZX-324V1T	15	15,3	11,5	370	370	380	2000	2000	2015	14,8	HZPA3H030032
ZX-324V1T	20	20,3	22	370	370	380	2000	2000	2015	19,7	HZPA3H040032
ZX-324V1T	24	24,3	26	120	120	125	2000	2000	2015	7,7	HZPA3H048022
ZX-324V1T	26	26,5	28	370	370	380	2000	2000	2015	25,6	HZPA3H052032
ZX-324V1T	32	32,5	35	370	370	380	2000	2000	2015	31,5	HZPA3H064032
ZX-324V2T	6	5,7	6,3	370	370	380	2000	2000	2015	5,9	HZPA3F012032
ZX-324V2T	8	8,2	8,9	370	370	380	2000	2000	2015	7,9	HZPA3F016032
ZX-324V2T	10	10,3	11,5	370	370	380	2000	2000	2015	9,8	HZPA3F020032
ZX-324V2T	15	15,3	11,5	370	370	380	2000	2000	2015	14,8	HZPA3F030032
ZX-324V2T	20	20,3	22	370	370	380	2000	2000	2015	19,7	HZPA3F040032
ZX-324V2T	24	24,3	26	120	120	125	2000	2000	2015	7,7	HZPA3F048022
ZX-324V2T	26	26,5	28	370	370	380	2000	2000	2015	25,6	HZPA3F052032
ZX-324V2T	32	32,5	35	370	370	380	2000	2000	2015	31,5	HZPA3F064032

Product in stock
Just in time product

Size list of sheets

Material	Thickness [mm]			Width [mm]			Length [mm]			Theo-retical weight	Item number
Identification	nominal size	minimum	maximum	nominal size	minimum	maximum	nominal size	minimum	maximum	[kg/ piece]	
ZX-410	6	5,7	6,3	370	370	380	2000	2000	2015	5,9	HZPA4A012032
ZX-410	8	8,2	8,9	370	370	380	2000	2000	2015	7,9	HZPA4A016032
ZX-410	10	10,3	11,5	370	370	380	2000	2000	2015	9,8	HZPA4A020032
ZX-410	15	15,3	11,5	370	370	380	2000	2000	2015	14,8	HZPA4A030032
ZX-410	20	20,3	22	370	370	380	2000	2000	2015	19,7	HZPA4A040032
ZX-410	24	24,3	26	120	120	125	2000	2000	2015	7,7	HZPA4A048022
ZX-410	26	26,5	28	370	370	380	2000	2000	2015	25,6	HZPA4A052032
ZX-410	32	32,5	35	370	370	380	2000	2000	2015	31,5	HZPA4A064032
ZX-530	6	5,7	6,3	370	370	380	2000	2000	2015	6,7	HZPA5D012032
ZX-530	8	8,2	8,9	370	370	380	2000	2000	2015	8,9	HZPA5D016032
ZX-530	10	10,3	11,5	370	370	380	2000	2000	2015	11,2	HZPA5D020032
ZX-530	15	15,3	11,5	370	370	380	2000	2000	2015	16,8	HZPA5D030032
ZX-530	20	20,3	22	370	370	380	2000	2000	2015	22,3	HZPA5D040032
ZX-530	24	24,3	26	120	120	125	2000	2000	2015	8,7	HZPA5D048022
ZX-530	26	26,5	28	370	370	380	2000	2000	2015	29,1	HZPA5D052032
ZX-530	32	32,5	35	370	370	380	2000	2000	2015	35,8	HZPA5D064032
ZX-530EL3	6	5,7	6,3	370	370	380	2000	2000	2015	5,7	HZP066012032
ZX-530EL3	8	8,2	8,9	370	370	380	2000	2000	2015	7,7	HZP066016032
ZX-530EL3	10	10,3	11,5	370	370	380	2000	2000	2015	9,6	HZP066020032
ZX-530EL3	15	15,3	11,5	370	370	380	2000	2000	2015	14,4	HZP066030032
ZX-530EL3	20	20,3	22	370	370	380	2000	2000	2015	19,2	HZP066040032
ZX-530EL3	24	24,3	26	120	120	125	2000	2000	2015	7,5	HZP066048022
ZX-530EL3	26	26,5	28	370	370	380	2000	2000	2015	25	HZP066052032
ZX-530EL3	32	32,5	35	370	370	380	2000	2000	2015	30,8	HZP066064032
ZX-550	5	5	6	1500	1500	1510	1500	1500	1510	20,9	HZPA5L010053
ZX-550	40	40	44	1500	1500	1510	1500	1500	1510	167,4	HZPA5L080053
ZX-550PV	5	5	6	1500	1500	1510	1500	1500	1510	23.2	HZPA7A010053
ZX-550PV	40	40	44	1500	1500	1510	1500	1500	1510	185,4	HZPA7A080053

Product in stock
Just in time product

Size list of rods and tubes

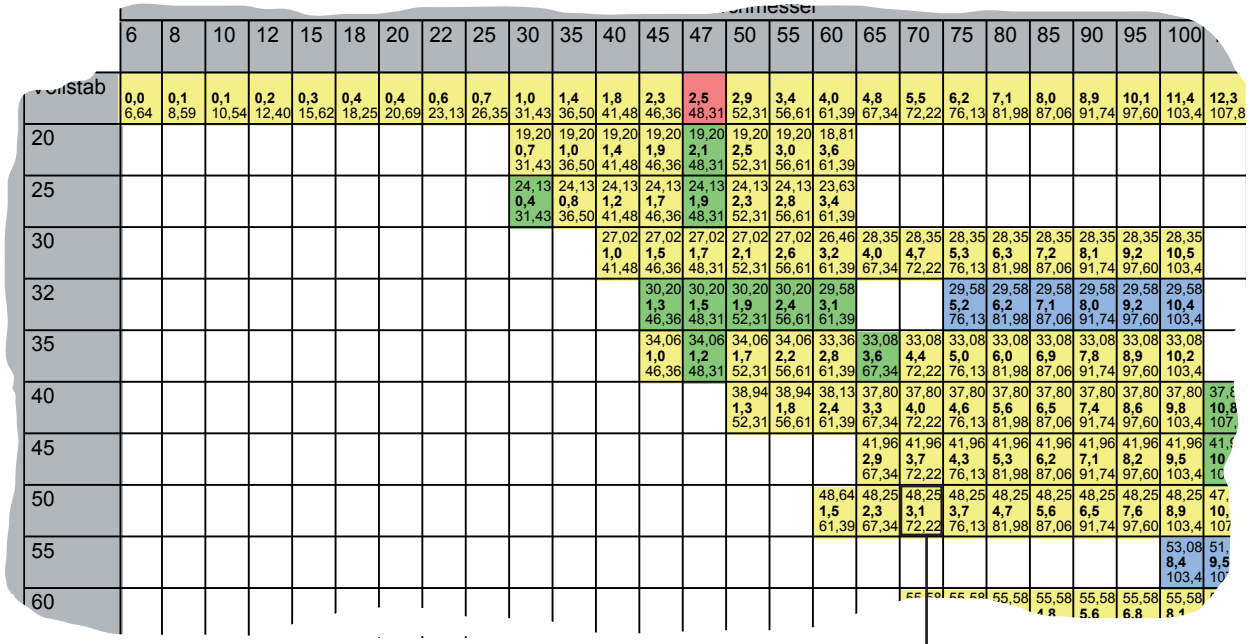
Dimensions types

Product in stock
Normally available in stock

Just in time product
Minimum order quantities and delivery times, see tab.6, page 36

Special product
On request available, min. quantities, ca. 10 weeks delivery time necessary

Scheduled product



Vollstab	6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100
	0,0 6,64	0,1 8,59	0,1 10,54	0,2 12,40	0,3 15,62	0,4 18,25	0,4 20,69	0,6 23,13	0,7 26,35	1,0 31,43	1,4 36,50	1,8 41,48	2,3 46,36	2,5 48,31	2,9 52,31	3,4 56,61	4,0 61,39	4,8 67,34	5,5 72,22	6,2 76,13	7,1 81,98	8,0 87,06	8,9 91,74	10,1 97,60	11,4 103,4	12,3 107,8
20										19,20 0,7 31,43	19,20 1,0 36,50	19,20 1,4 41,48	19,20 1,9 46,36	19,20 2,1 48,31	19,20 2,5 52,31	19,20 3,0 56,61	18,81 3,6 61,39									
25										24,13 0,4 31,43	24,13 0,8 36,50	24,13 1,2 41,48	24,13 1,7 46,36	24,13 1,9 48,31	24,13 2,3 52,31	24,13 2,8 56,61	23,63 3,4 61,39									
30												27,02 1,0 41,48	27,02 1,5 46,36	27,02 1,7 48,31	27,02 2,1 52,31	27,02 2,6 56,61	26,46 3,2 61,39	28,35 4,0 67,34	28,35 4,7 72,22	28,35 5,3 76,13	28,35 6,3 81,98	28,35 7,2 87,06	28,35 8,1 91,74	28,35 9,2 97,60	28,35 10,5 103,4	
32													30,20 1,3 46,36	30,20 1,5 48,31	30,20 1,9 52,31	30,20 2,4 56,61	29,58 3,1 61,39			29,58 5,2 76,13	29,58 6,2 81,98	29,58 7,1 87,06	29,58 8,0 91,74	29,58 9,2 97,60	29,58 10,4 103,4	
35													34,06 1,0 46,36	34,06 1,2 48,31	34,06 1,7 52,31	34,06 2,2 56,61	33,36 2,8 61,39	33,08 3,6 67,34	33,08 4,4 72,22	33,08 5,0 76,13	33,08 6,0 81,98	33,08 6,9 87,06	33,08 7,8 91,74	33,08 8,9 97,60	33,08 10,2 103,4	
40															38,94 1,3 52,31	38,94 1,8 56,61	38,13 2,4 61,39	37,80 3,3 67,34	37,80 4,0 72,22	37,80 4,6 76,13	37,80 5,6 81,98	37,80 6,5 87,06	37,80 7,4 91,74	37,80 8,6 97,60	37,80 9,8 103,4	37,8 10,8 107,
45																		41,96 2,9 67,34	41,96 3,7 72,22	41,96 4,3 76,13	41,96 5,3 81,98	41,96 6,2 87,06	41,96 7,1 91,74	41,96 8,2 97,60	41,96 9,5 103,4	41,9 10 10
50																	48,64 1,5 61,39	48,25 2,3 67,34	48,25 3,1 72,22	48,25 3,7 76,13	48,25 4,7 81,98	48,25 5,6 87,06	48,25 6,5 91,74	48,25 7,6 97,60	48,25 8,9 103,4	47, 10, 107
55																									53,08 8,4 103,4	51, 9,5 10
60																										

Extract from "Size list of rods and tubes"

Dimensions and theoretical weight per meter

minimum hole diameter [mm] →	48,25
theoretical weight per meter [kg/m] →	**3,1**
maximum outer diameter [mm] →	72,22

Length in stock

weight per meter	Length in stock
≤ 20 kg/m	2000 mm
> 20 kg/m	1000 mm

Length tolerance

Outer Ø	Length tolerance
≤ 100 mm	+3 mm
≤ 200 mm	+ 15 mm
≤ 300 mm	+ 25 mm
≤ 300 mm	+ 40 mm

Straightness tolerance

Outer diameter	Permission deviation from a straight line
≤ 45 mm	20 mm
≤ 100 mm	14 mm
> 100 mm	10 mm

Special products

Cut-to-size pieces, special sizes and special lengths are available on request.

Special tolerances

Rods and tubes, up to an outer diameter of 65 mm, can be ground with a tolerance range of 0,06 mm. With additional machining (sawing and planing), special shapes and lower tolerances can be archieved.

Size list of rods and tubes, made of ZX-100K

Outer diameter

Rod	6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
0,0 6,64		**0,1** 8,59	**0,1** 10,54	**0,2** 12,40	**0,3** 15,62	**0,4** 18,25	**0,4** 20,69	**0,6** 23,13	**0,7** 26,35	**1,0** 31,43	**1,4** 36,50	**1,8** 41,48	**2,3** 46,36	**2,5** 48,31	**2,9** 52,31	**3,4** 56,61	**4,0** 61,39	**4,8** 67,34	**5,5** 72,22	**6,2** 76,13	**7,1** 81,98	**8,0** 87,06	**8,9** 91,74	**10,1** 97,60	**11,4** 103,4	**12,3** 107,8	**13,5** 113,0	**14,5** 117,1	**Rod**
20										19,20 **0,7** 31,43	19,20 **1,0** 36,50	19,20 **1,4** 41,48	19,20 **1,9** 46,36	19,20 **2,1** 48,31	19,20 **2,5** 52,31	19,20 **3,0** 56,61	18,81 **3,6** 61,39											20
25										24,13 **0,4** 31,43	24,13 **0,8** 36,50	24,13 **1,2** 41,48	24,13 **1,7** 46,36	24,13 **1,9** 48,31	24,13 **2,3** 52,31	24,13 **2,8** 56,61	23,63 **3,4** 61,39											25
30												27,02 **1,0** 41,48	27,02 **1,5** 46,36	27,02 **1,7** 48,31	27,02 **2,1** 52,31	27,02 **2,6** 56,61	26,46 **3,2** 61,39	28,35 **4,0** 67,34	28,35 **4,7** 72,22	28,35 **5,3** 76,13	28,35 **6,3** 81,98	28,35 **7,2** 87,06	28,35 **8,1** 91,74	28,35 **9,2** 97,60	28,35 **10,5** 103,4				30
32													30,20 **1,3** 46,36	30,20 **1,5** 48,31	30,20 **1,9** 52,31	30,20 **2,4** 56,61	29,58 **3,1** 61,39			29,58 **5,2** 76,13	29,58 **6,2** 81,98	29,58 **7,1** 87,06	29,58 **8,0** 91,74	29,58 **9,2** 97,60	29,58 **10,4** 103,4				32
35													34,06 **1,0** 46,36	34,06 **1,2** 48,31	34,06 **1,7** 52,31	34,06 **2,2** 56,61	33,36 **2,8** 61,39	33,08 **3,6** 67,34	33,08 **4,4** 72,22	33,08 **5,0** 76,13	33,08 **6,0** 81,98	33,08 **6,9** 87,06	33,08 **7,8** 91,74	33,08 **8,9** 97,60	33,08 **10,2** 103,4				35
40															38,94 **1,3** 52,31	38,94 **1,8** 56,61	38,13 **2,4** 61,39	37,80 **3,3** 67,34	37,80 **4,0** 72,22	37,80 **4,6** 76,13	37,80 **5,6** 81,98	37,80 **6,5** 87,06	37,80 **7,4** 91,74	37,80 **8,6** 97,60	37,80 **9,8** 103,4	37,80 **10,8** 107,8	37,80 **12,0** 113,0	37,80 **13,0** 117,1	40
45																		41,96 **2,9** 67,34	41,96 **3,7** 72,22	41,96 **4,3** 76,13	41,96 **5,3** 81,98	41,96 **6,2** 87,06	41,96 **7,1** 91,74	41,96 **8,2** 97,60	41,96 **9,5** 103,4	41,96 **10,5** 107,8	41,96 **11,7** 113,0	41,96 **12,7** 117,1	45
50																	48,64 **1,5** 61,39	48,25 **2,3** 67,34	48,25 **3,1** 72,22	48,25 **3,7** 76,13	48,25 **4,7** 81,98	48,25 **5,6** 87,06	48,25 **6,5** 91,74	48,25 **7,6** 97,60	48,25 **8,9** 103,4	47,25 **10,0** 107,8	47,25 **11,2** 113,0	47,25 **12,2** 117,1	50
55																									53,08 **8,4** 103,4	51,98 **9,5** 107,8	51,98 **10,7** 113,0	51,98 **11,7** 117,1	55
60																			55,58 **2,3** 72,22	55,58 **2,9** 76,13	55,58 **3,8** 81,98	55,58 **4,8** 87,06	55,58 **5,6** 91,74	55,58 **6,8** 97,60	55,58 **8,1** 103,4	54,43 **9,2** 107,8	54,43 **10,4** 113,0	54,43 **11,4** 117,1	60
65																					61,57 **3,1** 81,98	61,57 **4,0** 87,06	61,57 **4,9** 91,74	61,57 **6,1** 97,60	61,57 **7,3** 103,4	60,29 **8,5** 107,8	60,29 **9,7** 113,0	60,29 **10,7** 117,1	65
70																					65,62 **2,6** 81,98	65,62 **3,5** 87,06	65,62 **4,4** 91,74	65,62 **5,5** 97,60	65,62 **6,8** 103,4	64,26 **8,0** 107,8	64,26 **9,2** 113,0	64,26 **10,2** 117,1	70
75																							71,41 **3,5** 91,74	71,41 **4,7** 97,60	71,41 **5,9** 103,4	69,93 **7,2** 107,8	69,93 **8,4** 113,0	69,93 **9,4** 117,1	75
80																							74,31 **3,1** 91,74	74,31 **4,2** 97,60	74,31 **5,5** 103,4	72,77 **6,7** 107,8	72,77 **7,9** 113,0	72,77 **8,9** 117,1	80
85																								81,06 **3,1** 97,60	81,06 **4,4** 103,4	79,38 **5,6** 107,8	79,38 **6,9** 113,0	79,38 **7,9** 117,1	85
90																									85,89 **3,5** 103,4	84,11 **4,8** 107,8	84,11 **6,0** 113,0	84,11 **7,0** 117,1	90
95																													95
100																											93,56 **4,3** 113,0	93,56 **5,3** 117,1	100
105																												101,3 **3,7** 117,1	105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-100K

Outer diameter

Inner diameter / Rod	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
Rod	**16,0** 122,9	**16,8** 125,9	**18,7** 132,7	**19,6** 135,9	**21,8** 143,4	**21,8** 143,4	**24,9** 153,3	**24,27** 151,2	**27,5** 161,1	**27,50** 161,0	**29,19** 165,9	**32,7** 175,5	**34,9** 181,5	**37,9** 188,9	**36,46** 185,4	**42,9** 201,0	**48,4** 213,7										Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40	37,80 **14,5** 122,9	37,80 **15,3** 125,9	37,80 **17,2** 132,7	37,80 **18,1** 135,9	37,80 **20,3** 143,4	38,13 **20,3** 143,4	37,20 **23,5** 153,3	37,20 **22,80** 151,2	37,20 **26,1** 161,1	37,20 **26,03** 161,0	37,20 **27,72** 165,9	37,20 **31,2** 175,5	37,20 **33,5** 181,5	37,20 **36,4** 188,9	37,20 **34,99** 185,4	37,20 **41,4** 201,0											40
45	41,96 **14,2** 122,9	41,96 **14,9** 125,9	41,96 **16,8** 132,7	41,96 **17,7** 135,9	41,96 **20,0** 143,4	41,96 **20,0** 143,4	41,29 **23,1** 153,3	41,29 **22,46** 151,2	41,29 **25,7** 161,1	41,29 **25,69** 161,0	41,29 **27,38** 165,9	41,29 **30,9** 175,5	41,29 **33,1** 181,5	41,29 **36,0** 188,9	41,29 **34,65** 185,4	41,29 **41,0** 201,0											45
50	47,25 **13,7** 122,9	47,25 **14,4** 125,9	47,25 **16,3** 132,7	47,25 **17,2** 135,9	47,25 **19,5** 143,4	47,25 **19,5** 143,4	46,50 **22,6** 153,3	46,50 **21,97** 151,2	46,50 **25,2** 161,1	46,50 **25,21** 161,0	46,50 **26,90** 165,9	46,50 **30,4** 175,5	46,50 **32,6** 181,5	46,50 **35,6** 188,9	46,50 **34,17** 185,4	46,50 **40,6** 201,0	46,50 **46,2** 213,7	46,50 **53,5** 229,3	46,50 **59,3** 241,0								50
55	51,98 **13,2** 122,9	51,98 **13,9** 125,9	51,98 **15,8** 132,7	51,98 **16,7** 135,9	51,98 **19,0** 143,4	51,98 **19,0** 143,4	51,15 **22,2** 153,3	51,15 **21,49** 151,2	51,15 **24,8** 161,1	51,15 **24,72** 161,0	51,15 **26,42** 165,9	51,15 **29,9** 175,5	51,15 **32,2** 181,5	51,15 **35,1** 188,9	51,15 **33,69** 185,4	51,15 **40,1** 201,0		51,15 **53,0** 229,3									55
60	54,43 **12,9** 122,9	54,43 **13,7** 125,9	54,43 **15,5** 132,7	54,43 **16,5** 135,9	54,43 **18,7** 143,4	54,43 **18,7** 143,4	53,57 **21,9** 153,3	53,57 **21,22** 151,2	53,57 **24,5** 161,1	53,57 **24,46** 161,0	53,57 **26,15** 165,9	53,57 **29,6** 175,5	53,57 **31,9** 181,5	53,57 **34,8** 188,9	53,57 **33,42** 185,4	53,57 **39,8** 201,0	53,57 **45,4** 213,7	53,57 **52,7** 229,3	53,57 **58,6** 241,0								60
65	60,29 **12,2** 122,9	60,29 **13,0** 125,9	60,29 **14,8** 132,7	60,29 **15,7** 135,9	60,29 **18,0** 143,4	60,29 **18,0** 143,4	59,33 **21,2** 153,3	59,33 **20,53** 151,2	59,33 **23,8** 161,1	59,33 **23,76** 161,0	59,33 **25,46** 165,9	59,33 **29,0** 175,5	59,33 **31,2** 181,5	59,33 **34,1** 188,9	59,33 **32,73** 185,4	59,33 **39,1** 201,0	59,33 **44,7** 213,7	59,33 **52,0** 229,3	59,33 **57,9** 241,0								65
70	64,26 **11,7** 122,9	64,26 **12,4** 125,9	64,26 **14,3** 132,7	64,26 **15,2** 135,9	64,26 **17,4** 143,4	64,26 **17,4** 143,4	63,24 **20,7** 153,3	63,24 **20,03** 151,2	63,24 **23,3** 161,1	63,24 **23,26** 161,0	63,24 **24,95** 165,9	63,24 **28,4** 175,5	63,24 **30,7** 181,5	63,24 **33,6** 188,9	63,24 **32,22** 185,4	63,24 **38,6** 201,0	63,24 **44,2** 213,7	63,24 **51,5** 229,3	63,24 **57,4** 241,0								70
75	69,93 **10,8** 122,9	69,93 **11,6** 125,9	69,93 **13,5** 132,7	69,93 **14,4** 135,9	69,93 **16,6** 143,4	69,93 **16,6** 143,4	68,82 **19,9** 153,3	68,82 **19,24** 151,2	68,82 **22,5** 161,1	68,82 **22,48** 161,0	68,82 **24,17** 165,9	68,82 **27,7** 175,5	68,82 **29,9** 181,5	68,82 **32,8** 188,9	68,82 **31,44** 185,4	68,82 **37,8** 201,0	68,82 **43,4** 213,7	68,82 **50,8** 229,3	68,82 **56,6** 241,0								75
80	72,77 **10,4** 122,9	72,77 **11,2** 125,9	72,77 **13,1** 132,7	72,77 **14,0** 135,9	72,77 **16,2** 143,4	72,77 **16,2** 143,4	71,61 **19,5** 153,3	71,61 **18,83** 151,2	71,61 **22,1** 161,1	71,61 **22,06** 161,0	71,61 **23,75** 165,9	71,61 **27,2** 175,5	71,61 **29,5** 181,5	71,61 **32,4** 188,9	71,61 **31,02** 185,4	71,61 **37,4** 201,0	71,61 **43,0** 213,7	71,61 **50,3** 229,3	71,61 **56,2** 241,0								80
85	79,38 **9,4** 122,9	79,38 **10,1** 125,9	79,38 **12,0** 132,7	79,38 **12,9** 135,9	79,38 **15,1** 143,4	79,38 **15,1** 143,4	78,12 **18,5** 153,3	78,12 **17,80** 151,2	78,12 **21,1** 161,1	78,12 **21,03** 161,0	78,12 **22,72** 165,9	78,12 **26,2** 175,5	78,12 **28,5** 181,5	78,12 **31,4** 188,9	78,12 **29,99** 185,4	78,12 **36,4** 201,0	78,12 **42,0** 213,7	78,12 **49,3** 229,3	78,12 **55,2** 241,0								85
90	84,11 **8,5** 122,9	84,11 **9,3** 125,9	84,11 **11,2** 132,7	84,11 **12,1** 135,9	84,11 **14,3** 143,4	84,11 **14,3** 143,4	82,77 **17,7** 153,3	82,77 **17,00** 151,2	82,77 **20,3** 161,1	82,77 **20,23** 161,0	82,77 **21,93** 165,9	82,77 **25,4** 175,5	82,77 **27,7** 181,5	82,77 **30,6** 188,9	82,77 **29,20** 185,4	82,77 **35,6** 201,0	82,77 **41,2** 213,7	82,77 **48,5** 229,3	82,77 **54,4** 241,0								90
95					89,78 **13,3** 143,4	89,78 **13,3** 143,4	88,35 **16,6** 153,3	88,35 **15,99** 151,2	88,35 **19,2** 161,1	88,35 **19,22** 161,0	88,35 **20,91** 165,9	88,35 **24,4** 175,5	88,35 **26,7** 181,5	88,35 **29,6** 188,9	88,35 **28,19** 185,4	88,35 **34,6** 201,0		88,35 **47,5** 229,3									95
100	93,56 **6,8** 122,9	93,56 **7,5** 125,9	93,56 **9,4** 132,7	93,56 **10,3** 135,9	93,56 **12,6** 143,4	93,56 **12,6** 143,4	92,07 **15,9** 153,3	92,07 **15,28** 151,2	92,07 **18,5** 161,1	92,07 **18,51** 161,0	92,07 **20,20** 165,9	92,07 **23,7** 175,5	92,07 **26,0** 181,5	92,07 **28,9** 188,9	92,07 **27,47** 185,4	92,07 **33,9** 201,0	92,07 **39,4** 213,7	92,07 **46,8** 229,3	92,07 **52,6** 241,0								100
105	101,3 **5,2** 122,9	101,3 **5,9** 125,9	101,3 **7,8** 132,7	101,3 **8,7** 135,9	101,3 **10,9** 143,4	101,3 **10,9** 143,4	97,65 **14,8** 153,3	97,65 **14,2** 151,2	97,65 **17,4** 161,1	97,65 **17,4** 161,0	97,65 **19,1** 165,9	97,65 **22,6** 175,5	97,65 **24,8** 181,5	97,65 **27,8** 188,9	97,65 **26,4** 185,4	97,65 **32,8** 201,0	97,65 **38,3** 213,7	97,65 **45,7** 229,3	97,65 **51,5** 241,0								105
110								102,3 **13,2** 151,2	102,3 **16,4** 161,1	102,3 **16,40** 161,0	102,3 **18,09** 165,9	102,3 **21,6** 175,5	102,3 **23,8** 181,5	102,3 **26,8** 188,9	102,3 **25,37** 185,4	102,3 **31,8** 201,0	102,3 **37,3** 213,7	102,3 **44,7** 229,3	102,3 **50,5** 241,0								110
115				110,9 **6,5** 135,9	110,9 **8,8** 143,4	110,9 **8,8** 143,4	106,9 **12,8** 153,3	106,9 **12,1** 151,2	106,9 **15,4** 161,1	106,9 **15,4** 161,0	106,9 **17,1** 165,9	106,9 **20,6** 175,5	106,9 **22,8** 181,5	106,9 **25,7** 188,9	106,9 **24,3** 185,4	106,9 **30,7** 201,0	106,9 **36,3** 213,7	106,9 **43,6** 229,3	106,9 **49,5** 241,0		106,9 **59,3** 259,6		106,9 **75,2** 286,9						115
120										111,6 **14,29** 161,0	111,6 **15,98** 165,9	111,6 **19,5** 175,5	111,6 **21,7** 181,5	111,6 **24,6** 188,9	111,6 **23,26** 185,4	111,6 **29,7** 201,0	111,6 **35,2** 213,7	111,6 **42,6** 229,3	111,6 **48,4** 241,0		111,6 **58,3** 259,6							120
130							119,9 **9,7** 153,3	119,9 **9,0** 151,2	119,9 **12,3** 161,1		119,9 **13,9** 165,9	119,9 **17,4** 175,5	119,9 **19,7** 181,5	119,9 **22,6** 188,9	119,9 **21,2** 185,4	119,9 **27,6** 201,0	119,9 **33,2** 213,7	119,9 **40,5** 229,3	119,9 **46,4** 241,0		119,9 **56,2** 259,6		119,9 **72,0** 286,9						130
140							135,1 **5,6** 153,3	135,1 **4,9** 151,2	135,1 **8,2** 161,1		135,1 **9,8** 165,9	135,1 **13,3** 175,5	135,1 **15,6** 181,5	135,1 **18,5** 188,9	135,1 **17,1** 185,4	135,1 **23,5** 201,0	135,1 **29,1** 213,7	135,1 **36,4** 229,3	132,3 **43,1** 241,0		132,3 **52,9** 259,6		132,3 **68,7** 286,9						140
150																144,7 **20,6** 201,0	144,7 **26,2** 213,7	144,7 **33,6** 229,3	141,7 **40,3** 241,0		141,7 **50,2** 259,6		141,7 **66,0** 286,9				150
155												148,6 **9,3** 175,5	148,6 **11,5** 181,5	148,6 **14,4** 188,9	148,6 **13,0** 185,4	148,6 **19,4** 201,0	148,6 **25,0** 213,7	148,6 **32,4** 229,3	145,5 **39,2** 241,0		145,5 **49,0** 259,6		145,5 **64,8** 286,9				155
160																	154,4 **23,2** 213,7	154,4 **30,5** 229,3	151,2 **37,4** 241,0		151,2 **47,2** 259,6		151,2 **63,1** 286,9				160
170																		164,0 **27,2** 229,3	160,6 **34,3** 241,0		160,6 **44,1** 259,6		160,6 **59,9** 286,9				170
180																	172,7 **16,8** 213,7	172,7 **24,1** 229,3	169,1 **31,3** 241,0		169,1 **41,1** 259,6		169,1 **57,0** 286,9				180
190																	182,3 **13,2** 213,7	182,3 **20,5** 229,3	178,6 **27,8** 241,0		178,6 **37,6** 259,6		178,6 **53,5** 286,9				190
200																		192,0 **16,7** 229,3	188,0 **24,1** 241,0		188,0 **34,0** 259,6		188,0 **49,8** 286,9		188,0 **86,2** 341,6		200
230																							220,5 **35,7** 286,9				230
250																								242,2 **47,8** 322,0	242,2 **61,5** 341,6			250
280																												280
300																										285,0 **59,72** 370,8		300
395																												395

Size list of rods and tubes, made of ZX-100EL55

Rod	Outer diameter 6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
	0,0 6,19	**0,1** 8,25	**0,1** 10,31	**0,2** 12,38	**0,2** 15,47	**0,3** 18,56	**0,4** 20,63	**0,5** 22,69	**0,6** 25,78	**0,9** 30,94	**1,3** 36,10	**1,6** 41,25	**2,1** 46,41	**2,3** 48,47	**2,6** 51,57	**3,1** 56,72	**3,7** 61,88	**4,3** 67,04	**5,0** 72,19	**5,8** 77,35	**6,6** 82,50	**7,4** 87,66	**8,3** 92,82	**9,3** 97,97	**10,3** 103,1	**11,3** 108,2	**12,4** 113,4	**13,6** 118,6	
20										19,34 **0,6** 30,94	19,34 **0,9** 36,10	19,34 **1,3** 41,25	19,34 **1,7** 46,41	19,34 **1,9** 48,47	19,34 **2,2** 51,57	19,34 **2,8** 56,72	19,34 **3,3** 61,88											20
25										24,17 **0,4** 30,94	24,17 **0,7** 36,10	24,17 **1,1** 41,25	24,17 **1,5** 46,41	24,17 **1,7** 48,47	24,17 **2,0** 51,57	24,17 **2,5** 56,72	24,17 **3,1** 61,88											25
30												29,01 **0,8** 41,25	29,01 **1,3** 46,41	29,01 **1,5** 48,47	29,01 **1,8** 51,57	29,01 **2,3** 56,72	29,01 **2,9** 61,88	29,01 **3,5** 67,04	29,01 **4,2** 72,19	29,01 **5,0** 77,35	29,01 **5,8** 82,50	29,01 **6,6** 87,66	29,01 **7,5** 92,82	29,01 **8,5** 97,97	29,01 **9,5** 103,1				30
32													30,94 **1,2** 46,41	30,94 **1,4** 48,47	30,94 **1,6** 51,57	30,94 **2,2** 56,72	30,94 **2,8** 61,88	30,94 **3,4** 67,04	30,94 **4,1** 72,19	30,94 **4,9** 77,35	30,94 **5,6** 82,50	30,94 **6,5** 87,66	30,94 **7,4** 92,82	30,94 **8,4** 97,97	30,94 **9,4** 103,1				32
35													33,84 **1,0** 46,41	33,84 **1,2** 48,47	33,84 **1,5** 51,57	33,84 **2,0** 56,72	33,84 **2,6** 61,88	33,84 **3,2** 67,04	33,84 **3,9** 72,19	33,84 **4,7** 77,35	33,84 **5,5** 82,50	33,84 **6,3** 87,66	33,84 **7,2** 92,82	33,84 **8,2** 97,97	33,84 **9,2** 103,1				35
40															38,68 **1,1** 51,57	38,68 **1,7** 56,72	38,68 **2,2** 61,88	38,68 **2,9** 67,04	38,68 **3,6** 72,19	38,68 **4,3** 77,35	38,68 **5,1** 82,50	38,68 **6,0** 87,66	38,68 **6,9** 92,82	38,68 **7,8** 97,97	38,68 **8,8** 103,1	38,68 **9,9** 108,2	38,68 **11,0** 113,4	38,68 **12,1** 118,6	40
45																		43,51 **2,5** 67,04	43,51 **3,2** 72,19	43,51 **4,0** 77,35	43,51 **4,8** 82,50	43,51 **5,6** 87,66	43,51 **6,5** 92,82	43,51 **7,4** 97,97	43,51 **8,4** 103,1	43,51 **9,5** 108,2	43,51 **10,6** 113,4	43,51 **11,8** 118,6	45
50																	48,35 **1,4** 61,88	48,35 **2,1** 67,04	48,35 **2,8** 72,19	48,35 **3,5** 77,35	48,35 **4,3** 82,50	48,35 **5,2** 87,66	48,35 **6,1** 92,82	48,35 **7,0** 97,97	48,35 **8,0** 103,1	48,35 **9,1** 108,2	48,35 **10,2** 113,4	48,35 **11,3** 118,6	50
55																		53,18 **1,6** 67,04	53,18 **2,3** 72,19	53,18 **3,0** 77,35	53,18 **3,8** 82,50	53,18 **4,7** 87,66	53,18 **5,6** 92,82	53,18 **6,5** 97,97	53,18 **7,5** 103,1	53,18 **8,6** 108,2	53,18 **9,7** 113,4	53,18 **10,9** 118,6	55
60																			58,02 **1,8** 72,19	58,02 **2,5** 77,35	58,02 **3,3** 82,50	58,02 **4,2** 87,66	58,02 **5,1** 92,82	58,02 **6,0** 97,97	58,02 **7,0** 103,1	58,02 **8,1** 108,2	58,02 **9,2** 113,4	58,02 **10,3** 118,6	60
65																					62,85 **2,8** 82,50	62,85 **3,6** 87,66	62,85 **4,5** 92,82	62,85 **5,5** 97,97	62,85 **6,5** 103,1	62,85 **7,5** 108,2	62,85 **8,6** 113,4	62,85 **9,8** 118,6	65
70																					67,68 **2,2** 82,50	67,68 **3,0** 87,66	67,68 **3,9** 92,82	67,68 **4,8** 97,97	67,68 **5,8** 103,1	67,68 **6,9** 108,2	67,68 **8,0** 113,4	67,68 **9,2** 118,6	70
75																							72,52 **3,2** 92,82	72,52 **4,2** 97,97	72,52 **5,2** 103,1	72,52 **6,2** 108,2	72,52 **7,4** 113,4	72,52 **8,5** 118,6	75
80																							77,35 **2,5** 92,82	77,35 **3,5** 97,97	77,35 **4,5** 103,1	77,35 **5,6** 108,2	77,35 **6,6** 113,4	77,35 **7,8** 118,6	80
85																								82,19 **2,8** 97,97	82,19 **3,8** 103,1	82,19 **4,8** 108,2	82,19 **5,9** 113,4	82,19 **7,1** 118,6	85
90																									87,02 **3,0** 103,1	87,02 **4,0** 108,2	87,02 **5,1** 113,4	87,02 **6,3** 118,6	90
95																										91,86 **3,2** 108,2	91,86 **4,3** 113,4	91,86 **5,4** 118,6	95
100																											96,69 **3,4** 113,4	96,69 **4,6** 118,6	100
105																												101,5 **3,6** 118,6	105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

Product in stock

Just in time product

Special product

Scheduled product

Size list of rods and tubes, made of ZX-100EL55

Outer diameter

Rod	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
Inner diameter																												Inner diameter
20																												20
25																												25
30																												30
32																												32
35																												35
40	38,68 **13,4** 123,7	38,68 **14,6** 128,9	38,68 **15,9** 134,0	38,68 **17,3** 139,2	38,68 **18,7** 144,3	38,68 **20,2** 149,5	38,68 **21,7** 154,7	38,68 **23,24** 159,8	38,68 **24,9** 165,0	38,68 **26,5** 170,1	38,68 **28,2** 175,3	38,68 **30,0** 180,4	38,68 **31,8** 185,6	38,68 **33,7** 190,7	38,68 **35,6** 195,9	38,68 **39,6** 206,2												40
45	43,51 **13,0** 123,7	43,51 **14,2** 128,9	43,51 **15,5** 134,0	43,51 **16,9** 139,2	43,51 **18,3** 144,3	43,51 **19,8** 149,5	43,51 **21,3** 154,7	43,51 **22,86** 159,8	43,51 **24,5** 165,0	43,51 **26,1** 170,1	43,51 **27,9** 175,3	43,51 **29,6** 180,4	43,51 **31,5** 185,6	43,51 **33,3** 190,7	43,51 **35,3** 195,9	43,51 **39,3** 206,2												45
50	48,35 **12,5** 123,7	48,35 **13,8** 128,9	48,35 **15,1** 134,0	48,35 **16,5** 139,2	48,35 **17,9** 144,3	48,35 **19,3** 149,5	48,35 **20,9** 154,7	48,35 **22,43** 159,8	48,35 **24,0** 165,0	48,35 **25,7** 170,1	48,35 **27,4** 175,3	48,35 **29,2** 180,4	48,35 **31,0** 185,6	48,35 **32,9** 190,7	48,35 **34,8** 195,9	48,35 **38,8** 206,2	48,35 **43,0** 216,5	48,35 **49,8** 232,0	48,35 **54,5** 242,3								50
55	53,18 **12,1** 123,7	53,18 **13,3** 128,9	53,18 **14,6** 134,0	53,18 **16,0** 139,2	53,18 **17,4** 144,3	53,18 **18,9** 149,5	53,18 **20,4** 154,7	53,18 **22,0** 159,8	53,18 **23,6** 165,0	53,18 **25,2** 170,1	53,18 **27,0** 175,3	53,18 **28,7** 180,4	53,18 **30,6** 185,6	53,18 **32,4** 190,7	53,18 **34,4** 195,9	53,18 **38,4** 206,2		53,18 **49,3** 232,0										55
60	58,02 **11,5** 123,7	58,02 **12,8** 128,9	58,02 **14,1** 134,0	58,02 **15,5** 139,2	58,02 **16,9** 144,3	58,02 **18,4** 149,5	58,02 **19,9** 154,7	58,02 **21,43** 159,8	58,02 **23,0** 165,0	58,02 **24,7** 170,1	58,02 **26,4** 175,3	58,02 **28,2** 180,4	58,02 **30,0** 185,6	58,02 **31,9** 190,7	58,02 **33,8** 195,9	58,02 **37,8** 206,2	58,02 **42,1** 216,5	58,02 **48,8** 232,0	58,02 **53,5** 242,3								60
65	62,85 **11,0** 123,7	62,85 **12,2** 128,9	62,85 **13,6** 134,0	62,85 **14,9** 139,2	62,85 **16,3** 144,3	62,85 **17,8** 149,5	62,85 **19,3** 154,7	62,85 **20,87** 159,8	62,85 **22,5** 165,0	62,85 **24,2** 170,1	62,85 **25,9** 175,3	62,85 **27,6** 180,4	62,85 **29,5** 185,6	62,85 **31,4** 190,7	62,85 **33,3** 195,9	62,85 **37,3** 206,2	62,85 **41,5** 216,5	62,85 **48,2** 232,0	62,85 **52,9** 242,3								65
70	67,68 **10,4** 123,7	67,68 **11,6** 128,9	67,68 **12,9** 134,0	67,68 **14,3** 139,2	67,68 **15,7** 144,3	67,68 **17,2** 149,5	67,68 **18,7** 154,7	67,68 **20,26** 159,8	67,68 **21,9** 165,0	67,68 **23,6** 170,1	67,68 **25,3** 175,3	67,68 **27,0** 180,4	67,68 **28,9** 185,6	67,68 **30,7** 190,7	67,68 **32,7** 195,9	67,68 **36,7** 206,2	67,68 **40,9** 216,5	67,68 **47,6** 232,0	67,68 **52,3** 242,3								70
75	72,52 **9,7** 123,7	72,52 **11,0** 128,9	72,52 **12,3** 134,0	72,52 **13,6** 139,2	72,52 **15,1** 144,3	72,52 **16,5** 149,5	72,52 **18,0** 154,7	72,52 **19,6** 159,8	72,52 **21,2** 165,0	72,52 **22,9** 170,1	72,52 **24,6** 175,3	72,52 **26,4** 180,4	72,52 **28,2** 185,6	72,52 **30,1** 190,7	72,52 **32,0** 195,9	72,52 **36,0** 206,2	72,52 **40,2** 216,5	72,52 **46,9** 232,0	72,52 **51,7** 242,3								75
80	77,35 **9,0** 123,7	77,35 **10,3** 128,9	77,35 **11,6** 134,0	77,35 **13,0** 139,2	77,35 **14,4** 144,3	77,35 **15,8** 149,5	77,35 **17,3** 154,7	77,35 **18,90** 159,8	77,35 **20,5** 165,0	77,35 **22,2** 170,1	77,35 **23,9** 175,3	77,35 **25,7** 180,4	77,35 **27,5** 185,6	77,35 **29,4** 190,7	77,35 **31,3** 195,9	77,35 **35,3** 206,2	77,35 **39,5** 216,5	77,35 **46,2** 232,0	77,35 **51,0** 242,3								80
85	82,19 **8,3** 123,7	82,19 **9,5** 128,9	82,19 **10,8** 134,0	82,19 **12,2** 139,2	82,19 **13,6** 144,3	82,19 **15,1** 149,5	82,19 **16,6** 154,7	82,19 **18,16** 159,8	82,19 **19,8** 165,0	82,19 **21,4** 170,1	82,19 **23,2** 175,3	82,19 **24,9** 180,4	82,19 **26,8** 185,6	82,19 **28,6** 190,7	82,19 **30,6** 195,9	82,19 **34,6** 206,2	82,19 **38,8** 216,5	82,19 **45,5** 232,0	82,19 **50,2** 242,3								85
90	87,02 **7,5** 123,7	87,02 **8,7** 128,9	87,02 **10,0** 134,0	87,02 **11,4** 139,2	87,02 **12,8** 144,3	87,02 **14,3** 149,5	87,02 **15,8** 154,7	87,02 **17,37** 159,8	87,02 **19,0** 165,0	87,02 **20,7** 170,1	87,02 **22,4** 175,3	87,02 **24,2** 180,4	87,02 **26,0** 185,6	87,02 **27,8** 190,7	87,02 **29,8** 195,9	87,02 **33,8** 206,2	87,02 **38,0** 216,5	87,02 **44,7** 232,0	87,02 **49,4** 242,3								90
95	91,86 **6,6** 123,7	91,86 **7,9** 128,9	91,86 **9,2** 134,0	91,86 **10,6** 139,2	91,86 **12,0** 144,3	91,86 **13,4** 149,5	91,86 **15,0** 154,7	91,86 **16,5** 159,8	91,86 **18,2** 165,0	91,86 **19,8** 170,1	91,86 **21,5** 175,3	91,86 **23,3** 180,4	91,86 **25,1** 185,6	91,86 **27,0** 190,7	91,86 **28,9** 195,9	91,86 **33,0** 206,2		91,86 **43,9** 232,0										95
100	96,69 **5,8** 123,7	96,69 **7,0** 128,9	96,69 **8,3** 134,0	96,69 **9,7** 139,2	96,69 **11,1** 144,3	96,69 **12,6** 149,5	96,69 **14,1** 154,7	96,69 **15,65** 159,8	96,69 **17,3** 165,0	96,69 **18,9** 170,1	96,69 **20,7** 175,3	96,69 **22,4** 180,4	96,69 **24,3** 185,6	96,69 **26,1** 190,7	96,69 **28,1** 195,9	96,69 **32,1** 206,2	96,69 **36,3** 216,5	96,69 **43,0** 232,0	96,69 **47,7** 242,3								100
105	101,5 **4,8** 123,7	101,5 **6,1** 128,9	101,5 **7,4** 134,0	101,5 **8,8** 139,2	101,5 **10,2** 144,3	101,5 **11,6** 149,5	101,5 **13,2** 154,7	101,5 **14,7** 159,8	101,5 **16,4** 165,0	101,5 **18,0** 170,1	101,5 **19,7** 175,3	101,5 **21,5** 180,4	101,5 **23,3** 185,6	101,5 **25,2** 190,7	101,5 **27,1** 195,9	101,5 **31,1** 206,2	101,5 **35,4** 216,5	101,5 **42,1** 232,0	101,5 **46,8** 242,3								105
110	106,3 **3,9** 123,7	106,3 **5,1** 128,9	106,3 **6,4** 134,0	106,3 **7,8** 139,2	106,3 **9,2** 144,3	106,3 **10,7** 149,5	106,3 **12,2** 154,7	106,3 **13,8** 159,8	106,3 **15,4** 165,0	106,3 **17,0** 170,1	106,3 **18,8** 175,3	106,3 **20,5** 180,4	106,3 **22,4** 185,6	106,3 **24,2** 190,7	106,3 **26,2** 195,9	106,3 **30,2** 206,2	106,3 **34,4** 216,5	106,3 **41,1** 232,0	106,3 **45,8** 242,3								110
115				111,2 **6,8** 139,2	111,2 **8,2** 144,3	111,2 **9,7** 149,5	111,2 **11,2** 154,7	111,2 **12,7** 159,8	111,2 **14,4** 165,0	111,2 **16,0** 170,1	111,2 **17,8** 175,3	111,2 **19,5** 180,4	111,2 **21,4** 185,6	111,2 **23,2** 190,7	111,2 **25,2** 195,9	111,2 **29,2** 206,2	111,2 **33,4** 216,5	111,2 **40,1** 232,0	111,2 **44,8** 242,3		111,2 **54,9** 262,9		111,2 **68,6** 288,7					115
120			116,0 **4,4** 134,0	116,0 **5,7** 139,2	116,0 **7,1** 144,3	116,0 **8,6** 149,5	116,0 **10,1** 154,7	116,0 **11,7** 159,8	116,0 **13,3** 165,0	116,0 **15,0** 170,1	116,0 **16,7** 175,3	116,0 **18,5** 180,4	116,0 **20,3** 185,6	116,0 **22,2** 190,7	116,0 **24,1** 195,9	116,0 **28,1** 206,2	116,0 **32,3** 216,5	116,0 **39,0** 232,0	116,0 **43,7** 242,3		116,0 **53,8** 262,9								120
130							125,7 **7,8** 154,7	125,7 **9,4** 159,8	125,7 **11,0** 165,0	125,7 **12,7** 170,1	125,7 **14,4** 175,3	125,7 **16,2** 180,4	125,7 **18,0** 185,6	125,7 **19,9** 190,7	125,7 **21,8** 195,9	125,7 **25,8** 206,2	125,7 **30,0** 216,5	125,7 **36,8** 232,0	125,7 **41,5** 242,3		125,7 **51,6** 262,9		125,7 **65,3** 288,7					130
140							135,3 **5,4** 154,7	135,3 **7,0** 159,8	135,3 **8,6** 165,0	135,3 **10,3** 170,1	135,3 **12,0** 175,3	135,3 **13,8** 180,4	135,3 **15,6** 185,6	135,3 **17,5** 190,7	135,3 **19,4** 195,9	135,3 **23,4** 206,2	135,3 **27,6** 216,5	135,3 **34,3** 232,0	135,3 **39,0** 242,3		135,3 **49,1** 262,9		135,3 **62,8** 288,7					140
150											145,0 **9,4** 175,3	145,0 **11,2** 180,4	145,0 **13,0** 185,6	145,0 **14,8** 190,7	145,0 **16,8** 195,9	145,0 **20,8** 206,2	145,0 **25,0** 216,5	145,0 **31,7** 232,0	145,0 **36,4** 242,3		145,0 **46,5** 262,9		145,0 **60,2** 288,7				150
155												149,8 **9,8** 180,4	149,8 **11,6** 185,6	149,8 **13,5** 190,7	149,8 **15,4** 195,9	149,8 **19,4** 206,2	149,8 **23,6** 216,5	149,8 **30,3** 232,0	149,8 **35,0** 242,3		149,8 **45,1** 262,9		149,8 **58,8** 288,7				155
160													154,7 **10,2** 185,6	154,7 **12,0** 190,7	154,7 **14,0** 195,9	154,7 **18,0** 206,2	154,7 **22,2** 216,5	154,7 **28,9** 232,0	154,7 **33,6** 242,3		154,7 **43,7** 262,9		154,7 **57,4** 288,7				160
170															164,3 **11,0** 195,9	164,3 **15,0** 206,2	164,3 **19,2** 216,5	164,3 **25,9** 232,0	164,3 **30,6** 242,3		164,3 **40,7** 262,9		164,3 **54,4** 288,7				170
180																	174,0 **16,0** 216,5	174,0 **22,8** 232,0	174,0 **27,5** 242,3		174,0 **37,6** 262,9		174,0 **51,3** 288,7				180
190																	183,7 **12,7** 216,5	183,7 **19,4** 232,0	183,7 **24,1** 242,3		183,7 **34,2** 262,9		183,7 **48,0** 288,7				190
200																		193,3 **15,9** 232,0	193,3 **20,6** 242,3		193,3 **30,7** 262,9		193,3 **44,4** 288,7		193,3 **89,7** 360,9		200
230																							222,3 **32,8** 288,7				230
250																							241,7 **24,1** 288,7	241,7 **45,5** 324,8	241,7 **69,4** 360,9			250
280																												280
300																										290,0 **67,1** 391,9		300
395																												395

Size list of rods and tubes, made of ZX-100EL63

Rod	Outer diameter 6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
	0,0 6,18	**0,1** 8,24	**0,1** 10,30	**0,2** 12,36	**0,2** 15,45	**0,3** 18,54	**0,4** 20,60	**0,5** 22,66	**0,6** 25,75	**0,9** 30,90	**1,3** 36,05	**1,6** 41,20	**2,1** 46,35	**2,3** 48,41	**2,6** 51,50	**3,1** 56,65	**3,7** 61,80	**4,3** 66,95	**5,0** 72,10	**5,8** 77,25	**6,6** 82,40	**7,4** 87,55	**8,3** 92,70	**9,2** 97,84	**10,2** 102,9	**11,3** 108,1	**12,4** 113,2	**13,6** 118,4	
20										19,36 **0,6** 30,90	19,36 **0,9** 36,05	19,36 **1,3** 41,20	19,36 **1,7** 46,35	19,36 **1,9** 48,41	19,36 **2,2** 51,50	19,36 **2,7** 56,65	19,36 **3,3** 61,80											20
25										24,20 **0,4** 30,90	24,20 **0,7** 36,05	24,20 **1,1** 41,20	24,20 **1,5** 46,35	24,20 **1,7** 48,41	24,20 **2,0** 51,50	24,20 **2,5** 56,65	24,20 **3,1** 61,80											25
30												29,04 **0,8** 41,20	29,04 **1,3** 46,35	29,04 **1,4** 48,41	29,04 **1,8** 51,50	29,04 **2,3** 56,65	29,04 **2,9** 61,80	29,04 **3,5** 66,95	29,04 **4,2** 72,10	29,04 **5,0** 77,25	29,04 **5,7** 82,40	29,04 **6,6** 87,55	29,04 **7,5** 92,70	29,04 **8,4** 97,84	29,04 **9,4** 102,9				30
32													30,98 **1,2** 46,35	30,98 **1,3** 48,41	30,98 **1,6** 51,50	30,98 **2,2** 56,65	30,98 **2,8** 61,80	30,98 **3,4** 66,95	30,98 **4,1** 72,10	30,98 **4,8** 77,25	30,98 **5,6** 82,40	30,98 **6,5** 87,55	30,98 **7,4** 92,70	30,98 **8,3** 97,84	30,98 **9,3** 102,9				32
35													33,89 **1,0** 46,35	33,89 **1,2** 48,41	33,89 **1,4** 51,50	33,89 **2,0** 56,65	33,89 **2,6** 61,80	33,89 **3,2** 66,95	33,89 **3,9** 72,10	33,89 **4,7** 77,25	33,89 **5,4** 82,40	33,89 **6,3** 87,55	33,89 **7,2** 92,70	33,89 **8,1** 97,84	33,89 **9,1** 102,9				35
40															38,73 **1,1** 51,50	38,73 **1,6** 56,65	38,73 **2,2** 61,80	38,73 **2,9** 66,95	38,73 **3,6** 72,10	38,73 **4,3** 77,25	38,73 **5,1** 82,40	38,73 **6,0** 87,55	38,73 **6,8** 92,70	38,73 **7,8** 97,84	38,73 **8,8** 102,9	38,73 **9,8** 108,1	38,73 **11,0** 113,2	38,73 **12,1** 118,4	40
45																		43,57 **2,5** 66,95	43,57 **3,2** 72,10	43,57 **3,9** 77,25	43,57 **4,7** 82,40	43,57 **5,6** 87,55	43,57 **6,5** 92,70	43,57 **7,4** 97,84	43,57 **8,4** 102,9	43,57 **9,5** 108,1	43,57 **10,6** 113,2	43,57 **11,7** 118,4	45
50																	48,41 **1,4** 61,80	48,41 **2,1** 66,95	48,41 **2,8** 72,10	48,41 **3,5** 77,25	48,41 **4,3** 82,40	48,41 **5,1** 87,55	48,41 **6,0** 92,70	48,41 **7,0** 97,84	48,41 **8,0** 102,9	48,41 **9,0** 108,1	48,41 **10,1** 113,2	48,41 **11,3** 118,4	50
55																		53,25 **1,6** 66,95	53,25 **2,3** 72,10	53,25 **3,0** 77,25	53,25 **3,8** 82,40	53,25 **4,7** 87,55	53,25 **5,6** 92,70	53,25 **6,5** 97,84	53,25 **7,5** 102,9	53,25 **8,6** 108,1	53,25 **9,7** 113,2	53,25 **10,8** 118,4	55
60																			58,09 **1,8** 72,10	58,09 **2,5** 77,25	58,09 **3,3** 82,40	58,09 **4,1** 87,55	58,09 **5,0** 92,70	58,09 **6,0** 97,84	58,09 **7,0** 102,9	58,09 **8,0** 108,1	58,09 **9,1** 113,2	58,09 **10,3** 118,4	60
65																					62,93 **2,7** 82,40	62,93 **3,6** 87,55	62,93 **4,5** 92,70	62,93 **5,4** 97,84	62,93 **6,4** 102,9	62,93 **7,5** 108,1	62,93 **8,6** 113,2	62,93 **9,7** 118,4	65
70																					67,77 **2,1** 82,40	67,77 **3,0** 87,55	67,77 **3,9** 92,70	67,77 **4,8** 97,84	67,77 **5,8** 102,9	67,77 **6,9** 108,1	67,77 **8,0** 113,2	67,77 **9,1** 118,4	70
75																							72,61 **3,2** 92,70	72,61 **4,2** 97,84	72,61 **5,2** 102,9	72,61 **6,2** 108,1	72,61 **7,3** 113,2	72,61 **8,5** 118,4	75
80																							77,45 **2,5** 92,70	77,45 **3,4** 97,84	77,45 **4,4** 102,9	77,45 **5,5** 108,1	77,45 **6,6** 113,2	77,45 **7,8** 118,4	80
85																								82,29 **2,7** 97,84	82,29 **3,7** 102,9	82,29 **4,8** 108,1	82,29 **5,9** 113,2	82,29 **7,0** 118,4	85
90																									87,13 **2,9** 102,9	87,13 **4,0** 108,1	87,13 **5,1** 113,2	87,13 **6,2** 118,4	90
95																										91,97 **3,1** 108,1	91,97 **4,2** 113,2	91,97 **5,4** 118,4	95
100																											96,82 **3,4** 113,2	96,82 **4,5** 118,4	100
105																												101,6 **3,6** 118,4	105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-100EL63

Outer diameter

Rod	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
14,8 123,5	**16,0** 128,7	**17,3** 133,8	**18,7** 139,0	**20,1** 144,1	**21,6** 149,3	**23,1** 154,4	**24,62** 159,6	**26,2** 164,7	**27,9** 169,9	**29,6** 175,0	**31,4** 180,2	**33,2** 185,3	**35,1** 190,5	**37,0** 195,6	**41,0** 205,9	**45,2** 216,2												Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40	38,73 **13,3** 123,5	38,73 **14,6** 128,7	38,73 **15,9** 133,8	38,73 **17,2** 139,0	38,73 **18,6** 144,1	38,73 **20,1** 149,3	38,73 **21,6** 154,4	38,73 **23,17** 159,6	38,73 **24,8** 164,7	38,73 **26,4** 169,9	38,73 **28,2** 175,0	38,73 **29,9** 180,2	38,73 **31,8** 185,3	38,73 **33,6** 190,5	38,73 **35,5** 195,6	38,73 **39,5** 205,9												40
45	43,57 **12,9** 123,5	43,57 **14,2** 128,7	43,57 **15,5** 133,8	43,57 **16,8** 139,0	43,57 **18,2** 144,1	43,57 **19,7** 149,3	43,57 **21,2** 154,4	43,57 **22,79** 159,6	43,57 **24,4** 164,7	43,57 **26,1** 169,9	43,57 **27,8** 175,0	43,57 **29,6** 180,2	43,57 **31,4** 185,3	43,57 **33,2** 190,5	43,57 **35,2** 195,6	43,57 **39,2** 205,9												45
50	48,41 **12,5** 123,5	48,41 **13,8** 128,7	48,41 **15,0** 133,8	48,41 **16,4** 139,0	48,41 **17,8** 144,1	48,41 **19,3** 149,3	48,41 **20,8** 154,4	48,41 **22,36** 159,6	48,41 **24,0** 164,7	48,41 **25,6** 169,9	48,41 **27,4** 175,0	48,41 **29,1** 180,2	48,41 **30,9** 185,3	48,41 **32,8** 190,5	48,41 **34,7** 195,6	48,41 **38,7** 205,9	48,41 **42,9** 216,2	48,41 **49,6** 231,7	48,41 **54,3** 242,0										50
53,25 **12,0** 123,5	53,25 **13,3** 128,7	53,25 **14,6** 133,8	53,25 **15,9** 139,0	53,25 **17,4** 144,1	53,25 **18,8** 149,3	53,25 **20,3** 154,4	53,25 **21,9** 159,6	53,25 **23,5** 164,7	53,25 **25,2** 169,9	53,25 **26,9** 175,0	53,25 **28,6** 180,2	53,25 **30,5** 185,3	53,25 **32,3** 190,5	53,25 **34,2** 195,6	53,25 **38,2** 205,9		53,25 **49,1** 231,7										55
58,09 **11,5** 123,5	58,09 **12,8** 128,7	58,09 **14,1** 133,8	58,09 **15,4** 139,0	58,09 **16,8** 144,1	58,09 **18,3** 149,3	58,09 **19,8** 154,4	58,09 **21,36** 159,6	58,09 **23,0** 164,7	58,09 **24,6** 169,9	58,09 **26,4** 175,0	58,09 **28,1** 180,2	58,09 **29,9** 185,3	58,09 **31,8** 190,5	58,09 **33,7** 195,6	58,09 **37,7** 205,9	58,09 **41,9** 216,2	58,09 **48,6** 231,7	58,09 **53,3** 242,0										60
62,93 **10,9** 123,5	62,93 **12,2** 128,7	62,93 **13,5** 133,8	62,93 **14,8** 139,0	62,93 **16,3** 144,1	62,93 **17,7** 149,3	62,93 **19,2** 154,4	62,93 **20,79** 159,6	62,93 **22,4** 164,7	62,93 **24,1** 169,9	62,93 **25,8** 175,0	62,93 **27,6** 180,2	62,93 **29,4** 185,3	62,93 **31,2** 190,5	62,93 **33,2** 195,6	62,93 **37,2** 205,9	62,93 **41,4** 216,2	62,93 **48,0** 231,7	62,93 **52,8** 242,0										65
67,77 **10,3** 123,5	67,77 **11,6** 128,7	67,77 **12,9** 133,8	67,77 **14,2** 139,0	67,77 **15,6** 144,1	67,77 **17,1** 149,3	67,77 **18,6** 154,4	67,77 **20,18** 159,6	67,77 **21,8** 164,7	67,77 **23,5** 169,9	67,77 **25,2** 175,0	67,77 **27,0** 180,2	67,77 **28,8** 185,3	67,77 **30,6** 190,5	67,77 **32,6** 195,6	67,77 **36,6** 205,9	67,77 **40,8** 216,2	67,77 **47,4** 231,7	67,77 **52,2** 242,0										70
72,61 **9,7** 123,5	72,61 **10,9** 128,7	72,61 **12,2** 133,8	72,61 **13,6** 139,0	72,61 **15,0** 144,1	72,61 **16,4** 149,3	72,61 **18,0** 154,4	72,61 **19,5** 159,6	72,61 **21,1** 164,7	72,61 **22,8** 169,9	72,61 **24,5** 175,0	72,61 **26,3** 180,2	72,61 **28,1** 185,3	72,61 **30,0** 190,5	72,61 **31,9** 195,6	72,61 **35,9** 205,9	72,61 **40,1** 216,2	72,61 **46,8** 231,7	72,61 **51,5** 242,0										75
77,45 **9,0** 123,5	77,45 **10,2** 128,7	77,45 **11,5** 133,8	77,45 **12,9** 139,0	77,45 **14,3** 144,1	77,45 **15,8** 149,3	77,45 **17,3** 154,4	77,45 **18,82** 159,6	77,45 **20,4** 164,7	77,45 **22,1** 169,9	77,45 **23,8** 175,0	77,45 **25,6** 180,2	77,45 **27,4** 185,3	77,45 **29,3** 190,5	77,45 **31,2** 195,6	77,45 **35,2** 205,9	77,45 **39,4** 216,2	77,45 **46,1** 231,7	77,45 **50,8** 242,0										80
82,29 **8,2** 123,5	82,29 **9,5** 128,7	82,29 **10,8** 133,8	82,29 **12,1** 139,0	82,29 **13,5** 144,1	82,29 **15,0** 149,3	82,29 **16,5** 154,4	82,29 **18,08** 159,6	82,29 **19,7** 164,7	82,29 **21,4** 169,9	82,29 **23,1** 175,0	82,29 **24,8** 180,2	82,29 **26,7** 185,3	82,29 **28,5** 190,5	82,29 **30,4** 195,6	82,29 **34,4** 205,9	82,29 **38,6** 216,2	82,29 **45,3** 231,7	82,29 **50,0** 242,0										85
87,13 **7,4** 123,5	87,13 **8,7** 128,7	87,13 **10,0** 133,8	87,13 **11,3** 139,0	87,13 **12,8** 144,1	87,13 **14,2** 149,3	87,13 **15,7** 154,4	87,13 **17,29** 159,6	87,13 **18,9** 164,7	87,13 **20,6** 169,9	87,13 **22,3** 175,0	87,13 **24,0** 180,2	87,13 **25,9** 185,3	87,13 **27,7** 190,5	87,13 **29,7** 195,6	87,13 **33,7** 205,9	87,13 **37,9** 216,2	87,13 **44,5** 231,7	87,13 **49,3** 242,0										90
91,97 **6,6** 123,5	91,97 **7,8** 128,7	91,97 **9,2** 133,8	91,97 **10,5** 139,0	91,97 **11,9** 144,1	91,97 **13,4** 149,3	91,97 **14,9** 154,4	91,97 **16,4** 159,6	91,97 **18,1** 164,7	91,97 **19,7** 169,9	91,97 **21,4** 175,0	91,97 **23,2** 180,2	91,97 **25,0** 185,3	91,97 **26,9** 190,5	91,97 **28,8** 195,6	91,97 **32,8** 205,9		91,97 **43,7** 231,7										95
96,82 **5,7** 123,5	96,82 **7,0** 128,7	96,82 **8,3** 133,8	96,82 **9,6** 139,0	96,82 **11,0** 144,1	96,82 **12,5** 149,3	96,82 **14,0** 154,4	96,82 **15,57** 159,6	96,82 **17,2** 164,7	96,82 **18,8** 169,9	96,82 **20,6** 175,0	96,82 **22,3** 180,2	96,82 **24,2** 185,3	96,82 **26,0** 190,5	96,82 **27,9** 195,6	96,82 **31,9** 205,9	96,82 **36,1** 216,2	96,82 **42,8** 231,7	96,82 **47,5** 242,0										100
101,6 **4,8** 123,5	101,6 **6,0** 128,7	101,6 **7,3** 133,8	101,6 **8,7** 139,0	101,6 **10,1** 144,1	101,6 **11,6** 149,3	101,6 **13,1** 154,4	101,6 **14,6** 159,6	101,6 **16,2** 164,7	101,6 **17,9** 169,9	101,6 **19,6** 175,0	101,6 **21,4** 180,2	101,6 **23,2** 185,3	101,6 **25,1** 190,5	101,6 **27,0** 195,6	101,6 **31,0** 205,9	101,6 **35,2** 216,2	101,6 **41,9** 231,7	101,6 **46,6** 242,0										105
106,5 **3,8** 123,5	106,5 **5,1** 128,7	106,5 **6,4** 133,8	106,5 **7,7** 139,0	106,5 **9,1** 144,1	106,5 **10,6** 149,3	106,5 **12,1** 154,4	106,5 **13,7** 159,6	106,5 **15,3** 164,7	106,5 **16,9** 169,9	106,5 **18,7** 175,0	106,5 **20,4** 180,2	106,5 **22,2** 185,3	106,5 **24,1** 190,5	106,5 **26,0** 195,6	106,5 **30,0** 205,9	106,5 **34,2** 216,2	106,5 **40,9** 231,7	106,5 **45,6** 242,0										110
			111,3 **6,7** 139,0	111,3 **8,1** 144,1	111,3 **9,6** 149,3	111,3 **11,1** 154,4	111,3 **12,6** 159,6	111,3 **14,3** 164,7	111,3 **15,9** 169,9	111,3 **17,6** 175,0	111,3 **19,4** 180,2	111,3 **21,2** 185,3	111,3 **23,1** 190,5	111,3 **25,0** 195,6	111,3 **29,0** 205,9	111,3 **33,2** 216,2	111,3 **39,9** 231,7	111,3 **44,6** 242,0		111,3 **54,7** 262,6		111,3 **68,4** 288,3						115
		116,1 **4,3** 133,8	116,1 **5,6** 139,0	116,1 **7,0** 144,1	116,1 **8,5** 149,3	116,1 **10,0** 154,4	116,1 **11,6** 159,6	116,1 **13,2** 164,7	116,1 **14,9** 169,9	116,1 **16,6** 175,0	116,1 **18,3** 180,2	116,1 **20,2** 185,3	116,1 **22,0** 190,5	116,1 **24,0** 195,6	116,1 **28,0** 205,9	116,1 **32,2** 216,2	116,1 **38,8** 231,7	116,1 **43,6** 242,0		116,1 **53,6** 262,6									120
						125,8 **7,8** 154,4	125,8 **9,3** 159,6	125,8 **10,9** 164,7	125,8 **12,6** 169,9	125,8 **14,3** 175,0	125,8 **16,1** 180,2	125,8 **17,9** 185,3	125,8 **19,8** 190,5	125,8 **21,7** 195,6	125,8 **25,7** 205,9	125,8 **29,9** 216,2	125,8 **36,6** 231,7	125,8 **41,3** 242,0		125,8 **51,3** 262,6		125,8 **65,0** 288,3						130
						135,5 **5,3** 154,4	135,5 **6,9** 159,6	135,5 **8,5** 164,7	135,5 **10,2** 169,9	135,5 **11,9** 175,0	135,5 **13,6** 180,2	135,5 **15,4** 185,3	135,5 **17,3** 190,5	135,5 **19,2** 195,6	135,5 **23,2** 205,9	135,5 **27,4** 216,2	135,5 **34,1** 231,7	135,5 **38,8** 242,0		135,5 **48,9** 262,6		135,5 **62,6** 288,3						140
										145,2 **9,2** 175,0	145,2 **11,0** 180,2	145,2 **12,8** 185,3	145,2 **14,7** 190,5	145,2 **16,6** 195,6	145,2 **20,6** 205,9	145,2 **24,8** 216,2	145,2 **31,5** 231,7	145,2 **36,2** 242,0		145,2 **46,3** 262,6		145,2 **60,0** 288,3					150
											150,0 **9,6** 180,2	150,0 **11,4** 185,3	150,0 **13,3** 190,5	150,0 **15,2** 195,6	150,0 **19,2** 205,9	150,0 **23,4** 216,2	150,0 **30,1** 231,7	150,0 **34,8** 242,0		150,0 **44,9** 262,6		150,0 **58,6** 288,3					155
												154,9 **10,0** 185,3	154,9 **11,9** 190,5	154,9 **13,8** 195,6	154,9 **17,8** 205,9	154,9 **22,0** 216,2	154,9 **28,7** 231,7	154,9 **33,4** 242,0		154,9 **43,4** 262,6		154,9 **57,2** 288,3					160
														164,5 **10,8** 195,6	164,5 **14,8** 205,9	164,5 **19,0** 216,2	164,5 **25,7** 231,7	164,5 **30,4** 242,0		164,5 **40,5** 262,6		164,5 **54,2** 288,3					170
																174,2 **15,8** 216,2	174,2 **22,5** 231,7	174,2 **27,2** 242,0		174,2 **37,3** 262,6		174,2 **51,0** 288,3					180
																183,9 **12,5** 216,2	183,9 **19,2** 231,7	183,9 **23,9** 242,0		183,9 **34,0** 262,6		183,9 **47,6** 288,3					190
																	193,6 **15,7** 231,7	193,6 **20,4** 242,0		193,6 **30,4** 262,6		193,6 **44,1** 288,3		193,6 **89,3** 360,4			200
																						222,6 **32,4** 288,3					230
																						242,0 **23,8** 288,3	242,0 **45,1** 324,4	242,0 **68,9** 360,4			250
																											280
																									290,4 **66,5** 391,3		300
																											395

Inner diameter

Size list of rods and tubes, made of ZX-100MT

Outer diameter

Inner diameter / Rod	6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
Rod						**0,4** 18,52	**0,5** 20,57	**0,6** 22,63	**0,8** 25,72	**1,1** 30,86	**1,5** 36,00	**2,0** 41,15	**2,5** 46,29	**2,7** 48,35	**3,1** 51,43	**3,8** 56,58	**4,5** 61,72	**5,2** 66,86	**6,1** 72,01	**7,0** 77,15	**7,9** 82,29	**9,0** 87,44	**10,0** 92,58	**11,2** 97,72	**12,4** 102,8	**13,6** 108,0	**15,0** 113,1	**16,4** 118,3	Rod
20												19,39 **1,5** 41,15	19,39 **2,1** 46,29	19,39 **2,3** 48,35	19,39 **2,7** 51,43	19,39 **3,3** 56,58	19,39 **4,0** 61,72											20
25													24,23 **1,8** 46,29	24,23 **2,0** 48,35	24,23 **2,4** 51,43	24,23 **3,1** 56,58	24,23 **3,8** 61,72											25
30														29,08 **1,8** 48,35	29,08 **2,1** 51,43	29,08 **2,8** 56,58	29,08 **3,5** 61,72	29,08 **4,2** 66,86	29,08 **5,1** 72,01	29,08 **6,0** 77,15	29,08 **6,9** 82,29	29,08 **8,0** 87,44	29,08 **9,0** 92,58	29,08 **10,2** 97,72	29,08 **11,4** 102,8				30
32															31,02 **2,0** 51,43	31,02 **2,6** 56,58	31,02 **3,3** 61,72	31,02 **4,1** 66,86	31,02 **4,9** 72,01	31,02 **5,8** 77,15	31,02 **6,8** 82,29	31,02 **7,8** 87,44	31,02 **8,9** 92,58	31,02 **10,0** 97,72	31,02 **11,3** 102,8				32
35																33,93 **2,4** 56,58	33,93 **3,1** 61,72	33,93 **3,9** 66,86	33,93 **4,7** 72,01	33,93 **5,6** 77,15	33,93 **6,6** 82,29	33,93 **7,6** 87,44	33,93 **8,7** 92,58	33,93 **9,8** 97,72	33,93 **11,0** 102,8				35
40																	38,77 **2,7** 61,72	38,77 **3,5** 66,86	38,77 **4,3** 72,01	38,77 **5,2** 77,15	38,77 **6,2** 82,29	38,77 **7,2** 87,44	38,77 **8,3** 92,58	38,77 **9,4** 97,72	38,77 **10,6** 102,8	38,77 **11,9** 108,0	38,77 **13,2** 113,1	38,77 **14,6** 118,3	40
45																		43,62 **3,0** 66,86	43,62 **3,8** 72,01	43,62 **4,7** 77,15	43,62 **5,7** 82,29	43,62 **6,7** 87,44	43,62 **7,8** 92,58	43,62 **9,0** 97,72	43,62 **10,2** 102,8	43,62 **11,4** 108,0	43,62 **12,8** 113,1	43,62 **14,2** 118,3	45
50																			48,47 **3,3** 72,01	48,47 **4,2** 77,15	48,47 **5,2** 82,29	48,47 **6,2** 87,44	48,47 **7,3** 92,58	48,47 **8,4** 97,72	48,47 **9,6** 102,8	48,47 **10,9** 108,0	48,47 **12,2** 113,1	48,47 **13,6** 118,3	50
55																				53,31 **3,6** 77,15	53,31 **4,6** 82,29	53,31 **5,6** 87,44	53,31 **6,7** 92,58	53,31 **7,8** 97,72	53,31 **9,1** 102,8	53,31 **10,3** 108,0	53,31 **11,7** 113,1	53,31 **13,0** 118,3	55
60																					58,16 **4,0** 82,29	58,16 **5,0** 87,44	58,16 **6,1** 92,58	58,16 **7,2** 97,72	58,16 **8,4** 102,8	58,16 **9,7** 108,0	58,16 **11,0** 113,1	58,16 **12,4** 118,3	60
65																						63,00 **4,3** 87,44	63,00 **5,4** 92,58	63,00 **6,5** 97,72	63,00 **7,7** 102,8	63,00 **9,0** 108,0	63,00 **10,3** 113,1	63,00 **11,7** 118,3	65
70																							67,85 **4,6** 92,58	67,85 **5,8** 97,72	67,85 **7,0** 102,8	67,85 **8,3** 108,0	67,85 **9,6** 113,1	67,85 **11,0** 118,3	70
75																								72,70 **5,0** 97,72	72,70 **6,2** 102,8	72,70 **7,5** 108,0	72,70 **8,8** 113,1	72,70 **10,2** 118,3	75
80																									77,54 **5,4** 102,8	77,54 **6,6** 108,0	77,54 **8,0** 113,1	77,54 **9,3** 118,3	80
85																										82,39 **5,7** 108,0	82,39 **7,0** 113,1	82,39 **8,4** 118,3	85
90																											87,24 **6,1** 113,1	87,24 **7,5** 118,3	90
95																												92,08 **6,4** 118,3	95
100																													100
105																													105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-100MT

Inner diameter / Rod	Outer diameter 120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
Rod	**17,8** 123,4	**19,4** 128,5	**20,9** 133,7	**22,6** 138,8	**24,3** 144,0	**26,0** 149,1	**27,9** 154,3	**29,75** 159,4	**31,7** 164,5	**33,7** 169,7	**35,8** 174,8	**37,9** 180,0	**40,1** 185,1	**42,4** 190,3	**44,7** 195,4	**49,5** 205,7	**54,6** 216,0										Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40	38,77 **16,1** 123,4	38,77 **17,6** 128,5	38,77 **19,2** 133,7	38,77 **20,8** 138,8	38,77 **22,5** 144,0	38,77 **24,3** 149,1	38,77 **26,1** 154,3	38,77 **27,99** 159,4	38,77 **29,9** 164,5	38,77 **32,0** 169,7	38,77 **34,0** 174,8	38,77 **36,2** 180,0	38,77 **38,4** 185,1	38,77 **40,6** 190,3	38,77 **42,9** 195,4	38,77 **47,8** 205,7											40
45	43,62 **15,6** 123,4	43,62 **17,1** 128,5	43,62 **18,7** 133,7	43,62 **20,3** 138,8	43,62 **22,0** 144,0	43,62 **23,8** 149,1	43,62 **25,6** 154,3	43,62 **27,52** 159,4	43,62 **29,5** 164,5	43,62 **31,5** 169,7	43,62 **33,6** 174,8	43,62 **35,7** 180,0	43,62 **37,9** 185,1	43,62 **40,2** 190,3	43,62 **42,5** 195,4	43,62 **47,3** 205,7											45
50	48,47 **15,1** 123,4	48,47 **16,6** 128,5	48,47 **18,2** 133,7	48,47 **19,8** 138,8	48,47 **21,5** 144,0	48,47 **23,3** 149,1	48,47 **25,1** 154,3	48,47 **27,00** 159,4	48,47 **29,0** 164,5	48,47 **31,0** 169,7	48,47 **33,0** 174,8	48,47 **35,2** 180,0	48,47 **37,4** 185,1	48,47 **39,6** 190,3	48,47 **42,0** 195,4	48,47 **46,8** 205,7	48,47 **51,9** 216,0	48,47 **59,9** 231,4	48,47 **65,6** 241,7								50
55	53,31 **14,5** 123,4	53,31 **16,0** 128,5	53,31 **17,6** 133,7	53,31 **19,2** 138,8	53,31 **21,0** 144,0	53,31 **22,7** 149,1	53,31 **24,5** 154,3	53,31 **26,4** 159,4	53,31 **28,4** 164,5	53,31 **30,4** 169,7	53,31 **32,5** 174,8	53,31 **34,6** 180,0	53,31 **36,8** 185,1	53,31 **39,1** 190,3	53,31 **41,4** 195,4	53,31 **46,2** 205,7		53,31 **59,4** 231,4									55
60	58,16 **13,9** 123,4	58,16 **15,4** 128,5	58,16 **17,0** 133,7	58,16 **18,6** 138,8	58,16 **20,3** 144,0	58,16 **22,1** 149,1	58,16 **23,9** 154,3	58,16 **25,79** 159,4	58,16 **27,7** 164,5	58,16 **29,8** 169,7	58,16 **31,8** 174,8	58,16 **34,0** 180,0	58,16 **36,2** 185,1	58,16 **38,4** 190,3	58,16 **40,8** 195,4	58,16 **45,6** 205,7	58,16 **50,6** 216,0	58,16 **58,7** 231,4	58,16 **64,4** 241,7								60
65	63,00 **13,2** 123,4	63,00 **14,7** 128,5	63,00 **16,3** 133,7	63,00 **17,9** 138,8	63,00 **19,6** 144,0	63,00 **21,4** 149,1	63,00 **23,2** 154,3	63,00 **25,11** 159,4	63,00 **27,1** 164,5	63,00 **29,1** 169,7	63,00 **31,1** 174,8	63,00 **33,3** 180,0	63,00 **35,5** 185,1	63,00 **37,7** 190,3	63,00 **40,1** 195,4	63,00 **44,9** 205,7	63,00 **50,0** 216,0	63,00 **58,0** 231,4	63,00 **63,7** 241,7								65
70	67,85 **12,4** 123,4	67,85 **14,0** 128,5	67,85 **15,5** 133,7	67,85 **17,2** 138,8	67,85 **18,9** 144,0	67,85 **20,6** 149,1	67,85 **22,5** 154,3	67,85 **24,36** 159,4	67,85 **26,3** 164,5	67,85 **28,3** 169,7	67,85 **30,4** 174,8	67,85 **32,5** 180,0	67,85 **34,7** 185,1	67,85 **37,0** 190,3	67,85 **39,3** 195,4	67,85 **44,2** 205,7	67,85 **49,2** 216,0	67,85 **57,3** 231,4	67,85 **63,0** 241,7								70
75	72,70 **11,6** 123,4	72,70 **13,2** 128,5	72,70 **14,7** 133,7	72,70 **16,4** 138,8	72,70 **18,1** 144,0	72,70 **19,8** 149,1	72,70 **21,7** 154,3	72,70 **23,6** 159,4	72,70 **25,5** 164,5	72,70 **27,5** 169,7	72,70 **29,6** 174,8	72,70 **31,7** 180,0	72,70 **33,9** 185,1	72,70 **36,2** 190,3	72,70 **38,5** 195,4	72,70 **43,4** 205,7	72,70 **48,4** 216,0	72,70 **56,5** 231,4	72,70 **62,2** 241,7								75
80	77,54 **10,8** 123,4	77,54 **12,3** 128,5	77,54 **13,9** 133,7	77,54 **15,5** 138,8	77,54 **17,2** 144,0	77,54 **19,0** 149,1	77,54 **20,8** 154,3	77,54 **22,71** 159,4	77,54 **24,7** 164,5	77,54 **26,7** 169,7	77,54 **28,8** 174,8	77,54 **30,9** 180,0	77,54 **33,1** 185,1	77,54 **35,3** 190,3	77,54 **37,7** 195,4	77,54 **42,5** 205,7	77,54 **47,6** 216,0	77,54 **55,6** 231,4	77,54 **61,4** 241,7								80
85	82,39 **9,9** 123,4	82,39 **11,4** 128,5	82,39 **13,0** 133,7	82,39 **14,6** 138,8	82,39 **16,3** 144,0	82,39 **18,1** 149,1	82,39 **19,9** 154,3	82,39 **21,81** 159,4	82,39 **23,8** 164,5	82,39 **25,8** 169,7	82,39 **27,8** 174,8	82,39 **30,0** 180,0	82,39 **32,2** 185,1	82,39 **34,4** 190,3	82,39 **36,8** 195,4	82,39 **41,6** 205,7	82,39 **46,7** 216,0	82,39 **54,8** 231,4	82,39 **60,4** 241,7								85
90	87,24 **8,9** 123,4	87,24 **10,4** 128,5	87,24 **12,0** 133,7	87,24 **13,7** 138,8	87,24 **15,4** 144,0	87,24 **17,1** 149,1	87,24 **19,0** 154,3	87,24 **20,85** 159,4	87,24 **22,8** 164,5	87,24 **24,8** 169,7	87,24 **26,9** 174,8	87,24 **29,0** 180,0	87,24 **31,2** 185,1	87,24 **33,5** 190,3	87,24 **35,8** 195,4	87,24 **40,6** 205,7	87,24 **45,7** 216,0	87,24 **53,8** 231,4	87,24 **59,5** 241,7								90
95	92,08 **7,9** 123,4	92,08 **9,4** 128,5	92,08 **11,0** 133,7	92,08 **12,6** 138,8	92,08 **14,4** 144,0	92,08 **16,1** 149,1	92,08 **17,9** 154,3	92,08 **19,8** 159,4	92,08 **21,8** 164,5	92,08 **23,8** 169,7	92,08 **25,9** 174,8	92,08 **28,0** 180,0	92,08 **30,2** 185,1	92,08 **32,5** 190,3	92,08 **34,8** 195,4	92,08 **39,6** 205,7		92,08 **52,8** 231,4									95
100	96,93 **6,8** 123,4	96,93 **8,4** 128,5	96,93 **9,9** 133,7	96,93 **11,6** 138,8	96,93 **13,3** 144,0	96,93 **15,0** 149,1	96,93 **16,9** 154,3	96,93 **18,76** 159,4	96,93 **20,7** 164,5	96,93 **22,7** 169,7	96,93 **24,8** 174,8	96,93 **26,9** 180,0	96,93 **29,1** 185,1	96,93 **31,4** 190,3	96,93 **33,7** 195,4	96,93 **38,5** 205,7	96,93 **43,6** 216,0	96,93 **51,7** 231,4	96,93 **57,4** 241,7								100
105		101,7 **7,2** 128,5	101,7 **8,8** 133,7	101,7 **10,4** 138,8	101,7 **12,2** 144,0	101,7 **13,9** 149,1	101,7 **15,7** 154,3	101,7 **17,6** 159,4	101,7 **19,6** 164,5	101,7 **21,6** 169,7	101,7 **23,7** 174,8	101,7 **25,8** 180,0	101,7 **28,0** 185,1	101,7 **30,3** 190,3	101,7 **32,6** 195,4	101,7 **37,4** 205,7	101,7 **42,5** 216,0	101,7 **50,6** 231,4	101,7 **56,3** 241,7								105
110			106,6 **7,6** 133,7	106,6 **9,3** 138,8	106,6 **11,0** 144,0	106,6 **12,7** 149,1	106,6 **14,6** 154,3	106,6 **16,4** 159,4	106,6 **18,4** 164,5	106,6 **20,4** 169,7	106,6 **22,5** 174,8	106,6 **24,6** 180,0	106,6 **26,8** 185,1	106,6 **29,1** 190,3	106,6 **31,4** 195,4	106,6 **36,2** 205,7	106,6 **41,3** 216,0	106,6 **49,4** 231,4	106,6 **55,1** 241,7								110
115				111,4 **8,0** 138,8	111,4 **9,7** 144,0	111,4 **11,5** 149,1	111,4 **13,3** 154,3	111,4 **15,2** 159,4	111,4 **17,2** 164,5	111,4 **19,2** 169,7	111,4 **21,2** 174,8	111,4 **23,4** 180,0	111,4 **25,6** 185,1	111,4 **27,8** 190,3	111,4 **30,2** 195,4	111,4 **35,0** 205,7	111,4 **40,1** 216,0	111,4 **48,2** 231,4	111,4 **53,8** 241,7		111,4 **66,0** 262,3		111,4 **82,5** 288,0					115
120					116,3 **8,4** 144,0	116,3 **10,2** 149,1	116,3 **12,0** 154,3	116,3 **13,9** 159,4	116,3 **15,9** 164,5	116,3 **17,9** 169,7	116,3 **20,0** 174,8	116,3 **22,1** 180,0	116,3 **24,3** 185,1	116,3 **26,6** 190,3	116,3 **28,9** 195,4	116,3 **33,7** 205,7	116,3 **38,8** 216,0	116,3 **46,9** 231,4	116,3 **52,6** 241,7		116,3 **64,7** 262,3								120
130							126,0 **9,3** 154,3	126,0 **11,2** 159,4	126,0 **13,1** 164,5	126,0 **15,1** 169,7	126,0 **17,2** 174,8	126,0 **19,3** 180,0	126,0 **21,5** 185,1	126,0 **23,8** 190,3	126,0 **26,1** 195,4	126,0 **31,0** 205,7	126,0 **36,0** 216,0	126,0 **44,1** 231,4	126,0 **49,8** 241,7		126,0 **61,9** 262,3		126,0 **78,5** 288,0					130
140									135,7 **10,2** 164,5	135,7 **12,2** 169,7	135,7 **14,2** 174,8	135,7 **16,4** 180,0	135,7 **18,6** 185,1	135,7 **20,8** 190,3	135,7 **23,2** 195,4	135,7 **28,0** 205,7	135,7 **33,1** 216,0	135,7 **41,1** 231,4	135,7 **46,8** 241,7		135,7 **59,0** 262,3		135,7 **75,5** 288,0					140
150											145,3 **11,0** 174,8	145,3 **13,2** 180,0	145,3 **15,4** 185,1	145,3 **17,6** 190,3	145,3 **20,0** 195,4	145,3 **24,8** 205,7	145,3 **29,9** 216,0	145,3 **38,0** 231,4	145,3 **43,6** 241,7		145,3 **55,8** 262,3		145,3 **72,4** 288,0				150
155												150,2 **11,5** 180,0	150,2 **13,7** 185,1	150,2 **16,0** 190,3	150,2 **18,3** 195,4	150,2 **23,1** 205,7	150,2 **28,2** 216,0	150,2 **36,3** 231,4	150,2 **42,0** 241,7		150,2 **54,1** 262,3		150,2 **70,7** 288,0				155
160													155,0 **12,0** 185,1	155,0 **14,2** 190,3	155,0 **16,6** 195,4	155,0 **21,4** 205,7	155,0 **26,5** 216,0	155,0 **34,5** 231,4	155,0 **40,2** 241,7		155,0 **52,4** 262,3		155,0 **68,9** 288,0				160
170															164,7 **12,9** 195,4	164,7 **17,8** 205,7	164,7 **22,8** 216,0	164,7 **30,9** 231,4	164,7 **36,6** 241,7		164,7 **48,8** 262,3		164,7 **65,3** 288,0				170
180																	174,4 **19,0** 216,0	174,4 **27,1** 231,4	174,4 **32,8** 241,7		174,4 **44,9** 262,3		174,4 **61,5** 288,0				180
190																	184,1 **14,9** 216,0	184,1 **23,0** 231,4	184,1 **28,7** 241,7		184,1 **40,8** 262,3		184,1 **57,4** 288,0				190
200																		193,8 **18,7** 231,4	193,8 **24,4** 241,7		193,8 **36,5** 262,3		193,8 **53,1** 288,0		193,8 **107,7** 360,0		200
230																							222,9 **38,9** 288,0				230
250																							242,3 **28,4** 288,0	242,3 **54,2** 324,0	242,3 **83,0** 360,0		250
280																											280
300																										290,7 **79,9** 390,9	300
395																											395

Size list of rods and tubes, made of ZX-324

Inner diameter / Rod	Outer diameter 6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
Rod	**0,0** 6,26	**0,1** 8,35	**0,1** 10,44	**0,2** 12,52	**0,2** 15,65	**0,4** 18,78	**0,4** 20,87	**0,6** 22,96	**0,7** 26,09	**1,0** 31,30	**1,4** 36,52	**1,8** 41,74	**2,3** 46,96	**2,5** 49,04	**2,8** 52,17	**3,4** 57,39	**4,1** 62,61	**4,8** 67,83	**5,5** 73,04	**6,4** 78,26	**7,2** 83,48	**8,2** 88,70	**9,1** 93,91	**10,2** 99,13	**11,3** 104,3				Rod
20										19,12 **0,6** 31,30	19,12 **1,0** 36,52	19,12 **1,4** 41,74	19,12 **1,9** 46,96	19,12 **2,1** 49,04	19,12 **2,4** 52,17	19,12 **3,0** 57,39	19,12 **3,7** 62,61										20
25										23,90 **0,4** 31,30	23,90 **0,8** 36,52	23,90 **1,2** 41,74	23,90 **1,7** 46,96	23,90 **1,9** 49,04	23,90 **2,2** 52,17	23,90 **2,8** 57,39	23,90 **3,5** 62,61										25
30												28,68 **1,0** 41,74	28,68 **1,4** 46,96	28,68 **1,6** 49,04	28,68 **2,0** 52,17	28,68 **2,6** 57,39	28,68 **3,2** 62,61	28,68 **3,9** 67,83	28,68 **4,7** 73,04	28,68 **5,5** 78,26	28,68 **6,4** 83,48	28,68 **7,3** 88,70	28,68 **8,3** 93,91	28,68 **9,3** 99,13	28,68 **10,4** 104,3				30
32													30,59 **1,3** 46,96	30,59 **1,5** 49,04	30,59 **1,8** 52,17	30,59 **2,4** 57,39	30,59 **3,1** 62,61												32
35													33,46 **1,1** 46,96	33,46 **1,3** 49,04	33,46 **1,7** 52,17	33,46 **2,2** 57,39	33,46 **2,9** 62,61	33,46 **3,6** 67,83	33,46 **4,4** 73,04	33,46 **5,2** 78,26	33,46 **6,1** 83,48	33,46 **7,0** 88,70	33,46 **8,0** 93,91	33,46 **9,0** 99,13	33,46 **10,1** 104,3				35
40															38,24 **1,3** 52,17	38,24 **1,9** 57,39	38,24 **2,6** 62,61	38,24 **3,2** 67,83	38,24 **4,0** 73,04	38,24 **4,8** 78,26	38,24 **5,7** 83,48	38,24 **6,6** 88,70	38,24 **7,6** 93,91	38,24 **8,7** 99,13	38,24 **9,8** 104,3	38,24 **10,9** 109,5	38,24 **12,1** 114,7	38,24 **13,4** 120,0	40
45																		43,02 **2,8** 67,83	43,02 **3,6** 73,04	43,02 **4,4** 78,26	43,02 **5,3** 83,48	43,02 **6,2** 88,70	43,02 **7,2** 93,91	43,02 **8,3** 99,13	43,02 **9,4** 104,3	43,02 **10,5** 109,5	43,02 **11,7** 114,7	43,02 **13,0** 120,0	45
50																	47,80 **1,7** 62,61	47,80 **2,4** 67,83	47,80 **3,2** 73,04	47,80 **4,0** 78,26	47,80 **4,9** 83,48	47,80 **5,8** 88,70	47,80 **6,8** 93,91	47,80 **7,8** 99,13	47,80 **8,9** 104,3	47,80 **10,1** 109,5	47,80 **11,3** 114,7	47,80 **12,6** 120,0	50
55																		52,58 **1,9** 67,83	52,58 **2,7** 73,04	52,58 **3,5** 78,26	52,58 **4,4** 83,48	52,58 **5,3** 88,70	52,58 **6,3** 93,91	52,58 **7,3** 99,13	52,58 **8,4** 104,3	52,58 **9,6** 109,5	52,58 **10,8** 114,7	52,58 **12,1** 120,0	55
60																			57,35 **2,1** 73,04	57,35 **2,9** 78,26	57,35 **3,8** 83,48	57,35 **4,8** 88,70	57,35 **5,7** 93,91	57,35 **6,8** 99,13	57,35 **7,9** 104,3	57,35 **9,0** 109,5	57,35 **10,2** 114,7	57,35 **11,5** 120,0	60
65																					62,13 **3,2** 83,48	62,13 **4,2** 88,70	62,13 **5,1** 93,91	62,13 **6,2** 99,13	62,13 **7,3** 104,3	62,13 **8,4** 109,5	62,13 **9,7** 114,7	62,13 **10,9** 120,0	65
70																					66,91 **2,6** 83,48	66,91 **3,5** 88,70	66,91 **4,5** 93,91	66,91 **5,6** 99,13	66,91 **6,6** 104,3	66,91 **7,8** 109,5	66,91 **9,0** 114,7	66,91 **10,3** 120,0	70
75																							71,69 **3,8** 93,91	71,69 **4,9** 99,13	71,69 **6,0** 104,3	71,69 **7,1** 109,5	71,69 **8,3** 114,7	71,69 **9,6** 120,0	75
80																							76,47 **3,1** 93,91	76,47 **4,1** 99,13	76,47 **5,2** 104,3	76,47 **6,4** 109,5	76,47 **7,6** 114,7	76,47 **8,9** 120,0	80
85																								81,25 **3,3** 99,13	81,25 **4,4** 104,3	81,25 **5,6** 109,5	81,25 **6,8** 114,7	81,25 **8,1** 120,0	85
90																									86,03 **3,6** 104,3	86,03 **4,8** 109,5	86,03 **6,0** 114,7	86,03 **7,3** 120,0	90
95																										90,81 **3,9** 109,5	90,81 **5,1** 114,7	90,81 **6,4** 120,0	95
100																											95,59 **4,2** 114,7	95,59 **5,5** 120,0	100
105																												100,3 **4,5** 120,0	105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-324

Outer diameter

Rod	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40	38,24 **14,7** 125,2	38,24 **16,1** 130,4	38,24 **17,6** 135,6	38,24 **19,1** 140,8	38,24 **20,6** 146,0	38,24 **22,2** 151,3	38,24 **23,9** 156,5		38,24 **27,4** 166,9	38,24 **29,22** 172,1	38,24 **31,11** 177,3	38,24 **33,0** 182,6	38,24 **35,1** 187,8	38,24 **37,1** 193,0	38,24 **39,24** 198,2	38,24 **43,6** 208,7												40
45	43,02 **14,3** 125,2	43,02 **15,7** 130,4	43,02 **17,2** 135,6	43,02 **18,6** 140,8	43,02 **20,2** 146,0	43,02 **21,8** 151,3	43,02 **23,5** 156,5	43,02 **25,20** 161,7	43,02 **27,0** 166,9	43,02 **28,81** 172,1	43,02 **30,71** 177,3	43,02 **32,6** 182,6	43,02 **34,7** 187,8	43,02 **36,7** 193,0	43,02 **38,83** 198,2	43,02 **43,2** 208,7												45
50	47,80 **13,9** 125,2	47,80 **15,3** 130,4	47,80 **16,7** 135,6	47,80 **18,2** 140,8	47,80 **19,8** 146,0	47,80 **21,4** 151,3	47,80 **23,0** 156,5	47,80 **24,75** 161,7	47,80 **26,5** 166,9	47,80 **28,36** 172,1	47,80 **30,26** 177,3	47,80 **32,2** 182,6	47,80 **34,2** 187,8	47,80 **36,3** 193,0	47,80 **38,38** 198,2	47,80 **42,8** 208,7	47,80 **47,4** 219,1	47,80 **54,8** 234,7	47,80 **60,0** 245,2									50
55	52,58 **13,4** 125,2	52,58 **14,8** 130,4	52,58 **16,2** 135,6	52,58 **17,7** 140,8	52,58 **19,3** 146,0	52,58 **20,9** 151,3	52,58 **22,5** 156,5	52,58 **24,25** 161,7	52,58 **26,0** 166,9	52,58 **27,87** 172,1	52,58 **29,76** 177,3	52,58 **31,7** 182,6	52,58 **33,7** 187,8	52,58 **35,8** 193,0	52,58 **37,89** 198,2	52,58 **42,3** 208,7	52,58 **46,9** 219,1	52,58 **54,3** 234,7	52,58 **59,5** 245,2									55
60	57,35 **12,8** 125,2	57,35 **14,2** 130,4	57,35 **15,7** 135,6	57,35 **17,2** 140,8	57,35 **18,7** 146,0	57,35 **20,3** 151,3	57,35 **22,0** 156,5	57,35 **23,71** 161,7	57,35 **25,5** 166,9	57,35 **27,32** 172,1	57,35 **29,21** 177,3	57,35 **31,2** 182,6	57,35 **33,2** 187,8	57,35 **35,2** 193,0	57,35 **37,34** 198,2	57,35 **41,7** 208,7	57,35 **46,4** 219,1	57,35 **53,7** 234,7	57,35 **58,9** 245,2									60
65	62,13 **12,2** 125,2	62,13 **13,6** 130,4	62,13 **15,1** 135,6	62,13 **16,6** 140,8	62,13 **18,1** 146,0	62,13 **19,7** 151,3	62,13 **21,4** 156,5	62,13 **23,12** 161,7	62,13 **24,9** 166,9	62,13 **26,73** 172,1	62,13 **28,62** 177,3	62,13 **30,6** 182,6	62,13 **32,6** 187,8	62,13 **34,6** 193,0	62,13 **36,75** 198,2	62,13 **41,2** 208,7	62,13 **45,8** 219,1	62,13 **53,1** 234,7	62,13 **58,3** 245,2									65
70	66,91 **11,6** 125,2	66,91 **13,0** 130,4	66,91 **14,4** 135,6	66,91 **15,9** 140,8	66,91 **17,5** 146,0	66,91 **19,1** 151,3	66,91 **20,8** 156,5	66,91 **22,48** 161,7	66,91 **24,3** 166,9	66,91 **26,09** 172,1	66,91 **27,98** 177,3	66,91 **29,9** 182,6	66,91 **31,9** 187,8	66,91 **34,0** 193,0	66,91 **36,11** 198,2	66,91 **40,5** 208,7	66,91 **45,1** 219,1	66,91 **52,5** 234,7	66,91 **57,7** 245,2									70
75	71,69 **10,9** 125,2	71,69 **12,3** 130,4	71,69 **13,8** 135,6	71,69 **15,2** 140,8	71,69 **16,8** 146,0	71,69 **18,4** 151,3	71,69 **20,1** 156,5	71,69 **21,79** 161,7	71,69 **23,6** 166,9	71,69 **25,40** 172,1	71,69 **27,29** 177,3	71,69 **29,2** 182,6	71,69 **31,2** 187,8	71,69 **33,3** 193,0	71,69 **35,42** 198,2	71,69 **39,8** 208,7	71,69 **44,4** 219,1	71,69 **51,8** 234,7	71,69 **57,0** 245,2									75
80	76,47 **10,2** 125,2	76,47 **11,6** 130,4	76,47 **13,0** 135,6	76,47 **14,5** 140,8	76,47 **16,1** 146,0	76,47 **17,7** 151,3	76,47 **19,3** 156,5	76,47 **21,06** 161,7	76,47 **22,8** 166,9	76,47 **24,67** 172,1	76,47 **26,56** 177,3	76,47 **28,5** 182,6	76,47 **30,5** 187,8	76,47 **32,6** 193,0	76,47 **34,69** 198,2	76,47 **39,1** 208,7	76,47 **43,7** 219,1	76,47 **51,1** 234,7	76,47 **56,3** 245,2									80
85	81,25 **9,4** 125,2	81,25 **10,8** 130,4	81,25 **12,2** 135,6	81,25 **13,7** 140,8	81,25 **15,3** 146,0	81,25 **16,9** 151,3	81,25 **18,6** 156,5	81,25 **20,28** 161,7	81,25 **22,0** 166,9	81,25 **23,89** 172,1	81,25 **25,78** 177,3	81,25 **27,7** 182,6	81,25 **29,7** 187,8	81,25 **31,8** 193,0	81,25 **33,91** 198,2	81,25 **38,3** 208,7	81,25 **42,9** 219,1	81,25 **50,3** 234,7	81,25 **55,5** 245,2									85
90	86,03 **8,6** 125,2	86,03 **10,0** 130,4	86,03 **11,4** 135,6	86,03 **12,9** 140,8	86,03 **14,4** 146,0	86,03 **16,1** 151,3	86,03 **17,7** 156,5	86,03 **19,45** 161,7	86,03 **21,2** 166,9	86,03 **23,06** 172,1	86,03 **24,95** 177,3	86,03 **26,9** 182,6	86,03 **28,9** 187,8	86,03 **31,0** 193,0	86,03 **33,08** 198,2	86,03 **37,5** 208,7	86,03 **42,1** 219,1	86,03 **49,5** 234,7	86,03 **54,7** 245,2									90
95	90,81 **7,7** 125,2	90,81 **9,1** 130,4	90,81 **10,5** 135,6	90,81 **12,0** 140,8	90,81 **13,6** 146,0	90,81 **15,2** 151,3	90,81 **16,8** 156,5	90,81 **18,57** 161,7	90,81 **20,4** 166,9	90,81 **22,18** 172,1	90,81 **24,07** 177,3	90,81 **26,0** 182,6	90,81 **28,0** 187,8	90,81 **30,1** 193,0	90,81 **32,20** 198,2	90,81 **36,6** 208,7	90,81 **41,2** 219,1	90,81 **48,6** 234,7	90,81 **53,8** 245,2									95
100	95,59 **6,8** 125,2	95,59 **8,2** 130,4	95,59 **9,6** 135,6	95,59 **11,1** 140,8	95,59 **12,6** 146,0	95,59 **14,3** 151,3	95,59 **15,9** 156,5	95,59 **17,65** 161,7	95,59 **19,4** 166,9	95,59 **21,26** 172,1	95,59 **23,15** 177,3	95,59 **25,1** 182,6	95,59 **27,1** 187,8	95,59 **29,2** 193,0	95,59 **31,28** 198,2	95,59 **35,7** 208,7	95,59 **40,3** 219,1	95,59 **47,7** 234,7	95,59 **52,9** 245,2									100
105	100,3 **5,8** 125,2	100,3 **7,2** 130,4	100,3 **8,6** 135,6	100,3 **10,1** 140,8	100,3 **11,7** 146,0	100,3 **13,3** 151,3	100,3 **15,0** 156,5	100,3 **16,7** 161,7	100,3 **18,4** 166,9	100,3 **20,3** 172,1	100,3 **22,2** 177,3	100,3 **24,1** 182,6	100,3 **26,1** 187,8	100,3 **28,2** 193,0	100,3 **30,3** 198,2	100,3 **34,7** 208,7	100,3 **39,3** 219,1	100,3 **46,7** 234,7	100,3 **51,9** 245,2									105
110	105,1 **4,8** 125,2	105,1 **6,2** 130,4	105,1 **7,6** 135,6	105,1 **9,1** 140,8	105,1 **10,7** 146,0	105,1 **12,3** 151,3	105,1 **13,9** 156,5	105,1 **15,66** 161,7	105,1 **17,4** 166,9	105,1 **19,27** 172,1	105,1 **21,16** 177,3	105,1 **23,1** 182,6	105,1 **25,1** 187,8	105,1 **27,2** 193,0	105,1 **29,29** 198,2	105,1 **33,7** 208,7	105,1 **38,3** 219,1	105,1 **45,7** 234,7	105,1 **50,9** 245,2									110
115				109,9 **8,0** 140,8	109,9 **9,6** 146,0	109,9 **11,2** 151,3	109,9 **12,9** 156,5	109,9 **14,6** 161,7	109,9 **16,4** 166,9	109,9 **18,2** 172,1	109,9 **20,1** 177,3	109,9 **22,0** 182,6	109,9 **24,0** 187,8	109,9 **26,1** 193,0	109,9 **28,2** 198,2	109,9 **32,6** 208,7	109,9 **37,2** 219,1	109,9 **44,6** 234,7	109,9 **49,8** 245,2		109,9 **60,9** 266,0		109,9 **76,0** 292,1						115
120			114,7 **5,4** 135,6	114,7 **6,9** 140,8	114,7 **8,5** 146,0	114,7 **10,1** 151,3	114,7 **11,8** 156,5	114,7 **13,5** 161,7	114,7 **15,3** 166,9	114,7 **17,09** 172,1	114,7 **18,98** 177,3	114,7 **20,9** 182,6	114,7 **22,9** 187,8	114,7 **25,0** 193,0	114,7 **27,11** 198,2	114,7 **31,5** 208,7	114,7 **36,1** 219,1	114,7 **43,5** 234,7	114,7 **48,7** 245,2		114,7 **59,8** 266,0		114,7 **74,9** 292,1						120
130							124,2 **9,4** 156,5	124,2 **11,1** 161,7	124,2 **12,9** 166,9	124,2 **14,7** 172,1	124,2 **16,6** 177,3	124,2 **18,6** 182,6	124,2 **20,6** 187,8	124,2 **22,6** 193,0	124,2 **24,7** 198,2	124,2 **29,1** 208,7	124,2 **33,8** 219,1	124,2 **41,1** 234,7	124,2 **46,3** 245,2		124,2 **57,4** 266,0		124,2 **72,5** 292,1						130
140							133,8 **6,8** 156,5	133,8 **8,6** 161,7	133,8 **10,3** 166,9	133,8 **12,2** 172,1	133,8 **14,1** 177,3	133,8 **16,0** 182,6	133,8 **18,0** 187,8	133,8 **20,1** 193,0	133,8 **22,2** 198,2	133,8 **26,6** 208,7	133,8 **31,2** 219,1	133,8 **38,6** 234,7	133,8 **43,8** 245,2		133,8 **54,8** 266,0		133,8 **69,9** 292,1						140
150											143,3 **11,3** 177,3	143,3 **13,3** 182,6	143,3 **15,3** 187,8	143,3 **17,3** 193,0	143,3 **19,44** 198,2	143,3 **23,8** 208,7	143,3 **28,5** 219,1	143,3 **35,8** 234,7	143,3 **41,0** 245,2		143,3 **52,1** 266,0		143,3 **67,2** 292,1				150
155												148,1 **11,8** 182,6	148,1 **13,8** 187,8	148,1 **15,9** 193,0	148,1 **18,0** 198,2	148,1 **22,4** 208,7	148,1 **27,0** 219,1	148,1 **34,4** 234,7	148,1 **39,6** 245,2		148,1 **50,6** 266,0		148,1 **65,7** 292,1				155
160															152,9 **16,50** 198,2	152,9 **20,9** 208,7	152,9 **25,5** 219,1	152,9 **32,9** 234,7	152,9 **38,1** 245,2		152,9 **49,2** 266,0		152,9 **64,2** 292,1				160
170															162,5 **13,4** 198,2	162,5 **17,8** 208,7	162,5 **22,4** 219,1	162,5 **29,8** 234,7	162,5 **35,0** 245,2		162,5 **46,0** 266,0		162,5 **61,1** 292,1				170
180																	172,0 **19,1** 219,1	172,0 **26,4** 234,7	172,0 **31,6** 245,2		172,0 **42,7** 266,0		172,0 **57,8** 292,1				180
190																	181,6 **15,6** 219,1	181,6 **23,0** 234,7	181,6 **28,1** 245,2		181,6 **39,2** 266,0						190
200																		191,1 **19,3** 234,7			191,1 **35,5** 266,0		191,1 **50,6** 292,1		191,1 **100,3** 365,2		200
230																							219,8 **38,4** 292,1				230
250																											250
280																											280
300																											300
395																											395

Inner diameter

Size list of rods and tubes, made of aus ZX-324V1T

Outer diameter

Rod	6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
20														19,31 **2,1** 48,55	19,31 **2,4** 51,65	19,31 **3,0** 56,82	19,31 **3,6** 61,98												20
25																24,14 **2,7** 56,82	24,14 **3,4** 61,98												25
30																	28,96 **3,1** 61,98	28,96 **3,8** 67,14	28,96 **4,6** 72,31	28,96 **5,4** 77,47	28,96 **6,2** 82,64	28,96 **7,1** 87,80							30
32																	30,89 **3,0** 61,98	30,89 **3,7** 67,14	30,89 **4,4** 72,31	30,89 **5,2** 77,47	30,89 **6,1** 82,64	30,89 **7,0** 87,80	30,89 **8,0** 92,97						32
35																		33,79 **3,5** 67,14	33,79 **4,2** 72,31	33,79 **5,0** 77,47	33,79 **5,9** 82,64	33,79 **6,8** 87,80	33,79 **7,8** 92,97						35
40																			38,62 **3,9** 72,31	38,62 **4,7** 77,47	38,62 **5,5** 82,64	38,62 **6,4** 87,80	38,62 **7,4** 92,97	38,62 **8,4** 98,13						40
45																				43,44 **4,3** 77,47	43,44 **5,1** 82,64	43,44 **6,0** 87,80	43,44 **7,0** 92,97	43,44 **8,0** 98,13	43,44 **9,1** 103,3					45
50																					48,27 **4,7** 82,64	48,27 **5,6** 87,80	48,27 **6,6** 92,97	48,27 **7,6** 98,13	48,27 **8,6** 103,3	48,27 **9,8** 108,4				50
55																													55
60																							57,92 **5,5** 92,97	57,92 **6,5** 98,13	57,92 **7,6** 103,3	57,92 **8,7** 108,4	57,92 **9,9** 113,6	57,92 **11,2** 118,7	60
65																								62,75 **5,9** 98,13	62,75 **7,0** 103,3	62,75 **8,1** 108,4	62,75 **9,3** 113,6	62,75 **10,6** 118,7	65
70																									67,58 **6,3** 103,3	67,58 **7,5** 108,4	67,58 **8,6** 113,6	67,58 **9,9** 118,7	70
75																													75
80																											77,23 **7,2** 113,6	77,23 **8,4** 118,7	80
85																												82,06 **7,6** 118,7	85
90																													90
95																													95
100																													100
105																													105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-324V1T

Outer diameter

Rod	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40																												40
45																												45
50																												50
55																												55
60																												60
65	62,75 **11,8** 123,9																											65
70	67,58 **11,2** 123,9	67,58 **12,6** 129,1																										70
75																												75
80	77,23 **9,8** 123,9	77,23 **11,1** 129,1	77,23 **12,5** 134,2	77,23 **14,0** 139,4																								80
85	82,06 **9,0** 123,9	82,06 **10,3** 129,1	82,06 **11,7** 134,2	82,06 **13,2** 139,4	82,06 **14,7** 144,6																							85
90	86,89 **8,1** 123,9	86,89 **9,5** 129,1	86,89 **10,9** 134,2	86,89 **12,3** 139,4	86,89 **13,9** 144,6	86,89 **15,4** 149,7																						90
95																												95
100			96,54 **9,0** 134,2	96,54 **10,5** 139,4	96,54 **12,0** 144,6	96,54 **13,6** 149,7	96,54 **15,2** 154,9	96,54 **16,92** 160,1																				100
105				101,3 **9,5** 139,4	101,3 **11,0** 144,6	101,3 **12,6** 149,7	101,3 **14,2** 154,9	101,3 **15,9** 160,1	101,3 **17,7** 165,2																		105
110					106,1 **10,0** 144,6	106,1 **11,6** 149,7	106,1 **13,2** 154,9	106,1 **14,9** 160,1	106,1 **16,6** 165,2	106,1 **18,4** 170,4																		110
115						111,0 **10,5** 149,7	111,0 **12,1** 154,9	111,0 **13,8** 160,1	111,0 **15,5** 165,2	111,0 **17,3** 170,4	111,0 **19,2** 175,6																	115
120																												120
130									125,5 **12,0** 165,2		125,5 **15,6** 175,6	125,5 **17,6** 180,7	125,5 **19,5** 185,9	125,5 **21,5** 191,1														130
140											135,1 **13,0** 175,6	135,1 **14,9** 180,7	135,1 **16,9** 185,9	135,1 **18,9** 191,1	135,1 **21,0** 196,2													140
150													144,8 **14,1** 185,9	144,8 **16,1** 191,1	144,8 **18,2** 196,2	144,8 **22,5** 206,6												150
155														149,6 **14,6** 191,1	149,6 **16,7** 196,2	149,6 **21,0** 206,6	149,6 **25,6** 216,9											155
160																												160
170																												170
180																	173,7 **17,5** 216,9	173,7 **24,7** 232,4	173,7 **29,8** 242,7									180
190																		183,4 **21,1** 232,4	183,4 **26,2** 242,7									190
200																					193,0 **33,3** 263,4							200
230																							222,0 **35,6** 289,2					230
250																												250
280																												280
300																												300
395																												395

Inner diameter

Inner diameter

Size list of rods and tubes, made of ZX-324V2T

Outer diameter

Rod	6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
	0,0 6,21	**0,1** 8,28	**0,1** 10,35	**0,2** 12,43	**0,2** 15,53	**0,4** 18,64	**0,4** 20,71	**0,5** 22,78	**0,7** 25,89	**1,0** 31,06	**1,4** 36,24	**1,8** 41,42	**2,3** 46,59		**2,8** 51,77	**3,4** 56,95	**4,0** 62,12	**4,7** 67,30	**5,5** 72,48	**6,3** 77,66	**7,2** 82,83	**8,1** 88,01	**9,1** 93,19		**11,2** 103,5				
20										19,26 **0,6** 31,06	19,26 **1,0** 36,24	19,26 **1,4** 41,42	19,26 **1,9** 46,59	19,26 **2,1** 48,66	19,26 **2,4** 51,77	19,26 **3,0** 56,95	19,26 **3,6** 62,12											20
25										24,08 **0,4** 31,06	24,08 **0,8** 36,24	24,08 **1,2** 41,42	24,08 **1,7** 46,59	24,08 **1,9** 48,66	24,08 **2,2** 51,77	24,08 **2,8** 56,95	24,08 **3,4** 62,12											25
30												28,90 **0,9** 41,42	28,90 **1,4** 46,59	28,90 **1,6** 48,66	28,90 **1,9** 51,77	28,90 **2,5** 56,95	28,90 **3,2** 62,12	28,90 **3,9** 67,30	28,90 **4,6** 72,48	28,90 **5,4** 77,66	28,90 **6,3** 82,83	28,90 **7,2** 88,01	28,90 **8,2** 93,19	28,90 **9,2** 98,36	28,90 **10,3** 103,5				30
32													30,82 **1,3** 46,59	30,82 **1,5** 48,66	30,82 **1,8** 51,77	30,82 **2,4** 56,95	30,82 **3,0** 62,12	30,82 **3,7** 67,30	30,82 **4,5** 72,48	30,82 **5,3** 77,66	30,82 **6,2** 82,83	30,82 **7,1** 88,01	30,82 **8,1** 93,19	30,82 **9,1** 98,36	30,82 **10,2** 103,5				32
35													33,71 **1,1** 46,59	33,71 **1,3** 48,66	33,71 **1,6** 51,77	33,71 **2,2** 56,95	33,71 **2,8** 62,12	33,71 **3,5** 67,30	33,71 **4,3** 72,48	33,71 **5,1** 77,66	33,71 **6,0** 82,83	33,71 **6,9** 88,01	33,71 **7,9** 93,19	33,71 **8,9** 98,36	33,71 **10,0** 103,5				35
40															38,53 **1,2** 51,77	38,53 **1,8** 56,95	38,53 **2,5** 62,12	38,53 **3,2** 67,30	38,53 **3,9** 72,48	38,53 **4,8** 77,66	38,53 **5,6** 82,83	38,53 **6,5** 88,01	38,53 **7,5** 93,19	38,53 **8,6** 98,36	38,53 **9,6** 103,5	38,53 **10,8** 108,7	38,53 **12,0** 113,8	38,53 **13,3** 119,0	40
45																		43,35 **2,8** 67,30	43,35 **3,5** 72,48	43,35 **4,3** 77,66	43,35 **5,2** 82,83	43,35 **6,1** 88,01	43,35 **7,1** 93,19	43,35 **8,1** 98,36	43,35 **9,2** 103,5	43,35 **10,4** 108,7	43,35 **11,6** 113,8	43,35 **12,8** 119,0	45
50																	48,16 **1,6** 62,12	48,16 **2,3** 67,30	48,16 **3,1** 72,48	48,16 **3,9** 77,66	48,16 **4,7** 82,83	48,16 **5,7** 88,01	48,16 **6,6** 93,19	48,16 **7,7** 98,36	48,16 **8,8** 103,5	48,16 **9,9** 108,7	48,16 **11,1** 113,8	48,16 **12,4** 119,0	50
55																													55
60																			57,79 **2,0** 72,48	57,79 **2,8** 77,66	57,79 **3,7** 82,83	57,79 **4,6** 88,01	57,79 **5,6** 93,19	57,79 **6,6** 98,36	57,79 **7,7** 103,5	57,79 **8,9** 108,7	57,79 **10,1** 113,8	57,79 **11,3** 119,0	60
65																					62,61 **3,1** 82,83	62,61 **4,0** 88,01	62,61 **5,0** 93,19	62,61 **6,0** 98,36	62,61 **7,1** 103,5	62,61 **8,2** 108,7	62,61 **9,5** 113,8	62,61 **10,7** 119,0	65
70																					67,43 **2,4** 82,83	67,43 **3,3** 88,01	67,43 **4,3** 93,19	67,43 **5,4** 98,36	67,43 **6,4** 103,5	67,43 **7,6** 108,7	67,43 **8,8** 113,8	67,43 **10,1** 119,0	70
75																													75
80																							77,06 **2,9** 93,19	77,06 **3,9** 98,36	77,06 **5,0** 103,5	77,06 **6,1** 108,7	77,06 **7,4** 113,8	77,06 **8,6** 119,0	80
85																								81,87 **3,1** 98,36	81,87 **4,2** 103,5	81,87 **5,3** 108,7	81,87 **6,6** 113,8	81,87 **7,8** 119,0	85
90																									86,69 **3,4** 103,5	86,69 **4,5** 108,7	86,69 **5,7** 113,8	86,69 **7,0** 119,0	90
95																													95
100																											96,32 **3,9** 113,8	96,32 **5,1** 119,0	100
105																												101,1 **4,1** 119,0	105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

- Product in stock
- Just in time product
- Special product
- Scheduled product

Size list of rods and tubes, made of ZX-324V2T

Outer diameter

Rod	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40	38,53 **14,6** 124,2	38,53 **16,0** 129,4	38,53 **17,4** 134,6	38,53 **18,9** 139,7	38,53 **20,4** 144,9	38,53 **22,0** 150,1	38,53 **23,6** 155,3		38,53 **27,1** 165,6	38,53 **28,9** 170,8	38,53 **30,8** 176,0	38,53 **32,7** 181,1	38,53 **34,7** 186,3	38,53 **36,8** 191,5		38,53 **43,2** 207,0											40
45	43,35 **14,2** 124,2	43,35 **15,5** 129,4	43,35 **17,0** 134,6	43,35 **18,4** 139,7	43,35 **20,0** 144,9	43,35 **21,6** 150,1	43,35 **23,2** 155,3	43,35 **24,94** 160,4	43,35 **26,7** 165,6	43,35 **28,5** 170,8	43,35 **30,4** 176,0	43,35 **32,3** 181,1	43,35 **34,3** 186,3	43,35 **36,4** 191,5	43,35 **38,5** 196,7	43,35 **42,8** 207,0											45
50	48,16 **13,7** 124,2	48,16 **15,1** 129,4	48,16 **16,5** 134,6	48,16 **18,0** 139,7	48,16 **19,5** 144,9	48,16 **21,1** 150,1	48,16 **22,8** 155,3	48,16 **24,48** 160,4	48,16 **26,2** 165,6		48,16 **29,9** 176,0	48,16 **31,9** 181,1	48,16 **33,9** 186,3	48,16 **35,9** 191,5		48,16 **42,4** 207,0	48,16 **47,0** 217,4	48,16 **54,3** 232,9	48,16 **59,4** 243,3								50
55																												55
60	57,79 **12,6** 124,2	57,79 **14,0** 129,4	57,79 **15,4** 134,6	57,79 **16,9** 139,7	57,79 **18,5** 144,9	57,79 **20,1** 150,1	57,79 **21,7** 155,3	57,79 **23,42** 160,4	57,79 **25,2** 165,6	57,79 **27,0** 170,8	57,79 **28,9** 176,0	57,79 **30,8** 181,1	57,79 **32,8** 186,3	57,79 **34,8** 191,5	57,79 **36,9** 196,7	57,79 **41,3** 207,0	57,79 **45,9** 217,4	57,79 **53,2** 232,9	57,79 **58,4** 243,3								60
65	62,61 **12,0** 124,2	62,61 **13,4** 129,4	62,61 **14,8** 134,6	62,61 **16,3** 139,7	62,61 **17,8** 144,9	62,61 **19,4** 150,1	62,61 **21,1** 155,3	62,61 **22,81** 160,4	62,61 **24,6** 165,6	62,61 **26,4** 170,8	62,61 **28,3** 176,0	62,61 **30,2** 181,1	62,61 **32,2** 186,3	62,61 **34,2** 191,5	62,61 **36,3** 196,7	62,61 **40,7** 207,0	62,61 **45,3** 217,4	62,61 **52,6** 232,9	62,61 **57,8** 243,3								65
70	67,43 **11,4** 124,2	67,43 **12,8** 129,4	67,43 **14,2** 134,6	67,43 **15,7** 139,7	67,43 **17,2** 144,9	67,43 **18,8** 150,1	67,43 **20,4** 155,3	67,43 **22,16** 160,4	67,43 **23,9** 165,6	67,43 **25,7** 170,8	67,43 **27,6** 176,0	67,43 **29,6** 181,1	67,43 **31,5** 186,3	67,43 **33,6** 191,5	67,43 **35,7** 196,7	67,43 **40,0** 207,0	67,43 **44,6** 217,4	67,43 **51,9** 232,9	67,43 **57,1** 243,3								70
75																												75
80	77,06 **9,9** 124,2	77,06 **11,3** 129,4	77,06 **12,7** 134,6	77,06 **14,2** 139,7	77,06 **15,8** 144,9	77,06 **17,3** 150,1	77,06 **19,0** 155,3	77,06 **20,70** 160,4	77,06 **22,5** 165,6	77,06 **24,3** 170,8	77,06 **26,2** 176,0	77,06 **28,1** 181,1	77,06 **30,1** 186,3	77,06 **32,1** 191,5		77,06 **38,6** 207,0	77,06 **43,2** 217,4	77,06 **50,5** 232,9	77,06 **55,6** 243,3								80
85	81,87 **9,1** 124,2	81,87 **10,5** 129,4	81,87 **11,9** 134,6	81,87 **13,4** 139,7	81,87 **15,0** 144,9	81,87 **16,5** 150,1	81,87 **18,2** 155,3	81,87 **19,90** 160,4	81,87 **21,7** 165,6	81,87 **23,5** 170,8	81,87 **25,4** 176,0	81,87 **27,3** 181,1	81,87 **29,3** 186,3	81,87 **31,3** 191,5	81,87 **33,4** 196,7	81,87 **37,8** 207,0	81,87 **42,4** 217,4	81,87 **49,7** 232,9	81,87 **54,8** 243,3								85
90	86,69 **8,3** 124,2	86,69 **9,6** 129,4	86,69 **11,1** 134,6	86,69 **12,6** 139,7	86,69 **14,1** 144,9	86,69 **15,7** 150,1	86,69 **17,4** 155,3	86,69 **19,05** 160,4	86,69 **20,8** 165,6	86,69 **22,6** 170,8	86,69 **24,5** 176,0	86,69 **26,4** 181,1	86,69 **28,4** 186,3	86,69 **30,5** 191,5	86,69 **32,6** 196,7	86,69 **36,9** 207,0	86,69 **41,5** 217,4	86,69 **48,8** 232,9	86,69 **54,0** 243,3								90
95																												95
100	96,32 **6,4** 124,2	96,32 **7,8** 129,4	96,32 **9,2** 134,6	96,32 **10,7** 139,7	96,32 **12,3** 144,9	96,32 **13,8** 150,1	96,32 **15,5** 155,3	96,32 **17,21** 160,4	96,32 **19,0** 165,6	96,32 **20,8** 170,8	96,32 **22,7** 176,0	96,32 **24,6** 181,1	96,32 **26,6** 186,3	96,32 **28,6** 191,5	96,32 **30,7** 196,7	96,32 **35,1** 207,0	96,32 **39,7** 217,4	96,32 **47,0** 232,9	96,32 **52,2** 243,3								100
105	101,1 **5,4** 124,2	101,1 **6,8** 129,4	101,1 **8,2** 134,6	101,1 **9,7** 139,7	101,1 **11,3** 144,9	101,1 **12,9** 150,1	101,1 **14,5** 155,3	101,1 **16,2** 160,4	101,1 **18,0** 165,6	101,1 **19,8** 170,8	101,1 **21,7** 176,0	101,1 **23,6** 181,1	101,1 **25,6** 186,3	101,1 **27,6** 191,5	101,1 **29,7** 196,7	101,1 **34,1** 207,0	101,1 **38,7** 217,4	101,1 **46,0** 232,9	101,1 **51,2** 243,3								105
110	105,9 **4,4** 124,2	105,9 **5,8** 129,4	105,9 **7,2** 134,6	105,9 **8,7** 139,7	105,9 **10,2** 144,9	105,9 **11,8** 150,1	105,9 **13,5** 155,3	105,9 **15,2** 160,4	105,9 **16,9** 165,6	105,9 **18,8** 170,8	105,9 **20,6** 176,0	105,9 **22,6** 181,1	105,9 **24,6** 186,3	105,9 **26,6** 191,5	105,9 **28,7** 196,7	105,9 **33,1** 207,0	105,9 **37,7** 217,4	105,9 **45,0** 232,9	105,9 **50,1** 243,3								110
115				110,7 **7,6** 139,7	110,7 **9,1** 144,9	110,7 **10,7** 150,1	110,7 **12,4** 155,3	110,7 **14,1** 160,4	110,7 **15,8** 165,6	110,7 **17,7** 170,8	110,7 **19,6** 176,0	110,7 **21,5** 181,1	110,7 **23,5** 186,3	110,7 **25,5** 191,5	110,7 **27,6** 196,7	110,7 **32,0** 207,0	110,7 **36,6** 217,4	110,7 **43,9** 232,9	110,7 **49,0** 243,3		110,7 **60,0** 264,0		110,7 **75,0** 289,9						115
120																												120
130							125,2 **8,8** 155,3	125,2 **10,5** 160,4	125,2 **12,3** 165,6		125,2 **16,0** 176,0	125,2 **17,9** 181,1	125,2 **19,9** 186,3	125,2 **22,0** 191,5	125,2 **24,0** 196,7	125,2 **28,4** 207,0	125,2 **33,0** 217,4	125,2 **40,3** 232,9	125,2 **45,5** 243,3		125,2 **56,4** 264,0		125,2 **71,4** 289,9						130
140							134,8 **6,2** 155,3	134,8 **7,9** 160,4	134,8 **9,7** 165,6	134,8 **11,5** 170,8	134,8 **13,4** 176,0	134,8 **15,3** 181,1	134,8 **17,3** 186,3	134,8 **19,3** 191,5	134,8 **21,4** 196,7	134,8 **25,8** 207,0	134,8 **30,4** 217,4	134,8 **37,7** 232,9	134,8 **42,8** 243,3		134,8 **53,8** 264,0		134,8 **68,8** 289,9						140
150											144,4 **10,6** 176,0	144,4 **12,5** 181,1	144,4 **14,5** 186,3	144,4 **16,5** 191,5	144,4 **18,6** 196,7	144,4 **23,0** 207,0	144,4 **27,6** 217,4	144,4 **34,9** 232,9	144,4 **40,0** 243,3		144,4 **51,0** 264,0		144,4 **66,0** 289,9				150
155												149,3 **11,0** 181,1	149,3 **13,0** 186,3	149,3 **15,0** 191,5	149,3 **17,1** 196,7	149,3 **21,5** 207,0	149,3 **26,1** 217,4	149,3 **33,4** 232,9	149,3 **38,6** 243,3		149,3 **49,5** 264,0		149,3 **64,5** 289,9				155
160																												160
170																												170
180																	173,3 **18,0** 217,4	173,3 **25,3** 232,9	173,3 **30,4** 243,3		173,3 **41,4** 264,0		173,3 **56,4** 289,9				180
190																		183,0 **21,7** 232,9	183,0 **26,9** 243,3		183,0 **37,8** 264,0							190
200																					192,6 **34,0** 264,0		192,6 **49,0** 289,9		192,6 **98,4** 362,3			200
230																							221,5 **36,5** 289,9					230
250																												250
280																												280
300																												300
395																												395

Inner diameter

Inner diameter

Size list of rods and tubes, made of ZX-324V11T

Outer diameter

Rod	6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
20													19,10 **1,9** 47,01	19,10 **2,2** 49,09	19,10 **2,5** 52,23	19,10 **3,1** 57,45	19,10 **3,8** 62,67												20
25														23,87 **1,9** 49,09	23,87 **2,3** 52,23	23,87 **2,9** 57,45	23,87 **3,5** 62,67												25
30																28,65 **2,6** 57,45	28,65 **3,3** 62,67	28,65 **4,0** 67,90	28,65 **4,8** 73,12	28,65 **5,6** 78,34	28,65 **6,5** 83,56	28,65 **7,4** 88,79	28,65 **8,4** 94,01	28,65 **9,5** 99,23	28,65 **10,6** 104,4				30
32																30,56 **2,5** 57,45	30,56 **3,2** 62,67	30,56 **3,9** 67,90	30,56 **4,6** 73,12	30,56 **5,5** 78,34	30,56 **6,4** 83,56	30,56 **7,3** 88,79	30,56 **8,3** 94,01	30,56 **9,4** 99,23	30,56 **10,5** 104,4				32
35																	33,42 **3,0** 62,67	33,42 **3,7** 67,90	33,42 **4,4** 73,12	33,42 **5,3** 78,34	33,42 **6,2** 83,56	33,42 **7,1** 88,79	33,42 **8,1** 94,01	33,42 **9,2** 99,23	33,42 **10,3** 104,4				35
40																		38,20 **3,3** 67,90	38,20 **4,1** 73,12	38,20 **4,9** 78,34	38,20 **5,8** 83,56	38,20 **6,8** 88,79	38,20 **7,8** 94,01	38,20 **8,8** 99,23	38,20 **10,0** 104,4	38,20 **11,1** 109,6	38,20 **12,4** 114,9	38,20 **13,6** 120,1	40
45																			42,97 **3,7** 73,12	42,97 **4,5** 78,34	42,97 **5,4** 83,56	42,97 **6,4** 88,79	42,97 **7,4** 94,01	42,97 **8,4** 99,23	42,97 **9,5** 104,4	42,97 **10,7** 109,6	42,97 **12,0** 114,9	42,97 **13,2** 120,1	45
50																				47,75 **4,1** 78,34	47,75 **5,0** 83,56	47,75 **5,9** 88,79	47,75 **6,9** 94,01	47,75 **8,0** 99,23	47,75 **9,1** 104,4	47,75 **10,3** 109,6	47,75 **11,5** 114,9	47,75 **12,8** 120,1	50
55																													55
60																						57,30 **4,8** 88,79	57,30 **5,8** 94,01	57,30 **6,9** 99,23	57,30 **8,0** 104,4	57,30 **9,2** 109,6	57,30 **10,4** 114,9	57,30 **11,7** 120,1	60
65																							62,07 **5,2** 94,01	62,07 **6,3** 99,23	62,07 **7,4** 104,4	62,07 **8,6** 109,6	62,07 **9,8** 114,9	62,07 **11,1** 120,1	65
70																								66,85 **5,7** 99,23	66,85 **6,8** 104,4	66,85 **8,0** 109,6	66,85 **9,2** 114,9	66,85 **10,5** 120,1	70
75																													75
80																										76,40 **6,5** 109,6	76,40 **7,8** 114,9	76,40 **9,0** 120,1	80
85																											81,17 **7,0** 114,9	81,17 **8,2** 120,1	85
90																												85,94 **7,4** 120,1	90
95																													95
100																													100
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230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-324V11T

Inner diameter / Rod	Outer diameter 120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510
20																											
25																											
30																											
32																											
35																											
40	38,20 **15,0** 125,3	38,20 **16,4** 130,5	38,20 **17,9** 135,7	38,20 **19,4** 141,0	38,20 **21,0** 146,2	38,20 **22,6** 151,4	38,20 **24,3** 156,6		38,20 **27,9** 167,1	38,20 **29,7** 172,3	38,20 **31,6** 177,5	38,20 **33,6** 182,8	38,20 **35,7** 188,0	38,20 **37,8** 193,2		38,20 **44,4** 208,9											
45	42,97 **14,6** 125,3	42,97 **16,0** 130,5	42,97 **17,5** 135,7	42,97 **19,0** 141,0	42,97 **20,6** 146,2	42,97 **22,2** 151,4	42,97 **23,9** 156,6	42,97 **25,64** 161,9	42,97 **27,4** 167,1	42,97 **29,3** 172,3	42,97 **31,2** 177,5	42,97 **33,2** 182,8	42,97 **35,3** 188,0	42,97 **37,4** 193,2	42,97 **39,5** 198,4	42,97 **44,0** 208,9										
50	47,75 **14,1** 125,3	47,75 **15,5** 130,5	47,75 **17,0** 135,7	47,75 **18,5** 141,0	47,75 **20,1** 146,2	47,75 **21,7** 151,4	47,75 **23,4** 156,6	47,75 **25,19** 161,9	47,75 **27,0** 167,1		47,75 **30,8** 177,5	47,75 **32,8** 182,8	47,75 **34,8** 188,0	47,75 **36,9** 193,2		47,75 **43,5** 208,9	47,75 **48,2** 219,3	47,75 **55,7** 235,0	47,75 **61,0** 245,4								
55																											
60	57,30 **13,1** 125,3	57,30 **14,5** 130,5	57,30 **16,0** 135,7	57,30 **17,5** 141,0	57,30 **19,0** 146,2	57,30 **20,7** 151,4	57,30 **22,4** 156,6	57,30 **24,13** 161,9	57,30 **25,9** 167,1	57,30 **27,8** 172,3	57,30 **29,7** 177,5	57,30 **31,7** 182,8	57,30 **33,8** 188,0	57,30 **35,8** 193,2	57,30 **38,0** 198,4	57,30 **42,5** 208,9	57,30 **47,2** 219,3	57,30 **54,7** 235,0	57,30 **60,0** 245,4							
65	62,07 **12,5** 125,3	62,07 **13,9** 130,5	62,07 **15,4** 135,7	62,07 **16,9** 141,0	62,07 **18,4** 146,2	62,07 **20,1** 151,4	62,07 **21,8** 156,6	62,07 **23,53** 161,9	62,07 **25,3** 167,1	62,07 **27,2** 172,3	62,07 **29,1** 177,5	62,07 **31,1** 182,8	62,07 **33,2** 188,0	62,07 **35,2** 193,2	62,07 **37,4** 198,4	62,07 **41,9** 208,9	62,07 **46,6** 219,3	62,07 **54,1** 235,0								
70	66,85 **11,8** 125,3	66,85 **13,2** 130,5	66,85 **14,7** 135,7	66,85 **16,2** 141,0	66,85 **17,8** 146,2	66,85 **19,4** 151,4	66,85 **21,1** 156,6	66,85 **22,89** 161,9	66,85 **24,7** 167,1	66,85 **26,6** 172,3	66,85 **28,5** 177,5	66,85 **30,5** 182,8	66,85 **32,5** 188,0	66,85 **34,6** 193,2	66,85 **36,8** 198,4	66,85 **41,2** 208,9	66,85 **45,9** 219,3	66,85 **53,4** 235,0	66,85 **58,7** 245,4							
75																											
80	76,40 **10,4** 125,3	76,40 **11,8** 130,5	76,40 **13,3** 135,7	76,40 **14,8** 141,0	76,40 **16,4** 146,2	76,40 **18,0** 151,4	76,40 **19,7** 156,6	76,40 **21,45** 161,9	76,40 **23,2** 167,1	76,40 **25,1** 172,3	76,40 **27,0** 177,5	76,40 **29,0** 182,8	76,40 **31,1** 188,0	76,40 **33,2** 193,2		76,40 **39,8** 208,9	76,40 **44,5** 219,3	76,40 **52,0** 235,0	76,40 **57,3** 245,4							
85	81,17 **9,6** 125,3	81,17 **11,0** 130,5	81,17 **12,5** 135,7	81,17 **14,0** 141,0	81,17 **15,6** 146,2	81,17 **17,2** 151,4	81,17 **18,9** 156,6	81,17 **20,65** 161,9	81,17 **22,5** 167,1	81,17 **24,3** 172,3	81,17 **26,2** 177,5	81,17 **28,2** 182,8	81,17 **30,3** 188,0	81,17 **32,4** 193,2	81,17 **34,5** 198,4	81,17 **39,0** 208,9	81,17 **43,7** 219,3	81,17 **51,2** 235,0	81,17 **56,5** 245,4							
90	85,94 **8,8** 125,3	85,94 **10,2** 130,5	85,94 **11,6** 135,7	85,94 **13,2** 141,0	85,94 **14,7** 146,2	85,94 **16,4** 151,4	85,94 **18,1** 156,6	85,94 **19,81** 161,9	85,94 **21,6** 167,1	85,94 **23,5** 172,3	85,94 **25,4** 177,5	85,94 **27,4** 182,8	85,94 **29,4** 188,0	85,94 **31,5** 193,2	85,94 **33,7** 198,4	85,94 **38,2** 208,9	85,94 **42,9** 219,3	85,94 **50,4** 235,0	85,94 **55,6** 245,4							
95																											
100		95,49 **8,4** 130,5	95,49 **9,8** 135,7	95,49 **11,3** 141,0	95,49 **12,9** 146,2	95,49 **14,6** 151,4	95,49 **16,2** 156,6	95,49 **17,99** 161,9	95,49 **19,8** 167,1	95,49 **21,7** 172,3	95,49 **23,6** 177,5	95,49 **25,6** 182,8	95,49 **27,6** 188,0	95,49 **29,7** 193,2	95,49 **31,9** 198,4	95,49 **36,3** 208,9	95,49 **41,0** 219,3	95,49 **48,5** 235,0	95,49 **53,8** 245,4							
105			100,2 **8,8** 135,7	100,2 **10,4** 141,0	100,2 **11,9** 146,2	100,2 **13,6** 151,4	100,2 **15,3** 156,6	100,2 **17,0** 161,9	100,2 **18,8** 167,1	100,2 **20,7** 172,3	100,2 **22,6** 177,5	100,2 **24,6** 182,8	100,2 **26,6** 188,0	100,2 **28,7** 193,2	100,2 **30,9** 198,4	100,2 **35,4** 208,9	100,2 **40,1** 219,3	100,2 **47,6** 235,0	100,2 **52,8** 245,4							
110				105,0 **9,3** 141,0	105,0 **10,9** 146,2	105,0 **12,5** 151,4	105,0 **14,2** 156,6	105,0 **16,0** 161,9	105,0 **17,8** 167,1	105,0 **19,6** 172,3	105,0 **21,6** 177,5	105,0 **23,6** 182,8	105,0 **25,6** 188,0	105,0 **27,7** 193,2	105,0 **29,8** 198,4	105,0 **34,3** 208,9	105,0 **39,0** 219,3	105,0 **46,5** 235,0	105,0 **51,8** 245,4							
115					109,8 **9,8** 146,2	109,8 **11,4** 151,4	109,8 **13,1** 156,6	109,8 **14,9** 161,9	109,8 **16,7** 167,1	109,8 **18,6** 172,3	109,8 **20,5** 177,5	109,8 **22,5** 182,8	109,8 **24,5** 188,0	109,8 **26,6** 193,2	109,8 **28,8** 198,4	109,8 **33,2** 208,9	109,8 **38,0** 219,3	109,8 **45,4** 235,0	109,8 **50,7** 245,4		109,8 **62,0** 266,3		109,8 **77,3** 292,4					
120																											
130								124,1 **11,4** 161,9	124,1 **13,2** 167,1		124,1 **17,0** 177,5	124,1 **19,0** 182,8	124,1 **21,0** 188,0	124,1 **23,1** 193,2	124,1 **25,2** 198,4	124,1 **29,7** 208,9	124,1 **34,4** 219,3	124,1 **41,9** 235,0	124,1 **47,2** 245,4		124,1 **58,4** 266,3		124,1 **73,8** 292,4				
140										133,6 **12,4** 172,3	133,6 **14,4** 177,5	133,6 **16,4** 182,8	133,6 **18,4** 188,0	133,6 **20,5** 193,2	133,6 **22,6** 198,4	133,6 **27,1** 208,9	133,6 **31,8** 219,3	133,6 **39,3** 235,0	133,6 **44,6** 245,4		133,6 **55,9** 266,3		133,6 **71,2** 292,4				
150												143,2 **13,6** 182,8	143,2 **15,6** 188,0	143,2 **17,7** 193,2	143,2 **19,9** 198,4	143,2 **24,3** 208,9	143,2 **29,0** 219,3	143,2 **36,5** 235,0	143,2 **41,8** 245,4		143,2 **53,1** 266,3		143,2 **68,4** 292,4				
155													148,0 **14,2** 188,0	148,0 **16,2** 193,2	148,0 **18,4** 198,4	148,0 **22,9** 208,9	148,0 **27,6** 219,3	148,0 **35,1** 235,0	148,0 **40,4** 245,4		148,0 **51,6** 266,3		148,0 **67,0** 292,4				
160																											
170																											
180																	171,8 **19,6** 219,3	171,8 **27,0** 235,0	171,8 **32,3** 245,4		171,8 **43,6** 266,3		171,8 **58,9** 292,4				
190																		181,4 **23,5** 235,0	181,4 **28,8** 245,4		181,4 **40,0** 266,3						
200																		190,9 **19,7** 235,0			190,9 **36,3** 266,3		190,9 **51,6** 292,4	190,9 **102,2** 365,5			
230																							219,6 **39,3** 292,4				
250																											
280																											
300																											
395																											

Size list of rods and tubes, made of ZX-324VMT

Outer diameter

Rod	6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
					0,3 15,66		**0,5** 20,88		**0,8** 26,09	**1,1** 31,31	**1,6** 36,53	**2,0** 41,75	**2,6** 46,97		**3,2** 52,19		**4,6** 62,63	**5,4** 67,85	**6,2** 73,06	**7,1** 78,28	**8,1** 83,50	**9,2** 88,72	**10,3** 93,94		**12,7** 104,3				
20										19,11 **0,7** 31,31	19,11 **1,1** 36,53	19,11 **1,6** 41,75	19,11 **2,1** 46,97	19,11 **2,4** 49,06	19,11 **2,7** 52,19	19,11 **3,4** 57,41	19,11 **4,1** 62,63											20
25										23,89 **0,5** 31,31	23,89 **0,9** 36,53	23,89 **1,4** 41,75	23,89 **1,9** 46,97	23,89 **2,1** 49,06	23,89 **2,5** 52,19	23,89 **3,2** 57,41	23,89 **3,9** 62,63											25
30												28,67 **1,1** 41,75	28,67 **1,6** 46,97	28,67 **1,8** 49,06	28,67 **2,2** 52,19	28,67 **2,9** 57,41	28,67 **3,6** 62,63	28,67 **4,4** 67,85	28,67 **5,2** 73,06	28,67 **6,2** 78,28	28,67 **7,2** 83,50							30
32													30,58 **1,5** 46,97	30,58 **1,7** 49,06	30,58 **2,1** 52,19	30,58 **2,7** 57,41	30,58 **3,5** 62,63	30,58 **4,3** 67,85	30,58 **5,1** 73,06		30,58 **7,0** 83,50								32
35													33,45 **1,3** 46,97	33,45 **1,5** 49,06	33,45 **1,9** 52,19	33,45 **2,5** 57,41	33,45 **3,3** 62,63	33,45 **4,0** 67,85	33,45 **4,9** 73,06	33,45 **5,8** 78,28	33,45 **6,8** 83,50								35
40															38,23 **1,5** 52,19	38,23 **2,1** 57,41	38,23 **2,9** 62,63	38,23 **3,6** 67,85	38,23 **4,5** 73,06	38,23 **5,4** 78,28	38,23 **6,4** 83,50								40
45																		43,00 **3,2** 67,85	43,00 **4,1** 73,06	43,00 **5,0** 78,28	43,00 **6,0** 83,50								45
50																	47,78 **1,9** 62,63	47,78 **2,7** 67,85	47,78 **3,6** 73,06	47,78 **4,5** 78,28	47,78 **5,4** 83,50								50
55																													55
60																			57,34 **2,4** 73,06	57,34 **3,3** 78,28	57,34 **4,3** 83,50								60
65																					62,12 **3,6** 83,50								65
70																					66,90 **2,9** 83,50								70
75																													75
80																													80
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230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

- Product in stock
- Just in time product
- Special product
- Scheduled product

Size list of rods and tubes, made of ZX-324VMT

Inner diameter / Rod	Outer diameter																												
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510		
Rod			21,4 135,6																										Rod
20																													20
25																													25
30																													30
32																													32
35																													35
40																													40
45																													45
50																													50
55																													55
60																													60
65																													65
70																													70
75																													75
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190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Size list of rods and tubes, made of ZX-410

Rod	Outer diameter 6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
	0,0 6,73	0,1 8,71	0,1 10,69	0,2 12,57	0,3 15,84	0,4 18,51	0,5 20,99	0,6 23,46	0,8 26,73	1,1 31,88	1,4 37,03	1,8 42,08	2,3 47,03		2,9 53,06	3,4 57,42	4,0 62,27	4,9 68,31	5,6 73,26	6,2 77,22	7,2 83,16	8,2 88,31	9,0 93,06	10,2 99,00	11,5 104,9		13,7 114,6		
20										19,50 0,7 31,88	19,50 1,0 37,03	19,50 1,4 42,08	19,50 1,9 47,03	19,50 2,1 49,01	19,50 2,5 53,06	19,50 3,0 57,42	19,50 3,6 62,27												20
25										24,50 0,4 31,88	24,50 0,8 37,03	24,50 1,2 42,08	24,50 1,7 47,03	24,50 1,9 49,01	24,50 2,3 53,06	24,50 2,8 57,42	24,50 3,4 62,27												25
30												27,44 1,1 42,08	27,44 1,5 47,03	27,44 1,7 49,01	27,44 2,2 53,06	27,44 2,7 57,42	27,44 3,3 62,27	29,40 4,0 68,31	29,40 4,7 73,26	29,40 5,3 77,22	29,40 6,3 83,16	29,40 7,2 88,31	29,40 8,1 93,06	29,40 9,3 99,00	29,40 10,6 104,9				30
32													30,67 1,3 47,03	30,67 1,5 49,01	30,67 2,0 53,06	30,67 2,5 57,42	30,67 3,1 62,27	30,67 3,9 68,31	30,67 4,6 73,26	30,67 5,2 77,22	30,67 6,2 83,16	30,67 7,2 88,31	30,67 8,1 93,06	30,67 9,3 99,00	30,67 10,5 104,9				32
35													34,59 1,1 47,03	34,59 1,3 49,01	34,59 1,7 53,06	34,59 2,2 57,42	34,59 2,8 62,27	34,30 3,6 68,31	34,30 4,4 73,26	34,30 5,0 77,22	34,30 6,0 83,16	34,30 6,9 88,31	34,30 7,8 93,06	34,30 9,0 99,00	34,30 10,3 104,9				35
40															39,54 1,3 53,06	39,54 1,8 57,42	39,54 2,4 62,27	39,20 3,3 68,31	39,20 4,0 73,26	39,20 4,6 77,22	39,20 5,6 83,16	39,20 6,5 88,31	39,20 7,4 93,06	39,20 8,6 99,00	39,20 9,9 104,9	39,20 10,9 109,4	39,20 12,1 114,6	39,20 13,1 118,8	40
45																43,51 1,5 57,42	43,51 2,1 62,27	43,51 2,9 68,31	43,51 3,6 73,26	43,51 4,2 77,22	43,51 5,2 83,16	43,51 6,2 88,31	43,51 7,1 93,06	43,51 8,3 99,00	43,51 9,5 104,9	43,51 10,5 109,4	43,51 11,8 114,6	43,51 12,8 118,8	45
50																	49,39 1,5 62,27	49,00 2,4 68,31	49,00 3,1 73,26	49,00 3,7 77,22	49,00 4,7 83,16	49,00 5,6 88,31	49,00 6,5 93,06	49,00 7,7 99,00	49,00 9,0 104,9	49,00 10,0 109,4	49,00 11,2 114,6	49,00 12,2 118,8	50
55																		53,90 1,8 68,31	53,90 2,6 73,26	53,90 3,2 77,22	53,90 4,2 83,16	53,90 5,1 88,31	53,90 6,0 93,06	53,90 7,2 99,00	53,90 8,5 104,9	53,90 9,5 109,4	53,90 10,7 114,6	53,90 11,7 118,8	55
60																			56,45 2,3 73,26	56,45 2,9 77,22	56,45 3,9 83,16	56,45 4,8 88,31	56,45 5,7 93,06	56,45 6,9 99,00	56,45 8,2 104,9	56,45 9,2 109,4	56,45 10,4 114,6	56,45 11,4 118,8	60
65																					62,52 3,1 83,16	62,52 4,1 88,31	62,52 5,0 93,06	62,52 6,2 99,00	62,52 7,4 104,9	62,52 8,4 109,4	62,52 9,6 114,6	62,52 10,7 118,8	65
70																					66,64 2,6 83,16	66,64 3,5 88,31	66,64 4,4 93,06	66,64 5,6 99,00	66,64 6,9 104,9	66,64 7,9 109,4	66,64 9,1 114,6	66,64 10,1 118,8	70
75																								72,52 4,7 99,00	72,52 6,0 104,9	72,52 7,0 109,4	72,52 8,2 114,6	72,52 9,2 118,8	75
80																							75,46 3,1 93,06	75,46 4,3 99,00	75,46 5,6 104,9	75,46 6,6 109,4	75,46 7,8 114,6	75,46 8,8 118,8	80
85																								82,32 3,2 99,00	82,32 4,4 104,9	82,32 5,4 109,4	82,32 6,6 114,6	82,32 7,7 118,8	85
90																									87,22 3,6 104,9	87,22 4,6 109,4	87,22 5,8 114,6	87,22 6,8 118,8	90
95																										93,10 3,4 109,4	93,10 4,7 114,6	93,10 5,7 118,8	95
100																											97,02 3,9 114,6	97,02 4,9 118,8	100
105																												102,9 3,7 118,8	105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-410

Inner diameter / Rod	Outer diameter 120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
Rod	**16,2** 124,7		**18,9** 134,6		**22,1** 145,5		**25,3** 155,5		**27,9** 163,4				**35,4** 184,1															Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40	39,20 **14,6** 124,7	39,20 **15,4** 127,7	39,20 **17,3** 134,6	39,20 **18,3** 137,9	39,20 **20,5** 145,5	39,54 **20,5** 145,5	38,80 **23,7** 155,5	38,80 **23,02** 153,4	38,80 **26,3** 163,4	38,80 **26,30** 163,3	38,80 **28,02** 168,3	38,80 **31,6** 178,1	38,80 **33,8** 184,1	38,80 **36,8** 191,6	38,80 **35,39** 188,1	38,80 **41,9** 203,9												40
45	43,51 **14,3** 124,7	43,51 **15,1** 127,7	43,51 **17,0** 134,6	43,51 **17,9** 137,9	43,51 **20,2** 145,5	43,51 **20,2** 145,5	43,07 **23,3** 155,5	43,07 **22,66** 153,4	43,07 **26,0** 163,4	43,07 **25,94** 163,3	43,07 **27,65** 168,3	43,07 **31,2** 178,1	43,07 **33,5** 184,1	43,07 **36,4** 191,6	43,07 **35,02** 188,1	43,07 **41,5** 203,9												45
50	49,00 **13,8** 124,7	49,00 **14,5** 127,7	49,00 **16,4** 134,6	49,00 **17,4** 137,9	49,00 **19,6** 145,5	49,00 **19,6** 145,5	48,50 **22,8** 155,5	48,50 **22,14** 153,4	48,50 **25,4** 163,4	48,50 **25,42** 163,3	48,50 **27,13** 168,3	48,50 **30,7** 178,1	48,50 **33,0** 184,1	48,50 **35,9** 191,6	48,50 **34,50** 188,1	48,50 **41,0** 203,9	48,50 **46,6** 216,8	48,50 **54,1** 232,6	48,50 **60,0** 244,5									50
55	53,90 **13,2** 124,7	53,90 **14,0** 127,7	53,90 **15,9** 134,6	53,90 **16,8** 137,9	53,90 **19,1** 145,5	53,90 **19,1** 145,5	53,35 **22,3** 155,5	53,35 **21,62** 153,4	53,35 **24,9** 163,4	53,35 **24,90** 163,3	53,35 **26,61** 168,3	53,35 **30,2** 178,1	53,35 **32,4** 184,1	53,35 **35,4** 191,6	53,35 **33,99** 188,1	53,35 **40,5** 203,9	53,35 **46,1** 216,8	53,35 **53,6** 232,6	53,35 **59,5** 244,5									55
60	56,45 **12,9** 124,7	56,45 **13,7** 127,7	56,45 **15,6** 134,6	56,45 **16,5** 137,9	56,45 **18,8** 145,5	56,45 **18,8** 145,5	55,87 **22,0** 155,5	55,87 **21,34** 153,4	55,87 **24,6** 163,4	55,87 **24,61** 163,3	55,87 **26,33** 168,3	55,87 **29,9** 178,1	55,87 **32,2** 184,1	55,87 **35,1** 191,6	55,87 **33,70** 188,1	55,87 **40,2** 203,9	55,87 **45,8** 216,8	55,87 **53,3** 232,6	55,87 **59,2** 244,5									60
65	62,52 **12,2** 124,7	62,52 **13,0** 127,7	62,52 **14,8** 134,6	62,52 **15,8** 137,9	62,52 **18,0** 145,5	62,52 **18,0** 145,5	61,89 **21,3** 155,5	61,89 **20,60** 153,4	61,89 **23,9** 163,4	61,89 **23,87** 163,3	61,89 **25,59** 168,3	61,89 **29,1** 178,1	61,89 **31,4** 184,1	61,89 **34,4** 191,6	61,89 **32,96** 188,1	61,89 **39,4** 203,9	61,89 **45,1** 216,8	61,89 **52,5** 232,6	61,89 **58,5** 244,5									65
70	66,64 **11,6** 124,7	66,64 **12,4** 127,7	66,64 **14,3** 134,6	66,64 **15,2** 137,9	66,64 **17,5** 145,5	66,64 **17,5** 145,5	65,96 **20,7** 155,5	65,96 **20,05** 153,4	65,96 **23,4** 163,4	65,96 **23,33** 163,3	65,96 **25,04** 168,3	65,96 **28,6** 178,1	65,96 **30,9** 184,1	65,96 **33,8** 191,6	65,96 **32,41** 188,1	65,96 **38,9** 203,9	65,96 **44,6** 216,8	65,96 **52,0** 232,6	65,96 **57,9** 244,5									70
75	72,52 **10,8** 124,7	72,52 **11,5** 127,7	72,52 **13,4** 134,6	72,52 **14,4** 137,9	72,52 **16,6** 145,5	72,52 **16,6** 145,5	71,78 **19,9** 155,5	71,78 **19,21** 153,4	71,78 **22,5** 163,4	71,78 **22,49** 163,3	71,78 **24,21** 168,3	71,78 **27,8** 178,1	71,78 **30,0** 184,1	71,78 **33,0** 191,6	71,78 **31,58** 188,1	71,78 **38,1** 203,9	71,78 **43,7** 216,8	71,78 **51,2** 232,6	71,78 **57,1** 244,5									75
80	75,46 **10,3** 124,7	75,46 **11,1** 127,7	75,46 **13,0** 134,6	75,46 **13,9** 137,9	75,46 **16,2** 145,5	75,46 **16,2** 145,5	74,69 **19,4** 155,5	74,69 **18,77** 153,4	74,69 **22,1** 163,4	74,69 **22,05** 163,3	74,69 **23,76** 168,3	74,69 **27,3** 178,1	74,69 **29,6** 184,1	74,69 **32,6** 191,6	74,69 **31,13** 188,1	74,69 **37,6** 203,9	74,69 **43,3** 216,8	74,69 **50,7** 232,6	74,69 **56,6** 244,5									80
85	82,32 **9,2** 124,7	82,32 **10,0** 127,7	82,32 **11,9** 134,6	82,32 **12,8** 137,9	82,32 **15,0** 145,5	82,32 **15,0** 145,5	81,48 **18,3** 155,5	81,48 **17,66** 153,4	81,48 **21,0** 163,4	81,48 **20,94** 163,3	81,48 **22,65** 168,3	81,48 **26,2** 178,1	81,48 **28,5** 184,1	81,48 **31,4** 191,6	81,48 **30,02** 188,1	81,48 **36,5** 203,9	81,48 **42,2** 216,8	81,48 **49,6** 232,6	81,48 **55,5** 244,5									85
90	87,22 **8,3** 124,7	87,22 **9,1** 127,7	87,22 **11,0** 134,6	87,22 **11,9** 137,9	87,22 **14,2** 145,5	87,22 **14,2** 145,5	86,33 **17,5** 155,5	86,33 **16,81** 153,4	86,33 **20,1** 163,4	86,33 **20,09** 163,3	86,33 **21,80** 168,3	86,33 **25,4** 178,1	86,33 **27,6** 184,1	86,33 **30,6** 191,6	86,33 **29,17** 188,1	86,33 **35,7** 203,9	86,33 **41,3** 216,8	86,33 **48,8** 232,6	86,33 **54,7** 244,5									90
95	93,10 **7,2** 124,7	93,10 **8,0** 127,7	93,10 **9,9** 134,6	93,10 **10,8** 137,9	93,10 **13,1** 145,5	93,10 **13,1** 145,5	92,15 **16,4** 155,5	92,15 **15,73** 153,4	92,15 **19,0** 163,4	92,15 **19,00** 163,3	92,15 **20,72** 168,3	92,15 **24,3** 178,1	92,15 **26,6** 184,1	92,15 **29,5** 191,6	92,15 **28,09** 188,1	92,15 **34,6** 203,9	92,15 **40,2** 216,8	92,15 **47,7** 232,6	92,15 **53,6** 244,5									95
100	97,02 **6,4** 124,7	97,02 **7,2** 127,7	97,02 **9,1** 134,6	97,02 **10,0** 137,9	97,02 **12,3** 145,5	97,02 **12,3** 145,5	96,03 **15,6** 155,5	96,03 **14,96** 153,4	96,03 **18,3** 163,4	96,03 **18,24** 163,3	96,03 **19,96** 168,3	96,03 **23,5** 178,1	96,03 **25,8** 184,1	96,03 **28,7** 191,6	96,03 **27,33** 188,1	96,03 **33,8** 203,9	96,03 **39,5** 216,8	96,03 **46,9** 232,6	96,03 **52,8** 244,5									100
105	102,9 **5,2** 124,7	102,9 **6,0** 127,7	102,9 **7,9** 134,6	102,9 **8,8** 137,9	102,9 **11,1** 145,5	102,9 **11,1** 145,5	101,8 **14,4** 155,5	101,8 **13,8** 153,4	101,8 **17,1** 163,4	101,8 **17,0** 163,3	101,8 **18,8** 168,3	101,8 **22,3** 178,1	101,8 **24,6** 184,1	101,8 **27,5** 191,6	101,8 **26,1** 188,1	101,8 **32,6** 203,9	101,8 **38,3** 216,8	101,8 **45,7** 232,6	101,8 **51,6** 244,5									105
110			107,8 **6,8** 134,6	107,8 **7,7** 137,9	107,8 **10,0** 145,5	107,8 **10,0** 145,5	106,7 **13,4** 155,5	106,7 **12,7** 153,4	106,7 **16,0** 163,4	106,7 **15,98** 163,3	106,7 **17,70** 168,3	106,7 **21,2** 178,1	106,7 **23,5** 184,1	106,7 **26,5** 191,6	106,7 **25,07** 188,1	106,7 **31,6** 203,9	106,7 **37,2** 216,8	106,7 **44,6** 232,6	106,7 **50,6** 244,5									110
115				112,7 **6,6** 137,9	112,7 **8,9** 145,5	112,7 **8,9** 145,5	111,5 **12,3** 155,5	111,5 **11,6** 153,4	111,5 **14,9** 163,4	111,5 **14,9** 163,3	111,5 **16,6** 168,3	111,5 **20,1** 178,1	111,5 **22,4** 184,1	111,5 **25,4** 191,6	111,5 **24,0** 188,1	111,5 **30,4** 203,9	111,5 **36,1** 216,8	111,5 **43,5** 232,6	111,5 **49,5** 244,5		111,5 **59,4** 263,3		111,5 **75,5** 291,0						115
120			117,6 **4,5** 134,6	117,6 **5,4** 137,9	117,6 **7,7** 145,5	117,6 **7,7** 145,5	116,4 **11,1** 155,5	116,4 **10,4** 153,4	116,4 **13,8** 163,4	116,4 **13,7** 163,3	116,4 **15,43** 168,3	116,4 **19,0** 178,1	116,4 **21,3** 184,1	116,4 **24,2** 191,6	116,4 **22,81** 188,1	116,4 **29,3** 203,9	116,4 **35,0** 216,8	116,4 **42,4** 232,6	116,4 **48,3** 244,5		116,4 **58,3** 263,3		116,4 **74,3** 291,0						120
130							125,1 **8,9** 155,5	125,1 **8,2** 153,4	125,1 **11,6** 163,4	125,1 **11,5** 163,3	125,1 **13,2** 168,3	125,1 **16,8** 178,1	125,1 **19,1** 184,1	125,1 **22,0** 191,6	125,1 **20,6** 188,1	125,1 **27,1** 203,9	125,1 **32,8** 216,8	125,1 **40,2** 232,6	125,1 **46,1** 244,5		125,1 **56,1** 263,3		125,1 **72,1** 291,0						130
140							137,2 **5,6** 155,5	137,2 **4,9** 153,4	137,2 **8,2** 163,4	137,2 **8,2** 163,3	137,2 **9,9** 168,3	137,2 **13,5** 178,1	137,2 **15,8** 184,1	137,2 **18,7** 191,6	137,2 **17,3** 188,1	137,2 **23,8** 203,9	137,2 **29,4** 216,8	137,2 **36,9** 232,6	137,2 **42,8** 244,5		137,2 **52,8** 263,3		137,2 **68,8** 291,0						140
150											147,0 **7,0** 168,3	147,0 **10,6** 178,1	147,0 **12,8** 184,1	147,0 **15,8** 191,6	147,0 **14,39** 188,1	147,0 **20,9** 203,9	147,0 **26,5** 216,8	147,0 **34,0** 232,6	147,0 **39,9** 244,5		147,0 **49,9** 263,3		147,0 **65,9** 291,0						150
155												150,9 **9,3** 178,1	150,9 **11,6** 184,1	150,9 **14,6** 191,6	150,9 **13,2** 188,1	150,9 **19,6** 203,9	150,9 **25,3** 216,8	150,9 **32,8** 232,6	150,9 **38,7** 244,5		150,9 **48,6** 263,3		150,9 **64,7** 291,0						155
160															156,8 **11,3** 188,1	156,8 **17,8** 203,9	156,8 **23,4** 216,8	156,8 **30,9** 232,6	156,8 **36,8** 244,5		156,8 **46,8** 263,3		156,8 **62,8** 291,0						160
170															166,6 **8,0** 188,1	166,6 **14,4** 203,9	166,6 **20,1** 216,8	166,6 **27,6** 232,6	166,6 **33,5** 244,5		166,6 **43,4** 263,3		166,6 **59,5** 291,0						170
180																	175,4 **17,0** 216,8	175,4 **24,4** 232,6	175,4 **30,3** 244,5		175,4 **40,3** 263,3		175,4 **56,4** 291,0						180
190																		185,2 **20,7** 232,6	185,2 **26,6** 244,5		185,2 **36,6** 263,3		185,2 **52,7** 291,0						190
200																					195,0 **32,7** 263,3		195,0 **48,8** 291,0		195,0 **85,7** 346,5				200
230																							228,7 **33,8** 291,0						230
250																							242,2 **27,2** 291,0	242,2 **50,2** 326,7	242,2 **64,1** 346,5				250
280																									266,0 **51,50** 346,5				280
300																										285,0 **62,99** 376,2			300
395																											375,2 **119,20** 504,9		395

Size list of rods and tubes, made of ZX-410V7T

Inner diameter / Rod	Outer diameter 6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
Rod	0,0 6,29	0,1 8,38	0,1 10,48	0,2 12,58	0,3 15,72	0,4 18,86	0,5 20,96	0,6 23,06	0,8 26,20	1,1 31,44	1,5 36,68	2,0 41,92	2,5 47,16		3,1 52,40	3,7 57,64	4,4 62,88	5,2 68,12	6,0 73,36	6,9 78,60	7,8 83,84	8,8 89,08	9,9 94,32		12,2 104,8				Rod
20																													20
25																													25
30																													30
32																													32
35																													35
40																													40
45																													45
50																													50
55																													55
60																													60
65																													65
70																													70
75																													75
80																													80
85																													85
90																													90
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105																													105
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180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-410V7T

Inner diameter / Rod	Outer diameter																											
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	
20																												20
25																												25
30																												30
32																												32
35																												35
40																												40
45																												45
50																												50
55																												55
60																												60
65																												65
70																												70
75																												75
80																												80
85																												85
90																												90
95																												95
100																												100
105																												105
110																												110
115																												115
120																												120
130																												130
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150																												150
155																												155
160																												160
170																												170
180																												180
190																												190
200																												200
230																												230
250																												250
280																												280
300																												300
395																												395

Size list of rods and tubes, made of ZX-530

Rod / Inner diameter	Outer diameter 6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod / Inner diameter
	0,0 6,70	**0,1** 8,67	**0,1** 10,64	**0,2** 12,51	**0,3** 15,76	**0,4** 18,42	**0,5** 20,88	**0,6** 23,34	**0,8** 26,60	**1,2** 31,72	**1,6** 36,84	**2,1** 41,86	**2,6** 46,79	**2,8** 48,76	**3,3** 52,80	**3,9** 57,13	**4,6** 61,96	**5,5** 67,97	**6,3** 72,89	**7,0** 76,83	**8,1** 82,74	**9,2** 87,86	**10,2** 92,59	**11,5** 98,50	**12,9** 104,4	**14,0** 108,8	**15,4** 114,0	**16,6** 118,2	
20										19,40 **0,8** 31,72	19,40 **1,2** 36,84	19,40 **1,6** 41,86	19,40 **2,2** 46,79	19,40 **2,4** 48,76	19,40 **2,9** 52,80	19,40 **3,4** 57,13	19,30 **4,1** 61,96											20
25											24,38 **0,9** 36,84	24,38 **1,4** 41,86	24,38 **1,9** 46,79	24,38 **2,1** 48,76	24,38 **2,6** 52,80	24,38 **3,2** 57,13	24,25 **3,9** 61,96											25
30												27,30 **1,2** 41,86	27,30 **1,7** 46,79	27,30 **1,9** 48,76	27,30 **2,4** 52,80	27,30 **3,0** 57,13	27,16 **3,7** 61,96	29,10 **4,5** 67,97	29,10 **5,3** 72,89	29,10 **6,0** 76,83	29,10 **7,1** 82,74	29,10 **8,2** 87,86	29,10 **9,2** 92,59	29,10 **10,5** 98,50	29,10 **11,9** 104,4				30
32													30,52 **1,5** 46,79	30,52 **1,7** 48,76	30,52 **2,2** 52,80	30,52 **2,8** 57,13	30,36 **3,5** 61,96												32
35													34,42 **1,2** 46,79	34,42 **1,4** 48,76	34,42 **1,9** 52,80	34,42 **2,5** 57,13	34,24 **3,2** 61,96	33,95 **4,1** 67,97	33,95 **4,9** 72,89	33,95 **5,6** 76,83	33,95 **6,8** 82,74	33,95 **7,8** 87,86	33,95 **8,8** 92,59	33,95 **10,1** 98,50	33,95 **11,6** 104,4				35
40															39,34 **1,5** 52,80	39,34 **2,0** 57,13	39,14 **2,7** 61,96	38,80 **3,7** 67,97	38,80 **4,5** 72,89	38,80 **5,2** 76,83	38,80 **6,3** 82,74	38,80 **7,4** 87,86	38,80 **8,4** 92,59	38,80 **9,7** 98,50	38,80 **11,1** 104,4	38,60 **12,3** 108,8	38,60 **13,7** 114,0	38,60 **14,8** 118,2	40
45																		43,07 **3,3** 67,97	43,07 **4,1** 72,89	43,07 **4,8** 76,83	43,07 **5,9** 82,74	43,07 **7,0** 87,86	43,07 **8,0** 92,59	43,07 **9,3** 98,50	43,07 **10,7** 104,4	42,85 **11,9** 108,8	42,85 **13,2** 114,0	42,85 **14,4** 118,2	45
50																	49,14 **1,7** 61,96	48,75 **2,7** 67,97	48,75 **3,5** 72,89	48,75 **4,2** 76,83	48,75 **5,3** 82,74	48,75 **6,3** 87,86	48,75 **7,4** 92,59	48,75 **8,7** 98,50	48,75 **10,1** 104,4	48,25 **11,3** 108,8	48,25 **12,7** 114,0	48,25 **13,8** 118,2	50
55																		53,63 **2,1** 67,97	53,63 **2,9** 72,89	53,63 **3,6** 76,83	53,63 **4,7** 82,74	53,63 **5,8** 87,86	53,63 **6,8** 92,59	53,63 **8,1** 98,50	53,63 **9,5** 104,4	53,08 **10,7** 108,8	53,08 **12,1** 114,0	53,08 **13,2** 118,2	55
60																			56,16 **2,6** 72,89	56,16 **3,3** 76,83	56,16 **4,4** 82,74	56,16 **5,4** 87,86	56,16 **6,4** 92,59	56,16 **7,8** 98,50	56,16 **9,2** 104,4	55,58 **10,4** 108,8	55,58 **11,8** 114,0	55,58 **12,9** 118,2	60
65																					62,21 **3,5** 82,74	62,21 **4,6** 87,86	62,21 **5,6** 92,59	62,21 **6,9** 98,50	62,21 **8,3** 104,4	61,57 **9,6** 108,8	61,57 **10,9** 114,0	61,57 **12,1** 118,2	65
70																					66,30 **2,9** 82,74	66,30 **3,9** 87,86	66,30 **5,0** 92,59	66,30 **6,3** 98,50	66,30 **7,7** 104,4	65,62 **8,9** 108,8	65,62 **10,3** 114,0	65,62 **11,5** 118,2	70
75																							72,15 **4,0** 92,59	72,15 **5,3** 98,50	72,15 **6,8** 104,4	71,41 **8,0** 108,8	71,41 **9,4** 114,0	71,41 **10,5** 118,2	75
80																							75,08 **3,5** 92,59	75,08 **4,8** 98,50	75,08 **6,2** 104,4	74,31 **7,5** 108,8	74,31 **8,9** 114,0	74,31 **10,0** 118,2	80
85																								81,90 **3,6** 98,50	81,90 **5,0** 104,4	81,06 **6,3** 108,8	81,06 **7,6** 114,0	81,06 **8,8** 118,2	85
90																									86,78 **4,0** 104,4	85,89 **5,3** 108,8	85,89 **6,7** 114,0	85,89 **7,8** 118,2	90
95																										91,68 **4,1** 108,8	91,68 **5,5** 114,0	91,68 **6,6** 118,2	95
100																											95,54 **4,6** 114,0	95,54 **5,8** 118,2	100
105																												102,3 **4,1** 118,2	105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-530

Outer diameter

Inner diameter / Rod	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
Rod	**18,3** 124,1	**19,2** 127,0	**21,3** 133,9	**22,3** 137,2	**24,9** 144,8	**24,9** 144,8	**28,4** 154,7	**27,64** 152,6	**31,4** 162,6	**31,33** 162,5	**33,25** 167,4	**37,2** 177,2	**39,8** 183,2	**43,1** 190,7	**41,54** 187,1	**48,8** 202,9	**55,2** 215,7											Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40	38,60 **16,5** 124,1	38,60 **17,4** 127,0	38,60 **19,5** 133,9	38,60 **20,6** 137,2	38,60 **23,1** 144,8	38,94 **23,1** 144,8	39,00 **26,6** 154,7	39,00 **25,84** 152,6	39,00 **29,6** 162,6	39,00 **29,52** 162,5	39,00 **31,45** 167,4	39,00 **35,4** 177,2	39,00 **38,0** 183,2	39,00 **41,3** 190,7	39,00 **39,73** 187,1	39,00 **47,0** 202,9											40
45	42,85 **16,1** 124,1	42,85 **17,0** 127,0	42,85 **19,1** 133,9	42,85 **20,2** 137,2	42,85 **22,7** 144,8	42,85 **22,7** 144,8	43,29 **26,2** 154,7	43,29 **25,42** 152,6	43,29 **29,1** 162,6	43,29 **29,10** 162,5	43,29 **31,03** 167,4	43,29 **35,0** 177,2	43,29 **37,6** 183,2	43,29 **40,9** 190,7	43,29 **39,32** 187,1	43,29 **46,6** 202,9											45
50	48,25 **15,5** 124,1	48,25 **16,4** 127,0	48,25 **18,5** 133,9	48,25 **19,6** 137,2	48,25 **22,1** 144,8	48,25 **22,1** 144,8	48,75 **25,6** 154,7	48,75 **24,83** 152,6	48,75 **28,6** 162,6	48,75 **28,51** 162,5	48,75 **30,44** 167,4	48,75 **34,4** 177,2	48,75 **37,0** 183,2	48,75 **40,3** 190,7	48,75 **38,72** 187,1	48,75 **46,0** 202,9	48,75 **52,4** 215,7	48,75 **60,7** 231,4	48,00 **67,5** 243,3								50
55	53,08 **14,9** 124,1	53,08 **15,8** 127,0	53,08 **17,9** 133,9	53,08 **19,0** 137,2	53,08 **21,5** 144,8	53,08 **21,5** 144,8	53,63 **25,0** 154,7	53,63 **24,23** 152,6	53,63 **28,0** 162,6	53,63 **27,92** 162,5	53,63 **29,84** 167,4	53,63 **33,8** 177,2	53,63 **36,4** 183,2	53,63 **39,7** 190,7	53,63 **38,13** 187,1	53,63 **45,4** 202,9	53,63 **51,8** 215,7	53,63 **60,1** 231,4	52,80 **66,9** 243,3								55
60	55,58 **14,6** 124,1	55,58 **15,5** 127,0	55,58 **17,6** 133,9	55,58 **18,7** 137,2	55,58 **21,2** 144,8	55,58 **21,2** 144,8	56,16 **24,7** 154,7	56,16 **23,90** 152,6	56,16 **27,6** 162,6	56,16 **27,59** 162,5	56,16 **29,51** 167,4	56,16 **33,5** 177,2	56,16 **36,1** 183,2	56,16 **39,4** 190,7	56,16 **37,80** 187,1	56,16 **45,1** 202,9	56,16 **51,4** 215,7	56,16 **59,8** 231,4	55,30 **66,6** 243,3								60
65	61,57 **13,8** 124,1	61,57 **14,6** 127,0	61,57 **16,8** 133,9	61,57 **17,8** 137,2	61,57 **20,4** 144,8	61,57 **20,4** 144,8	62,21 **23,8** 154,7	62,21 **23,06** 152,6	62,21 **26,8** 162,6	62,21 **26,74** 162,5	62,21 **28,66** 167,4	62,21 **32,6** 177,2	62,21 **35,2** 183,2	62,21 **38,5** 190,7	62,21 **36,95** 187,1	62,21 **44,2** 202,9	62,21 **50,6** 215,7	62,21 **59,0** 231,4	61,25 **65,8** 243,3								65
70	65,62 **13,2** 124,1	65,62 **14,0** 127,0	65,62 **16,2** 133,9	65,62 **17,2** 137,2	65,62 **19,8** 144,8	65,62 **19,8** 144,8	66,30 **23,2** 154,7	66,30 **22,43** 152,6	66,30 **26,2** 162,6	66,30 **26,11** 162,5	66,30 **28,04** 167,4	66,30 **32,0** 177,2	66,30 **34,6** 183,2	66,30 **37,9** 190,7	66,30 **36,33** 187,1	66,30 **43,6** 202,9	66,30 **50,0** 215,7	66,30 **58,3** 231,4	65,28 **65,2** 243,3								70
75	71,41 **12,2** 124,1	71,41 **13,1** 127,0	71,41 **15,2** 133,9	71,41 **16,3** 137,2	71,41 **18,8** 144,8	71,41 **18,8** 144,8	72,15 **22,2** 154,7	72,15 **21,47** 152,6	72,15 **25,2** 162,6	72,15 **25,15** 162,5	72,15 **27,08** 167,4	72,15 **31,1** 177,2	72,15 **33,6** 183,2	72,15 **37,0** 190,7	72,15 **35,36** 187,1	72,15 **42,6** 202,9	72,15 **49,0** 215,7	72,15 **57,4** 231,4	71,04 **64,2** 243,3								75
80	74,31 **11,7** 124,1	74,31 **12,6** 127,0	74,31 **14,7** 133,9	74,31 **15,8** 137,2	74,31 **18,3** 144,8	74,31 **18,3** 144,8	75,08 **21,7** 154,7	75,08 **20,96** 152,6	75,08 **24,7** 162,6	75,08 **24,64** 162,5	75,08 **26,57** 167,4	75,08 **30,6** 177,2	75,08 **33,1** 183,2	75,08 **36,4** 190,7	75,08 **34,85** 187,1	75,08 **42,1** 202,9	75,08 **48,5** 215,7	75,08 **56,9** 231,4	73,92 **63,7** 243,3								80
85	81,06 **10,5** 124,1	81,06 **11,4** 127,0	81,06 **13,5** 133,9	81,06 **14,5** 137,2	81,06 **17,1** 144,8	81,06 **17,1** 144,8	81,90 **20,4** 154,7	81,90 **19,69** 152,6	81,90 **23,4** 162,6	81,90 **23,37** 162,5	81,90 **25,30** 167,4	81,90 **29,3** 177,2	81,90 **31,8** 183,2	81,90 **35,2** 190,7	81,90 **33,58** 187,1	81,90 **40,9** 202,9	81,90 **47,2** 215,7	81,90 **55,6** 231,4	80,64 **62,5** 243,3								85
90	85,89 **9,5** 124,1	85,89 **10,4** 127,0	85,89 **12,5** 133,9	85,89 **13,6** 137,2	85,89 **16,1** 144,8	85,89 **16,1** 144,8	86,78 **19,5** 154,7	86,78 **18,71** 152,6	86,78 **22,4** 162,6	86,78 **22,40** 162,5	86,78 **24,32** 167,4	86,78 **28,3** 177,2	86,78 **30,9** 183,2	86,78 **34,2** 190,7	86,78 **32,61** 187,1	86,78 **39,9** 202,9	86,78 **46,3** 215,7	86,78 **54,6** 231,4	85,44 **61,5** 243,3								90
95	91,68 **8,3** 124,1	91,68 **9,2** 127,0	91,68 **11,3** 133,9	91,68 **12,4** 137,2	91,68 **14,9** 144,8	91,68 **14,9** 144,8	92,63 **18,2** 154,7	92,63 **17,47** 152,6	92,63 **21,2** 162,6	92,63 **21,15** 162,5	92,63 **23,08** 167,4	92,63 **27,1** 177,2	92,63 **29,6** 183,2	92,63 **33,0** 190,7	92,63 **31,36** 187,1	92,63 **38,6** 202,9	92,63 **45,0** 215,7	92,63 **53,4** 231,4	91,20 **60,3** 243,3								95
100	95,54 **7,4** 124,1	95,54 **8,3** 127,0	95,54 **10,5** 133,9	95,54 **11,5** 137,2	95,54 **14,0** 144,8	95,54 **14,0** 144,8	96,53 **17,4** 154,7	96,53 **16,59** 152,6	96,53 **20,3** 162,6	96,53 **20,28** 162,5	96,53 **22,20** 167,4	96,53 **26,2** 177,2	96,53 **28,8** 183,2	96,53 **32,1** 190,7	96,53 **30,49** 187,1	96,53 **37,8** 202,9	96,53 **44,1** 215,7	96,53 **52,5** 231,4	95,04 **59,5** 243,3								100
105	102,3 **5,8** 124,1	102,3 **6,7** 127,0	102,3 **8,8** 133,9	102,3 **9,9** 137,2	102,3 **12,4** 144,8	102,3 **12,4** 144,8	102,3 **16,0** 154,7	102,3 **15,2** 152,6	102,3 **18,9** 162,6	102,3 **18,9** 162,5	102,3 **20,8** 167,4	102,3 **24,8** 177,2	102,3 **27,4** 183,2	102,3 **30,7** 190,7	102,3 **29,1** 187,1	102,3 **36,4** 202,9	102,3 **42,8** 215,7	102,3 **51,1** 231,4	100,8 **58,2** 243,3								105
110	107,2 **4,6** 124,1	107,2 **5,5** 127,0	107,2 **7,6** 133,9	107,2 **8,7** 137,2	107,2 **11,2** 144,8	107,2 **11,2** 144,8	107,2 **14,8** 154,7	107,2 **14,0** 152,6	107,2 **17,7** 162,6	107,2 **17,68** 162,5	107,2 **19,61** 167,4	107,2 **23,6** 177,2	107,2 **26,2** 183,2	107,2 **29,5** 190,7	107,2 **27,90** 187,1	107,2 **35,2** 202,9	107,2 **41,5** 215,7	107,2 **49,9** 231,4	105,6 **57,0** 243,3								110
115				112,1 **7,4** 137,2	112,1 **10,0** 144,8	112,1 **10,0** 144,8	112,1 **13,5** 154,7	112,1 **12,7** 152,6	112,1 **16,4** 162,6	112,1 **16,4** 162,5	112,1 **18,3** 167,4	112,1 **22,3** 177,2	112,1 **24,9** 183,2	112,1 **28,2** 190,7	112,1 **26,6** 187,1	112,1 **33,9** 202,9	112,1 **40,3** 215,7	112,1 **48,6** 231,4	110,4 **55,7** 243,3		110,4 **67,0** 262,0		110,4 **85,0** 289,5					115
120			117,0 **5,0** 133,9	117,0 **6,1** 137,2	117,0 **8,6** 144,8	117,0 **8,6** 144,8	117,0 **12,2** 154,7	117,0 **11,4** 152,6	117,0 **15,1** 162,6	117,0 **15,09** 162,5	117,0 **17,02** 167,4	117,0 **21,0** 177,2	117,0 **23,6** 183,2	117,0 **26,9** 190,7	117,0 **25,30** 187,1	117,0 **32,6** 202,9	117,0 **39,0** 215,7	117,0 **47,3** 231,4	115,2 **54,5** 243,3		115,2 **65,7** 262,0		115,2 **83,7** 289,5					120
130							125,7 **9,6** 154,7	125,7 **8,9** 152,6	125,7 **12,6** 162,6	125,7 **12,6** 162,5	125,7 **14,5** 167,4	125,7 **18,5** 177,2	125,7 **21,0** 183,2	125,7 **24,4** 190,7	125,7 **22,8** 187,1	125,7 **30,1** 202,9	125,7 **36,4** 215,7	125,7 **44,8** 231,4	123,8 **52,0** 243,3		123,8 **63,2** 262,0		123,8 **81,3** 289,5					130
140							136,5 **6,3** 154,7		136,5 **9,3** 162,6	136,5 **9,2** 162,5	136,5 **11,2** 167,4	136,5 **15,1** 177,2	136,5 **17,7** 183,2	136,5 **21,0** 190,7	136,5 **19,4** 187,1	136,5 **26,7** 202,9	136,5 **33,1** 215,7	136,5 **41,4** 231,4	135,8 **48,3** 243,3		135,8 **59,5** 262,0		135,8 **77,6** 289,5					140
150											146,2 **7,9** 167,4	146,2 **11,9** 177,2	146,2 **14,4** 183,2	146,2 **17,8** 190,7	146,2 **16,17** 187,1	146,2 **23,5** 202,9	146,2 **29,8** 215,7	146,2 **38,2** 231,4	145,5 **45,1** 243,3		145,5 **56,3** 262,0		145,5 **74,4** 289,5					150
155												150,1 **10,5** 177,2	150,1 **13,1** 183,2	150,1 **16,4** 190,7	150,1 **14,8** 187,1	150,1 **22,1** 202,9	150,1 **28,4** 215,7	150,1 **36,8** 231,4	149,3 **43,7** 243,3		149,3 **55,0** 262,0		149,3 **73,0** 289,5					155
160													156,0 **11,0** 183,2	156,0 **14,3** 190,7	156,0 **12,7** 187,1	156,0 **20,0** 202,9	156,0 **26,3** 215,7	156,0 **34,7** 231,4	155,2 **41,6** 243,3		155,2 **52,8** 262,0		155,2 **70,9** 289,5					160
170															165,7 **9,0** 187,1	165,7 **16,2** 202,9	165,7 **22,6** 215,7	165,7 **31,0** 231,4	164,9 **38,0** 243,3		164,9 **49,2** 262,0		164,9 **67,2** 289,5					170
180																	174,5 **19,1** 215,7	174,5 **27,4** 231,4	173,6 **34,4** 243,3		173,6 **45,7** 262,0		173,6 **63,7** 289,5					180
190																	184,2 **14,9** 215,7	184,2 **23,3** 231,4	183,3 **30,3** 243,3		183,3 **41,6** 262,0		183,3 **59,6** 289,5					190
200																		194,0 **18,9** 231,4	193,0 **26,0** 243,3		193,0 **37,2** 262,0		193,0 **55,3** 289,5		193,0 **96,8** 344,7			200
230																							226,4 **38,7** 289,5					230
250																												250
280																												280
300																												300
395																												395

Size list of rods and tubes, made of ZX-530CD3

Rod \ Outer diameter	6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
						0,5 18,76	**0,6** 20,84	**0,7** 22,93	**0,9** 26,05	**1,3** 31,26	**1,7** 36,47	**2,2** 41,68	**2,8** 46,89																
20												19,14 **1,8** 41,68	19,14 **2,4** 46,89	19,14 **2,6** 48,98	19,14 **3,0** 52,10	19,14 **3,8** 57,31	19,14 **4,6** 62,52												20
25													23,93 **2,1** 46,89	23,93 **2,4** 48,98	23,93 **2,8** 52,10	23,93 **3,5** 57,31	23,93 **4,3** 62,52												25
30														28,72 **2,0** 48,98	28,72 **2,4** 52,10	28,72 **3,2** 57,31	28,72 **4,0** 62,52	28,72 **4,9** 67,73	28,72 **5,8** 72,95	28,72 **6,8** 78,16									30
32															30,63 **2,3** 52,10	30,63 **3,0** 57,31	30,63 **3,8** 62,52	30,63 **4,7** 67,73	30,63 **5,7** 72,95		30,63 **7,8** 83,37								32
35																33,50 **2,8** 57,31	33,50 **3,6** 62,52	33,50 **4,5** 67,73	33,50 **5,4** 72,95	33,50 **6,5** 78,16	33,50 **7,6** 83,37								35
40																	38,29 **3,2** 62,52	38,29 **4,0** 67,73	38,29 **5,0** 72,95	38,29 **6,0** 78,16	38,29 **7,1** 83,37	38,29 **8,3** 88,58							40
45																		43,07 **3,5** 67,73	43,07 **4,5** 72,95	43,07 **5,5** 78,16	43,07 **6,6** 83,37	43,07 **7,8** 88,58	43,07 **9,0** 93,79						45
50																			47,86 **3,9** 72,95	47,86 **5,0** 78,16	47,86 **6,0** 83,37	47,86 **7,2** 88,58	47,86 **8,4** 93,79	47,86 **9,7** 99,00					50
55																													55
60																					57,43 **4,7** 83,37	57,43 **5,9** 88,58	57,43 **7,1** 93,79	57,43 **8,4** 99,00	57,43 **9,8** 104,2	57,43 **11,2** 109,4			60
65																						62,22 **5,2** 88,58	62,22 **6,4** 93,79	62,22 **7,7** 99,00	62,22 **9,1** 104,2	62,22 **10,5** 109,4	62,22 **12,0** 114,6		65
70																							67,00 **5,6** 93,79	67,00 **6,9** 99,00	67,00 **8,2** 104,2	67,00 **9,7** 109,4	67,00 **11,2** 114,6	67,00 **12,8** 119,8	70
75																													75
80																									76,57 **6,5** 104,2	76,57 **7,9** 109,4	76,57 **9,4** 114,6	76,57 **11,0** 119,8	80
85																										81,36 **6,9** 109,4	81,36 **8,4** 114,6	81,36 **10,0** 119,8	85
90																											86,15 **7,4** 114,6	86,15 **9,0** 119,8	90
95																													95
100																													100
105																													105
110																													110
115																													115
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250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

- Product in stock
- Just in time product
- Special product
- Scheduled product

Size list of rods and tubes, made of ZX-530CD3

Inner diameter / Rod	Outer diameter 120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510
20																											
25																											
30																											
32																											
35																											
40																											
45																											
50																											
55																											
60																											
65																											
70																											
75																											
80	76,57 **12,7** 125,0	76,57 **14,4** 130,2																									
85	81,36 **11,7** 125,0	81,36 **13,4** 130,2	81,36 **15,2** 135,4																								
90	86,15 **10,6** 125,0	86,15 **12,4** 130,2	86,15 **14,2** 135,4	86,15 **16,0** 140,6																							
95																											
100	95,72 **8,4** 125,0	95,72 **10,1** 130,2	95,72 **11,9** 135,4	95,72 **13,8** 140,6	95,72 **15,7** 145,8	95,72 **17,7** 151,1																					
105		100,5 **8,9** 130,2	100,5 **10,7** 135,4	100,5 **12,6** 140,6	100,5 **14,5** 145,8	100,5 **16,5** 151,1	100,5 **18,6** 156,3																				
110			105,2 **9,4** 135,4	105,2 **11,3** 140,6	105,2 **13,2** 145,8	105,2 **15,2** 151,1	105,2 **17,3** 156,3	105,2 **19,4** 161,5																			
115				110,0 **10,0** 140,6	110,0 **11,9** 145,8	110,0 **13,9** 151,1	110,0 **16,0** 156,3	110,0 **18,1** 161,5	110,0 **20,3** 166,7																		
120																											
130							124,4 **11,6** 156,3	124,4 **13,7** 161,5	124,4 **16,0** 166,7		124,4 **20,6** 177,1	124,4 **23,0** 182,3															
140									134,0 **12,8** 166,7	134,0 **15,0** 171,9	134,0 **17,4** 177,1	134,0 **19,8** 182,3	134,0 **22,3** 187,5	134,0 **24,9** 192,7												
150											143,5 **14,0** 177,1	143,5 **16,4** 182,3	143,5 **18,9** 187,5	143,5 **21,4** 192,7	143,5 **24,1** 197,9												
155												148,3 **14,6** 182,3	148,3 **17,1** 187,5	148,3 **19,6** 192,7	148,3 **22,3** 197,9	148,3 **27,8** 208,4											
160																											
170																											
180																	172,2 **23,6** 218,8	172,2 **32,8** 234,4									
190																	181,8 **19,2** 218,8	181,8 **28,4** 234,4	181,8 **34,8** 244,8								
200																		191,4 **23,8** 234,4									
230																											
250																											
280																											
300																											
395																											

Size list of rods and tubes, made of ZX-530EL3

Rod	Outer diameter 6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
	0,0 6,12	**0,1** 8,16	**0,1** 10,20	**0,2** 12,24	**0,2** 15,31	**0,4** 18,37	**0,4** 20,41	**0,5** 22,45	**0,7** 25,51	**1,0** 30,61	**1,3** 35,71	**1,7** 40,81	**2,2** 45,92	**2,4** 47,96	**2,7** 51,02	**3,2** 56,12	**3,8** 61,22	**4,5** 66,32	**5,2** 71,42	**6,0** 76,53	**6,8** 81,63	**7,7** 86,73	**8,6** 91,83	**9,6** 96,93	**10,6** 102,0	**11,7** 107,1	**12,9** 112,2	**14,1** 117,3	
20										19,54 **0,6** 30,61	19,54 **0,9** 35,71	19,54 **1,3** 40,81	19,54 **1,8** 45,92	19,54 **2,0** 47,96	19,54 **2,3** 51,02	19,54 **2,8** 56,12	19,54 **3,4** 61,22											20
25											24,42 **0,7** 35,71	24,42 **1,1** 40,81	24,42 **1,6** 45,92	24,42 **1,7** 47,96	24,42 **2,0** 51,02	24,42 **2,6** 56,12	24,42 **3,2** 61,22											25
30												29,31 **0,8** 40,81	29,31 **1,3** 45,92	29,31 **1,5** 47,96	29,31 **1,8** 51,02	29,31 **2,3** 56,12	29,31 **3,0** 61,22	29,31 **3,6** 66,32	29,31 **4,3** 71,42	29,31 **5,1** 76,53	29,31 **5,9** 81,63	29,31 **6,8** 86,73	29,31 **7,7** 91,83	29,31 **8,7** 96,93	29,31 **9,8** 102,0				30
32													31,26 **1,2** 45,92	31,26 **1,4** 47,96	31,26 **1,7** 51,02	31,26 **2,2** 56,12	31,26 **2,8** 61,22												32
35													34,19 **1,0** 45,92	34,19 **1,2** 47,96	34,19 **1,5** 51,02	34,19 **2,0** 56,12	34,19 **2,6** 61,22	34,19 **3,3** 66,32	34,19 **4,0** 71,42	34,19 **4,8** 76,53	34,19 **5,6** 81,63	34,19 **6,5** 86,73	34,19 **7,4** 91,83	34,19 **8,4** 96,93	34,19 **9,4** 102,0				35
40															39,07 **1,1** 51,02	39,07 **1,7** 56,12	39,07 **2,3** 61,22	39,07 **2,9** 66,32	39,07 **3,6** 71,42	39,07 **4,4** 76,53	39,07 **5,2** 81,63	39,07 **6,1** 86,73	39,07 **7,1** 91,83	39,07 **8,0** 96,93	39,07 **9,1** 102,0	39,07 **10,2** 107,1	39,07 **11,3** 112,2	39,07 **12,5** 117,3	40
45																		43,96 **2,5** 66,32	43,96 **3,2** 71,42	43,96 **4,0** 76,53	43,96 **4,8** 81,63	43,96 **5,7** 86,73	43,96 **6,6** 91,83	43,96 **7,6** 96,93	43,96 **8,7** 102,0	43,96 **9,8** 107,1	43,96 **10,9** 112,2	43,96 **12,1** 117,3	45
50																	48,84 **1,4** 61,22	48,84 **2,1** 66,32	48,84 **2,8** 71,42	48,84 **3,6** 76,53	48,84 **4,4** 81,63	48,84 **5,2** 86,73	48,84 **6,2** 91,83	48,84 **7,2** 96,93	48,84 **8,2** 102,0	48,84 **9,3** 107,1	48,84 **10,4** 112,2	48,84 **11,6** 117,3	50
55																		53,73 **1,6** 66,32	53,73 **2,3** 71,42	53,73 **3,0** 76,53	53,73 **3,9** 81,63	53,73 **4,7** 86,73	53,73 **5,7** 91,83	53,73 **6,6** 96,93	53,73 **7,7** 102,0	53,73 **8,8** 107,1	53,73 **9,9** 112,2	53,73 **11,1** 117,3	55
60																			58,61 **1,7** 71,42	58,61 **2,5** 76,53	58,61 **3,3** 81,63	58,61 **4,2** 86,73	58,61 **5,1** 91,83	58,61 **6,1** 96,93	58,61 **7,1** 102,0	58,61 **8,2** 107,1	58,61 **9,4** 112,2	58,61 **10,6** 117,3	60
65																					63,50 **2,7** 81,63	63,50 **3,6** 86,73	63,50 **4,5** 91,83	63,50 **5,5** 96,93	63,50 **6,5** 102,0	63,50 **7,6** 107,1	63,50 **8,8** 112,2	63,50 **10,0** 117,3	65
70																					68,38 **2,0** 81,63	68,38 **2,9** 86,73	68,38 **3,8** 91,83	68,38 **4,8** 96,93	68,38 **5,9** 102,0	68,38 **7,0** 107,1	68,38 **8,1** 112,2	68,38 **9,3** 117,3	70
75																							73,26 **3,1** 91,83	73,26 **4,1** 96,93	73,26 **5,2** 102,0	73,26 **6,2** 107,1	73,26 **7,4** 112,2	73,26 **8,6** 117,3	75
80																							78,15 **2,4** 91,83	78,15 **3,4** 96,93	78,15 **4,4** 102,0	78,15 **5,5** 107,1	78,15 **6,6** 112,2	78,15 **7,8** 117,3	80
85																								83,03 **2,6** 96,93	83,03 **3,6** 102,0	83,03 **4,7** 107,1	83,03 **5,8** 112,2	83,03 **7,0** 117,3	85
90																									87,92 **2,7** 102,0	87,92 **3,8** 107,1	87,92 **5,0** 112,2	87,92 **6,2** 117,3	90
95																										92,80 **2,9** 107,1	92,80 **4,1** 112,2	92,80 **5,3** 117,3	95
100																											97,68 **3,1** 112,2	97,68 **4,3** 117,3	100
105																												102,5 **3,3** 117,3	105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

- Product in stock
- Just in time product
- Special product
- Scheduled product

Size list of rods and tubes, made of ZX-530EL3

Inner diameter / Rod	Outer diameter 120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
15,3 122,4	**16,6** 127,5	**18,0** 132,6	**19,4** 137,7	**20,8** 142,8	**22,4** 147,9	**23,9** 153,0	**25,56** 158,1	**27,2** 163,2	**29,0** 168,3	**30,7** 173,4	**32,6** 178,5	**34,5** 183,6	**36,4** 188,7	**38,4** 193,8	**42,6** 204,0	**46,9** 214,2											15,3
20																												20
25																												25
30																												30
32																												32
35																												35
40	39,07 **13,8** 122,4	39,07 **15,1** 127,5	39,07 **16,4** 132,6	39,07 **17,8** 137,7	39,07 **19,3** 142,8	39,07 **20,8** 147,9	39,07 **22,4** 153,0	39,07 **24,00** 158,1	39,07 **25,7** 163,2	39,07 **27,4** 168,3	39,07 **29,2** 173,4	39,07 **31,0** 178,5	39,07 **32,9** 183,6	39,07 **34,8** 188,7	39,07 **36,8** 193,8	39,07 **41,0** 204,0											40
43,96 **13,3** 122,4	43,96 **14,6** 127,5	43,96 **16,0** 132,6	43,96 **17,4** 137,7	43,96 **18,9** 142,8	43,96 **20,4** 147,9	43,96 **22,0** 153,0	43,96 **23,58** 158,1	43,96 **25,3** 163,2	43,96 **27,0** 168,3	43,96 **28,8** 173,4	43,96 **30,6** 178,5	43,96 **32,5** 183,6	43,96 **34,4** 188,7	43,96 **36,4** 193,8	43,96 **40,6** 204,0											45
48,84 **12,9** 122,4	48,84 **14,2** 127,5	48,84 **15,5** 132,6	48,84 **17,0** 137,7	48,84 **18,4** 142,8	48,84 **19,9** 147,9	48,84 **21,5** 153,0	48,84 **23,12** 158,1	48,84 **24,8** 163,2	48,84 **26,5** 168,3	48,84 **28,3** 173,4	48,84 **30,1** 178,5	48,84 **32,0** 183,6	48,84 **34,0** 188,7	48,84 **36,0** 193,8	48,84 **40,1** 204,0	48,84 **44,5** 214,2	48,84 **51,4** 229,5	48,84 **56,3** 239,7									50
53,73 **12,4** 122,4	53,73 **13,7** 127,5	53,73 **15,0** 132,6	53,73 **16,4** 137,7	53,73 **17,9** 142,8	53,73 **19,4** 147,9	53,73 **21,0** 153,0	53,73 **22,6** 158,1	53,73 **24,3** 163,2	53,73 **26,0** 168,3	53,73 **27,8** 173,4	53,73 **29,6** 178,5	53,73 **31,5** 183,6	53,73 **33,5** 188,7	53,73 **35,4** 193,8	53,73 **39,6** 204,0	53,73 **44,0** 214,2	53,73 **50,9** 229,5	53,73 **55,8** 239,7									55
58,61 **11,8** 122,4	58,61 **13,1** 127,5	58,61 **14,5** 132,6	58,61 **15,9** 137,7	58,61 **17,3** 142,8	58,61 **18,9** 147,9	58,61 **20,4** 153,0	58,61 **22,05** 158,1	58,61 **23,7** 163,2	58,61 **25,4** 168,3	58,61 **27,2** 173,4	58,61 **29,1** 178,5	58,61 **31,0** 183,6	58,61 **32,9** 188,7	58,61 **34,9** 193,8	58,61 **39,0** 204,0	58,61 **43,4** 214,2	58,61 **50,3** 229,5	58,61 **55,2** 239,7									60
63,50 **11,2** 122,4	63,50 **12,5** 127,5	63,50 **13,9** 132,6	63,50 **15,3** 137,7	63,50 **16,7** 142,8	63,50 **18,2** 147,9	63,50 **19,8** 153,0	63,50 **21,44** 158,1	63,50 **23,1** 163,2	63,50 **24,8** 168,3	63,50 **26,6** 173,4	63,50 **28,5** 178,5	63,50 **30,4** 183,6	63,50 **32,3** 188,7	63,50 **34,3** 193,8	63,50 **38,4** 204,0	63,50 **42,8** 214,2	63,50 **49,7** 229,5	63,50 **54,6** 239,7									65
68,38 **10,5** 122,4	68,38 **11,8** 127,5	68,38 **13,2** 132,6	68,38 **14,6** 137,7	68,38 **16,1** 142,8	68,38 **17,6** 147,9	68,38 **19,2** 153,0	68,38 **20,78** 158,1	68,38 **22,5** 163,2	68,38 **24,2** 168,3	68,38 **26,0** 173,4	68,38 **27,8** 178,5	68,38 **29,7** 183,6	68,38 **31,6** 188,7	68,38 **33,6** 193,8	68,38 **37,8** 204,0	68,38 **42,1** 214,2	68,38 **49,1** 229,5	68,38 **54,0** 239,7									70
73,26 **9,8** 122,4	73,26 **11,1** 127,5	73,26 **12,5** 132,6	73,26 **13,9** 137,7	73,26 **15,4** 142,8	73,26 **16,9** 147,9	73,26 **18,4** 153,0	73,26 **20,1** 158,1	73,26 **21,8** 163,2	73,26 **23,5** 168,3	73,26 **25,3** 173,4	73,26 **27,1** 178,5	73,26 **29,0** 183,6	73,26 **30,9** 188,7	73,26 **32,9** 193,8	73,26 **37,1** 204,0	73,26 **41,4** 214,2	73,26 **48,4** 229,5	73,26 **53,3** 239,7									75
78,15 **9,1** 122,4	78,15 **10,4** 127,5	78,15 **11,7** 132,6	78,15 **13,2** 137,7	78,15 **14,6** 142,8	78,15 **16,1** 147,9	78,15 **17,7** 153,0	78,15 **19,32** 158,1	78,15 **21,0** 163,2	78,15 **22,7** 168,3	78,15 **24,5** 173,4	78,15 **26,3** 178,5	78,15 **28,2** 183,6	78,15 **30,2** 188,7	78,15 **32,2** 193,8	78,15 **36,3** 204,0	78,15 **40,7** 214,2	78,15 **47,6** 229,5	78,15 **52,5** 239,7									80
83,03 **8,3** 122,4	83,03 **9,6** 127,5	83,03 **10,9** 132,6	83,03 **12,3** 137,7	83,03 **13,8** 142,8	83,03 **15,3** 147,9	83,03 **16,9** 153,0	83,03 **18,51** 158,1	83,03 **20,2** 163,2	83,03 **21,9** 168,3	83,03 **23,7** 173,4	83,03 **25,5** 178,5	83,03 **27,4** 183,6	83,03 **29,4** 188,7	83,03 **31,4** 193,8	83,03 **35,5** 204,0	83,03 **39,9** 214,2	83,03 **46,8** 229,5	83,03 **51,7** 239,7									85
87,92 **7,4** 122,4	87,92 **8,7** 127,5	87,92 **10,1** 132,6	87,92 **11,5** 137,7	87,92 **13,0** 142,8	87,92 **14,5** 147,9	87,92 **16,0** 153,0	87,92 **17,66** 158,1	87,92 **19,3** 163,2	87,92 **21,1** 168,3	87,92 **22,8** 173,4	87,92 **24,7** 178,5	87,92 **26,6** 183,6	87,92 **28,5** 188,7	87,92 **30,5** 193,8	87,92 **34,6** 204,0	87,92 **39,0** 214,2	87,92 **46,0** 229,5	87,92 **50,8** 239,7									90
92,80 **6,5** 122,4	92,80 **7,8** 127,5	92,80 **9,2** 132,6	92,80 **10,6** 137,7	92,80 **12,0** 142,8	92,80 **13,6** 147,9	92,80 **15,1** 153,0	92,80 **16,8** 158,1	92,80 **18,4** 163,2	92,80 **20,2** 168,3	92,80 **21,9** 173,4	92,80 **23,8** 178,5	92,80 **25,7** 183,6	92,80 **27,6** 188,7	92,80 **29,6** 193,8	92,80 **33,8** 204,0	92,80 **38,1** 214,2	92,80 **45,0** 229,5	92,80 **50,0** 239,7									95
97,68 **5,6** 122,4	97,68 **6,9** 127,5	97,68 **8,2** 132,6	97,68 **9,6** 137,7	97,68 **11,1** 142,8	97,68 **12,6** 147,9	97,68 **14,2** 153,0	97,68 **15,81** 158,1	97,68 **17,5** 163,2	97,68 **19,2** 168,3	97,68 **21,0** 173,4	97,68 **22,8** 178,5	97,68 **24,7** 183,6	97,68 **26,7** 188,7	97,68 **28,6** 193,8	97,68 **32,8** 204,0	97,68 **37,2** 214,2	97,68 **44,1** 229,5	97,68 **49,0** 239,7									100
102,5 **4,6** 122,4	102,5 **5,9** 127,5	102,5 **7,2** 132,6	102,5 **8,6** 137,7	102,5 **10,1** 142,8	102,5 **11,6** 147,9	102,5 **13,2** 153,0	102,5 **14,8** 158,1	102,5 **16,5** 163,2	102,5 **18,2** 168,3	102,5 **20,0** 173,4	102,5 **21,8** 178,5	102,5 **23,7** 183,6	102,5 **25,7** 188,7	102,5 **27,6** 193,8	102,5 **31,8** 204,0	102,5 **36,2** 214,2	102,5 **43,1** 229,5	102,5 **48,0** 239,7									105
107,4 **3,5** 122,4	107,4 **4,8** 127,5	107,4 **6,2** 132,6	107,4 **7,6** 137,7	107,4 **9,0** 142,8	107,4 **10,6** 147,9	107,4 **12,1** 153,0	107,4 **13,8** 158,1	107,4 **15,4** 163,2	107,4 **17,2** 168,3	107,4 **19,0** 173,4	107,4 **20,8** 178,5	107,4 **22,7** 183,6	107,4 **24,6** 188,7	107,4 **26,6** 193,8	107,4 **30,8** 204,0	107,4 **35,1** 214,2	107,4 **42,1** 229,5	107,4 **47,0** 239,7									110
			112,3 **6,5** 137,7	112,3 **8,0** 142,8	112,3 **9,5** 147,9	112,3 **11,0** 153,0	112,3 **12,7** 158,1	112,3 **14,3** 163,2	112,3 **16,1** 168,3	112,3 **17,8** 173,4	112,3 **19,7** 178,5	112,3 **21,6** 183,6	112,3 **23,5** 188,7	112,3 **25,5** 193,8	112,3 **29,7** 204,0	112,3 **34,0** 214,2	112,3 **41,0** 229,5	112,3 **45,8** 239,7		112,3 **56,3** 260,1		112,3 **70,5** 285,6						115
		117,2 **3,9** 132,6	117,2 **5,4** 137,7	117,2 **6,8** 142,8	117,2 **8,3** 147,9	117,2 **9,9** 153,0	117,2 **11,5** 158,1	117,2 **13,2** 163,2	117,2 **14,9** 168,3	117,2 **16,7** 173,4	117,2 **18,5** 178,5	117,2 **20,4** 183,6	117,2 **22,4** 188,7	117,2 **24,4** 193,8	117,2 **28,5** 204,0	117,2 **32,9** 214,2	117,2 **39,8** 229,5	117,2 **44,7** 239,7		117,2 **55,1** 260,1		117,2 **69,4** 285,6						120
						126,9 **7,5** 153,0	126,9 **9,1** 158,1	126,9 **10,8** 163,2	126,9 **12,5** 168,3	126,9 **14,3** 173,4	126,9 **16,1** 178,5	126,9 **18,0** 183,6	126,9 **19,9** 188,7	126,9 **21,9** 193,8	126,9 **26,1** 204,0	126,9 **30,4** 214,2	126,9 **37,4** 229,5	126,9 **42,3** 239,7		126,9 **52,7** 260,1		126,9 **66,9** 285,6						130
						136,7 **4,8** 153,0		136,7 **8,1** 163,2	136,7 **9,8** 168,3	136,7 **11,6** 173,4	136,7 **13,5** 178,5	136,7 **15,4** 183,6	136,7 **17,3** 188,7	136,7 **19,3** 193,8	136,7 **23,4** 204,0	136,7 **27,8** 214,2	136,7 **34,7** 229,5	136,7 **39,6** 239,7		136,7 **50,1** 260,1		136,7 **64,3** 285,6						140
										146,5 **8,8** 173,4	146,5 **10,6** 178,5	146,5 **12,5** 183,6	146,5 **14,5** 188,7	146,5 **16,5** 193,8	146,5 **20,6** 204,0	146,5 **25,0** 214,2	146,5 **31,9** 229,5	146,5 **36,8** 239,7		146,5 **47,2** 260,1		146,5 **61,5** 285,6						150
											151,4 **9,2** 178,5	151,4 **11,0** 183,6	151,4 **13,0** 188,7	151,4 **15,0** 193,8	151,4 **19,1** 204,0	151,4 **23,5** 214,2	151,4 **30,4** 229,5	151,4 **35,3** 239,7		151,4 **45,8** 260,1		151,4 **60,0** 285,6						155
												156,2 **9,5** 183,6	156,2 **11,4** 188,7	156,2 **13,4** 193,8	156,2 **17,6** 204,0	156,2 **22,0** 214,2	156,2 **28,9** 229,5	156,2 **33,8** 239,7		156,2 **44,2** 260,1		156,2 **58,4** 285,6						160
														166,0 **10,2** 193,8	166,0 **14,4** 204,0	166,0 **18,7** 214,2	166,0 **25,7** 229,5	166,0 **30,6** 239,7		166,0 **41,0** 260,1		166,0 **55,2** 285,6						170
																175,8 **15,3** 214,2	175,8 **22,3** 229,5	175,8 **27,2** 239,7		175,8 **37,6** 260,1		175,8 **51,8** 285,6						180
																185,6 **11,7** 214,2	185,6 **18,7** 229,5	185,6 **23,6** 239,7		185,6 **34,0** 260,1		185,6 **48,2** 285,6						190
																	195,3 **14,8** 229,5	195,3 **19,8** 239,7		195,3 **30,2** 260,1		195,3 **44,4** 285,6		195,3 **91,3** 357,1				200
																						224,6 **31,8** 285,6						230
																												250
																												280
																												300
																												395

Size list of rods and tubes, made of ZX-530KF15

Rod	Outer diameter 6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
20														19,07 **2,4** 49,17	19,07 **2,7** 52,31	19,07 **3,4** 57,54	19,07 **4,1** 62,77												20
25																23,84 **3,2** 57,54	23,84 **3,9** 62,77												25
30																	28,60 **3,6** 62,77	28,60 **4,4** 68,00	28,60 **5,2** 73,23	28,60 **6,2** 78,47									30
32																	30,51 **3,5** 62,77	30,51 **4,3** 68,00	30,51 **5,1** 73,23		30,51 **7,0** 83,70								32
35																		33,37 **4,0** 68,00	33,37 **4,9** 73,23	33,37 **5,8** 78,47	33,37 **6,8** 83,70								35
40																			38,14 **4,5** 73,23	38,14 **5,4** 78,47	38,14 **6,4** 83,70	38,14 **7,4** 88,93							40
45																				42,91 **5,0** 78,47	42,91 **6,0** 83,70	42,91 **7,0** 88,93	42,91 **8,1** 94,16						45
50																					47,67 **5,5** 83,70	47,67 **6,5** 88,93	47,67 **7,6** 94,16	47,67 **8,8** 99,39						50
55																													55
60																							57,21 **6,5** 94,16	57,21 **7,6** 99,39	57,21 **8,9** 104,6	57,21 **10,2** 109,8			60
65																								61,97 **7,0** 99,39	61,97 **8,2** 104,6	61,97 **9,5** 109,8	61,97 **10,9** 115,0		65
70																									66,74 **7,5** 104,6	66,74 **8,8** 109,8	66,74 **10,2** 115,0	66,74 **11,6** 120,3	70
75																													75
80																											76,28 **8,6** 115,0	76,28 **10,0** 120,3	80
85																												81,04 **9,1** 120,3	85
90																													90
95																													95
100																													100
105																													105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

- Product in stock
- Just in time product
- Special product
- Scheduled product

Size list of rods and tubes, made of ZX-530KF15

Outer diameter

Rod	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40																												40
45																												45
50																												50
55																												55
60																												60
65																												65
70																												70
75																												75
80	76,28 **11,5** 125,5	76,28 **13,0** 130,7																										80
85	81,04 **10,6** 125,5	81,04 **12,2** 130,7	81,04 **13,8** 136,0																									85
90	85,81 **9,7** 125,5	85,81 **11,2** 130,7	85,81 **12,9** 136,0	85,81 **14,5** 141,2																								90
95																												95
100			95,34 **10,9** 136,0	95,34 **12,5** 141,2	95,34 **14,3** 146,4	95,34 **16,1** 151,7																						100
105				100,1 **11,5** 141,2	100,1 **13,2** 146,4	100,1 **15,0** 151,7	100,1 **16,9** 156,9																					105
110					104,8 **12,1** 146,4	104,8 **13,9** 151,7	104,8 **15,7** 156,9	104,8 **17,7** 162,1																				110
115						109,6 **12,7** 151,7	109,6 **14,6** 156,9	109,6 **16,5** 162,1	109,6 **18,5** 167,3																			115
120																												120
130									123,9 **14,6** 167,3		123,9 **18,8** 177,8	123,9 **21,0** 183,0																130
140											133,4 **16,0** 177,8	133,4 **18,1** 183,0	133,4 **20,4** 188,3	133,4 **22,7** 193,5														140
150													143,0 **17,3** 188,3	143,0 **19,6** 193,5	143,0 **22,0** 198,7													150
155														147,7 **18,0** 193,5	147,7 **20,4** 198,7	147,7 **25,3** 209,2												155
160																												160
170																												170
180																	171,6 **21,7** 219,7	171,6 **30,0** 235,4										180
190																		181,1 **26,1** 235,4	181,1 **31,9** 245,8									190
200																												200
230																												230
250																												250
280																												280
300																												300
395																												395

Inner diameter

Size list of rods and tubes, made of ZX-750V5T

Outer diameter

Rod	6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
					0,3 15,55	**0,4** 18,66	**0,5** 20,74	**0,6** 22,81	**0,8** 25,92	**1,1** 31,10	**1,5** 36,29	**2,0** 41,47	**2,5** 46,65	**2,7** 48,73	**3,0** 51,84	**3,7** 57,02	**4,4** 62,21	**5,1** 67,39	**6,0** 72,57	**6,8** 77,76	**7,8** 82,94	**8,8** 88,12	**9,8** 93,31	**11,0** 98,49	**12,2** 103,6	**13,4** 108,8	**14,7** 114,0	**16,1** 119,2	
20													19,24 **2,0** 46,65	19,24 **2,3** 48,73	19,24 **2,6** 51,84	19,24 **3,3** 57,02	19,24 **4,0** 62,21												20
25														24,05 **2,0** 48,73	24,05 **2,4** 51,84	24,05 **3,0** 57,02	24,05 **3,7** 62,21												25
30															28,86 **2,1** 51,84	28,86 **2,7** 57,02	28,86 **3,4** 62,21	28,86 **4,2** 67,39	28,86 **5,0** 72,57	28,86 **5,9** 77,76									30
32																30,78 **2,6** 57,02	30,78 **3,3** 62,21												32
35																	33,67 **3,1** 62,21	33,67 **3,8** 67,39	33,67 **4,7** 72,57	33,67 **5,6** 77,76									35
40																		38,48 **3,5** 67,39	38,48 **4,3** 72,57	38,48 **5,2** 77,76									40
45																			43,29 **3,8** 72,57	43,29 **4,7** 77,76									45
50																				48,10 **4,2** 77,76									50
55																													55
60																													60
65																													65
70																													70
75																													75
80																													80
85																													85
90																													90
95																													95
100																													100
105																													105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Inner diameter

Inner diameter

- Product in stock
- Just in time product
- Special product
- Scheduled product

Size list of rods and tubes, made of ZX-750V5T

Inner diameter / Rod	Outer diameter 120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510	Rod
Rod	**17,5** 124,4	**19,0** 129,6	**20,5** 134,7																									Rod
20																												20
25																												25
30																												30
32																												32
35																												35
40																												40
45																												45
50																												50
55																												55
60																												60
65																												65
70																												70
75																												75
80																												80
85																												85
90																												90
95																												95
100																												100
105																												105
110																												110
115																												115
120																												120
130																												130
140																												140
150																												150
155																												155
160																												160
170																												170
180																												180
190																												190
200																												200
230																												230
250																												250
280																												280
300																												300
395																												395

Size list of rods and tubes, made of ZX-750V5KF

Rod	Outer diameter 6	8	10	12	15	18	20	22	25	30	35	40	45	47	50	55	60	65	70	75	80	85	90	95	100	105	110	115	Rod
Inner diameter					**0,3** 15,62	**0,4** 18,74	**0,5** 20,82	**0,6** 22,91	**0,8** 26,03	**1,2** 31,24	**1,6** 36,44	**2,1** 41,65	**2,6** 46,85	**2,9** 48,94	**3,3** 52,06	**4,0** 57,27	**4,7** 62,47	**5,5** 67,68	**6,4** 72,88	**7,3** 78,09	**8,4** 83,30	**9,4** 88,50	**10,6** 93,71	**11,8** 98,91	**13,0** 104,1	**14,4** 109,3	**15,8** 114,5	**17,3** 119,7	
20													19,16 **2,2** 46,85	19,16 **2,4** 48,94	19,16 **2,8** 52,06	19,16 **3,5** 57,27	19,16 **4,3** 62,47												20
25														23,95 **2,2** 48,94	23,95 **2,6** 52,06	23,95 **3,3** 57,27	23,95 **4,0** 62,47												25
30															28,74 **2,3** 52,06	28,74 **3,0** 57,27	28,74 **3,7** 62,47	28,74 **4,5** 67,68	28,74 **5,4** 72,88	28,74 **6,4** 78,09									30
32																30,66 **2,8** 57,27	30,66 **3,6** 62,47												32
35																	33,53 **3,4** 62,47	33,53 **4,2** 67,68	33,53 **5,0** 72,88	33,53 **6,0** 78,09									35
40																		38,32 **3,8** 67,68	38,32 **4,6** 72,88	38,32 **5,6** 78,09									40
45																			43,11 **4,2** 72,88	43,11 **5,1** 78,09									45
50																				47,90 **4,6** 78,09									50
55																													55
60																													60
65																													65
70																													70
75																													75
80																													80
85																													85
90																													90
95																													95
100																													100
105																													105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Product in stock
Just in time product
Special product
Scheduled product

Size list of rods and tubes, made of ZX-750V5KF

Inner diameter / Rod	Outer diameter																												
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	200	210	225	235	240	255	270	280	315	350	380	510		
Rod	18,8 124,9	20,4 130,1	22,1 135,3																										Rod
20																													20
25																													25
30																													30
32																													32
35																													35
40																													40
45																													45
50																													50
55																													55
60																													60
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75																													75
80																													80
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100																													100
105																													105
110																													110
115																													115
120																													120
130																													130
140																													140
150																													150
155																													155
160																													160
170																													170
180																													180
190																													190
200																													200
230																													230
250																													250
280																													280
300																													300
395																													395

Shipping overview of cut-to-size pieces, blanks & end products

Cut-to-size pieces and blanks made of standard and special compounds

Sawing

End products made of standard and special compounds

Machining

We manufacture for you low-cost end products made of ZEDEX® polymers, always with the optimal procedure in relation to the quantities required. In our production we use the following procedures:

Bonding

Marking

Injection moulding

1-, 2 components, inserts (e.g. thread inserts) available

Part weight 0,5 to 1600 g

Tools manufacturing, prototype moulds (aluminium) with short delivery times

Sterilization

Introduction

The word sterilization describes the procedure to eliminate the microorganisms from materials and items. After this procedure, the materials and items are called with the term "sterile".

Through the sterilization of the items, would be theoretically destroyed all the microorganisms that belong to or hang on the items, therefore killing the spore forms, viruses, prions (proteinaceous infectious particle), plasmids and other DNA-fragments.

In the praxis, a full sterilization is not achievable with a reliability of 100 %. Therefore we can talk about a reduction of the microorganisms number of a specific factor (in powers of 10), depending on the application required, or about a possibility of full sterilization. For example, it is possible to require, that the residual content of the microorganisms of a sterilized item is maximum 10–6 c.f.u. (colony forming units). That means, that the possibility of finding a microorganism in the item, is maximum one in a million.

Looking at the technical definition of disinfection, it can be noticed that generally the sterilization has got a bigger probability (in power of 10) of a full sterilization. The sterilization is obtainable through physical (thermal, radiation) or chemical procedures.

Chemical sterilization

The term "chemical sterilization" refers to a sterilization made through specifics chemical substances, as formaldehyde or peracetic acid. The chemical sterilization is normally used for thermolabile materials. With thermostable materials, it is always preferable a steam sterilization to a chemical sterilization.

Liquid chemical sterilization

The destruction of microorganisms is done by the application of chemicals, some of them in a liquid form, on the items to be sterilized. For example, the sterilization in the beverage technology, is made with hydrogen peroxide, dissolved ozone or peracetic acid. A critical parameter in all the liquid chemical sterilization processes, is the temperature of the sterilizing solution. To remove the chemicals from the sterilized object, this one is typically washed with sterile water.

Dry sterilization process

"Dry sterilization process" refers to a not clearly defined group of sterilization procedures. The microorganisms killing is done with gas on the dry item to be sterilized. Gas sterilization is performed for example with formaldehyde, ethylene oxide, ozone or hydrogen peroxide.

This procedure occurs frequently in the cold antiseptic filling of foods, especially in beverages. Before filling the to be sterilized objects, mostly plastic bottles made of PET or HDPE, these ones are sterilized first with chemical agents, mostly with peracetic acid products, then washed (liquid chemical sterilization process) and as final treatment, for a further killing of microorganisms, additional gases are used, preferably hydrogen peroxide in gaseous form.

Moist heat sterilization

The moist heat sterilization (heating in an autoclave) is the standard procedure. The air inside the autoclave is completely replaced by water steam. The real time and the temperature necessary for a sterilization process depends on the autoclave type and on the pathogens agents´ resistance.

The item is heated 20 minutes at 121 °C with a water steam's pressure of 2 bar, or 5 minutes at 134 °C with a pressure of 3 bar. To eliminate the prions, a temperature of 134 °C, with 3bar pressure and a time of 18 minutes are required.

Dry heat sterilization

– The annealing of metal objects through a temperature of about 500 °C, is commonly used in microbiological laboratories.
– The flame treatment: the item is subjected for few seconds to a flame treatment.
– The dry heat sterilization of glass, metals, porcelain are made with one of the following procedures:
  180 °C for at least 30 min.
  170 °C for at least 60 min.
  160 °C for at least 120 min.

Radiation sterilization

Sterilization by ionizing radiation could be done with UV-rays, X-rays, gamma rays (principally with the radioactive isotope Cobalt-60) or electron bombardment (electron beam sterilization, beam energy from 3 to 12 MeV, typical absorbed dose of 25 kGy). In the industrial sterilization process (as the medical disposables) gamma irradiations or electron beams are used in large-scale.[1]

Plastic reaction

The energy radiation involve, depending on the plastic type, the following reactions:

– chain scission
– chain branching
– cross linking

As a result of these reactions, the following changes can also occur weeks after the radiation procedure:

– discoloration
– gas separation
– odour formation
– cross linking
– embrittlement
– strengthening
– softening
– chemical decomposition
– molar mass variation
– improvement or deterioration of the mechanical and chemical properties
– change in the melting and glass transition temperature
– toxicological changes.

1 Not affected by
2 Optical variations
3 Properties variations
X Not suitable

Table 7: kind of sterilizations and influence of the sterilization procedures on the plastic (relative comparison)

	Dry sterilization (Ethylene oxide)	UV-rays sterilization	Liquid chemical sterilization	Gamma-rays radiation sterilization	Dry heat sterilization at 160°C	Moist heat sterilization		
						at 143°C	at 134°C	at 121°C
ZX-100K	1	2	2	3	X	3	3	2
ZX-100EL63	X	X	X	3	X	X	3	2
ZX-100MT	1	2	2	3	X	3	3	2
ZX-324	1	2	1	1	1	1	1	1
ZX-324V1T	1	2	2	1	1	1	1	1
ZX-324V2T	1	2	1	2	1	1	1	1
ZX-324V11T	1	2	1	1	1	1	1	1
ZX-324VMT	1	1	1	2	1	2	2	2
ZX-410	1	1	2	2	1	2	2	1
ZX-410V7T	1	1	3	2	1	2	2	2
ZX-530	1	2	1	3	2	3	2	2
ZX-530CD3	1	2	1	3	2	3	2	2
ZX-530EL3	1	2	1	3	2	2	2	2
ZX-530KF15	1	2	1	3	2	3	3	1
ZX-550	1	2	1	X	1	1	1	1
ZX-550PV	1	2	1	X	1	1	1	1
ZX-750V5T	1	X	1	2	1	X	2	2
ZX-750V5KF	1	X	1	2	1	X	2	2

High energy radiation

The radiation absorbed dose is defined as the amount of energy absorbed per unit mass.

SI unit is [J/kg] or [Gy]; the old unit was [Rad], abbreviated "rd".

The conversion is the following:

1 J/kg = 1 Gy = 100 rad.

The absorbed dose rate indicates how fast the energy is absorbed [Gy/s].

Between a sterilization done either by electron beam, or X-ray or gamma-ray, there are no direct differences, concerning their influence on the plastic properties variations, of course when these procedures have got the same absorbed dose and dose absorbed rate.

Anyway, there is an indirect difference between a sterilization made with gamma irradiation and one made with an electron beam. In fact in both procedures an oxidative degradation takes place.

However with the same absorbed dose and dose absorbed rate, this degradation is with an electron beam many times higher than with a gamma irradiation.

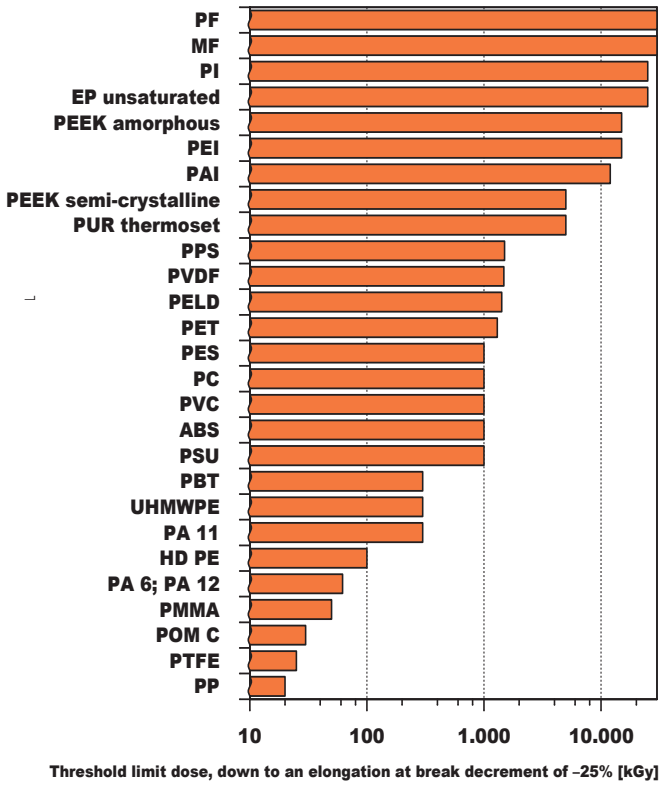


Figure 7: relative resistance of the standard plastics

Relative resistance against high energy radiation

Figure 7 shows the pure radiation resistance of plastics. As property limit value, an elongation at break decrement of –25 % from the initial value is used.

Looking at this graphic is observable, that thermosetting plastic are more resistant than the thermoplastic, and aromatic polymers are more resistant than the aliphatic ones. Plastics with low density have got a higher resistance.

Rating of ZEDEX® polymers resistance against radiations

ZX-100K is relatively resistant to high-energy radiation. A first strong degradation occurs with an absorbed dose of 1000 kGy (10 kGy/h; 1 meV gamma ray, source: Cobalt-60).

ZX-410 has got a high resistance to gamma-rays and beta-rays radiations. After a radiation exposure of 15000 kGy (2 MeV electron beam; 5 kGy / s), ZX-410 has still got 90 % of its tensile strength.

ZX-324V1T is to alpha, beta and gamma rays very resistant. A gamma-ray absorbed dose of 10 000 kGy causes nearly no damage.

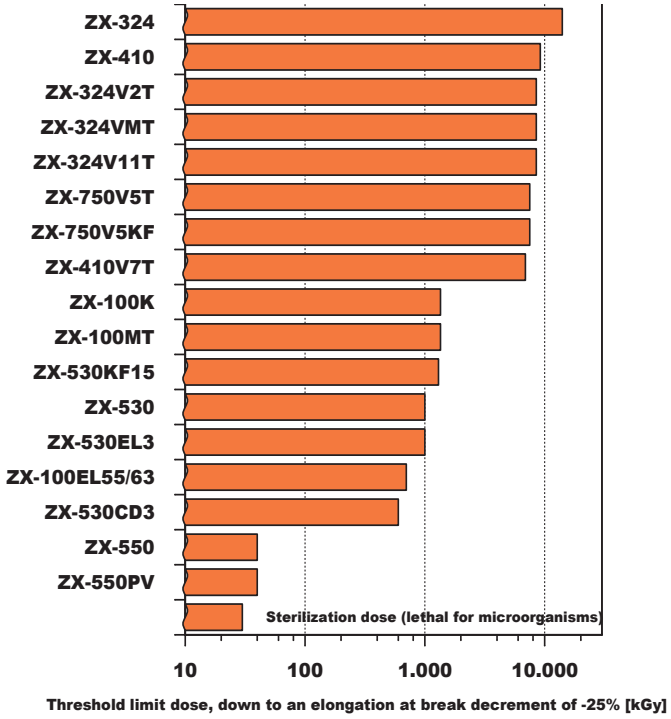


Figure 8: relative resistance of the ZEDEX® plastics

Reference: [1] Wikipedia

Rating of ZEDEX® polymers against the chemicals used in the sterilization

The family ZX-530 has got the highest chemical resistance of all the ZEDEX® plastics.
PEEK is also inferior to ZX-530. When the ZX-530 comes in contact with few chemicals a colour change occurs, which, however, do not affect the properties.
The family ZX-324 is chemicals resistant to all the chemicals used during a sterilization and an antiseptic process.
The ZX-410 and ZX-100, after several sterilization procedures, have got a properties variation.

1 Marginally influenced by
2 Optical variations
3 Properties variations
X Not suitable

	Water vapour 140°C	Hydrogen peroxide	Ozone	Paracetic acid	Formaldehyde
ZX-100K	3	2	1	2	**2**
ZX-100EL55/63	X	X	X	X	X
ZX-100MT	3	2	1	2	**2**
ZX-324	1	1	1	1	1
ZX-324V1T	2	1	1	1	2
ZX-324V2T	1	1	1	1	1
ZX-324V11T	1	1	1	1	1
ZX-324VMT	1	1	1	1	1
ZX-410	2	2	1	2	3
ZX-410V7T	2	2	1	2	3
ZX-530	1	2	1	1	1
ZX-530CD3	1	2	1	1	1
ZX-530EL3	1	2	1	1	1
ZX-530KF15	1	2	1	1	1
ZX-550	1	1	1	1	1
ZX-550PV	1	1	1	1	1
ZX-750V5T	2	**3**	1	1	1
ZX-750V5KF	2	**3**	1	1	1

Table 8: relative resistance to the chemical sterilizations

Security

The quantity of sterilization cycles that a material is able to stand, depends on several factors as temperature, chemical agents, sterilization equipment and processing parameters. Therefore, the materials should be tested following specific operational and sterilization terms.

Improvements

Thanks to our extensive testing facilities, we offer you the opportunity to change the components´ properties considering your specific application. If a standard plastics do not have the required properties, we can produce special compounds according to the expected properties.

Support

The instructions and information in this document permit the comparison of our materials and thus to choose the appropriated one. On request, we will give you more specific information, or we will support you in your material selection. ■

Chemical resistance

Introduction

The term "chemical resistance" is normally used, although an absolute resistance is never given. The chemical resistance describes how the resistance properties of polymers interact with the chemical agents (e.g. air, gas, water, grease). This means that the substances influence the polymers, but at the same time also the polymers influence the chemical agents. For example, some polymers affect on the grease consistency, and thus the grease influence negatively the polymers.

Influence on plastics

Every chemical agent has got a different behaviour for each polymers category. Its behaviour could cause, either chemical interactions or physical interactions with the polymers.

Chemical interaction agents react with the primary valence bonds and modify the polymers´ properties irreversibly. In this case the chain breaks, thus it shortens and induces an embrittlement of the polymers. The polymers response with softening, swelling till its dissolution in the agent. Even a small chemical attack could lead to strong properties changes.

Physical interaction agents do not react with the polymers, but they reduce their physical bonds forces. The agent penetrates in the empty areas of the chains, spreads them and increases the space between the chains, thus it causes a reduction of the secondary valence bonds forces. This reaction takes place till the polymers reach a state of equilibrium. The polymers response with softening and swelling. If the agent is extracted from the polymers, they will nearly restore the initial properties.
Physical interaction agents influence depend on the polyamides conditioning. The polyamides, with an absorption of water (agent), pass from a hard and brittle condition to an elastic and tough condition.
The influence intensity of the chemical agents depends on the following parameters:

Temperature

A temperature increment leads to a speed increment of the Brownian motion. The processes go every 10°C temperature increment, from 3 up to 4 times faster. If the temperature rises above the glass transition temperature, a sharp reduction of the resistance occurs.

Residence time
With the increment of the residence time decreases the resistance.

Concentration
In aqueous solutions, the resistance decreases with a concentration increment.

Degree of crystallinity
Through the crystallization, a big part of the crystalline structure increases its resistance, thanks to a more densely packed crystalline structure. Consequently the penetration of agents will be more difficult.

Filler materials
... as e.g. fibres reduce the resistance. Fibres act like capillary, and enable a faster penetration of the agents into polymers. On the other hand, fibres lead to a structure deformation reduction and, consequently, to an increment of the stress cracking resistance.

Polymer internal stress level
The internal structure, through internal tensions, will deform and by doing so it will create free space between the chains, and therefore it will easily permit the penetration of agents. Thus the resistance will be reduced. These free spaces created by internal tension, are many times bigger in amorphous structures than in crystalline structures. This causes the lower resistance of the amorphous materials (see "Resistance to stress cracking").

Resistance to stress cracking
When amorphous polymers are exposed to tensions, these can also be internal tensions caused by processing, the crystal lattice structure will change. This generates free spaces, thus it produces stress cracks and therefore permit an easy and deep penetration of agents in the amorphous polymers.
At this point deep cracks are developed, and this leads the workpiece to the breakdown. Only with mechanical tensions or only with agents, such a damage does not take place. In amorphous polymers, as for example ZX-410 and ZX-410V7T, the resistance to stress cracking must be checked, before using them with chemicals. In these cases, please contact us.

Chemical resistance of the ZEDEX® polymers

To determine whether a ZEDEX® high performance plastic is resistant to a specific chemical substance or not, the following 5 possibilities are at your disposal:

1. Relative values

The table 9 is used to compare the relative resistance of high-performance plastics ZEDEX® to chemicals.

Resistance **1** excellent **2** good **3** bad **X** not resistant	Weak acids	Strong acids	Weak alkalis	Stong alkalis	Organic solvents	Alcohols	Hydrocarbons	Fuels	UV-radiations
ZX-100K/MT	2	**X**	**X**	**X**	1	2	**X**	2	3
ZX-100EL55/63	2	3	2	3	**X**	3	1	2	**X**
ZX-410 familiy	1	1	1	**X**	**x**	3	**X**	3	3
ZX-530 familiy	1	1	1	1	2	1	3	2	2
ZX-550 familiy	1	1	1	1	1	1	1	2	2
ZX-750 familiy	1	1	1	1	1	1	1	1	1

Table 9: relative resistance

2.Chemicals list – when chemicals names are known

In the alphabetical order arranged list of chemicals (from page 84), the ZEDEX® materials´ resistance to the listed chemicals, depends on their concentration and on the application temperature.

3. Synonym list - if chemicals are not available in the chemicals list

The chemicals are often be known with other names. In the synonym list (from page 116), these chemical synonyms are listed keeping the order of with the chemicals present in the chemicals list.

4. Chemical groups list - if chemicals are neither in the chemical nor in the and synonym lists

The chemicals can be classified into chemical groups, using their chemical formula. These chemical groups, as well as some typical examples, are listed in the table 10 on page 121.

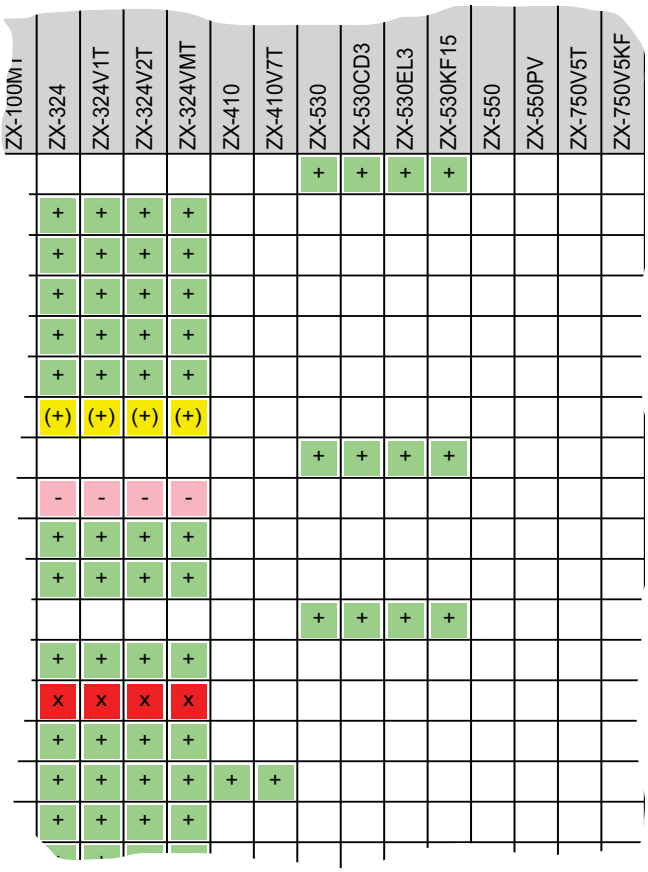
5. pH-limit value list - resistance to inorganic acids, alkalis and salts

The pH-limit value list offers the possibility to determine, with the help of a known pH-value, the plastics´ resistance to the used chemicals. The pH-limit value list is in the table 12 on page 122.

Chemicals list

When using the following tables, please note that the corrosion rate, in all given cases, is affected by many factors, as e.g. concentration, temperature, range of movement and the presence of impurities. This guide is generally used to classify materials through their resistance to chemicals, which usually, also contain impurities. The rankings should be viewed as a first approach to check the own requirements.

The tabulated values, resulted from 2 months resistance tests, were obtained with unstressed test pieces (ISO-1 test piece) immersed in various chemicals. The values for the ZX-410 and ZX-410V7T were determined with a flexural stress of the outer fibre lower than 0.5%. If some agents are not in the tables, or those in the tables have got different concentrations or temperatures, their resistance can be provided on request. In special cases (e.g. mixtures), we provide ISO tensile tested pieces for an immersion tests. After the immersion test, we determine the agent influences on the plastic and evaluate its resistance to your application. ■



Extract from "Chemicals list"

Interpretation of the table

+ Resistant

not affected by, without or very little weight change (<1 %). Changes in mechanical properties less than 10 %.

(+) Limited resistant

after a certain time, considerable reduction of the mechanical properties (10 %–50 %), weight change from 1 % up to 5 %, short contact with the chemicals can be considered, in many cases, acceptable.

- Not resistant

Weight change >5 % and/or reduction of the mechanical properties more than 50 %.

x Soluble

Material dissolves or decomposes

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
1,1,1-trichloroethane G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
1,1,1-trichloroethane G Halogenated hydrocarbons	100%	40°C									-	-								
1,1,2,2-tetrachloroethane G Halogenated hydrocarbons	100%	20°C					(+)	(+)	(+)	(+)										
1,1,2-trichloro-1,2,2-trifluoroethane G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
1,1-dichloroethylene G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
1,2,3,4-tetrahydronaphthalene G Aromatic hydrocarbons	100%	20°C					+	+	+	+										
1,2-dichloroethane G Halogenated hydrocarbons	100%	20°C			-	-	+	+	+	+										
1,2-dichloroethane G Halogenated hydrocarbons	100%	100°C											+	+	+	+				
1,3-butanediol G Alcohols / glycols	100%	20°C					+	+	+	+										
1,4-dioxane G Ether	100%	20°C			+	+	+	+	+	+									+	+
1,4-dioxane G Ether	100%	100°C											+	+	+	+	+	+		
1-butanol G Alcohols / glycols	100%	20°C			(+)	(+)	+	+	+	+	+	+								
1-butanol G Alcohols / glycols	100%	100°C											+	+	+	+				
1-butylamine G Amines	100%	20°C					+	+	+	+										
1-butylamine G Amines	100%	100°C											(+)	(+)	(+)	(+)	+	+		
1-chloro1,1-difluoroethane G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
1-hexanol G Alcohols / glycols	100%	20°C					+	+	+	+	+	+								
1-propanol G Alcohols / glycols	100%	20°C									+	+								
2,2,2-trichloroethanol G Alcohols / glycols	100%	20°C					+	+	+	+										
2,2,2-trifluoroethanol G Alcohols / glycols	100%	20°C					+	+	+	+										
2-chloroethanol G Alcohols / glycols	100%	20°C					+	+	+	+										
2-pentanol G Alcohols	100%	20°C					+	+	+	+										
2-pentanol G Alcohols	100%	100°C											+	+	+	+	+	+		
acetaldehyde G Aldehydes / ketones	40%	20°C					+	+	+	+										
acetaldehyde G Aldehydes / ketones	100%	20°C					+	+	+	+	-	-								
acetaldehyde G Aldehydes / ketones	100%	100°C											+	+	+	+	+	+		

G Group + Resistant (+) Limited resistant - Not resistant X Soluble

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
acetamide G Amides	50%	20°C					+	+	+	+										
acetic acid G Organic acids	5%	20°C	+	(+)			+	+	+	+	+	+							+	+
acetic acid G Organic acids	10%	20°C			+	+	+	+	+	+	+	+							+	+
acetic acid G Organic acids	20%	20°C					+	+	+	+	+	+								
acetic acid G Organic acids	30%	20°C					+	+	+	+										
acetic acid G Organic acids	50%	20°C					+	+	+	+										
acetic acid G Organic acids	70%	20°C									+	+								
acetic acid G Organic acids	95%	20°C					+	+	+	+	-	-								
acetic acid G Organic acids	100%	20°C	x	x	(+)	(+)	+	+	+	+										
acetic acid	100%	20°C																	(+)	(+)
acetic acid G Organic acids	100%	100°C											+	+	+	+	+	+		
acetic anhydride G Acid anhydride	100%	100°C											+	+	+	+				
acetone G Ketones	5%	20°C					+	+	+	+										
acetone G Ketones	10%	20°C					+	+	+	+										
acetone G Ketones	50%	20°C					+	+	+	+	(+)	(+)								
acetone G Ketones	100%	20°C	-	-	+	+	+	+	+	+	-	-							+	+
acetone G Ketones	100%	100°C											+	+	+	+	+	+		
acetonitrile G Nitrile	100%	20°C					+	+	+	+										
acetonitrile G Nitrile	100%	100°C											+	+	+	+	+	+		
acetophenone G Aromatic ketones	100%	20°C					+	+	+	+										
acetyl chloride G Acyl halides	100%	20°C					+	+	+	+										
acetyl chloride G Acyl halides	100%	100°C											+	+	+	+	+	+		
acetylene G Hydrocarbons, acetylene	100%	20°C					+	+	+	+										
acrylic acid G Organic acids	100%	20°C					+	+	+	+										
acrylonitrile G Nitrile	100%	20°C					+	+	+	+										
a-diisobutylene	100%	100°C											+	+	+	+	+	+		

G Group + Resistant (+) Limited resistant - Not resistant x Soluble

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
air (liquid)	100%	-180°C					+	+	+	+										
G Other inorganic chemicals																				
allyl alcohol	100%	20°C					+	+	+	+										
G Alcohols																				
allyl chloride	100%	20°C					+	+	+	+										
G Halogenated hydrocarbons																				
aluminium hydroxide	100%	20°C					+	+	+	+										
G Inorganic alkalis																				
aluminium sulphate	5%	20°C					+	+	+	+										
G Inorganic salts																				
aluminium sulphate	100%	20°C					+	+	+	+										
G Inorganic salts																				
aluminum chloride	10%	20°C					+	+	+	+										
G Inorganic salts																				
aluminum chloride	100%	20°C					+	+	+	+										
G Inorganic salts																				
aluminum chloride	100%	100°C											+	+	+	+	+	+		
G Inorganic salts																				
aluminum fluoride	100%	20°C					+	+	+	+										
G Inorganic salts																				
amino acids	100%	20°C					+	+	+	+										
G Amino acids																				
ammonia	10%	20°C																	-	-
G Inorganic alkalis																				
ammonia	20%	20°C					+	+	+	+										
G Inorganic alkalis																				
ammonia	100%	20°C					+	+	+	+										
G Inorganic alkalis																				
ammonia	100%	100°C											+	+	+	+	+	+		
G Inorganic alkalis																				
ammonium acetate	100%	20°C					+	+	+	+										
G Salts																				
ammonium bicarbonate	100%	20°C					+	+	+	+										
G Inorganic salts																				
ammonium carbonate	10%	20°C					+	+	+	+										
G Inorganic salts																				
ammonium carbonate	50%	100°C					+	+	+	+										
G Inorganic salts																				
ammonium carbonate	100%	20°C					+	+	+	+										
G Inorganic salts																				
ammonium chloride	10%	20°C					+	+	+	+										
G Inorganic salts																				
ammonium chloride	30%	20°C					+	+	+	+										
G Inorganic salts																				
ammonium chloride	100%	20°C					+	+	+	+										
G Inorganic salts																				
ammonium chloride	100%	100°C											+	+	+	+	+	+		
G Inorganic salts																				
ammonium fluoride	100%	20°C					+	+	+	+										
G Inorganic salts																				
ammonium hydrogen phosphate	100%	20°C					+	+	+	+										
G Inorganic salts																				

G Group + Resistant (+) Limited resistant - Not resistant x Soluble

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
ammonium hydroxide G Inorganic alkalis	1%	20°C					+	+	+	+	+	+								
ammonium hydroxide G Inorganic alkalis	10%	20°C			-	-	+	+	+	+	+	+								
ammonium hydroxide G Inorganic alkalis	30%	20°C					+	+	+	+	-	-								
ammonium hydroxide G Inorganic alkalis	100%	20°C			-	-	+	+	+	+	-	-								
ammonium hydroxide G Inorganic alkalis	100%	100°C											+	+	+	+	+	+		
ammonium nitrate G Inorganic salts	100%	20°C					+	+	+	+										
ammonium nitrate G Inorganic salts	100%	100°C											+	+	+	+	+	+		
ammonium sulphate G Inorganic salts	10%	20°C					+	+	+	+										
ammonium sulphate G Inorganic salts	100%	20°C					+	+	+	+										
ammonium sulphate G Inorganic salts	100%	100°C											+	+	+	+	+	+		
ammonium sulphide G Inorganic salts	20%	20°C					+	+	+	+										
ammonium sulphide G Inorganic salts	100%	20°C					+	+	+	+										
ammonium thiocyanate G Inorganic salts	100%	20°C					+	+	+	+										
amyl acetate G Ester	100%	20°C					+	+	+	+	(+)	(+)								
amyl chloride G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
aniline G Aromatic amines	100%	20°C			+	+	+	+	+	+										
aniline G Aromatic amines	100%	100°C											+	+	+	+				
antimony (III) chloride G Inorganic salts	10%	20°C					+	+	+	+										
antimony (III) chloride G Inorganic salts	50%	40°C					+	+	+	+										
antimony (III) chloride G Inorganic salts	100%	20°C					+	+	+	+										
aqua regia G Inorganic acids	100%	20°C					-	-	-	-										
argon G Other inorganic chemicals	100%	20°C					+	+	+	+										
aromatic hydrocarbons G Aromatic hydrocarbons	100%	80°C					+	+	+	+										
automatic transmission fluid Dexron II	100%	-180°C									+	+								
barium chloride G Inorganic salts	100%	100°C											+	+	+	+	+	+		
barium hydroxide G Inorganic alkalis	100%	100°C											+	+	+	+	+	+		

G Group + Resistant (+) Limited resistant - Not resistant X Soluble

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
barium sulfate G Inorganic salts	100%	100°C											+	+	+	+	+	+		
benzaldehyde G Aldehydes / ketones	100%	20°C					+	+	+	+	-	-								
benzaldehyde G Aldehydes / ketones	100%	100°C											+	+	+	+				
benzene G Aromatic hydrocarbons	100%	20°C			+	+	+	+	+	+	-	-							+	+
benzene G Aromatic hydrocarbons	100%	100°C											+	+	+	+	+	+		
benzenesulfonic acid G Organic acids	100%	100°C											+	+	+	+	+	+		
benzoic acid G Organic acids	20%	20°C					+	+	+	+										
benzoic acid G Organic acids	100%	20°C					+	+	+	+										
benzonitrile G Cyano compounds	100%	100°C											+	+	+	+	+	+		
benzyl alcohol G Alcohols / glycols	100%	20°C					+	+	+	+										
benzylchloride G Halogenated aromatic hydrocarbons	100%	20°C					+	+	+	+										
benzylchloride G Halogenated aromatic hydrocarbons	100%	100°C											+	+	+	+	+	+		
bitumen G Other hydrocarbons	100%	20°C					+	+	+	+									+	+
bleach G Other inorganic chemicals	100%	20°C			+	+	+	+	+	+										
borax G Inorganic salts	10%	20°C					+	+	+	+										
borax G Inorganic salts	50%	20°C					+	+	+	+										
borax G Inorganic salts	100%	20°C					+	+	+	+										
borax G Inorganic salts	100%	100°C											+	+	+	+	+	+		
boric acid G Inorganic acids	10%	20°C					+	+	+	+										
boric acid G Inorganic acids	100%	20°C					+	+	+	+										
boron trifluoride G Other inorganic chemicals	100%	20°C					(+)	(+)	(+)	(+)										
brake fluids (DIN 53521)	100%	20°C			+	+	+	+	+	+	-	-								
bromid acid G Inorganic acids	100%	20°C					-	-	-	-										
bromine G Halogens	100%	20°C					-	-	-	-										
bromine G Halogens	100%	100°C			(+)	(+)							(+)	(+)	(+)	(+)	+	+		
bromine (liquid) G Halogens	100%	20°C					-	-	-	-										

G Group + Resistant (+) Limited resistant - Not resistant x Soluble

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
bromochloromethane G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
butadiene -1,3 G Aliphatic hydrocarbons	100%	20°C					+	+	+	+										
butadiene -1,3 G Aliphatic hydrocarbons	100%	100°C											+	+	+	+	+	+		
butane G Aliphatic hydrocarbons	100%	20°C			+	+	+	+	+	+	+	+								
butene G Aliphatic hydrocarbons	100%	20°C					+	+	+	+										
butene G Aliphatic hydrocarbons	100%	100°C											+	+	+	+				
butyl acetate G Ester	100%	20°C			+	+	+	+	+	+	(+)	(+)							+	+
butyl acetate G Ester	100%	100°C											+	+	+	+				
butyl glycol G Alcohols / glycols	100%	20°C					+	+	+	+										
butylene phthalate G Ester	100%	100°C											+	+	+	+				
butyric acid G Organic acids	20%	20°C					+	+	+	+										
butyric acid G Organic acids	100%	20°C					+	+	+	+										
butyrolactone G Lactones	100%	20°C					+	+	+	+										
calcium carbonate G Inorganic salts	100%	20°C					+	+	+	+										
calcium chloride G Inorganic salts	5%	20°C					+	+	+	+										
calcium chloride G Inorganic salts	10%	20°C			+	+	+	+	+	+									+	+
calcium chloride G Inorganic salts	100%	20°C					+	+	+	+										
calcium chloride G Inorganic salts	100%	100°C											+	+	+	+	+	+		
calcium hydroxide G Inorganic alkalis	10%	20°C					+	+	+	+										
calcium hydroxide G Inorganic alkalis	100%	20°C					+	+	+	+										
calcium hypochlorite G Inorganic salts	100%	20°C			+	+	+	+	+	+										
calcium nitrate G Inorganic salts	100%	100°C											+	+	+	+	+	+		
calcium salts G Inorganic salts	100%	20°C					+	+	+	+										
calcium sulfate G Inorganic salts	100%	100°C											+	+	+	+	+	+		
camphor G Aldehydes / ketones	50%	20°C					+	+	+	+										
caprolactam G Amides	100%	120°C					(+)	(+)	(+)	(+)										

G Group + Resistant (+) Limited resistant - Not resistant X Soluble

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
carbon dioxide G Other inorganic chemicals	100%	20°C					+	+	+	+										
carbon dioxide G Other inorganic chemicals	100%	100°C											+	+	+	+	+	+		
carbon disulfide G Other inorganic chemicals	100%	20°C			+	+	+	+	+	+									+	+
carbon disulfide G Other inorganic chemicals	100%	100°C											+	+	+	+	+	+		
carbon monoxide gas G Other inorganic chemicals	100%	200°C					+	+	+	+										
carbon tetrachloride G Halogenated hydrocarbons	100%	20°C			+	+	+	+	+	+	+	+							+	+
carbon tetrachloride G Halogenated hydrocarbons	100%	100°C											+	+	+	+				
carbonic acid G Inorganic acids	10%	20°C					+	+	+	+										
carbonic acid G Inorganic acids	100%	20°C					+	+	+	+										
casein	100%	20°C					+	+	+	+										
castor oil	100%	20°C					+	+	+	+										
Castrol Universal brake- and clutch fluid	100%	140°C					+	+	+	+										
celluloseacetate G Ester	100%	20°C					+	+	+	+										
chloral hydrate	100%	20°C					+	+	+	+										
chloramine G Sulfonamides	10%	20°C					+	+	+	+										
chlorine G Halogens	100%	20°C					+	+	+	+										
chlorine G Halogens	100%	100°C											(+)	(+)	(+)	(+)	+	+		
chlorine (aqueous solution) G Halogens	10%	20°C					(+)	(+)	(+)	(+)										
chlorine (aqueous solution) G Halogens	100%	20°C					-	-	-	-										
chlorine, liquid G Halogens	100%	20°C					-	-	-	-										
chloroacetic acid G Organic acids	10%	20°C					+	+	+	+										
chloroacetic acid G Organic acids	100%	20°C					+	+	+	+										
chlorobenzene G Halogenated aromatic hydrocarbons	100%	20°C					+	+	+	+									+	+
chlorobenzene G Halogenated aromatic hydrocarbons	100%	100°C											+	+	+	+	+	+		
chlorodifluoromethane G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
chloroethane G Halogenated hydrocarbons	100%	20°C					+	+	+	+										

G Group + Resistant (+) Limited resistant - Not resistant x Soluble

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
chloroform G Halogenated hydrocarbons	100%	20°C			-	-	+	+	+	+	-	-							+	+
chloroform G Halogenated hydrocarbons	100%	100°C											+	+	+	+	+	+		
chloromethyl ether G Ether	100%	40°C					+	+	+	+										
chlorophenols G Phenols	5%	100°C											+	+	+	+				
chlorosulfonic acid G Inorganic acids	10%	20°C					+	+	+	+										
chlorosulfonic acid G Inorganic acids	50%	100°C					+	+	+	+										
chlorosulfonic acid G Inorganic acids	100%	20°C					+	+	+	+										
chlorosulfonic acid G Inorganic acids	100%	100°C											-	-	-	-	+	+		
chromic acid G Inorganic acids	1%	20°C					+	+	+	+	+	+								
chromic acid G Inorganic acids	10%	20°C					+	+	+	+	+	+								
chromic acid G Inorganic acids	20%	20°C					+	+	+	+										
chromic acid G Inorganic acids	40%	20°C			+	+	+	+	+	+										
chromic acid G Inorganic acids	50%	20°C					+	+	+	+										
chromic acid G Inorganic acids	100%	100°C											(+)	(+)	(+)	(+)	+	+		
chromic anhydride G Other inorganic chemicals	50%	100°C					-	-	-	-										
chromic anhydride G Other inorganic chemicals	95%	20°C									(+)	(+)								
chromic anhydride G Other inorganic chemicals	100%	20°C					+	+	+	+										
chromosulfuric acid G Inorganic acids	100%	100°C											+	+	+	+				
chromyl chloride G Other inorganic chemicals	100%	20°C					+	+	+	+										
citric acid G Organic acids	10%	20°C			+	+	+	+	+	+									+	+
citric acid G Organic acids	20%	80°C					+	+	+	+										
citric acid G Organic acids	50%	20°C					+	+	+	+										
citric acid G Organic acids	100%	20°C									+	+								
cleaning materials	100%	100°C											+	+	+	+	+	+		
cobalt salts G Inorganic salts	20%	20°C					+	+	+	+										
coffee	100%	20°C									-	-								

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
combustible (JP)	100%	100°C											+	+	+	+	+	+		
compressed air G Other inorganic chemicals	100%	20°C					+	+	+	+										
coolants (DIN 53521) G Other inorganic chemicals	100%	120°C					+	+	+	+										
copper chloride G Inorganic salts	5%	20°C					+	+	+	+										
copper chloride G Inorganic salts	50%	100°C					+	+	+	+										
copper chloride G Inorganic salts	100%	20°C					+	+	+	+										
copper fluoride G Inorganic salts	100%	20°C					+	+	+	+										
copper sulfate G Inorganic salts	1%	20°C					+	+	+	+										
copper sulfate G Inorganic salts	10%	20°C					+	+	+	+										
copper sulfate G Inorganic salts	100%	20°C					+	+	+	+										
copper sulfate G Inorganic salts	100%	100°C											+	+	+	+	+	+		
copper(II) salts G Inorganic salts	10%	20°C					+	+	+	+										
copper(II) salts G Inorganic salts	50%	20°C					+	+	+	+										
cotton seed oil	100%	-180°C									+	+								
cotton seed oil	100%	20°C			+	+														
cotton seed oil	100%	100°C											+	+	+	+	+	+		
cresol G Phenols	95%	20°C					-	-	-	-										
cresol G Phenols	100%	20°C			-	-														
cresol G Phenols	100%	100°C											+	+	+	+	+	+		
cresyl diphenyl phosphate G Ester	100%	100°C											+	+	+	+				
crude oil	100%	-180°C									+	+								
crude oil	100%	20°C					+	+	+	+										
crude oil	100%	100°C											+	+	+	+	+	+		
cyankali G Inorganic salts	100%	20°C					+	+	+	+										
cyclohexane G Hydrocarbons	100%	20°C					+	+	+	+	+	+							+	+
cyclohexane G Hydrocarbons	100%	100°C											+	+	+	+	+	+		

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
cyclohexanol G Alcohols / glycols	100%	20°C					+	+	+	+	+	+								
cyclohexanol G Alcohols / glycols	100%	100°C											+	+	+	+	+	+		
cyclohexanone G Aldehydes / ketones	100%	20°C					+	+	+	+									+	+
cyclohexanone G Aldehydes / ketones	100%	100°C											+	+	+	+	+	+		
decahydronaphthalene G Hydrocarbons	100%	20°C					+	+	+	+										
decalin	100%	20°C																	+	+
detergents	100%	100°C											+	+	+	+	+	+		
detergents, synthetic	20%	20°C			+	+														
developer G Other inorganic chemicals	100%	20°C					+	+	+	+										
dextrin G Other hydrocarbons	100%	20°C					+	+	+	+										
D-glucose G Carbohydrate	100%	20°C					+	+	+	+										
dibutyl ether G Ether	100%	20°C					+	+	+	+										
dibutyl ether G Ether	100%	100°C											+	+	+	+				
dibutyl phthalate G Ester	100%	20°C			+	+	+	+	+	+	(+)	(+)								
dichloroacetic acid G Organic acids	50%	20°C					+	+	+	+										
dichloroacetic acid G Organic acids	100%	20°C					+	+	+	+										
dichloroacetic acid methyl ester G Ester	100%	20°C					+	+	+	+										
dichlorobenzene G Halogenated aromatic hydrocarbons	100%	20°C					+	+	+	+										
Dichlorodifluoromethane G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
dichlorofluoromethane G Halogenated hydrocarbons	100%	60°C					(+)	(+)	(+)	(+)										
dichlorotetrafluoroethane G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
diesel fuels (DIN 51601) G Other hydrocarbons	100%	20°C					+	+	+	+										
Diesel oil	100%	-180°C									+	+								
Diesel oil	100%	20°C			+	+													+	+
Diesel oil	100%	100°C											+	+	+	+	+	+		
diethyl ether G Ether	100%	20°C			+	+	+	+	+	+	+	+								

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
diethyl ether G Ether	100%	100°C											+	+	+	+				
diethyl ketone G Aldehydes / ketones	100%	20°C					+	+	+	+										
diethylamine G Amines	100%	20°C					+	+	+	+										
diethylene glycol G Alcohols / glycols	100%	20°C					+	+	+	+										
diisobutyl ketone G Aldehydes / ketones	100%	20°C					+	+	+	+										
dimethyl ether G Ether	100%	20°C					+	+	+	+										
dimethyl sulfoxide G Sulfoxides	100%	100°C											+	+	+	+				
dimethyl terephthalate G Ester	100%	100°C											+	+	+	+	+	+		
dimethylamine G Amines	100%	20°C					+	+	+	+										
dimethylformamide G Amides	100%	20°C					+	+	+	+									(+)	(+)
dimethylformamide G Amides	100%	100°C											+	+	+	+	+	+		
dioctyl phthalate G Ester	100%	20°C					+	+	+	+	(+)	(+)								
dioctyl phthalate G Ester	100%	100°C											+	+	+	+	+	+		
diphenyl ether G Ether	100%	20°C					+	+	+	+										
diphenyl sulfone G Sulfones	100%	20°C					(+)	(+)	(+)	(+)										
dipropylene glycol G Alcohols / glycols	100%	20°C					+	+	+	+										
epichlorohydrin G Ether	100%	20°C					+	+	+	+										
epichlorohydrin G Ether	100%	100°C											+	+	+	+	+	+		
essential oils	100%	20°C					+	+	+	+										
Esso turbine Oil 2380	100%	-180°C									+	+								
Esso turbine Oil 2380	100%	20°C	(+)	+																
Esso turbine Oil 2389	100%	-180°C									+	+								
Esso turbine Oil 2389	100%	20°C	(+)	+																
ethane G Aliphatic hydrocarbons	100%	20°C					(+)	(+)	(+)	(+)										
ethanol G Alcohols / glycols	40%	20°C					+	+	+	+	+	+								
ethanol G Alcohols / glycols	95%	20°C					+	+	+	+	+	+								

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
ethanol G Alcohols / glycols	100%	20°C	(+)	(+)	+	+	+	+	+	+									+	+
ethanolamine G Alcohols	100%	100°C											+	+	+	+	+	+		
ethyl acetate G Ester	100%	20°C	x	x	+	+	+	+	+	+	(+)	(+)							+	+
ethyl acetate G Ester	100%	100°C											+	+	+	+	+	+		
ethylene G Aliphatic hydrocarbons	100%	20°C					+	+	+	+										
ethylene carbonate G Carbonates	100%	40°C					+	+	+	+										
ethylene glycol G Alcohols / glycols	50%	140°C					+	+	+	+	-	-								
ethylene glycol G Alcohols / glycols	100%	20°C			+	+	+	+	+	+	+	+								
ethylene glycol G Alcohols / glycols	100%	100°C											+	+	+	+	+	+		
ethylene oxide G Ether	100%	20°C					+	+	+	+										
ethylenediamine G Amines	100%	20°C					+	+	+	+										
ethylenediamine G Amines	100%	100°C											+	+	+	+	+	+		
fats G Other hydrocarbons	100%	20°C					+	+	+	+										
fatty acids G Organic acids	5%	20°C					+	+	+	+										
fatty acids G Organic acids	100%	20°C					+	+	+	+										
fluorine G Halogens	100%	20°C					-	-	-	-										
Fluorochlorohydrocarbon (FCHC) G Halogenated hydrocarbons	100%	20°C					+	+	+	+	+	+								
fluorosilicic acid G Inorganic acids	30%	20°C					+	+	+	+										
formaldehyde G Aldehydes / ketones	30%	20°C					+	+	+	+										
formaldehyde G Aldehydes / ketones	30%	100°C											+	+	+	+				
formaldehyde G Aldehydes / ketones	40%	100°C															+	+		
formaldehyde G Aldehydes / ketones	100%	20°C					+	+	+	+	-	-								
formalin G Aldehydes / ketones	100%	20°C					+	+	+	+										
formamide G Amides	100%	20°C					+	+	+	+										
formic acid G Organic acids	1%	20°C					+	+	+	+										
formic acid G Organic acids	5%	20°C			+	+	+	+	+	+										

G Group + Resistant (+) Limited resistant - Not resistant x Soluble

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
formic acid G Organic acids	10%	20°C					+	+	+	+									+	+
formic acid G Organic acids	50%	20°C					+	+	+	+										
formic acid G Organic acids	95%	20°C			(+)	(+)														
formic acid G Organic acids	95%	60°C					(+)	(+)	(+)	(+)										
formic acid G Organic acids	100%	20°C					(+)	(+)	(+)	(+)	+	+								
formic acid G Organic acids	100%	100°C											+	+	+	+	+	+		
formol G Aldehydes / ketones	100%	20°C					+	+	+	+										
Freon G Halogenated hydrocarbons	100%	100°C											+	+	+	+	+	+		
Freon 11 G Halogenated hydrocarbons	100%	20°C			+	+														
fruit juices G Other Chemicals	100%	20°C					+	+	+	+									+	+
fuel oil	100%	-180°C									+	+								
fuel oil	100%	20°C																	+	+
fuel oil	100%	100°C											+	+	+	+	+	+		
fuel oil (DIN 51603) G Other hydrocarbons	100%	-180°C									+	+								
fuel oil (DIN 51603) G Other hydrocarbons	100%	20°C					+	+	+	+										
furan G Heterocyclic compounds	100%	100°C											+	+	+	+	+	+		
furfural G Alcohols / glycols	100%	20°C					+	+	+	+										
furfuryl alcohol G Alcohols / glycols	100%	20°C					+	+	+	+										
gear oil Castrol Hypoyep 90	100%	-180°C									+	+								
gear oil Castrol Hypoyep 90	100%	140°C					+	+	+	+										
glycerol G	100%	20°C			+	+	+	+	+	+									+	+
glycolic acid G Organic acids, hydroxy acids	30%	20°C					+	+	+	+										
glycolic acid G Organic acids, hydroxy acids	100%	20°C					+	+	+	+										
glycolic acid G Organic acids, hydroxy acids	100%	100°C											+	+	+	+	+	+		
helium G Other inorganic chemicals	100%	20°C					+	+	+	+										
heptane G Aliphatic hydrocarbons	100%	20°C			+	+	+	+	+	+									+	+

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
heptane G Aliphatic hydrocarbons	100%	100°C											+	+	+	+	+	+		
hexachlorobenzene G Halogenated aromatic hydrocarbons	100%	80°C					+	+	+	+										
hexane G Aliphatic hydrocarbons	100%	20°C			+	+	+	+	+	+	+	+								
hexane G Aliphatic hydrocarbons	100%	100°C											+	+	+	+	+	+		
humic acids G Organic acids	100%	20°C					+	+	+	+										
hydraulic oils	100%	-180°C									+	+								
hydraulic oils	100%	20°C					+	+	+	+										
hydrazine G Hydrazine	100%	20°C					+	+	+	+										
hydrobromic acid G Halogens	1%	20°C					+	+	+	+										
hydrobromic acid G Halogens	100%	20°C					(+)	(+)	(+)	(+)										
hydrochloric acid G Inorganic acids	1%	20°C					+	+	+	+	+	+							+	+
hydrochloric acid G Inorganic acids	5%	20°C									+	+								
hydrochloric acid G Inorganic acids	10%	20°C			+	+	+	+	+	+	+	+								
hydrochloric acid G Inorganic acids	20%	20°C					+	+	+	+	+	+								
hydrochloric acid G Inorganic acids	20%	100°C											+	+	+	+	+	+		
hydrochloric acid G Inorganic acids	30%	20°C			-	-	+	+	+	+	+	+								
hydrochloric acid G Inorganic acids	30%	100°C											+	+	+	+				
hydrochloric acid G Inorganic acids	40%	20°C					+	+	+	+									-	-
hydrochloric acid G Inorganic acids	40%	100°C															+	+		
hydrochloric acid G Inorganic acids	100%	20°C					+	+	+	+	-	-								
hydrofluoric acid G Inorganic acids	5%	20°C			+	+	(+)	(+)	(+)	(+)										
hydrofluoric acid G Inorganic acids	30%	100°C											+	+	+	+	+	+		
hydrofluoric acid G Inorganic acids	50%	20°C			-	-	-	-	-	-										
hydrofluoric acid G Inorganic acids	100%	20°C					-	-	-	-										
hydrogen G Other inorganic chemicals	100%	20°C					+	+	+	+										
hydrogen G Other inorganic chemicals	100%	100°C											+	+	+	+	+	+		

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
hydrogen cyanide G Inorganic acids	100%	20°C					+	+	+	+										
hydrogen iodide G Inorganic acids	50%	100°C					+	+	+	+										
hydrogen iodide G Inorganic acids	100%	20°C					+	+	+	+										
hydrogen peroxide G Other inorganic chemicals	1%	20°C					+	+	+	+										
hydrogen peroxide G Other inorganic chemicals	30%	20°C			+	+	+	+	+	+	+	+							-	-
hydrogen peroxide G Other inorganic chemicals	30%	100°C											(+)	(+)	(+)	(+)				
hydrogen peroxide G Other inorganic chemicals	50%	20°C					+	+	+	+										
hydrogen peroxide G Other inorganic chemicals	100%	20°C					+	+	+	+										
hydrogen sulfide G Inorganic acids	100%	100°C											+	+	+	+	+	+		
hydrogen sulfide, dry G Inorganic acids	10%	20°C					+	+	+	+										
hydrogen sulfide, dry G Inorganic acids	100%	20°C					+	+	+	+										
ink	100%	20°C									+	+							+	+
iodine G Halogens	100%	20°C					(+)	(+)	(+)	(+)										
iodoform G Halogenated hydrocarbons	50%	20°C					+	+	+	+										
iodoform G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
iron(II) chloride G Inorganic salts	5%	20°C					+	+	+	+										
iron(II) chloride G Inorganic salts	10%	20°C					+	+	+	+										
iron(II) chloride G Inorganic salts	100%	20°C					+	+	+	+										
iron(II) sulfate G Inorganic salts	100%	20°C					+	+	+	+										
iron(III) chloride G Inorganic salts	5%	20°C					+	+	+	+	+	+								
iron(III) chloride G Inorganic salts	10%	20°C					+	+	+	+										
iron(III) chloride G Inorganic salts	50%	100°C					(+)	(+)	(+)	(+)										
iron(III) chloride G Inorganic salts	100%	20°C					+	+	+	+										
iron(III) chloride G Inorganic salts	100%	100°C											+	+	+	+	+	+		
isobutanol G Alcohols / glycols	100%	20°C					+	+	+	+										
isobutyl acetate G Ester	100%	20°C					+	+	+	+	(+)	(+)								

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
isooctane G Aliphatic hydrocarbons	100%	20°C	(+)	+			+	+	+	+									+	+
isooctane/toluene (70:30) G Hydrocarbons	70%	20°C	-	-																
isopropyl acetate G Ester	100%	20°C					+	+	+	+	(+)	(+)								
isopropyl alcohol G Alcohols / glycols	100%	20°C			(+)	(+)					+	+								
isopropyl ether G Ether	100%	20°C					+	+	+	+										
Javelle water G Inorganic salts	10%	20°C			+	+														
Javelle water G Inorganic salts	20%	100°C											+	+	+	+				
kerosene G Other hydrocarbons	100%	20°C					+	+	+	+										
kerosene G Other hydrocarbons	100%	100°C											+	+	+	+	+	+		
ketones (aliphatic) G Aldehydes / ketones	100%	20°C					+	+	+	+										
lactic acid G Organic acids	10%	20°C					+	+	+	+									+	+
lactic acid G Organic acids	50%	140°C					+	+	+	+										
lactic acid G Organic acids	95%	20°C					+	+	+	+										
lactic acid G Organic acids	100%	20°C					+	+	+	+										
lactic acid G Organic acids	100%	100°C											+	+	+	+	+	+		
lanolin	100%	20°C					+	+	+	+										
lead (II) acetate G Inorganic salts	10%	20°C					+	+	+	+										
lead (II) acetate G Inorganic salts	100%	20°C					+	+	+	+										
light petrol G Other hydrocarbons	100%	20°C									+	+								
linseed oil	100%	20°C					+	+	+	+									+	+
lithium salt G Inorganic salts	10%	20°C					+	+	+	+										
lubricating grease	100%	20°C			+	+	+	+	+	+										
lubricating oil G Other hydrocarbons	100%	-180°C									+	+								
lubricating oil G Other hydrocarbons	100%	20°C					+	+	+	+										
lubricating oil G Other hydrocarbons	100%	100°C											+	+	+	+	+	+		
lye G Other inorganic chemicals	100%	20°C					+	+	+	+	+	+								

G Group + Resistant (+) Limited resistant - Not resistant X Soluble

Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
machine oil, engine oil	100%	-180°C									+	+								
magnesium chloride G Inorganic salts	10%	20°C					+	+	+	+										
magnesium chloride G Inorganic salts	40%	100°C					(+)	(+)	(+)	(+)										
magnesium chloride G Inorganic salts	100%	20°C					(+)	(+)	(+)	(+)										
magnesium chloride G Inorganic salts	100%	100°C											+	+	+	+	+	+		
magnesium hydroxide G Inorganic alkalis	10%	20°C					+	+	+	+										
magnesium hydroxide G Inorganic alkalis	100%	20°C					+	+	+	+										
magnesium hydroxide G Inorganic alkalis	100%	100°C											+	+	+	+	+	+		
magnesium stearate G Inorganic salts	100%	20°C									+	+								
maleic acid G Organic acids	10%	20°C					+	+	+	+										
maleic acid G Organic acids	20%	20°C					+	+	+	+										
maleic acid G Organic acids	50%	20°C					+	+	+	+										
maleic acid G Organic acids	100%	20°C					+	+	+	+										
malic acid G Organic acids	50%	20°C					+	+	+	+										
malic acid G Organic acids	100%	20°C					+	+	+	+										
malonic acid G Organic acids	100%	20°C					+	+	+	+										
manganese salt G Inorganic salts	10%	20°C					+	+	+	+										
menthol G Alcohols / glycols	100%	20°C					+	+	+	+										
mercury G Other inorganic chemicals	100%	20°C					+	+	+	+										
mercury(II) chloride G Inorganic salts	5%	20°C					+	+	+	+										
mercury(II)-nitrate G Inorganic salts	100%	20°C					+	+	+	+										
methane G Aliphatic hydrocarbons	100%	20°C					+	+	+	+										
methanol G Alcohols / glycols	50%	20°C					+	+	+	+	+	+								
methanol G Alcohols / glycols	100%	20°C			+	+	+	+	+	+	+	+							+	+
methoxybutanol G Alcohols / glycols	100%	20°C					+	+	+	+										
methyl acetate G Ester	100%	20°C					+	+	+	+	(+)	(+)								

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
methyl bromide G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
methyl chloride G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
methyl ethyl ketone G Aldehydes / ketones	20%	20°C					+	+	+	+										
methyl ethyl ketone G Aldehydes / ketones	100%	20°C			+	+	+	+	+	+	-	-							+	+
methyl ethyl ketone G Aldehydes / ketones	100%	100°C											+	+	+	+	+	+		
methyl isobutyl ketone G Aldehydes / ketones	100%	20°C					+	+	+	+										
methyl isobutyl ketone G Aldehydes / ketones	100%	100°C											+	+	+	+	+	+		
methylamine G Amines	100%	20°C					+	+	+	+										
methylene chloride G Halogenated hydrocarbons	100%	20°C			-	-	+	+	+	+	x	x							+	+
methylglycol G Alcohols / glycols, ether	100%	20°C					+	+	+	+	-	-								
milk	100%	20°C																	+	+
mineral oil G Other hydrocarbons	100%	20°C	-	(+)	+	+	+	+	+	+										
mineral oil G Other hydrocarbons	100%	100°C											+	+	+	+				
moist heat sterilisation G Other inorganic chemicals	100%	120°C					+	+	+	+	+	+								
morpholine G Amines, ether	100%	20°C					+	+	+	+										
morpholine G Amines, ether	100%	100°C											(+)	(+)	(+)	(+)	+	+		
motor oil G Other hydrocarbons	100%	-180°C									+	+								
motor oil G Other hydrocarbons	100%	100°C											+	+	+	+				
motor oil G Other hydrocarbons	100%	120°C					+	+	+	+										
moulds (MIL-T-18404/ 4.4.8) G Other inorganic chemicals	100%	20°C					+	+	+	+										
N,N-dimethylacetamide G Amides	100%	20°C					+	+	+	+										
N,N-dimethylaniline G Amines	100%	100°C											+	+	+	+	+	+		
naphta	100%	20°C					+	+	+	+	+	+								
naphthalene G Aromatic hydrocarbons	100%	20°C					+	+	+	+										
naphthalene-sulfonic acid G Organic acids	100%	20°C					-	-	-	-										
natural gas G Other hydrocarbons	100%	20°C					+	+	+	+										

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
neon G Other inorganic chemicals	100%	20°C					+	+	+	+										
nickel salt G Inorganic salts	10%	20°C					+	+	+	+										
nickel salt G Inorganic salts	100%	20°C					+	+	+	+										
nitric acid G Inorganic acids	1%	20°C									+	+								
nitric acid G Inorganic acids	5%	20°C					+	+	+	+	+	+								
nitric acid G Inorganic acids	10%	20°C			+	+	+	+	+	+	+	+								
nitric acid G Inorganic acids	10%	100°C											+	+	+	+	+	+		
nitric acid G Inorganic acids	20%	20°C					+	+	+	+										
nitric acid G Inorganic acids	30%	20°C					(+)	(+)	(+)	(+)										
nitric acid G Inorganic acids	30%	100°C											(+)	(+)	(+)	(+)	+	+		
nitric acid G Inorganic acids	40%	20°C			-	-														
nitric acid G Inorganic acids	50%	20°C					(+)	(+)	(+)	(+)										
nitric acid G Inorganic acids	70%	20°C					(+)	(+)	(+)	(+)										
nitric acid G Inorganic acids	95%	20°C					-	-	-	-										
nitric acid G Inorganic acids	100%	100°C											(+)	(+)	(+)	(+)	+	+		
nitrobenzene G Aromatic nitro compounds	100%	20°C					+	+	+	+									+	+
nitrobenzene G Aromatic nitro compounds	100%	100°C											+	+	+	+	+	+		
nitrogen G Other inorganic chemicals	100%	20°C					+	+	+	+										
nitrogen G Other inorganic chemicals	100%	100°C											+	+	+	+	+	+		
nitrogen (200 bar) G Other inorganic chemicals	100%	20°C					+	+	+	+										
nitrogen oxide G Other inorganic chemicals	100%	20°C					+	+	+	+										
nitromethane G Aliphatic nitro compounds	100%	20°C					+	+	+	+										
nitromethane G Aliphatic nitro compounds	100%	100°C											+	+	+	+				
nitrotoluene G Aromatic nitro compounds	100%	20°C					+	+	+	+										
nitrous acid G Inorganic acids	10%	20°C					+	+	+	+										
N-methylaniline G Aromatic amines	100%	20°C					+	+	+	+										

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
N-methylpyrrolidone G Amides	100%	20°C					+	+	+	+										
octane G Aliphatic hydrocarbons	100%	20°C					+	+	+	+	+	+								
octenes G Aliphatic hydrocarbons	100%	20°C					+	+	+	+										
oil of turpentine	100%	20°C					+	+	+	+										
oleic acid G Organic acids	100%	20°C			+	+	+	+	+	+										
oleum G Inorganic acids	100%	20°C					x	x	x	x										
olive oil	100%	20°C			+	+														
oxalic acid G Organic acids	10%	20°C					+	+	+	+									+	+
oxalic acid G Organic acids	20%	20°C					+	+	+	+										
oxalic acid G Organic acids	50%	100°C					+	+	+	+										
oxalic acid G Organic acids	100%	20°C					+	+	+	+										
oxygen G Other inorganic chemicals	100%	20°C					+	+	+	+										
oxygen under pressure G Other inorganic chemicals	100%	20°C					+	+	+	+										
ozone G Other inorganic chemicals	100%	20°C					+	+	+	+									(+)	(+)
ozone (rarefied with air) G Other inorganic chemicals	1%	40°C					+	+	+	+										
palmitic acid G Organic acids	100%	20°C					+	+	+	+										
paraffin oil G Other hydrocarbons	100%	20°C					+	+	+	+									+	+
paraffine G Aliphatic hydrocarbons	100%	20°C					+	+	+	+										
pentanes G Aliphatic hydrocarbons	100%	20°C					+	+	+	+										
perchloric acid G Inorganic acids	10%	20°C					+	+	+	+										
perchloric acid G Inorganic acids	70%	100°C					+	+	+	+										
perchloric acid G Inorganic acids	100%	20°C					+	+	+	+										
petrol	100%	20°C			+	+													+	+
petrol	100%	100°C											+	+	+	+	+	+		
petrol, sour	100%	20°C					+	+	+	+										
petrol, unleaded G Other hydrocarbons	100%	20°C					+	+	+	+										

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
petrol,normal (DIN 53521) G Other hydrocarbons	100%	80°C					+	+	+	+	(+)	(+)								
petrol,super (DIN 53521) G Other hydrocarbons	100%	60°C					+	+	+	+										
petrol,super (DIN 53521) G Other hydrocarbons	100%	80°C									(+)	(+)								
petroleum G Other hydrocarbons	100%	20°C			+	+													+	+
petroleum G Other hydrocarbons	100%	100°C											+	+	+	+	+	+		
petroleum ether G Other hydrocarbons	100%	20°C					+	+	+	+										
phenol G Phenols	5%	20°C					+	+	+	+										
phenol G Phenols	95%	20°C					(+)	(+)	(+)	(+)	-	-								
phenol G Phenols	100%	20°C			(+)	(+)													+	+
phenol G Phenols	100%	40°C					-	-	-	-	-	-								
phenol G Phenols	100%	100°C											+	+	+	+	+	+		
phenol cc. G Phenols	100%	20°C					-	-	-	-										
phosphoric acid G Inorganic acids	1%	20°C					+	+	+	+	+	+								
phosphoric acid G Inorganic acids	5%	20°C									+	+								
phosphoric acid G Inorganic acids	10%	20°C					+	+	+	+	+	+								
phosphoric acid G Inorganic acids	20%	20°C					+	+	+	+										
phosphoric acid G Inorganic acids	30%	20°C									+	+								
phosphoric acid G Inorganic acids	50%	20°C					+	+	+	+										
phosphoric acid G Inorganic acids	50%	200°C									-	-								
phosphoric acid G Inorganic acids	70%	20°C			+	+	+	+	+	+	-	-								
phosphoric acid G Inorganic acids	100%	20°C																	(+)	(+)
phosphoric acid G Inorganic acids	100%	100°C											+	+	+	+	+	+		
phosphorus trichlorides G Other inorganic chemicals	100%	20°C					+	+	+	+										
phosphorus trichlorides G Other inorganic chemicals	100%	100°C											+	+	+	+	+	+		
phthalic acid G Organic acids	50%	20°C					+	+	+	+										
phthalic acid G Organic acids	100%	20°C					+	+	+	+										

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
picric acid G Phenols	50%	20°C					+	+	+	+										
picric acid G Phenols	100%	20°C					+	+	+	+										
potash lye	10%	20°C																	(+)	(+)
potash lye	50%	20°C																	-	-
potassium acetate G Salts	100%	20°C					+	+	+	+										
potassium bromate G Inorganic salts	100%	20°C					+	+	+	+										
potassium bromide G Inorganic salts	10%	20°C					+	+	+	+										
potassium bromide G Inorganic salts	100%	20°C					+	+	+	+										
potassium carbonate G Inorganic salts	50%	20°C					+	+	+	+	+	+								
potassium carbonate G Inorganic salts	100%	20°C					+	+	+	+	+	+								
potassium chlorate G Inorganic salts	100%	20°C					+	+	+	+										
potassium chloride G Inorganic salts	10%	20°C			+	+	+	+	+	+										
potassium chloride G Inorganic salts	100%	20°C					+	+	+	+										
potassium chloride G Inorganic salts	100%	100°C											+	+	+	+	+	+		
potassium dichromate G Inorganic salts	5%	20°C					+	+	+	+										
potassium dichromate G Inorganic salts	10%	20°C					+	+	+	+										
potassium dichromate G Inorganic salts	30%	80°C					+	+	+	+										
potassium dichromate G Inorganic salts	40%	20°C					+	+	+	+										
potassium dichromate G Inorganic salts	100%	20°C			+	+	+	+	+	+										
potassium hydroxide G Inorganic alkalis	1%	20°C			+	+														
potassium hydroxide G Inorganic alkalis	10%	20°C			(+)	(+)														
potassium hydroxide G Inorganic alkalis	50%	20°C			-	-														
potassium hydroxide G Inorganic alkalis	50%	100°C											+	+	+	+	+	+		
potassium hydroxide G Inorganic alkalis	70%	20°C					+	+	+	+										
potassium nitrate G Inorganic salts	10%	20°C					+	+	+	+										
potassium nitrate G Inorganic salts	50%	20°C					+	+	+	+										

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
potassium perchlorate G Inorganic salts	100%	20°C					+	+	+	+										
potassium permanganate G Inorganic salts	1%	20°C					+	+	+	+									+	+
potassium permanganate G Inorganic salts	10%	20°C			+	+	+	+	+	+										
potassium permanganate G Inorganic salts	30%	80°C					+	+	+	+										
potassium permanganate G Inorganic salts	100%	20°C					+	+	+	+										
potassium permanganate G Inorganic salts	100%	100°C											+	+	+	+	+	+		
potassium persulfate G Inorganic salts	100%	20°C					+	+	+	+										
potassium sulfate G Inorganic salts	5%	20°C					+	+	+	+										
potassium sulfate G Inorganic salts	100%	20°C					+	+	+	+										
potassium sulphide G Inorganic salts	50%	20°C					+	+	+	+										
propane G Aliphatic hydrocarbons	100%	20°C					+	+	+	+										
propanols	100%	20°C																	+	+
propene G Aliphatic hydrocarbons	100%	20°C					+	+	+	+										
propionic acid G Organic acids	5%	20°C					+	+	+	+										
propionic acid G Organic acids	10%	20°C					+	+	+	+									(+)	(+)
propionic acid G Organic acids	50%	20°C					+	+	+	+										
propyl acetate G Ester	100%	20°C					+	+	+	+	(+)	(+)								
propylene chlorohydrin G Alcohols / glycols	100%	100°C											+	+	+	+	+	+		
propylene glycol G Alcohols / glycols	100%	20°C					+	+	+	+	+	+								
pyridine G Amines	100%	20°C					+	+	+	+									-	-
pyridine G Amines	100%	100°C											+	+	+	+	+	+		
pyrogallol G Phenols	50%	20°C					-	-	-	-										
pyrogallol G Phenols	100%	20°C					-	-	-	-										
radiation 25kGy - for 6 hours	100%	20°C					+	+	+	+										
rare gases (argon, helium, neon,...) G Other inorganic chemicals	100%	20°C					+	+	+	+										
resorcinol G Phenols	100%	20°C					-	-	-	-										

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
resorcinol/alcohol G Phenols	50%	20°C					-	-	-	-										
salicylic acid G Organic acids	1%	20°C																	+	+
salicylic acid G Organic acids	100%	20°C					-	-	-	-									+	+
sea water	100%	100°C											+	+	+	+	+	+		
silicic acid G Inorganic acids	100%	20°C					+	+	+	+										
silicon oil	100%	20°C			+	+													+	+
silicon oil	100%	80°C					+	+	+	+										
silver nitrate G Inorganic salts	50%	20°C					+	+	+	+										
silver nitrate G Inorganic salts	100%	20°C					+	+	+	+										
Skydrol 500B	100%	20°C	x	(+)																
Skydrol LD	100%	20°C	-	(+)																
soap solution	1%	20°C			+	+														
soap solution	100%	20°C																	(+)	(+)
sodium acetate G Salts	10%	20°C			+	+	+	+	+	+										
sodium acetate G Salts	100%	20°C					+	+	+	+										
sodium acetate G Salts	100%	100°C											+	+	+	+	+	+		
sodium carbonate G Inorganic salts	10%	20°C					+	+	+	+									(+)	(+)
sodium carbonate G Inorganic salts	20%	20°C			+	+														
sodium carbonate G Inorganic salts	20%	80°C					+	+	+	+										
sodium carbonate G Inorganic salts	100%	20°C					+	+	+	+										
sodium carbonate G Inorganic salts	100%	100°C											+	+	+	+	+	+		
sodium chlorate G Inorganic salts	5%	20°C					+	+	+	+										
sodium chlorate G Inorganic salts	10%	20°C					+	+	+	+										
sodium chlorate G Inorganic salts	50%	20°C					+	+	+	+										
sodium chloride G Inorganic salts	5%	80°C					+	+	+	+										
sodium chloride G Inorganic salts	10%	20°C			+	+	+	+	+	+									-	-

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
sodium chloride G Inorganic salts	100%	20°C					+	+	+	+										
sodium chloride G Inorganic salts	100%	100°C											+	+	+	+	+	+		
sodium cyanide G Inorganic salts	10%	20°C					+	+	+	+										
sodium cyanide G Inorganic salts	100%	20°C					+	+	+	+										
sodium dichromate G Inorganic salts	10%	20°C					+	+	+	+										
sodium disulfite G Inorganic salts	10%	20°C			+	+													+	+
sodium hydrogensulfate G Inorganic salts	5%	20°C					+	+	+	+										
sodium hydrogensulfate G Inorganic salts	10%	20°C			+	+	+	+	+	+										
sodium hydrogensulfate G Inorganic salts	50%	20°C					+	+	+	+										
sodium hydroxide G Inorganic alkalis	1%	20°C			+	+														
sodium hydroxide	5%	20°C																	(+)	(+)
sodium hydroxide G Inorganic alkalis	15%	100°C															+	+		
sodium hydroxide G Inorganic alkalis	30%	20°C									+	+								
sodium hydroxide G Inorganic alkalis	30%	100°C											+	+	+	+	+	+		
sodium hydroxide G Inorganic alkalis	50%	20°C			-	-														
sodium hydroxide	50%	20°C																	-	-
sodium hydroxide G Inorganic alkalis	50%	100°C											+	+	+	+	+	+		
sodium hydroxide G Inorganic alkalis	100%	20°C					+	+	+	+										
sodium hypochlorite G Inorganic salts	5%	20°C					+	+	+	+										
sodium hypochlorite G Inorganic salts	10%	20°C			+	+	+	+	+	+										
sodium hypochlorite G Inorganic salts	20%	100°C											+	+	+	+				
sodium hypochlorite G Inorganic salts	30%	20°C					+	+	+	+										
sodium hypochlorite G Inorganic salts	100%	20°C					+	+	+	+										
sodium lactate G Salts	50%	20°C					+	+	+	+										
sodium metasilicate G Inorganic salts	10%	20°C					+	+	+	+										
sodium metasilicate G Inorganic salts	100%	20°C					+	+	+	+										

G Group + Resistant (+) Limited resistant - Not resistant x Soluble

Chemicals list

chemical / concentration / temperature			materials																		
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
sodium nitrate G Inorganic salts	10%	20°C					+	+	+	+									+	+
sodium nitrate G Inorganic salts	50%	20°C					+	+	+	+										
sodium nitrite G Inorganic salts	10%	20°C					+	+	+	+										
sodium nitrite G Inorganic salts	50%	20°C					+	+	+	+										
sodium phosphite G Inorganic salts	100%	100°C											+	+	+	+				
sodium salt G Inorganic salts	10%	20°C					+	+	+	+										
sodium salt G Inorganic salts	50%	20°C					+	+	+	+										
sodium sulfate G Inorganic salts	10%	20°C					+	+	+	+										
sodium sulfate G Inorganic salts	100%	20°C					+	+	+	+										
sodium sulfate G Inorganic salts	100%	100°C											+	+	+	+				
sodium sulfide G Inorganic salts	5%	20°C					+	+	+	+										
sodium sulfide G Inorganic salts	10%	20°C					+	+	+	+										
sodium sulfide G Inorganic salts	95%	20°C					+	+	+	+										
sodium sulfide G Inorganic salts	100%	100°C											+	+	+	+	+	+		
sodium sulfite G Inorganic salts	5%	20°C					+	+	+	+										
sodium sulfite G Inorganic salts	10%	20°C					+	+	+	+										
sodium thiosulfate G Inorganic salts	10%	20°C					+	+	+	+									+	+
sodium thiosulfate G Inorganic salts	20%	20°C					+	+	+	+										
sodium thiosulfate G Inorganic salts	50%	20°C					+	+	+	+										
sodium thiosulfate G Inorganic salts	100%	100°C											+	+	+	+	+	+		
sodium, hot	10%	20°C					+	+	+	+										
sodium, hot	40%	20°C					+	+	+	+										
sodium, hot	50%	20°C					+	+	+	+										
sodium, hot	100%	20°C					+	+	+	+										
sodium, molten G Other inorganic chemicals	100%	20°C					-	-	-	-										
sodium-o- phosphate,tertiary G Inorganic salts	10%	20°C					+	+	+	+										

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
sodium-o- phosphate,tertiary G Inorganic salts	50%	20°C					+	+	+	+										
sodium-o- phosphate,tertiary G Inorganic salts	100%	100°C											+	+	+	+				
softeners G Other inorganic chemicals	100%	20°C					+	+	+	+										
solvents	100%	100°C											+	+	+	+	+	+		
steam,water vapor G Other inorganic chemicals	100%	100°C					+	+	+	+										
steam,water vapor G Other inorganic chemicals	100%	120°C									(+)	(+)								
steam,water vapor G Other inorganic chemicals	100%	140°C											+	+	+	+				
stearic acid G Organic acids	100%	20°C					+	+	+	+										
styrene G Aromatic hydrocarbons	100%	20°C																	+	+
styrene G Aromatic hydrocarbons	100%	80°C					+	+	+	+										
sulfinol	100%	100°C											+	+	+	+	+	+		
sulfolane	100%	100°C											+	+	+	+				
sulfur dichloride G Other inorganic chemicals	100%	20°C					+	+	+	+										
sulfur dioxide G Other inorganic chemicals	100%	100°C											+	+	+	+	+	+		
sulfur dioxide (gaseous)	100%	200°C					+	+	+	+										
sulfur hexafluoride G Other inorganic chemicals	100%	20°C					+	+	+	+										
sulfur trioxide G Other inorganic chemicals	100%	20°C					+	+	+	+										
sulfuric acid G Inorganic acids	1%	20°C					+	+	+	+	+	+							+	+
sulfuric acid G Inorganic acids	5%	20°C			+	+	+	+	+	+	+	+								
sulfuric acid G Inorganic acids	10%	20°C					+	+	+	+	+	+								
sulfuric acid G Inorganic acids	20%	20°C					+	+	+	+	+	+								
sulfuric acid G Inorganic acids	30%	20°C	+	+	+	+	+	+	+	+	+	+								
sulfuric acid G Inorganic acids	30%	100°C											+	+	+	+	+	+		
sulfuric acid G Inorganic acids	40%	20°C					+	+	+	+	+	+								
sulfuric acid G Inorganic acids	50%	80°C									+	+								
sulfuric acid G Inorganic acids	50%	100°C											+	+	+	+	+	+		

G Group + Resistant (+) Limited resistant - Not resistant x Soluble

Chemicals list

chemical / concentration / temperature	ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
	materials																	
sulfuric acid 50% 200°C G Inorganic acids					(+)	(+)	(+)	(+)										
sulfuric acid 95% 20°C G Inorganic acids			-	-														
sulfuric acid 95% 100°C G Inorganic acids											(+)	(+)	(+)	(+)	+	+		
sulfuric acid 100% 20°C G Inorganic acids	x	x															-	-
sulfurous acid 10% 20°C G Inorganic acids					+	+	+	+										
sulfurous acid 100% 20°C G Inorganic acids					+	+	+	+										
sulfuryl chloride 100% 20°C G Other inorganic chemicals					+	+	+	+										
sulphur 100% 20°C G Other inorganic chemicals					+	+	+	+										
tannic acid 100% 20°C G Organic acids					+	+	+	+										
tar 100% 20°C					+	+	+	+									+	+
tartaric acid 5% 20°C G Organic acids					+	+	+	+										
tartaric acid 10% 20°C G Organic acids					+	+	+	+										
tartaric acid 50% 20°C G Organic acids					+	+	+	+										
tartaric acid 100% 20°C G Organic acids					+	+	+	+									+	+
tetrachloroethylene 100% 20°C G Halogenated hydrocarbons			+	+	+	+	+	+	+	+								
tetrachloroethylene 100% 100°C G Halogenated hydrocarbons											+	+	+	+				
tetraethyl lead 100% 20°C G Organometallic compounds					+	+	+	+										
tetrafluoropropanol 100% 20°C G Alcohols					+	+	+	+										
tetrahydrofurane 100% 20°C G Ether			(+)	(+)	+	+	+	+									+	+
tetrahydrofurane 100% 100°C G Ether											+	+	+	+	+	+		
tetralin 100% 20°C G Aromatic hydrocarbons																	+	+
thionyl chloride 100% 20°C G Other inorganic chemicals					+	+	+	+										
thiophene 100% 20°C					+	+	+	+										
tincture iodine 10% 20°C G Halogens					(+)	(+)	(+)	(+)										
tincture iodine 100% 20°C G Halogens																	+	+
toluene 100% 20°C G Aromatic hydrocarbons			+	+	+	+	+	+	-	-							+	+

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
toluene G Aromatic hydrocarbons	100%	100°C											+	+	+	+	+	+		
tomato juice	100%	100°C											+	+	+	+	+	+		
transformer oil	100%	20°C																	+	+
transformer oils	100%	20°C			+	+														
transformer oils	100%	40°C					+	+	+	+										
tributyl phosphate G Ester	100%	20°C					+	+	+	+										
trichloroacetic acid G Organic acids	50%	20°C					(+)	(+)	(+)	(+)										
trichloroacetic acid G Organic acids	100%	20°C					(+)	(+)	(+)	(+)										
trichloroacetic acid G Organic acids	100%	100°C											+	+	+	+	+	+		
trichlorobenzene G Halogenated aromatic hydrocarbons	100%	20°C					-	-	-	-										
trichloroethylene G Halogenated hydrocarbons	100%	20°C			(+)	(+)	+	+	+	+	-	-								
trichloroethylene G Halogenated hydrocarbons	100%	100°C											(+)	(+)	(+)	(+)	+	+		
trichlorophenol G Phenols	100%	20°C					-	-	-	-										
tricresyl phosphate G Ester	100%	20°C					(+)	(+)	(+)	(+)										
triethanolamine G Alcohols	100%	20°C					+	+	+	+										
triethyl phosphate G Ester	100%	20°C					+	+	+	+	(+)	(+)								
triethyl phosphate G Ester	100%	100°C											+	+	+	+	+	+		
triethylamine G Amines	100%	20°C					+	+	+	+										
trimethylamine G Amines	100%	20°C					+	+	+	+										
turpentine	100%	20°C			+	+														
turpentine	100%	100°C											+	+	+	+	+	+		
turpentine substitutes	100%	20°C			+	+														
urea G Carbamide	5%	20°C					+	+	+	+										
urea G Carbamide	20%	20°C					+	+	+	+										
urea G Carbamide	100%	20°C					+	+	+	+									+	+
uric acid	10%	20°C					+	+	+	+										

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
urine	100%	20°C					+	+	+	+										
vaseline G Other hydrocarbons	100%	20°C			+	+	+	+	+	+									+	+
vegetable and mineral oils	100%	20°C			+	+	+	+	+	+										
vegetable and mineral oils	100%	100°C											+	+	+	+	+	+		
vegetable oils	100%	20°C			+	+														
vinegar G Organic acids	5%	20°C									+	+								
vinegar G Organic acids	10%	20°C			+	+					+	+								
vinegar G Organic acids	20%	20°C									+	+								
vinegar G Organic acids	70%	20°C									+	+								
vinegar G Organic acids	95%	20°C									-	-								
vinegar G Organic acids	100%	20°C			(+)	(+)	+	+	+	+										
vinegar G Organic acids	100%	100°C											+	+	+	+	+	+		
viny lacetate G Ester	100%	20°C					+	+	+	+										
vinyl bromide G Halogenated hydrocarbons	100%	80°C					+	+	+	+										
vinyl chloride G Halogenated hydrocarbons	100%	20°C					+	+	+	+										
waste gas with hydrogen fluoride	10%	20°C			(+)	(+)														
waste gas with hydrogen fluoride	10%	100°C											+	+	+	+				
water G Other inorganic chemicals	100%	20°C			+	+	+	+	+	+	+	+							+	+
water, chlorinated G Other inorganic chemicals	100%	20°C					+	+	+	+	+	+								
Water, distilled G Other inorganic chemicals	100%	20°C					+	+	+	+	+	+								
water, ion free	100%	100°C									+	+	+	+	+	+	+	+		
Water, mineral free G Other inorganic chemicals	100%	20°C					+	+	+	+	+	+								
wax, molten	100%	20°C																	+	+
white spirits	100%	20°C					+	+	+	+										
wine G Other inorganic chemicals	100%	20°C					+	+	+	+									+	+
xylene G Aromatic hydrocarbons	100%	20°C			+	+	+	+	+	+	(+)	(+)							+	+

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Chemicals list

chemical / concentration / temperature			materials																	
			ZX-100EL55	ZX-100EL63	ZX-100K	ZX-100MT	ZX-324	ZX-324V1T	ZX-324V2T	ZX-324VMT	ZX-410	ZX-410V7T	ZX-530	ZX-530CD3	ZX-530EL3	ZX-530KF15	ZX-550	ZX-550PV	ZX-750V5KF	ZX-750V5T
xylene G Aromatic hydrocarbons	100%	100°C											+	+	+	+	+	+		
zinc (II) salts G Inorganic salts	10%	20°C					+	+	+	+										
zinc (II) salts G Inorganic salts	50%	20°C					+	+	+	+										
zinc chloride G Inorganic salts	5%	20°C					+	+	+	+	+	+								
zinc chloride G Inorganic salts	10%	20°C					+	+	+	+	+	+							+	+
zinc chloride G Inorganic salts	40%	20°C					+	+	+	+										
zinc chloride G Inorganic salts	50%	20°C					+	+	+	+										
zinc chloride G Inorganic salts	100%	20°C					+	+	+	+										
zinc chloride G Inorganic salts	100%	100°C											+	+	+	+	+	+		
zinc sulfate G Inorganic salts	100%	20°C					+	+	+	+										

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Synonym list

Synonyms	Name from chemicals list
a,a-Dichlorobenzenea; benzylidene chloride	benzylidene chloride
acetic acid amide, ethanamide	acetamide
Acetic acid pentyl ester; pentyl acetate	amyl acetate
acetic acid; isobutyl ester	isobutyl acetate
acetyl oxide; ethanoic anhydride	acetic anhydride
acetylene tetrabromide	1,1,2,2-tetrabromoethane
acetylene tetrachloride	1,1,2,2-tetrachloroethane
a-chlorotoluene	benzylchloride
acrylic acid n-butyl ester	butyl acrylate
adeps lanae; wool wax; wool grease	lanolin
alumina	aluminium oxide
aluminium diacetate	aluminum acetate
aluminium trichloride hexahydrate	aluminium chloride
aluminium trichloride	aluminium chloride
aluminum trifluoride	aluminum fluoride
amidosulfonic acid; sulfamidic acid	sulfamic acid
aminoacetic acid	glycine
aminobenzene; phenylamine	aniline
aminocyclohexane	cyclohexylamine
ammonium alum	aluminium ammonium sulphate
ammonium bisulfate	ammonium hydrogen sulphate >=10%
ammonium docosaoxoheptamolyb-date(6–)	ammonium molybdate
ammonium hydrogen carbonate	ammonium bicarbonate
ammonium hydroxide	ammonia hydrous solution <=10%
ammonium peroxydisulfate	ammonium persulphate
ammonium pyrochromate	ammonium dichromate
ammonium salt of benzoic acid	ammonium benzoate
ammonium salt of formic acid	ammonium formate
ammonium sulfocyanite	ammonium thiocyanate
amyl alcohols	pentanols
anise seed oil	anise oil
antimony(V) chloride	antimony pentachloride
aragonite	boiler scale
asphalt	bitumen
azepan-2-one	epsilon-caprolactam
barium dinitrate; barium salt	barium nitrate
barium hydroxide anhydrous	barium hydroxide
barium superoxide	barium peroxide
beeswax	wax, molten
benzaldoxime	antifomine
benzene-1,2-dicarboxylic acid	phthalic acid
benzene-1,3-diol	resorcinol
benzene-1,4-diol	hydroquinone
benzenecarbonyl chlorid	benzoyl chloride
benzenecarboxaldehyde	benzaldehyde

Synonyms	Name from chemicals list
benzoic acid amide	benzamide
beryllium sulphate tetrahydrate	beryllium sulphate
bicarbonate of ammonia	ammonium hydrogen carbonate
biethylene; erythrene; divinyl; vinylethylene	1,3-butadiene
biphenyl	diphenyl
bitter salts	magnesium sulphate
bleach	chloride of lime
boron (III) chloride	boron trichloride
boron (III) fluoride	boron trifluoride
british gum	dextrin
bromoethene	vinyl bromide
bromomethane	methyl bromide
butanal	butyraldehyde
Butanedioic acid	succinic acid
butanoic acid	butyric acid
butter of antimony	antimony (III) chloride
butyl alcohol	1-butanol
butyl alcohol; butyl hydroxidearbinol	1-butanol
butyl bromide	1-bromobutane
butyl ethanoate	butyl acetate
butyl mercaptan	1-butanethiol
butyl octadecanoate	n-butyl stearate
butyl phthalate	dibutyl phthalate
butyl phthalate; used as plasticizer	di-n-butyl phthalate
butylene	butene
cadmium oxide with acetic acid	cadmium acetate
calcite	calcspar
calcium (II) hydroxide	calcium hydrogen sulphide
calcium acetylide	calcium carbide
calcium bicarbonate	calcium hydrogen carbonate
calcium chromate	chromatite
calcium dibromide	calcium bromide
calcium dichloride	cadmium chloride
calcium difluoride	calcium fluoride
calcium dihydrogen phosphate	calcium phosphate
calcium ethanedioate	calcium oxalate
calcium orthoarsenate	calcium orthoarsenate
calcium salt	calcium hypochlorite
calcium salt of acetic acid (mono-hydrate)	calcium acetate
calcium(II) chloride	calcium chloride
carbamide; carbonyl diamide	urea
carbolic acid	phenol
carbon bisulphide	carbon disulfide
carbonyl chloride gaseou	phosgene, gaseous
carbonyl chloride liquid	phosgene, liquid
carbonyl chloride; dichloromethanal	phosgene

Synonym list

Synonyms	Name from chemicals list
carbowax; (PEG)	polyethylene glycol
carboxylic acids	fatty acids
chalk	calcium carbonate
chile saltpeter; peru saltpeter	sodium nitrate
chlorane; hydrochloric acid gas	hydrogen chloride
chloroallylchloride	1,3-dichloropropene
chlorodifluoromethane	Freon 22 (HCFC-22)
chloroethanal	chloroacetaldehyde
chloroethane	ethyl chloride
chloroethanoic acid	chloroacetic acid
chloroethene	vinyl chloride
chloromethane	methyl chloride
chloropropanone; 1-chloro-2-propanone	chloroacetone
chromium potassium sulfate	chrome alum
chromium(3+) salt of nitric acid	chromium nitrate(III)
chromium(II)/(III) chloride	chromium chloride
chromium(II)/(III) fluoride	chromium fluorides
chromium(II)/(III) hydroxide	chromium hydroxide
chromium(III) oxide/chromium(VI) oxide	chromium oxide
chromium(VI) dichloride dioxide	chromyl chloride
chromium(VI) oxide; chromium trioxide	chromic anhydride
cis, cis-9,12-octadecadienoic acid	linoleic acid
copper carbonate	copper(II) carbonate
copper difluoride	copper(II) fluoride
copper(I) chloride	cuprous chloride
corilagin	tannin
cyanoethene; vinylcyanide	acrylonitrile
decahydronaphthalene	decalin
decalin	decahydronaphthalene
denatured collagen	gelatin
diammonium hydrogen phosphate	ammonium phosphates
diammonium sulfate	ammonium sulphate
diammonium sulfate	ammonium sulphate
diazane	hydrazine
dibenzopyrrole; 9-azafluorene	9H-carbazole
dibutyl phthalate	butylene phthalate
dichlorodifluoromethane	Freon 12 (CFC-12)
dichlorofluoromethane	Freon 21 (HCFC-21)
dichloromethane	methylene chloride
diethyl ketone; diethylketone	3-pentanone
dihydrogen dioxide	hydrogen peroxide
dihydrogen hexafluorosilicate(2-)	fluorosilicic acid
diisopropyl ether	isopropyl ether
dimethyl 4-phthalate	dimethyl terephthalate
dimethyl 4-phthalate; DMT	dimethyl terephthalate
dimethyl ester of sulfuric acid	dimethyl sulphate

Synonyms	Name from chemicals list
diphenyl oxide; phenyl ether	diphenyl ether
diphenylmethanone	benzophenone
dipotassium 2,3-dihydroxybutane-dioate	potassium tartrate
dipotassium salt	potassium chromate
dipotassium sulfide	potassium sulphide
disodium hydrogen phosphate	sodium-o- phosphate,secondary
disodium peroxide	sodium peroxide
disodium sulfide	sodium sulphide
dodecan-1-ol	lauryl alcohol
dodecanoic acid	lauric acid
endo-1,7,7-trimethyl- bicyclo[2.2.1] heptan-2-ol	(+/-)-borneol
epoxypropane	propylene oxide
ethanal	acetaldehyde
ethanedioic acid	oxalic acid
ethanenitrile; methyl cyanide	acetonitrile
ethanoic acid	acetic acid
ethanoic anhydride	acetic anhydride
ethanoyl chloride, acyl chloride	acetyl chloride
ethene	ethylene
ethenyl acetate	viny lacetate
ethoxyethane	diethyl ether
ethyl alcohol	ethanol
ethyl bromide	ethylbromide
ethyl chloride	chloroethane
ethyl ethanoate; acetic ester	ethyl acetate
ethyl ether	diethyl ether
ethyl propenoate	ethyl acrylate
ethylene	ethene
ethylene chlorohydrin	2-chloroethanol
ethylene dichloride; ethane dichloride	dichloroethane
ethylene glycol dinitrate	nitroglycol
ethylene glycol ether	1,2-diethoxyethane
ethyne	acetylene
fatty alkyl sulphates	fatty alcohol sulphates
ferrous sulfate	iron(II) sulfate
fluates	aluminium fluorosilicate
fluoric acid; fluorhydric acid	hydrofluoric acid
formaldehyde solution 37%	formalin
formonitrile	hydrogen cyanide
fructose; fruit sugar	D-fructose
fuming sulfuric acid	oleum
furan-2-carbaldehyde; furfuraldehyde	furfural
gaseous oxiran	ethylene oxide, gaseous
glauber's salt (decahydrate)	sodium sulphate
glycerin; propan-1,2,3-triol	glycerol
glycerol a-monochlorohydrin; 3-MCPD	3-chloropropane-1,2-diol

Synonym list

Synonyms	Name from chemicals list
glycol; MEG	ethylene glycol
gypsum	calcium sulphate
hexadecanoic acid	palmitic acid
hexafluorosilicic acid	fluorosilicates
hexahydrophenol	cyclohexanol
hexahydrotoluene	methylcyclohexane
hexanedioic acid	adipic acid
hexyl alcohol	1-hexanol
hydrated alumina	aluminium hydroxide
hydrated potassium aluminium sulfate	alum
hydrazine hydroxide	hydrazine hydrate
hydrocyanic acid	hydrogen cyanide
hydrogen chloride	hydrochloric acid
hydrogen iodide	hydriodic acid
hydrogen perchlorate	perchloric acid
hydroxybenzene, carbolic acid	phenol, aqueous
hydroxybutanedioic acid	malic acid
hydroxylammonium sulfate	hydroxylamine sulphate
hypochlorous acid	hypochlorous acid
iron(II) sulfate	ferrous sulphate
iron(II)/(III) oxalate	iron oxalate
iron(III) chloride	ferric chloride
iron(III) nitrate	ferric nitrate
iron(III) sulfate	ferric sulphate
isooctanol	2-ethyl-1-hexanol
isopropyl ethanoate	isopropyl acetate
lauric acid pentyl ester	amyl laurate
lauroyl chloride	dodecanoyl chloride
lead (II) acetate trihydrate; salt of saturn	lead (II) acetate
lead dichloride	lead (II) chloride
lead dinitrate	lead (II) nitrate
lead(II) ethanoate	lead (II) acetate
liquid oxiran	ethylene oxide, liquid
lithium alumanuide; LAH	lithium aluminium hydride
magnesia	magnesium oxide
magnesium hydroxide carbonate	magnesium carbonate
manganese salt of sulfuric acid	manganese(II) sulphate
manganese(IV) oxide	manganese dioxide
mercaptoacetic acid	thioglycolic acid
mercuric chloride	mercury(II) chloride
mercuric chloride (sublimate)	mercury(II) chloride
mercuric cyanide	mercury(II) cyanide
mercuric sulfate	mercury(II) sulphate
mercury dinitrate	mercury(II) nitrate
methanal	formaldehyde
methanamide; carbamaldehyde	formamide

Synonyms	Name from chemicals list
methanecarboxylic acid	acetic acid
methanesulfinylmethane	dimethyl sulfoxide
methanoic acid	formic acid
methoxybenzene	anisole
methoxymethane	dimethyl ether
methyl 2-hydroxybenzoate	methyl salicylate
methyl 2-methylprop-2-enoate	methyl methacrylate
methyl alcohol	methanol
methyl chloroform	1,1,1-trichloroethane
methyl dichloro acetate	dichloroacetic acid methyl ester
methyl ethanoate	methyl acetate
methyl ethyl ketone; MEK	2-butanone
methyl hydride; biogas	methane
methyl methanoate	methyl formate
methylbenzene	toluene
methylene bromochloride	bromochloromethane
methylene chloride	dichloromethane
methylphenol	cresol
milk of lime	calcium hydroxide
milky sap of tropical trees	latex
mono./di./tri.-potassium phosphate	potassium phosphates
monosilicic acid; orthosilicic acid	silicic acid
N, N-dimethylhydrazine (unsym.)	1,1-dimethylhydrazine
N,N-diethylamine;	diethylamine
N,N-dimethylmethanamide; DMF	dimethylformamide
n-amyl alcohol	amyl alcohol
naxol	cyclohexanol
n-butyl ester	n-butyl acetate
N-chloro 4-methylbenzenesulfon-amide	chloramine-T
N-ethyl-N-benzyl-aniline	N-benzyl-N-ethylaniline
Neutral ammonium fluoride	ammonium fluoride
nickel sulphide	nickel(II) sulphide
nickel(2+)	nickel tartrate
nickel(II) nitrate hexahydrate	nickel(II) sulphate
nitric acid silver(1+) salt	silver nitrate
nitrogen oxide	nitrous fumes
nitrohydrochloric acid	aqua regia
nitromagnesite (hexahydrate)	magnesium nitrate
n-octane	octane
N-phenyl aniline;	diphenylamine
N-phenylacetamide	acetanilide
o-;m-;p-Nitropheno	nitrophenols
O-acetylsalicylic acid; 2-acetoxybenzoic acid	acetylsalicylic acid
o-cresol / m-cresol / p-cresol	cresols
octadecanoic acid	stearic acid
octadecanoic acid	stearic acid

Synonym list

Synonyms	Name from chemicals list
oldhamite	calcium sulphide
oxacyclopentane	tetrahydrofurane
oxirane	ethylene oxide
oxocarbon	carbon oxide
para-aminobenzoic acid; PABA	aminobenzoic acid
paraffin oil	vaseline oil
para-tert-Butylphenol	4-tert-butylphenol
parmaceti	spermaceti
PBS-1 (mono), PBS-4 (tetra)	sodium perborate
p-Chlorocresol	4-chloro-3-methylphenol
pentan-3-one	diethyl ketone
pentane-2,4-dione	acetylacetone
pentyl acetate	amyl acetate
perchlorobenzene	hexachlorobenzene
perchloroethane	hexachloroethane
perchloroethene, perchloroethylene	tetrachloroethylene
Permanent white, baryta white	barium sulphate
peroxysulfuric acid; peroxomonosulfuric acid	caro`s acid
PF	phenolic resins
phenyl cyanide	benzonitrile
phenyl methyl ketone, phenylethanone	acetophenone
phenyl sulfone	diphenyl sulfone
phenylcarbinol	benzyl alcohol
phenylmalonic acid diethyl ester	amyl phthalate
Phenylmethanol	benzyl alcohol
phenylsulfonic acid	benzenesulphonic acid
phosphane	phosphine
phosphoric acid	orthophosphoric acid
phosphoric acid diethyl ester	butyl phosphate
phosphorus trichloride oxide	phosphoryl chloride
phosphorus trichloride phosphorous chloride	phosphorus(III) chloride
phosphorus(V) oxide	phosphorus pentoxid
pickling lime	calcium hydroxide
poly acrylic acid ester	polyacrylate
polyacrylic acid ester	acronal solution
polyiodide potassium solution	iodine-potassium iodide solution
potash lye; potassium hydrate	potassium hydroxide
potash, pearl ash	potassium carbonate
potassium bicarbonate	potassium hydrogencarbonate
potassium bichromate	potassium dichromate
Potassium bisulfate	potassium hydrogen sulphate
Potassium bisulfate	potassium hydrogen sulphite
potassium bitartrate	tartaric acid
Potassium cyanide	Cyankali
potassium hydroxide	potash lye
potassium manganate(VII)	potassium permanganate

Synonyms	Name from chemicals list
potassium monosulfide	potassium sulphide
potassium peroxydisulfate	potassium persulfate
Prop-2-en-1-ol	allyl alcohol
propan-2-ol; isopropanol	Isopropyl alcohol, 2-propanol
propan-2-one; dimethyl ketone	acetone
propan-2-one; dimethyl ketone/ aqueous	acetone, aqueous
propane-1,2-diol	propylene glycol
propanedioic acid	malonic acid
propanoic acid	propionic acid
propanone	acetone
propene	propene
propene acid	acrylic acid
propyl alcohol	propanols
propyl ethanoate	propyl acetate
propyl ether	dipropyl ether
prussian red	potassium hexacyanoferrate(III)
pyridine-3-carboxylic acid, nicotinic acid; niacin	nicotinic acid
sal ammoniac	ammonium chloride
sal volatile; salt of hartshorn	ammonium carbonate
saltpetre	potassium nitrate
sec-amyl alcohol	2-pentanol
soda ash	sodium carbonate
soda ash, aqueous	sodium carbonate, aqueous
sodium 2-hydroxypropanoate	sodium lactate
sodium bicarbonate	sodium hydrogencarbonate
sodium bisulfate	sodium hydrogensulfate
sodium bisulfate, aqueous	sodium hydrogensulphate, aqueous
sodium chlorate(I)	sodium hypochlorite 02% a.Cl
sodium ethanoate	sodium acetate
sodium hydrogen phosphate	disodium hydrogen phosphate
sodium hypochlorite	Javelle water
sodium hypochlorite solution; sodium chlorate(I)	sodium hypochlorite solution
sodium hypophosphite	sodium phosphinate
sodium metabisulfite; sodium pyrosulfite	sodium disulfite
sodium oxidanide; caustic soda; lye	sodium hydroxide
sodium persulfate	sodium peroxodisulphate
sodium salt of benzoic acid	sodium benzoate
sodium salt of formic acid	sodium formate
sodium silicate hydrate	sodium silicate
sodium sulfhydrate	sodium hydrogensulphide
sodium tetraborate decahydrate	borax
sodium thiosulfate, sodium hyposulfite	antichlor
ß-butylene glycol	1,3-butanediol
ß-D-galactopyranosyl-(1->4)-D-glucose; milk sugar	lactose

Synonym list

Synonyms	Name from chemicals list
sulfonylideneoxidane	sulfur trioxide
sulfurated hydrogen	hydrogen sulphide
sulfuric acid lead salt	lead (II) sulphate
sulfuric chlorohydrin	chlorosulfonic acid
sulfurous dichloride	thionyl chloride
sulphanilic acid	aminobenzenesulphonic acid
table salt	sodium chloride
tannimum; gallotanic acid	tannic acid
TBP	tributyl phosphate
tetrachloro-1,2-difluoroethane	Freon 112 (CFC-112)
tetrafluoroboric acid; borofluoric acid	fluoroboric acid
tetrahydro-1,4-oxazine	morpholine
tetrahydrobenzene, 1,2,3,4-	cyclohexene
tetrahydrothiophene 1,1-dioxide	sulfolane
tetralin	1,2,3,4-tetrahydronaphthalene
tetramethylene glycol	1,4-butanediol
traces of phenol and butanol	water contaminated with organic solvents
triammonium citrate	ammonium citrate
tribromomethane	bromoform
tricalcium phosphate	sodium-o- phosphate,tertiary
trichloro(nitro)methane	trichloronitromethane
trichloroacetaldehyde monohydrate	chloral hydrate
trichlorofluoromethane	Freon 11 (CFC-11)
trichloromethane	chloroform
trichloromethane, formyl trichloride	chloroform
triethylphosphate	triethyl phosphate
triglyceride	fats and oils
trioxygen	ozone
trisodium citrate dihydrate	sodium citrate
trisodium phosphate; sodium phosphate tribasic	sodium phosphates
ultrapure water	pure water
vinyl benzene	styrene
vinylidene chloride	1,1-dichloroethylene
vinylidene chloride; 1,1-dichloroethylene	dichloroethylenes
vitamin C	L-ascorbic acid
whale oil	sperm oil
white arsenic, arseneous anhydride	arsenic trioxide
white vitriol	zinc sulphate
xylol	xylene
zinc carbonate hydrate	zinc carbonate
zinc nitrate hydrate	zinc nitrate
zinc(II) chloride	zinc chloride

Chemical group list

The chemicals group list offers information to find the resistance of plastics to chemical substances, which are not mentioned in the chemical list. However, the appropriate chemical group must be known (derived from the chemical formula).

Example

A chemical is not named in the chemicals list.

However, it is known that one or more elements belonging to a group, e.g. aldehydes/ketones group.

In Table 10 are listed some typical elements, representative of these groups, which are eligible as potential elements of the chemical in question.

These elements are also included in the chemicals list and thus the chemical resistance can be established.

Please note

This option does not provide a reliability of 100 %. It should be only used as help, just in the case that the chemical resistance can not be determined from the list of chemicals.

Chemical groups	Typical elements
Aldehydes / ketones	acetaldehyde
	Acetone
	Methyl ethyl ketone
Alcohols / glycols	Diethylene glycol
	Ethanol
	Glycerin
	Isopropanol
	Methanol
	Trichloroethanol
Aliphatic hydrocarbons	Acetylene
	Methane
	Octane
Amides	Acetamide
	Dimethylacetamide
	Dimethylformamide
	Formamide
Amines	Aniline
	Dimethylamine
	Ethylenediamine
	Triethylamine
Aromatic hydrocarbons	Benzene
	Toluene
Halogenated hydrocarbons	Carbon tetrachloride
	Fluorochlorohydrocarbon (FCHC)
Halogenated hydrocarbons	Tetrachloroethylene
	Trichloroethane (1,1,1-)
	Trichloroethylene
Ester	Amyl acetate
	Ethyl acetate
Ether	Ether
	Isopropyl ether
Halogens	Chlorine (liquid)
	Chlorine gas (dry)
Inorganic acids	Hydrochloric acids
	Phosphorus acid
	Sulfuric acid
Inorganic alkaline	Ammonium hydroxide
	Sodium hydroxide
Nitriles	Acetonitrile
	Acrylonitrile
Organic acids	Acetic acids
	Formic acid
	Oleic acid
Phenols	Phenol
Inorganic salts	Potassium carbonate
	Potassium chlorate
	Potassium chloride
	Potassium sulfate

Table 10: chemical groups - Typical elements

pH-limit list - Resistance to inorganic acids, alkalis & salts

Using the pH-limit list can be determined the chemical resistance of plastics to inorganic acids, alkalis & salts. In table 11 are listed as example, the pH values of some typical substances. Whereas ,in table 12 are listed the pH limit values of the ZEDEX® materials. When a chemical's pH-value is between the limit value of two materials, the material with the higher limit value is the resistant one to this chemical.

Substances	pH-value	Kind
Lead-acid battery	< 0	
Gastric acid	1,0 - 1,5	
Lemon juice	2,4	
Cola	2,0 - 3,0	
Vinegar	2,5	
Morello cherry juice	2,7	
Orange or apple juice	3,5	
Wine	4,0	acid
Sour milk	4,5	
Beer	4,5 - 5,0	
Acid rain	< 5,0	
Coffee	5,0	
Tea	5,5	
Rain	5,6	
Mineral water	6,0	
Milk	6,5	
Water (depending on hardness)	6,0 - 8,5	acid to alkali
Human saliva	6,5 - 7,4	
Blood	7,4	
Seawater	7,5 - 8,4	
Pancreatic juice	8,3	
Soap	9,0 - 10,0	alkali
Household ammonia	11,5	
Bleach	12,5	
Concrete	12,6	
Household lye	13,5 - 14,0	

Table 11: typical pH values

Material	pH-value lower limit	pH-value upper limit
ZX-100K	1	9
ZX-100EL55	1	9
ZX100EL63	1	9
ZX-100MT	1	9
ZX-324	1	14
ZX-324V1T	1	10
ZX-324V2T	1	14
ZX-324V11T	1	14
ZX-324VMT	1	14
ZX-410	1	9
ZX-410V7T	1	9
ZX-530	1	14
ZX-530CD3	1	14
ZX-530EL3	1	14
ZX-530KF15	1	14
ZX-550	1	14
ZX-550PV	1	14
ZX750V5T	1	9
ZX-750V5KF	1	9

Table 12: pH-limit values of the ZEDEX® material

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.

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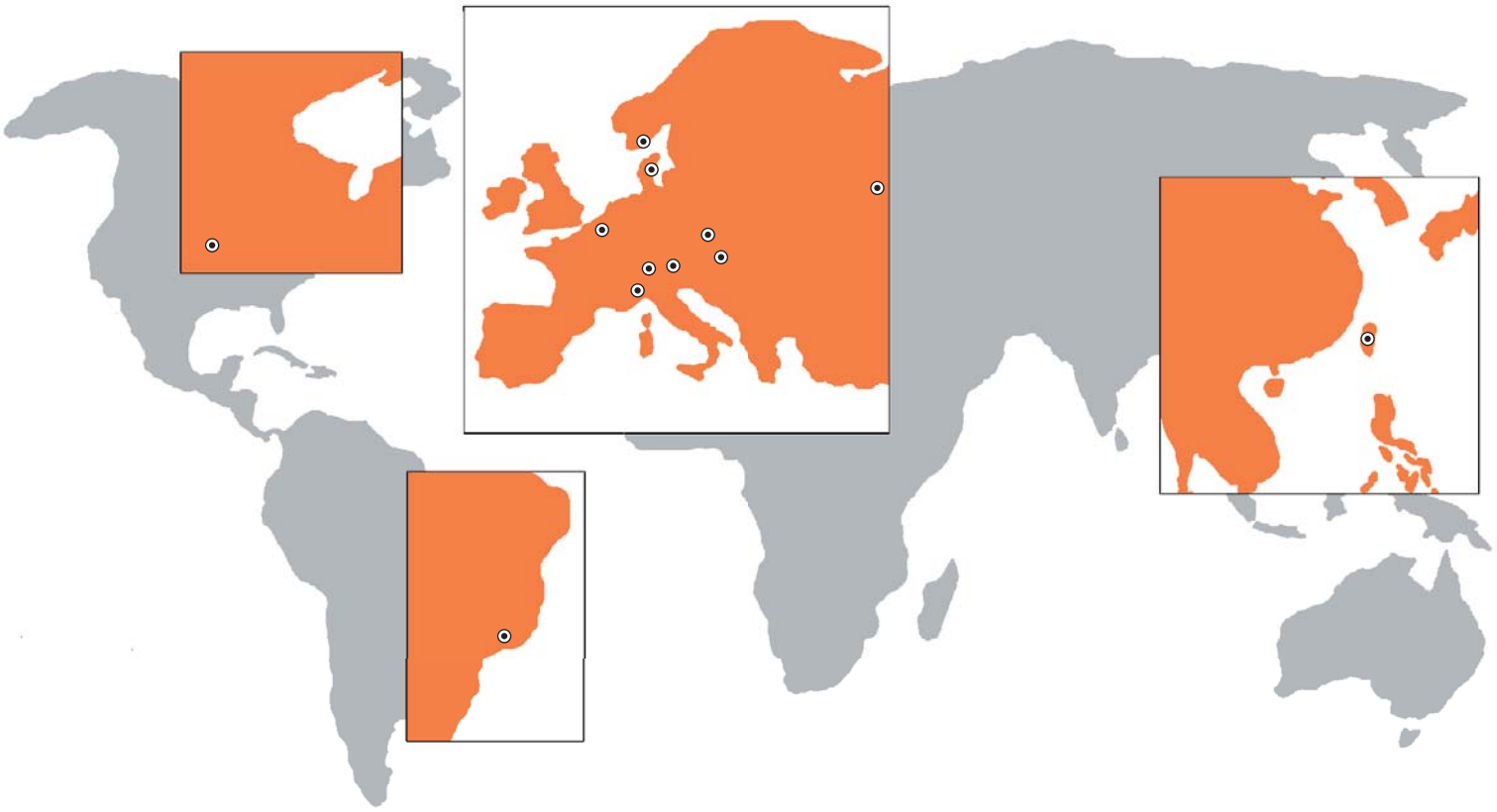

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