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Maintenance-free precision bushings
used for slide bearings made from
ZEDEX[®] plastics



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The dimensions of the "bushings used for slide bearings made from ZEDEX-plastics" have been determined according to the following standards:

- DIN 1494 part 1
- DIN 1498 shape F (without slit)
- DIN 1552 part 1
- DIN 1850 part 1,3,4,5

All bushings quoted are available in four different classes of bearing clearances.

class of bearing clearance	contraction	recommended casing hole) *	ISO -tolerance of the hole after insertion	contraction in the article number	applications / restrictions
coarse	C	H5	C 8	C08	highest load-carrying capacity at high ambient temperatures
standard	D	H5	D 8	D08	complete load-carrying capacity
fine	F	H5	F 8	F08	high accuracy reduced stress on high sliding speed
negative	N	H5	N 8	N08	highest accuracy maximum sliding speed up to 10m/min

Table 1: Classes of bearing clearances)* = see chapter 4.1.

The dimension list shows the maximum and minimum diameters of the bushing inserted ($d1_{max}$ and $d1_{min}$) for the standard design. The figures for other classes of bearing clearances are to be taken from the ISO-tolerance table.

Constitution of the article number:

Z 1A D08 001003001

Class of bearing clearance:

coarse	C08
standard	D08
fine	F08
negative	N08

Material contraction:

ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1T	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

Shape:

cylindrical	Z
cylindrical with collar	B

Example:

Z 5D D08 001003001

In this connection means:

- Z = cylindrical shape
- 5D = material ZX-530
- D08 = standard class of bearing ISO D8






III.1: Article key

Slide bearing bushes can also be manufactured or revised according to customer's requirements.

- ↳ Please enlist the **free** advisory service of our application research department.
 - ↳ Please fill out the questionnaire enclosed and send it back to us.
 - ↳ We will elaborate a plastics-oriented bearing and draw up a calculation concerning the load-carrying capacity as well as the working life for you.








2. Material overview

<p>ZX-100A standard material</p> 	<p>budget-priced</p> <ul style="list-style-type: none"> - maintenance-free - wear resistant - low friction - high damping - reduced accuracy - impact resistant - vibration resistant - food suitable - reasonably priced 	<p>application:</p> <p>ambient temperature: -100°C up to +55°C (+70°C) sliding speed 0 up to 100m/min surface pressure up to 20 N/mm² (60 N/mm² short-term) impacts and vibrations dirt and abrasive particles outdoor and water use negative bearing clearance possible alternative material for bronze, POM, PA</p>	Preface
<p>ZX-100EL63 standard material</p> 	<p>vibration damper</p> <ul style="list-style-type: none"> - maintenance-free - wear resistant - elastic, flexible - shore hardness 63D - very high damping - highly impact resistant - vibration resistant 	<p>application:</p> <p>ambient temperature: -50°C up to +55°C (+70°C) sliding speed 0 up to 10m/min surface pressure up to 3N/mm² (10 N/mm² short-term) impacts and vibrations dirt and abrasive particles outdoor and water use chemicals negative bearing clearance possible alternative material for rubber, elastomers</p>	Material overview
<p>ZX-100K standard material</p> 	<p>allrounder</p> <ul style="list-style-type: none"> - maintenance-free - wear resistant - low friction - impact resistant - vibration resistant - reasonably priced 	<p>application:</p> <p>ambient temperature: -150°C up to + 70°C (+90°C) sliding speed 0 up to 100m/min surface pressure up to 25 N/mm² (75 N/mm² short-term) edge pressure or geometry error permissible impacts and vibrations dirt and abrasive particles outdoor and water use chemicals negative bearing clearance possible alternative material for bronze, POM, PA, DU</p>	Design guidelines
<p>ZX-100MT standard material</p> 	<p>allrounder-high quantity</p> <ul style="list-style-type: none"> - maintenance-free - wear resistant - low friction - low stick-slip danger - high damping - impact resistant - vibration resistant - food suitable - reasonably priced 	<p>application:</p> <p>ambient temperature: -30°C up to +80°C (+100°C) sliding speed 0 up to 100m/min surface pressure up to 28N/mm² (85 N/mm² short-term) impacts and vibrations dirt and abrasive particles outdoor and water use chemicals negative bearing clearance possible alternative material for bronze, POM, PA</p>	Mathematica I example
<p>ZX-324 special material</p> 	<p>high static stress</p> <ul style="list-style-type: none"> - maintenance-free - low friction - high strength at - temperatures up to 250°C - highly impact resistant - vibration resistant - good chemical resistance - hydrolysis resistant 	<p>application:</p> <p>ambient temperature: -100°C up to +180°C (+220°C) sliding speed 0 up to 5m/min surface pressure up to 50N/mm² (125N/mm² short-term) edge pressure or geometry error permissible impacts and vibrations dirt and abrasive particles outdoor and water use negative bearing clearance possible alternative material for bronze, POM, PA, PEEK</p>	Tribology
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<p>ZX-324V1T standard material</p> 	<p>budget-priced high tech</p> <ul style="list-style-type: none"> - maintenance- free - wear resistant - low wear at temperatures up to 250°C - low friction - low stick-slip danger - low temperature development - high strength at temperatures up to 250 °C 	<p>application:</p> <p>ambient temperature: -50°C up to +160°C (+200°C) sliding speed 0 up to 5m/min surface pressure up to 40N/mm² (120N/mm² short term) edge pressure or geometry error permissible impacts and vibrations dirt and abrasive particles outdoor and water use aggressive chemicals negative bearing clearance possible alternative material for bronze, POM, PA , PEEK</p>	Preface
<p>ZX-324V2T standard material</p> 	<p>low speed</p> <ul style="list-style-type: none"> - maintenance- free - wear resistant - decreasing wear characteristics with increasing temperature - low friction - high strength at temperatures up to 250 °C 	<p>application:</p> <p>ambient temperature: -50°C up to +170°C (+210°C) sliding speed 0 up to 40m/min surface pressure up to 45N/mm² (125 N/mm² short term) edge pressure or geometry error permissible impacts and vibrations dirt and abrasive particles outdoor and water use aggressive chemicals negative bearing clearance possible alternative material for bronze, POM, PA , PEEK</p>	Contents
<p>ZX-324V3T special material</p> 	<p>low speed, high temp.</p> <ul style="list-style-type: none"> - maintenance -free - wear resistant - low friction - decreasing frictional properties with increasing temperature - high strength at temperatures exceeding 100 °C 	<p>application:</p> <p>ambient temperature: -50°C up to +180°C (+240°C) sliding speed 0 up to 100m/min surface pressure up to 43N/mm² (130 N/mm² short term) impacts and vibrations outdoor and water use aggressive chemicals alternative material for bronze, POM, PA , PEEK</p>	Material overview
<p>ZX-324VMT special material</p> 	<p>high static stress, high temperature</p> <ul style="list-style-type: none"> - maintenance- free - wear resistant - geringer Verschleiß bei Temperaturen bis 250°C - low friction - decreasing frictional properties with increasing temperature - high strength at temperatures up to 250 °C 	<p>application:</p> <p>ambient temperature: -50°C up to +210°C (+250°C) sliding speed 0 up to 100m/min surface pressure up to 50N/mm² (150 N/mm² short term) outdoor and water use chemicals alternative material for bronze, POM, PA , PEEK</p>	Design guidelines
<p>ZX-410 standard material</p> 	<p>high pv-value</p> <ul style="list-style-type: none"> - maintenance- free - low friction - low temperature development - high strength at temperatures up to 150 °C - hydrolysis resistant 	<p>application:</p> <p>ambient temperature: -50°C up to +150°C (+190°C) sliding speed 0 up to 100m/min surface pressure up to 50N/mm² (140 N/mm² short term) dirt and abrasive particles outdoor and water use negative bearing clearance possible alternative material for bronze, POM, PA , PEEK</p>	Mathematica I example
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<p>ZX-530 bearing material</p> 	<p>high speed</p> <ul style="list-style-type: none"> - maintenance- free - wear resistant - low wear at temperatures up to 200°C - low friction - low stick-slip danger - very low temperature development - very high chemical resistance 	<p>application:</p> <p>ambient temperature : -30°C up to +110°C (+130°C) sliding speed 0 up to 200m/min surface pressure up to 30N/mm² (80 N/mm² short term) outdoor and water use aggressive chemicals negative bearing clearance possible alternative material for bronze, POM, PA, PEEK, PTFE-Compunds</p>	Preface
<p>ZX-550 standard material</p> 	<p>agressive chemicals</p> <ul style="list-style-type: none"> - maintenance- free - wear resistant - very low wear - very low friction - low stick-slip danger - low temperature development - extremely high chemical resistance - hydrolysis resistant 	<p>application:</p> <p>ambient temperature: -100°C up to +110°C (+130°C) sliding speed 10 up to 200m/min surface pressure up to 8N/mm² (20 N/mm² short term) dirt and abrasive particles outdoor and water use aggressive chemicals negative bearing clearance possible alternative material for bronze, POM, PA, PEEK, PTFE-Compunds</p>	Material overview
<p>ZX-720 standard material</p> 	<p>low friction</p> <ul style="list-style-type: none"> - maintenance -free - wear resistant - very low friction - low stick-slip danger - very low temperature development - high chemical resistance - hydrolysis resistant 	<p>application:</p> <p>ambient temperature: -100°C up to +110°C (+130°C) sliding speed 10 up to 200m/min surface pressure up to 10N/mm² (20 N/mm² short term) dirt and abrasive particles outdoor and water use chemicals negative bearing clearance possible alternative material for bronze, POM, PA, PEEK, PTFE-Compound</p>	Design guidelines
<p>ZX-750V1T special material</p> 	<p>high temperature, high working life</p> <ul style="list-style-type: none"> - maintenance -free - wear resistant - constant friction with increasing temperature and surface pressure - extremely high strength 	<p>application:</p> <p>ambient temperature: -50°C up to +220°C (+260°C) sliding speed 0 up to 100m/min surface pressure up to 50N/mm² (150 N/mm² short term) alternative material for bronze, POM, PA , PEEK</p>	Mathematica I example
<p>ZX-750V2T special material</p> 	<p>high temperature, high rigidity</p> <ul style="list-style-type: none"> - maintenance -free - wear resistant - low wear at temperatures up to 200°C - low friction - high strength at temperatures up to 250 °C 	<p>application:</p> <p>ambient temperature: -50°C up to +220°C (+260°C) sliding speed 40 up to 150m/min surface pressure up to 60N/mm² (170 N/mm² short term) alternative material for bronze, POM, PA, PEEK</p>	Tribology
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2. Material overview

ZX-750V3T

special material



high temperature, high rigidity

- maintenance-free
- wear resistant
- low wear at temperatures up to 200°C
- low stick-slip danger
- high strength at temperatures up to 270 °C

application:

ambient temperature: -50°C up to +230°C (+270°C)
 sliding speed 10 up to 250m/min
 surface pressure up to 70N/mm² (180 N/mm² kurzzeitg.)
 outdoor and water use
 alternative material for bronze, POM, PA , PEEK

ZX-750V4

special material



high temperature, high speed

- maintenance- free
- wear resistant
- very low friction
- low stick-slip danger
- low temperature development

application:

ambient temperature: -50°C up to +210°C (+250°C)
 sliding speed 0 up to 200m/min
 surface pressure up to 35N/mm² (120 N/mm² kurzzeitg.)
 outdoor and water use
 alternative material for bronze, POM, PA , PEEK

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properties		strength										physical			electrical					
		ZX-750V/4	ZX-750V3	ZX-750V2T	ZX-750V1T	ZX-750V0	ZX-720	ZX-550	ZX-530	ZX-410	ZX-324VMT	ZX-324V3T	ZX-324V2T	ZX-324V1T	ZX-324	ZX-100M T	ZX-100K	ZX-100 EL63	ZX-100A	
		1,41	-	1,45	-	-	1,86	1,7	1,51	1,33	1,48	1,37	1,33	1,33	1,32	1,75	1,35	1,23	1,3	density [kg/dm³]
		-	-	-	42000	-	-	800	1380	-	10000	5700	3500	3500	3600	5000	2500	310	2200	modulus in tension [N/mm²]
	85	233	-	200	203	94	12	49	61	96	142	104	96	96	96	72	65	-	50	tensile strength [N/mm²]
		-	-	-	-	-	14	-	66	-	-	-	65	65	-	-	48	-	46,7	bursting strength [N/mm²]
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	50	tensile stress at yield [N/mm²]
	26	2	-	2	1,5	90	200	9	4	30	1,6	9	37	37	50	36	60	-	330	elongation at break [%]
	2800	17500	14600	22000	3000	-	-	2590	3200	2800	10000	6000	3700	3700	4100	2400	2000	-	2080	modulus in flexure [N/mm²]
		339	330	330	-	-	-	72,4	92	130	210	180	160	160	170	85	85	-	70	flexural strength [N/mm²]
		-	-	-	-	-	-	-	-	-	150	-	-	-	-	-	-	-	-	flexural yield stress [N/mm²]
		-	-	-	-	-	-	60	74	146	150	130	125	120	125	-	-	-	-	compressive strength [N/mm²]
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	-	-	creep modulus, 1% deformation, 1000h [N/mm²]
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110	stress at 1% deformation [N/mm²]
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	92	ball indentation hardness H358/30 [MPa]
		-	-	-	-	-	-	34	136	159	231	197	175	175	174	153	136	-	-	ball indentation hardness H961/30 [MPa]
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	220	-	-	-	Rockwell hardness scale L
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	107	Rockwell hardness scale M
		-	-	-	-	-	-	-	-	110	-	-	103	103	99	-	50	-	85	Rockwell hardness scale E
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Shore hardness scale A
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70	-	97	Shore hardness scale D
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	20000	k.Br.	-	k.Br.	impact strength Charpy unnotched [J/m²]
		-	-	-	-	-	-	-	-	-	9000	6300	6300	6300	8000	3200	6000	k.Br.	15400	impact strength Charpy notched [J/m²]
		-	-	-	-	-	-	240	-	534	280	k.Br.	580	580	k.Br.	-	-	-	-	impact strength IZOD unnotched [J/m²]
70	110	73	135	73	90	90	90	70	30	64	90	90	80	80	110	110	110	110	110	impact strength IZOD notched [J/m²]
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	creep strength
		-	-	-	-	-	-	-	-	195	270	200	165	170	160	95	75	-	69	heat distortion temperature 1,8 Mpa [°C]
		-	-	-	-	-	-	-	-	-	0,24	0,24	-	-	0,25	0,28	0,24	-	125	VICAT softening point VST/B 50 [°C]
		-	-	-	-	-	-	-	-	-	0,24	0,24	-	-	-	-	-	-	0,22	thermal conductivity [W/(m*K)]
		-	-	-	-	-	-	-	-	-	-	-	-	-	1,35	1,8	1,5	-	1,4	specific heat capacity [kJ/(kg*K)]
		-	-	-	-	-	-	-	-	-	V-0	V-0	-	-	V-0	94HB	94HB	94HB	94HB	fire behavior (3,2mm) UL 94
		-	-	-	-	-	-	-	-	-	43	43	-	-	-	-	25	-	21	oxygen index
		-	-	-	-	-	-	-	-	-	-	-	-	1E17	-	-	-	-	-	specific volume resistance [*cm]
		-	-	-	-	-	-	-	-	-	-	-	-	1E15	1E15	1E12	>1E15	1E12	1E12	surface resistance []
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	55	2,2	-	-	penetration resistance [kV/cm]
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	tracking resistance
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	dielectric constant (110Hz) [-]
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	dissipation factor (110Hz) [-]
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	arc resistance [s]

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2. Material overview

properties	bearings		tribological		friction		wear		precision		environmental influences		misc.	substitute for ...						
	ZX-750V4	ZX-750V3	ZX-750V2T	ZX-750V1T	ZX-750V0	ZX-720	ZX-550	ZX-530	ZX-410	ZX-324VMT	ZX-324V3T	ZX-324V2T			ZX-324V1T	ZX-324	ZX-100M T	ZX-100K	ZX-100 EL63	ZX-100A
perm.surface pressure at v=1m/min [N/mm ²]	35	8	-	-	-	1,7	2	25	20	10	33	56	42	20	14	35	1,1	-	-	
perm.surface pressure at v=10m/min [N/mm ²]	5,6	4	-	3,5	-	0,85	2,45	5	11	3,8	5	4	3	6	3	2	0,17	1,6	-	
perm.surface pressure at v=100m/min [N/mm ²]	0,35	0,42	0,16	0,15	-	-	0,18	0,3	0,35	0,21	0,3	-	0,17	0,1	0,115	0,1	-	0,075	-	
temperature development at v=1m/min [°C]	-	27	-	-	-	26	27	34	36	65	60	65	61	100	45	42	32	-	-	
temperature development at v=10m/min [°C]	200	46	24	90	-	21	38	63	35	74	83	95	47	33	78	60	35	70	-	
temperature development at v=100m/min [°C]	155	90	144	110	-	-	68	59	45	110	94	120	109	80	-	35	-	-	-	
vibration and impact resistance	6	4	6	4	7	6	7	5	6	5	6	6	7	6	6	6	6	6	6	
vibration and impact damping	6	6	6	6	7	6	6	4	6	7	7	7	7	6	5	7	6	6	6	
μ static at 20° C in dry runs [-]	0,19	0,17	0,16	0,14	0,12	0,09	0,12	0,18	0,2	0,12	0,14	0,13	0,11	0,09	0,12	0,11	-	-	-	
μ dynamic at 20° C in dry runs [-]	0,17	0,15	0,14	0,13	0,10	0,06	0,11	0,17	0,16	0,095	0,15	0,155	0,13	0,09	0,11	0,08	-	-	-	
μ dynamic at 100° C in dry runs [-]	0,11	0,1	0,1	0,125	-	-	0,08	0,11	-	0,08	0,07	0,09	0,2	-	0,07	0,15	-	-	-	
wear factor at 20°C [mm/100km]	0,288	0,12	0,071	0,043	1,38	0,295	0,045	0,045	0,225	0,043	0,091	1,210	2,610	3,150	0,110	0,070	-	0,044	-	
wear factor at 100°C [mm/100km]	0,700	0,230	0,110	-	-	-	-	0,109	0,326	0,180	-	0,141	0,894	-	-	0,210	-	-	-	
wear factor at 200°C [mm/100km]	0,677	0,568	0,405	-	-	-	-	0,465	0,297	0,360	-	0,484	0,459	0,534	-	-	-	-	-	
wear factor at 240°C [mm/100km]	0,885	0,742	-	-	-	-	-	-	-	0,523	-	0,636	0,659	-	-	-	-	-	-	
dimensional stability through water absorption	6	6	6	6	7	6	6	6	4	6	6	6	6	6	6	6	6	6	6	
water absorption 23°C/rel.humidity 93% [%]	0,2	0,2	0,12	0,1	0,24	-	0,01	0,01	0,6	0,05	0,05	0,1	0,1	0,05	0,2	0,3	0,2	0,35	-	
dimensional stability through change in temp.	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
neg.bearing clearance for highest precision	✓	-	-	-	-	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓	✓	-	-	
misalignment adjustment	6	1	1	1	6	2	2	2	4	1	2	4	4	4	4	5	6	6	6	
max.permmissible temperature for material [°C]	300	270	260	260	240	-	250	240	190	250	250	250	250	250	130	110	75	75	-	
max.temp.for slide bearing attachment,stat.[°C]	250	270	260	260	260	130	130	130	190	250	240	210	200	220	100	90	70	70	-	
max.temp.for slide bearing attachment,dyn.[°C]	210	230	220	220	220	110	110	110	150	210	180	170	160	180	80	70	55	55	-	
coefficient of expansion up to 100°C [10 ⁻⁶ /°K]	-	3,6	3	3,2	5,5	14,4	12	6	5,5	-	-	-	-	-	7,1	8	14	8,7	-	
coefficient of expansion up to 150°C [10 ⁻⁶ /°K]	6,5	3,6	3	3,2	5,5	19,2	16	9	5,8	3,8	5,0	6,5	5,9	5,9	10,7	12	-	13,2	-	
insertion in water	-	-	-	☉	-	-	☉	☉	-	☉	☉	☉	☉	☉	☉	☉	☉	☉	☉	-
dust, dirt, abrasive substance	6	6	6	6	6	2	2	6	7	6	6	7	7	7	7	6	1	1	1	
UV resistance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
hydrolysis resistance [hot water]	6	7	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
chemical resistance	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
non-toxic	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-	✓	-	-	-	
price/volume [DM/dm ³]	294	312	319	334	266	-	255	227	200	365	290	326	259	290	74	47	-	23	-	
bronze	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	-	✓	-	
polyamide (Pa6, Pa.6.6 ; Pa.12)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	-	✓	-	
polyoxymethylene (POM)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	-	✓	-	
PEEK / PEEK compounds	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓	✓	-	-	-	-	-	
PTFE / PTFE compounds	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	
rubber	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	

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Table 2: Material properties



3.Slide bearings

Slide bearings absorb the journals of axes or screws. We distinguish between radial bearings to transduce/ absorb transverse forces and axial bearings to absorb longitudinal forces. Moreover, there are guide bearings which merely guide the screw in its position without absorbing any definable forces.

The journals rotate inside the bearing bushes subject to sliding friction with oil, grease, water or even without lubrication (i.e. in dry runs).

3.1.Slide bearings made from plastics

In general, our slide bearings run smoother than anti-friction bearings and are also indifferent to edge pressure, impacts and vibrations, owing to the big contact surface of the slide bearings (between screw and slide bearing bushes) and its high polymer damping properties. Slide bearings do not require any sealings, for they are indifferent to dirt.

Slide bearings are simply constructed and can also be produced separately (ill. 9) without any difficulties. Running on pure liquid friction, they achieve an almost unlimited working life and are able to run with highest screw speed.

In general, they are cheaper than anti-friction bearings.

3.1.1.Slide bearing materials

We supply all slide bearing bushes itemized in this catalogue only made from plastics of the **Wolf-ZEDEX-series** - see chapter 2-

3.1.2.Slide bearing shape and dimensions

The dimensions of the slide bearings made from plastics, which are offered in this brochure, correspond to the following DIN-standards.This is to make sure, that metallic slide bearings according to DIN can be replaced by those made from plastics, without altering the dimensions and tolerances of the connecting parts.

- *DIN 1850*
solid bushings used to insert into casings

- *DIN 1552*
used to press on journals

- *DIN 1494*
rolled bushings used as stuffing bushings

- *DIN 1498*
considerably thick-walled compared to stuffing bushings

The bushings are supplied according to standard without lubricating grooves, lubricating bags, oil drilling rigs and without slit.

In case these additives are required, you should enquire separately.



Attaching the bushings

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4. Design guidelines

4.1. Attaching the bushings to insert into the casing

4.1.1. Inserting the bushings

In general, the slide bearing bushes are fixed by simply stuffing them into the casing hole (economical way of attachment).

4.1.2. Interference of bushings

Due to the fact, that plastic alloys taken from the ZEDEX-series show a lower elastic modulus than metallic materials, the stuffing interference of the bushings outside diameter has to be chosen bigger than that of similar metal slide bearings.

outside diameter $\varnothing d_{2v}$ (mm)	interference/- oversize min. (mm)	interference/- oversize max. (mm)
exceeding 6 - 10	0,05	0,08
exceeding 10 - 20	0,08	0,12
exceeding 20 - 50	0,10	0,15
exceeding 50 - 100	0,15	0,20
exceeding 100 - 150	0,20	0,28
exceeding 150 - 230	0,25	0,35
exceeding 230 - 300	0,3	0,4

Table 3: Stuffing interferences

4.1.3. Adapter hole

4.1.3.1. Standard adapter hole

All slide bearing bushes are designed for a stuffing fit used for an adaptor hole with a sufficient wall thickness as well as of an ISO-tolerance of H5. All bushings are available with the necessary interferences/oversizes listed in table 3 (conditions of installation).

4.1.3.2. Special adapter holes

Principally the use of an adaptor hole of a quality deviant from 5 is possible (eg. H6 or H7). In these cases, only the holes upper dimensional deviation $\varnothing d1$ of the bushings increases after insertion.

Please take all further information concerning the increase of the installation bearing clearance caused by the use of an ISO-tolerance deviant from H5 out of table 4.

Increase of the installation bearing clearance Sv by the use of an adapter hole of an ISO-tolerance of	H6 [μ m]	H7 [μ m]	H8 [μ m]	H9 [μ m]
Casing inside diameter up to 3mm	2	6	10	21
Casing inside diameter exceeding 3mm - 6mm	3	7	13	25
Casing inside diameter exceeding 6mm - 10mm	3	9	16	30
Casing inside diameter exceeding 10mm - 18mm	3	10	19	35
Casing inside diameter exceeding 18mm - 30mm	4	12	24	34
Casing inside diameter exceeding 30mm - 50mm	5	14	28	51
Casing inside diameter exceeding 50mm - 80mm	6	17	33	61
Casing inside diameter exceeding 80mm - 120mm	7	20	39	72
Casing inside diameter exceeding 120mm - 180mm	7	22	45	82
Casing inside diameter exceeding 180mm - 250mm	9	26	52	95
Casing inside diameter exceeding 250mm - 315mm	9	29	58	107

Table 4: Increase of the installation bearing clearance

$$d1_{max} = Sv + \varnothing d1_{H5} \quad [2]$$

in which:

$d1_{H5}$ = upper dimensional deviation of the slide bearing bush by using a casing of an ISO-tolerance [mm] deviant from H5

Sv = increase of the installation bearing clearance [mm] taken from table 4

$\varnothing d1_{max}$ = upper dimensional deviation of the slide bearing inserted into a casing of an ISO-tolerance of H5 taken from dimensions lists granting an appropriate screw diameter d [mm]

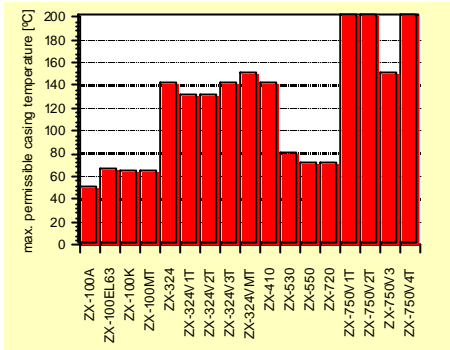
ISO-tolerance of the adapter hole	upper dimensional deviation (\varnothing 30mm) [μ m]	difference of the upper dimensional deviations [μ m]	upper dimensional deviation of the hole d1 after insertion taken from dimension list [μ m]	lower dimensional deviation of the hole d1 after insertion [μ m]
H5	9	0	98	65
H6	13	4	98+4=102	65
H7	21	12	98+12=110	65
H8	33	24	98+24=122	65
H9	52	43	98+43=141	65

Example for a bushing of a diameter $d1= 30$ mm



4.1.4. Attachment when operating on high temperature fluctuations

When exceeding the permissible temperatures (ill. 2) additional securing measures **and** compensation measures have to be taken into account, because the shear stress arisen through the stuffing interference inside the cross-section of the slide bearing, is reduced by stress relaxation, which is caused by action application of heat.



Ill.2: Maximum permissible casing temperature (PC)

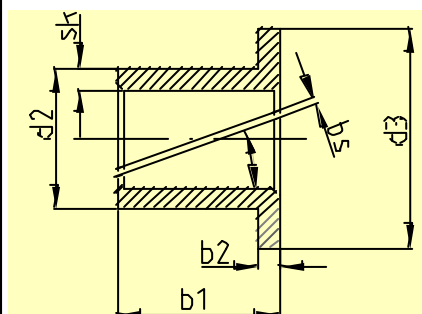
The **securing measures** can be based on a mold clamping mechanism (e.g. by installing the bushing inside a ring-shaped groove (ill. 6) or by using security rings) or on a non-positive connection (e.g. by bonding the bushing inside the casing (ill. 4)).

These securing measures require a slit-shaped bushing.

Concerning the **compensation measures** we recommend to slit the bushing in order to make sure, that it does not jam, even when operating at altered ambient temperatures.

4.2. Slit-shaped bushing

In case the slide bearing bushes are exposed to considerable temperature fluctuations, the bushing should have an axial slit in addition to the above-mentioned securing measures, in order to reduce the danger of stress relaxation and the change in operation bearing clearance resulting from this. Slit-shaped bushings can be used with a lower bearing clearance than bushings without a slit.



Ill. 3: Slit-shaped cylindrical bushing with collar

The slit angle β should be designed between 15 to 45° depending on the bushing width. The minimum slit width bs can be calculated according to the following formula (3):

$$bs = (d \cdot 0,024) + 0,22 \quad [3]$$

in which:

bs = slit width [mm]

d = screw diameter [mm]

In case the bushing should be bonded and the screw diameter exceeds 100 mm, the slide bearing bush should be constructed from modules.

4.2.1. Attachment of slit-shaped bushings

4.2.1.1. Bonding of slit-shaped bushings

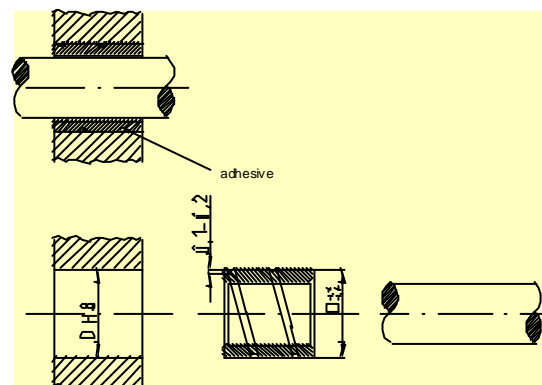
Bonded, slit-shaped bushings should be used, when exceeding the permissible casing temperature in illustration 2 and when the inside diameter of the bushing and the bearing clearance should only be altered slightly when operating with temperature fluctuations.

The inside diameter of the slit-shaped, bonded bushing is not subject to dimensional changes when operating at temperature ranges of -50°C up to +120°C depending on the slide bearing material.

For the bonding we recommend the "adhesive 100", which we can directly supply. This adhesive can be used when operating at temperature ranges of -40°C up to +80°C. For temperatures exceeding +80°C we recommend our "adhesive 200", which can be used short-term at temperatures up to 120°C.

The outside diameter of the bushings should be provided with a spiral groove and an undersize, for the adhesive cannot be removed on installation. See ill. 4

After curing the adhesive, the hole of the bushing requires a secondary finishing in order to achieve the final tolerances.



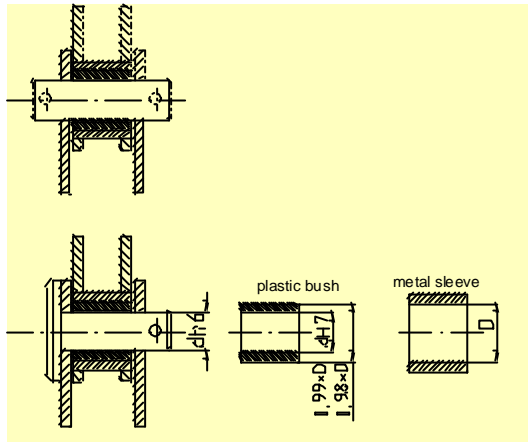
Ill. 4: Bonded slide bearing bush



Attachment of the bushings

4.3. Swimming bushing

When operating with a swimming beared bush, the bushing must be installed inside the metal sleeve without pre-stressing. In the molded state, the slit-shaped bushing is able to move either inside the casing or on the screw. In order to avoid a possible axial shifting, the bushing can be installed as shown in illustration 5.



Ill. 5: Swimming beared slide bearing bush

4.4. Chamber-shaped bushing

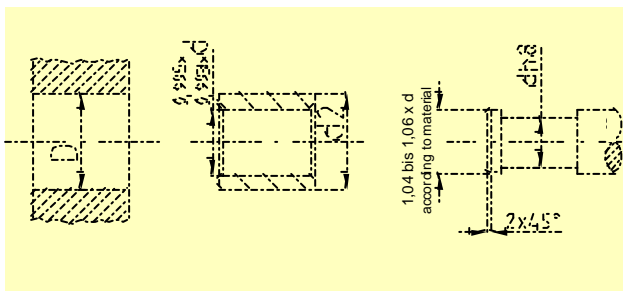
Chamber-shaped bushings are installed in order to increase the compressive strength and to reduce the deformation (shaft cavity see chapter 12.2.3.2.) during long-term operation.

The bushing must be installed under pre-stressing in radial direction and, depending on the material, also in axial direction by means of tight fitting or pre-stressing.



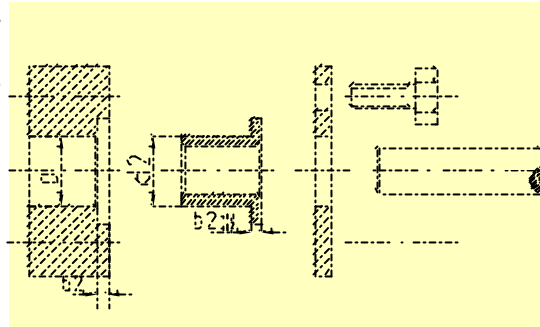
Ill. 6a: Chamber-shaped bushing Ill. 6b: Without chamber bushing

4.5. Stuffed bushing



Ill.7: Stuffed slide bearing bush

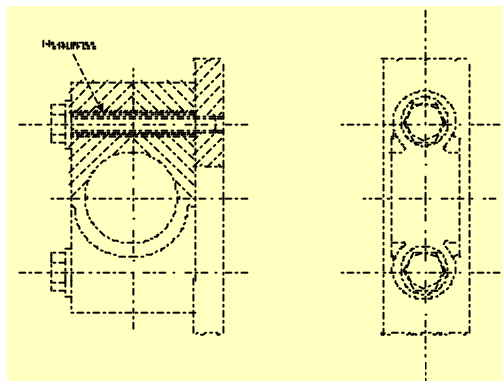
4.6. Clamped bushing



Ill. 8: Clamped slide bearing bush

4.7. Divided bearings

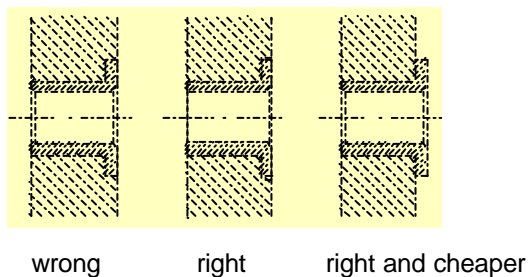
Divided bearings are often used for reasons of assembly technique. The entire bearing block is made from plastics. A steel sleeve should be inserted inside the bearing block to absorb the screw force (see ill. 9), in order to avoid a creeping of the bearing block caused by the compressive stress which is due to the screw connection.



Ill.9: Divided bearing

4.8. Stuffing of collar bushings

Concerning the stuffing of collar bushings, we would like to point out that the collar should not be stuffed, for this may cause a contraction of the bearing clearance



Ill.10: Pressed in bushing

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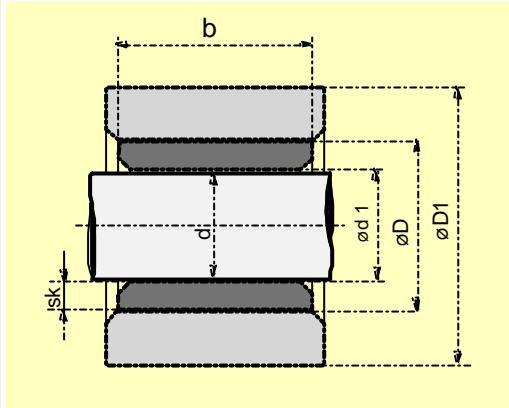
Slide bearings (with collar)

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5.Chosing the geometry (Measurement of the slide bearing bush)

5.1. Bearing dimensions



Ill. 11: Designation of the radial slide bearing

5.1.1. Bearing wall thickness (sk)

Depending on the stress exerted on the slide bearing we recommend either a thick or a thin construction of the wall thickness.

Construction	DIN
extremely thin-walled	1494 part 1
thin-walled	1498 frame F
	1850 part 1
	1850 part 5
thick-walled	1552 part 1
	1850 part 3
	1850 part 4

Table. 5 : Division of wall thickness

5.1.1.1. Bearing wall thickness (sk) subjected to high static stress

An operation under high static stress in general causes an elastic and possibly (after long-term exposure time) also a plastic deformation of the stressed sliding surface.

These deformations are in proportion to the wall thickness of the plastic bushing, which causes a reduction of the bushings accuracy with an increasing wall thickness. **Therefore, we recommend the use of a possibly thin-walled bushing for slide bearings subjected to highly static stress and without strong impact stress**, or to install a clamped slide bearing bush (see chapter 4.4.).

5.1.1.2. Bearing wall thickness (sk) subjected to high impact or vibration stress.

In case of this stress, a possibly high damping should be achieved. Owing to the fact, that the damping of the plastic bushing increases with an increasing material thickness, you should prefer the use of a more thick-walled bushing when operating under impact stress (see chapter 9).

5.1.1.3. Bearing wall thickness (sk) subjected to high dynamic stress

In order to avoid a thermal overloading of the slide bearing, the frictional heat developing from high dynamic stress should be conducted as quickly as possible from the sliding surface of the slide bearing. For the most part, the shaft is made from metal and shows a high thermal conductivity, therefore the shaft considerably conducts the heat.

The thermal conductivity effected by the slide bearing is very low, due to the bad thermal conductivity of plastics. Furthermore, the thermal conductivity effected by the slide bearing behaves in antiproportion to the wall thickness, so that thin-walled slide bearing bushes show a better thermal conductivity of the slide bearing. In which proportion the heat is conducted by the casing or the shaft depends on the mass of the shaft, thus only on the length of the shaft when the density and the screw diameter are given.

When operating, for example, with thin-walled bushings of a diameter of 12 mm and a screw length of about 10 mm 30 % of the heat is conducted by the shaft and with a screw length of 50 mm about 50 % of the heat.

When operating with screw lengths of 200 mm and more 70 % of the heat is conducted by the shaft. It follows from that that slide bearings with short shafts (length below 50 mm) and thick-walled slide bearing bushes quickly become thermally overload.

This danger particularly occurs when operating when using thick-walled bushings with a small inside diameter. Moreover, it follows from that that this danger can considerably be reduced when using very long shafts (length exceeding 200 mm) in combination with thick-walled slide bearing bushes, so that **thick-walled bushings in combination with long shafts can perfectly be used when operating subjected to high dynamic stress**.

In case the use of thick-walled bushings (e.g. to achieve a much better damping) is necessary, it must be considered that a **thick-walled bushing requires a bigger installation bearing clearance** (caused by the higher extension of the wall thickness and the inferior thermal conductivity) than a thin-walled slide bearing.



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5.1.1.4. Bearing wall thickness (sk) subjected to edge pressure

We recommend to use **thick-walled bushings** in case the construction of the bearing seat is subjected to errors in geometry and misalignments in order to achieve a lower spring constant on the wall of the slide bearing bush, which in this case also works as a spring damping element. This causes better deformations (adaptation of the bushing to the incorrect geometry) and therefore a reduction of stress as well as an increase of working life.

5.1.2. Bushing width b

The bushings most frequently used in practice have a **maximum width of about 0,8 up to 1,2 x screw diameter**. This is due to the high costs of production (in general, a wide bearing bush is more expensive than two half bushings) and to the specific dynamic load-carrying capacity.

The bigger the proportion b / d , the lower the specific dynamic load-carrying capacity of a slide bearing bush (see ill. 26), because the danger of overheating (caused by the accumulation of heat in the middle of the slide bearing bush) rises with an increasing bushing width.

5.2. Bearing clearance

5.2.1. Inside diameter of the bushing after installation

The slide bearing bushes are available in four different classes of bearing clearances.

According to stress exerted on the application and its demand of accuracy you can chose either a big (D), a small (F) or even a negatively (N) constructed (including pre-stressing) installation bearing clearance.

All standard designed slide bearing bushes (abbreviation "C") show an inside diameter with the ISO-tolerance D8 after stuffing them into the casing with a tolerance H5. The dimension list shows the maximum and minimum diameters ($d1_{max}$ or $d1_{min}$) respective to this class of bearing clearances.

Please take the figures for the other classes of bearing clearances from the ISO-tolerance table.

When using casings of bigger tolerance ranges the hole of the stuffed slide bearing bush increases accordingly (see page 12).

5.2.2. Screw diameter

The tolerance of the screw diameter must not exceed the nominal dimension, for it may not fall below the minimum installation bearing clearance. Therefore, according to the ISO-standard, the tolerance ranges "a" to "h" are suited for the screw. Concerning the quality of the screw, we recommend the ISO-tolerance class 6 to 7.

We recommend an ISO-tolerance of h6 or h7 as a standard tolerance of the screw.

When operating with screws of other dimensional deviations the inside diameter of the slide bearing bush can be matched accordingly, in order to achieve the required clearance (see preface).

5.2.3. Installation bearing clearance

The installation bearing clearance is determined by the dimensions of the slide bearing hole \varnothing_{d1} in the molded state and by the tolerance of the screw diameter. The installation bearing clearance is measured in a standard conditioning atmosphere (20°C and 50 % rF) after stuffing the slide bearing bush into the bearing seat with an ISO-quality of H5 in the operational state.

The minimum and maximum installation bearing clearance yields from the following formulas:

$$Se_{min} = \varnothing d1_{min} - Ao_{screw} \quad [4]$$

$$Se_{max} = \varnothing d1_{max} - Au_{screw} \quad [5]$$

in which:

Se = installation bearing clearance

Au = lower dimensional deviation

Ao = upper dimensional deviation

$\varnothing d1_{max}$ = taken from formula [2]

$\varnothing d1_{min}$ = taken from the dimension lists

The question, whether slide bearing bushes with a reduced installation bearing clearance are suited for your application, depends on the stress and will be settled in the course of the slide bearing calculation (see chapter 12.2.).



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5.2.4. Operating bearing clearance

The operating bearing clearance appears when the bushing is working on operational conditions. It basically differs from the installation bearing clearance regarding the dimensional changes, which are caused by the stress exerted on the slide bearing and the influence of the ambient temperature.

The operating bearing clearance of slit-shaped bushings yields from the following formula (7):

$$S_S = (d_2 \cdot \alpha_{Geh} - d_1 \cdot \alpha_w - 2 \cdot sk_{Bu} \cdot \alpha_{Bu}) \quad [7]$$

in which:

S_S = change in bearing clearance due to temperature changes of slit-shaped bushings [mm]
= temperature changes [°C]

d_2 = outside diameter of the bushing [mm]

α_{Bu} = coefficient of expansion of the slide bearing taken from table 6 [1/°C]

α_{Geh} = coefficient of expansion of the casing taken from table 6 [1/°C]

d_1 = inside diameter of the bushing [mm]

α_w = coefficient of expansion of the casing taken from table 6 [1/°C]

sk_{Bu} = wall thickness of the bushing [mm] = $(d_2 - d_1) / 2$

5.2.4.1. Changes in bearing clearance due to humidity

The slide bearings made from plastic alloys of the ZX-series do not undergo a considerable change in bearing clearance due to atmospheric humidity.

Even when operating directly in water, no ZX-material shows a considerable dimensional change.

5.2.4.2. Changes in bearing clearance due to temperature

Owing to the fact, that the linear coefficients of expansion of plastic alloys of the ZX-series are seven times bigger than those of steel alloys, the operating bearing clearance is reduced with increasing temperature depending on the casing and the slide bearing material.

The operating bearing clearance of non-slitted bushings yields from the following formula (6):

$$S_Z = (d_2 \cdot (\alpha_{Geh} - \alpha_{Bu}) - d_1 \cdot \alpha_w) \quad [6]$$

in which:

S_Z = change in bearing clearance due to temperature changes of non slitted bushings[mm]
= temperature changes [°C]

d_2 = outside diameter of the bushing [mm]

α_{Bu} = coefficient of expansion of the slide bearing taken from table 6 [1/°C]

α_{Geh} = coefficient of expansion of the casing taken from table 6 [1/°C]

d_1 = inside diameter of the bushing [mm]

α_w = coefficient of expansion of the screw taken from table 6 [1/°C]

material	coefficient of expansion up to 50 °C (1/K)	coefficient of expansion up to 80 °C (1/K)	coefficient of expansion up to 100 °C (1/K)	coefficient of expansion up to 150 °C (1/K)	coefficient of expansion up to 200 °C (1/K)	coefficient of expansion up to 250 °C (1/K)
ZX-100A	6,6*10 ⁻⁵	6,9*10 ⁻⁵	6,7*10 ⁻⁵	13,2*10 ⁻⁵		
ZX-100EL63			14*10 ⁻⁵			
ZX-100K	6*10 ⁻⁵	7*10 ⁻⁵	8*10 ⁻⁵	12*10 ⁻⁵		
ZX-100MT	5,5*10 ⁻⁵	6,2*10 ⁻⁵	7,1*10 ⁻⁵	10,7*10 ⁻⁵		
ZX-324	5,6*10 ⁻⁵			5,9*10 ⁻⁵		9,5*10 ⁻⁵
ZX-324V1T	5,6*10 ⁻⁵			5,9*10 ⁻⁵		9,5*10 ⁻⁵
ZX-324V2T	6,2*10 ⁻⁵			6,5*10 ⁻⁵		10,4*10 ⁻⁵
ZX-324V3T	4,8*10 ⁻⁵			5,0*10 ⁻⁵		9,6*10 ⁻⁵
ZX-324VMT	3,5*10 ⁻⁵			3,8*10 ⁻⁵		6,9*10 ⁻⁵
ZX-410			5,5*10 ⁻⁵	5,8*10 ⁻⁵		
ZX-530			6,0*10 ⁻⁵	9,0*10 ⁻⁵		
ZX-550			12*10 ⁻⁵		16*10 ⁻⁵	
ZX-720			14,4*10 ⁻⁵		19,2*10 ⁻⁵	
ZX-750V1						3,2*10 ⁻⁵
ZX-750V2						3*10 ⁻⁵
ZX-750V3						3,6*10 ⁻⁵
ZX-750V4	6,2*10 ⁻⁵			6,5*10 ⁻⁵		10,4*10 ⁻⁵
steel						1,2*10 ⁻⁵
cast iron						1,05*10 ⁻⁵
aluminium						2,38*10 ⁻⁵
brass						1,85*10 ⁻⁵

Table 6: Thermal coefficient of linear expansion

Attention:

Slit-shaped bushings which are stucked in do not change their inside diameter due to temperature changes (see chapter 4.2.1.).



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6. Counter-rotating material (screw, axis)

6.1.1.8. Alloyed cold-worked steels according to DIN-standard 17350 cured and tempered:

X210Cr12 (Vickers hardness HV = 750)
X155CrVMo121 (Vickers hardness HV = 750)
100Cr6 (Vickers hardness HV = 750)

6.1. Material

The following materials can be used as counter-rotating material (relative material cost).
X36CrMo17 (Vickers hardness HV = 500)

Please prefer those materials among the group, which are printed in red. 6.1.1.9. Alloyed warm-worked steels according to DIN-standard 17350 cured and tempered:

X40CrMoV51 (Vickers hardness HV = 450)

6.1.1. Metals

6.1.1.1. Non-alloy-treated steels according to DIN-standard 17100 used for economy-priced solutions: 6.1.1.10. High speed steels according to DIN-standard 17350 cured and tempered:

S6-5-2 (Vickers hardness HV = 850)

St 37-2k – used for low stress applications (1)
St 44-2 - used for moderate stress applications
St 50-2k – used for medium stress applications (1,5)
St 52-3 (Vickers hardness HV=170)

6.1.1.11. Recommended protection against corrosion:

Nickel-plating, e.g. KANIGE or KANISIL 2000; coating thickness depending on the kind of chemical wear 30 to 50 µm, quenched and tempered from 500 to 800 Vickers and ground according to RZ = 1 to 4 µm.

6.1.1.2. Alloy-treated, cured and tempered case-hardened steels according to DIN-standard 17210 used for longest working life:

16MnCr5 – small screws (1,7) (Vickers hardness HV = 750)

15CrNi6 – thermosetting for big screws (2,1)

6.1.2. NE Metals

6.1.1.3. Tempered steels according to DIN-standard 17200 with a tough core and a hard surface:

C45 – for small screws (1,6) (Vickers hardness HV = 170) 42CrMo4 – for big screws (2)

Aluminium and aluminium alloys should not be used, unless the surface is hard chromed or hard coated. When operating with other NE-metals, we ask you to call our application research department, because here we must reckon with higher wear due to sliding friction and higher coefficients of friction.

6.1.3. Plastics

6.1.1.4. Stainless steels according to DIN-standard 17440 susceptible to hardening and tempering:

X 20Cr13 Martens steel (3,2)

X 20CrNi172 Martens steel (4,0)

We recommend Inkupox CF as an excellent plastics or “screw material”. This material consisting of carbon fiber reinforced epoxide resin showing an outstanding relation of tensile strength/elastic modulus.

It is extremely stiff and very light, so that it is highly suitable for applications in the field of light construction and when operating with overlength screws.

6.1.1.5. Steels used for surface layer hardening according to DIN-standard 17212 cured and tempered:

CF 53 (Vickers hardness HV = 600)

6.1.4. Painted sliding surfaces

6.1.1.6. Stainless cast steel according to DIN-standard 17445, solution calcined and quenched:

G-X30CrNiSiNb2424 (Vickers hardness HV = 280)

Painted metallic basic elements can also be used as counter-rotating surfaces. The main advantage is, that the unprotected basic element is protected against corrosion due to the paint and the visible counter-rotating surfaces can be constructed in all kinds of shades. In many cases of application the paint modifications have turned out to be sufficiently hard wearing in combination with ZEDEX-100K.

6.1.1.7. Stainless steels according to DIN-standard 17115 quenched and tempered:

Recommendations of paint are available upon request.

23MnNiCrMo64 (Vickers hardness HV = 280)



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6.2. Hardness of the counter-rotating partner

When operating with *very hard screw materials*, the screw does not show any wear as well as the wear of the slide bearing is reduced. This is due to the feed wear, which means that the roughness holes on the screw surface are filled because of the polymer abrasion, so that the screw surface becomes smooth.

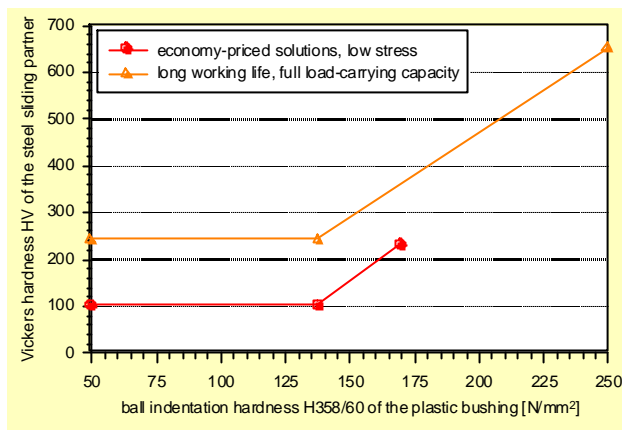
When operating with *flexible screw materials* and depending on the plastic sliding partner the roughness tips on the screw can become subject to abrasion due to the plastic sliding partner, so that new roughness tips constantly break off which avoids the smoothing of the screw surface.

Moreover, the metal particles remaining in the bearing seat cause additional wear.

Depending on the demand and the hardness of the employed slide bearing materials you can take the minimum required hardnesses in function of the ball indentation hardness of the slide bearing material from table 7.

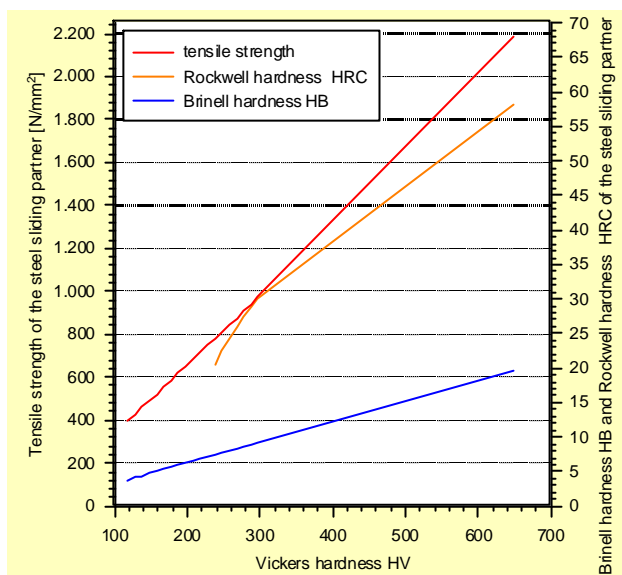
Material	Ball indentation hardness according to DIN -standard 53456 H358/30 [N/mm ²]
ZX-100A	92
ZX-100EL63	-
ZX-100K	136
ZX-100MT	153
ZX-324	174
ZX-324V1T	175
ZX-324V2T	175
ZX-324V3T	197
ZX-324VMT	231
ZX-410	159
ZX-530	136
ZX-550	34
ZX-720	-
ZX-750V1	-
ZX-750V2	202
ZX-750V3	-
ZX-750V4	-

Table 7 : Ball indentation hardness of ZX-materials



Ill. 12: Hardness of the counter-rotating material

Illustration 13 enables the conversion into the tensile strength and other hardness data of the metal sliding partners with adequate accuracy.



Ill. 13: Conversion Vickers hardness, Brinell hardness and tensile strength for steels approximately

Provided that dirt and abrasive particles can get into the bearing seat, the hardness of the counter-rotating material should be chosen harder than that of the abrasive particles. However, we recommend to use grooved slide bearing bushes as further precaution. See chapter 8.



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6.3. Surface quality of the metal sliding surface

In general, it applies to all alloys of the ZX-series: the smaller the roughness of the metal sliding surface, the lower the wear on the plastic sliding surface.

Furthermore, you must take into consideration that the machining grooves which resulted from the machining of the metal sliding surface possibly run in sliding direction.

Owing to the feed wear which enables a smoothing of the metal sliding surface, a regular sliding with minimum wear is already possible, when the surface quality of the metal sliding surface 2,0 µm Rz is not exceeded.

These surface qualities should always be applied, when slide bearings of the ZX-series must achieve a very long working life.

In practice, however, such high surface qualities are often not applied, because either the considerably high production cost is economically not justified or the extremely high life span of the bearing is not required.

In the field of mechanical engineering, a compromise surface roughness of the metal screw of 4 µm Rz has gained acceptance regarding production cost and working life of the slide bearing. This is why all laboratory and component tests quoted in this brochure have been carried out with a surface roughness of 4 µm Rz of the metal sliding surfaces.

7.Lubrication

A lubrication of slide bearings made from ZEDEX-materials is principally not required.

However, the efficiency of the bushings can be improved without negatively influencing the load-carrying capacity of the bearing.

Moreover, an unique initial lubrication may improve the feed performance of the slide bearing bushes.

7.1. Influence of lubrication

- ↪ reduction of friction
- ↪ reduction of wear
- ↪ lightening the feed phase
- ↪ avoiding tribocorrosion
- ↪ noise reduction
- ↪ reinforcement of shock absorption
- ↪ cooling the slide bearing by the lubricant
- ↪ protecting the metal parts against corrosion
- ↪ sealing the bearing seat

In most cases of application a lubrication of the ZX-materials has turned out to be superfluous, often an omission of lubrication has even been required.

7.2. Influence of temperature on the lubricants

7.2.1.Viscosity

With increasing temperature the viscosity of lubricants is reduced. They show low viscosity.

Depending on the chemical composition of the lubricant the influence of temperature is more or less strong. At temperatures of 200 °C many lubricants only achieve the viscosity of water, that means they are very runny. Owing to this viscosity reduction typical problems can arise, especially in the field of hydrodynamic lubrication and flat-run behaviour.

7.2.2.Surface tension

Lubricants have different surface tensions depending on their chemical composition. The surface tension is a measure of the wetting properties of the lubricants on the respective bearing or screw material. A low surface tension enables a very good wetting, but also a creeping and migration of the lubricant out of the bearing seat. Whereas a high surface tension on the one hand creates drooling and bad wetting, but on the other hand reduces the lubricant dissipation and guarantees lubrication during the whole working life. Apart from the dependence on the lubricant, the surface tension is strongly dependent on the temperature. With increasing temperature the surface tension decreases. The wetting becomes better, the bonding becomes worse. In combination with the decreasing viscosity due to the increase of temperature, oils can quickly moisten wide ambient ranges of bearing seats at high temperatures. This causes a reduction of the lubricant quantity inside the bearing gap and therefore a reduction of the working life and/or a noise increase. These processes are irreversible. After the oil has chilled, the migrated area remains wet. The oil does not flow back into the capillary gap of the bearing. Owing to the fact that this process carries on with every new heating-up, you have to take care when operating at high temperatures.

Normally, synthetic lubricants as for example ester are well adhesive at room temperature. However, at temperatures exceeding 100 °C the surface tension decreases to the range of silicone oils. In this case the apparent surface tension of the solid is higher than that of the lubricant. This enables a complete wetting of the reachable surface element. The component and casing surfaces are coated in this case with a closed lubricating film, which can cause drastic lubricant dissipations inside the bearing itself. Due to these migration and wetting processes, great distances can be covered. Leakage currents of some ten centimetres have been ascertained.

This also enables lubricants to advance to component ranges, where they are unwelcome, e.g. electric contacts, casing sealings, electronic components, optical systems etc. In any case this creeping causes



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lubricant dissipation and therefore deficient lubrication.

7.2.3. Evaporation

All lubricants have a steam pressure depending on their chemical composition. That means, every lubricant emits in certain limits and to a certain extent molecules to the surrounding atmosphere. This process is influenced by the ambient pressure and the ambient temperature. A low ambient pressure leads to a quicker evaporation. In some cases the boiling range of lubricants with a low viscosity can be exceeded. But modern lubricants can achieve considerable evaporation rates also without boiling the fluid. These evaporation rates can cause lubricant dissipations of several percent per day, if the systems are not closed and sealed. Apart from the temperature and the atmospheric pressure, this process depends on the free surface. Here are especially sensitive oil films developed by means of migration. In this case a very big evaporated area faces a very low quantity of lubricants. This leads to very quick evaporation processes in these ranges. The reinforcements into the evaporated surfaces ensues by means of capillary effects released inside the roughnesses of the surfaces themselves.

7.2.4. Ageing

With increasing temperature lubricants become chemically more reactive in the presence of oxygen. The chemical processes which run very slowly at room temperature are drastically speeded up with increasing temperature. Here applies the van t'Hoff rule, according to which the reaction rate of a chemical reaction is increased two to four times by means of a raising of temperature by 10 K. Thus the reaction rate is 2^{18} (260000) times quicker at 200 °C than at 20 °C. In practice this means that when operating at room temperature we achieve a working life of 20 years, whereas at a temperature of 200 °C we achieve a working life of almost 1 hour. The lubricants change their chemical composition, the viscosity and the neutralising or acid value increase and additives are decomposed in every case. Especially the viscosity increase (oxidative polymerisation) drastically changes the characteristics of the lubricant. Some lubricants which are long-term exposed to high ambient temperatures are transformed into sticky material, rubber-like substances or tar- and asphalt-like products. These lubricants are consequently no longer erational for bearing systems at low temperatures.

7.2.5. Yield point of greases

When operating with greases at high temperatures, the thickener which is in most cases a metal soap starts to melt. The lubricant loses its internal structure and becomes completely liquid. In general this process is reversible, however, operations at temperatures exceeding the melting point of the thickener may create spontaneous flat-running.

High temperature applications thus require the constructive guarantee that sufficient quantities of lubricants are provided in the area of tribological stressed elements.

We recommend the constructive installation of oil pools and oil barriers or the epilamination of the component surfaces in order to reduce the migration of the oil out of the bearing seat.

7.3. Lubricants

7.3.1. Lubricating oils

According to their origin lubricants can be subdivided into:

- mineral oils
- animal and vegetable oils
- synthetic oils
- other, e.g. water

Mineral oils which can be extracted from petroleum and partly from coal have the biggest importance. They consist of paraffine, naphthene and aromatic solvents. Animal and vegetable oils such as castor oil, fish oil, olive oil a.o. are used for special applications, e.g. in the field of precision engineering.

The lubricants must have a whole lot of physical and chemical properties in order to be able to fulfil their complex tasks.

The viscosity is of decisive importance when achieving a hydrodynamic or elastohydrodynamic lubricating condition; it is a measure of the internal friction of the lubricating oil. Often so-called additives are added to lubricating oils in order to make them able to fulfil their function when operating subject to high, complex stress over a long-term period. The most important lubricant additives are quoted with their tasks, active substances and modes of action in table 8.



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Additive	Task	Active substances	Mode of action
viscosity index improvement (VI-improvement)	reduction of viscosity decrease with increasing temperature	polymerised olefins and isoolefin, polymetacrylates, polyacetylenes a.o.	extension of muddled molecules with increasing temperature
pour point reduction	prevention of jam (non-flow at low temperature)	condensation products of chlorinated paraffine and naphthalene, polymetacrylate a.o.	adsorption on the surface of the paraffine crystals, hindrance of the growth of paraffine crystals
high pressure additives (EP-additives) anti-wear additives	prevention of gubbling -up or of adhesive wear due to high stress	organic sulphur-, phosphorus- and chlorine compounds and their combinations a.o.	formation of reactive layers on the tribologically stressed surfaces
reduction of friction	reduction of the coefficient of sliding friction	fatty acids, fatty acid esters, fatty acid amides, fatty acid salts a.o.	formation of adsorbent and reactive layers on the tribologically stressed surfaces
corrosion inhibitors	restriction of corrosion of metallic materials	fatty acids, nitrogen-, phosphorus- and sulphur compounds a.o.	formation of protective layers which disturb the admission of oxygen and water to the metal surface
oxidation inhibitors	reduction of oxidation of lubricating oils	sulphur- and phosphorus compounds, phenol derivatives, amines a.o.	interruption of the free-radical chain of oxidation
detergents	prevention of segregation on material surfaces	organo-metallic compounds such as phenolates, sulphonates, phosphates, naphthenters a.o.	prevention of the coagulation of oxidation products
dispersants	prevention of cold mud formation	amides, imides of polybasic organic acids	peptisation of oil-insoluble oxidation products
demulsifying agents	separation of oil and water	polar, surface active compounds	increase of the interfacial surface tension between oil and water
emulsifying agents	formation of emulsions (for colling lubricants)	alkaline salts of carboxylic acids a.o.	decrease of the interfacial surface tension between oil and water
foam preventive methods	prevention of foam formation	silicone polymers a.o.	destruction of oil skin which surround the air bubbles

Table 8: Lubricant additives



Lubricating greases

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7.3.2.Lubricating greases

Lubricating greases consist of a lubricating oil without or with additives and a soap in function of a thickening agent.

In general, the soap forms a fibrous skeleton which keeps the lubricating oil. Depending on the kind of soap we distinguish between sodium greases, lithium greases, calcium greases, aluminium greases, barium greases and complex greases.

	sodium grease	lithium grease	calcium grease	calcium complex grease	bentonite
thickener shape	fiber	fiber	fiber	fiber	platelet
fiber length μm	100	25	1	1	0.5
fiber diameter μm	1	0.2	0.1	0.1	0.1
shortened form	long fibrous	medium fibrous	short fibrous	short fibrous	short fibrous
properties					
drop point $^{\circ}\text{C}$	150 -200	170 - 220	80 -100	250 - 300	round 300
working temperature					
upper $^{\circ}\text{C}$	+120	+140	+60	+100	+150
under $^{\circ}\text{C}$	-30	-40	-35	-30	-20
water resistance	not resistant	good	very good	very good	good
worked resistance 0,1mm	60 - 100	30 - 60	30 -60	<30	30 - 60
corrosion protection	good	very bad	bad	bad	good
maximum working speed mn/min	150 - 250	200 - 250	150 - 200	> 250	
employment					
suitability for anti-friction bearings	good	very good	limited	limited	very good
suitability for slide bearings	good	good	limited		good
main application	transmission grease	general purpose grease		general purpose grease	high temperature grease
price	average	high	low	very high	very high

Table 9: Properties of lubricating greases

7.3.3.Solid lubricants

Solid lubricants are frequently employed for lubrications on extreme conditions e.g. at very high or very low temperatures, in aggressive chemicals, in vacuum or on conditions which do not permit a lubrication with oils or greases for reasons of service engineering, safety engineering, environmental technology or healthy.

When lubricating with solid lubricants the slide bearing mostly works in the area of mixed friction, so that when operating with e.g. metallic bearings only the emergency running properties improve.



7.4. Recommendation of lubricants

Owing to the fact that ZEDEX-materials are resistant to the usual lubricants you can, if required, unhesitatingly lubricate with water or all usual mineral oils, sliding paints (see chapter 6.1.4.), greases and pastes.

We recommend pastes and on top of them oils for applications with sliding speeds below 10 m/min. Lubricants with MoS₂ in function of a solid lubricant should not be used.

For applications at temperatures exceeding 100 °C we recommend a lubrication with perfluorinated polyalkylether in the form of oil or paste (e.g. Gleitmo 591 by Fa. Fuchs Lubritech, D-67685 Weilerbach).

At any rate we recommend to check possible interactions between the lubricant and the contacted components before lubrication.

7.5. Lubricating groove design

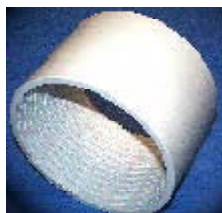
Owing to the fact that ZEDEX-materials are machinable without any problems all lubricating groove designs and geometries are possible.

The DIN-standards 1591 and 1850 part 2 quote possible designs. You should preferably use simple axial grooves (design form J). For applications subject to oscillating movement the bushings should be provided with at least four axial grooves.

7.5.1. Grooves installed in hydrodynamically operated slide bearings

Grooves installed in slide bearings running under hydrodynamic circumstances and subject to oil lubrication should not be arranged in the area of compression zone. This does not apply for slide bearings used for turbines and pumps (due to the necessary industrial water lubrication). In these cases of application the bushings show a grooved structure also in the compression zone.

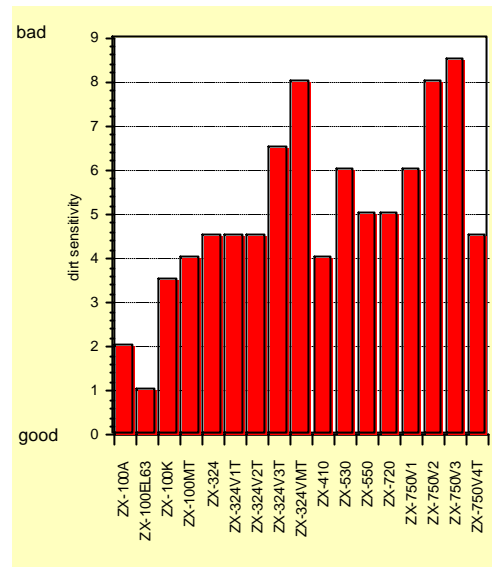
The grooved structure of the bushing removes possible abrasive particles contained in the industrial water and enables a big volume flow rate of the industrial water through the bearing, so that a strong cooling as well as an extremely long working life is achieved. When operating with big screw diameters (exceeding 250 mm) the bearing should be constructed in form of a bar bearing.



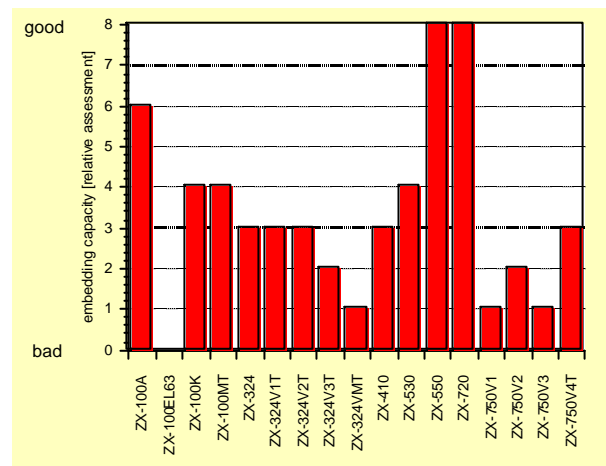
Ill.14: Slide bearing bush with grooves for turbines

8.Dirt and abrasive particles

In case a slide bearing is subject to small quantities of dirt or abrasive particles getting into the bearing seat, you should use ZX-materials of a low dirt sensitivity and a high embedding capacity, because embedded abrasive particles cause less damage inside the bearing than those rotating with the screw.



Ill.15: Dirt sensitivity



Ill.16: Embedding capacity (relative assessment)

In case a slide bearing is subject to bigger quantities of abrasive particles getting into the bearing seat, you should additionally use dirt grooves. These dirt grooves absorb the harmful particles, separate them from the sliding surface and take them away from the bearing. Concerning the optimum groove design please contact our application research department.

In both cases we recommend either to use a hard screw or a bearing which is sealed by means of grease lubrication.



9. Damping

The ZEDEX-materials show a very high mechanical damping (ZX-100K 5%-18% depending on the exciting frequency).

The loss factor of ZEDEX-materials, which is a measure of the mechanical damping, is extensively independent on the material thickness. However, for physical reasons we recommend to choose a smaller material thickness when requiring a high rigidity, for the rigidity increases with constant elastic modulus and constant area. By means of an additional oil film without any lubrication function the rigidity is considerably increased. Tests have revealed that the loss factor can be increased by about 300 % when using an additional oil film.

10. Environmental influences

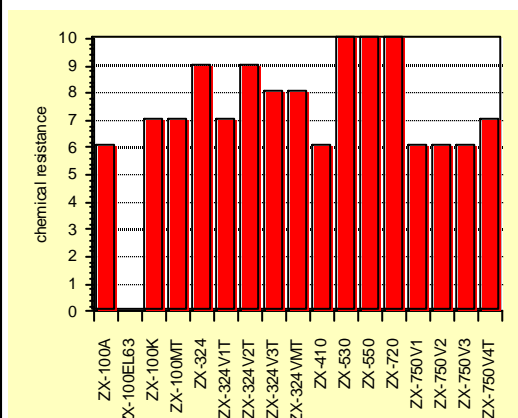
10.1. Chemicals

The chemical resistance should not be confused with the stress cracking sensitivity.

Stress cracking sensitivity means the accelerated breakage or cracking which is caused by the influence of certain chemicals on mechanically stressed components. Just mechanical tensions or just reacting chemicals do not cause such damages, only after a much longer period of time (see chapter 10.2.).

Illustration 17 shows a general chemical resistance comparison of ZX-materials for a better clarity.

Please take a detailed list of the chemical resistances from our folders about "semi-finished products" which we willingly send you upon request or use our chemical resistance program disc which we have enclosed.



Ill. 17: Chemical resistance

10.2. Stress crack formation

In view of chemistry thermoplastic materials are in general more similar to lubricants than metals. This often leads to chemical interactions between lubricants and thermoplastics, especially elastomers.

These interactions can be:

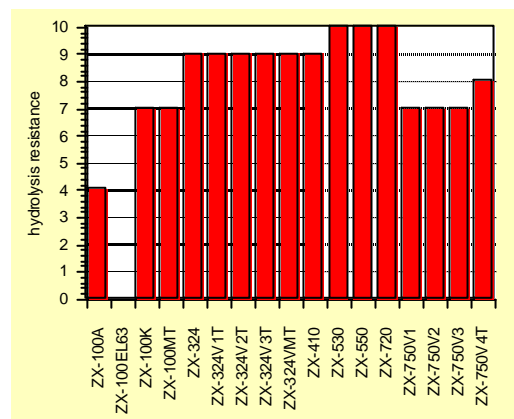
swelling, shrinkage, embrittlement, dissolution and, which is very important, stress crack formation. Especially amorphous, that is not crystalline or partly crystalline thermoplastics tend towards stress crack formation at higher temperatures and in contact with lubricants. Static or dynamic stress causes cracks which start from the surface skin and run vertically through the component and normally even reach the neutral fiber. If this neutral phase is broken also the component breaks spontaneously, this is particularly important when components and casings are combined by means of snap-in joints.

The stress crack sensitivity and the occurrence of stress crack formation can be evaluated in accordance with outer fiber strain.

10.3. Hydrolysis resistance

Water or room temperature have neither any chemical nor physical effect. The ZX-materials almost do not absorb any water. The water absorbed does not act as a plasticiser.

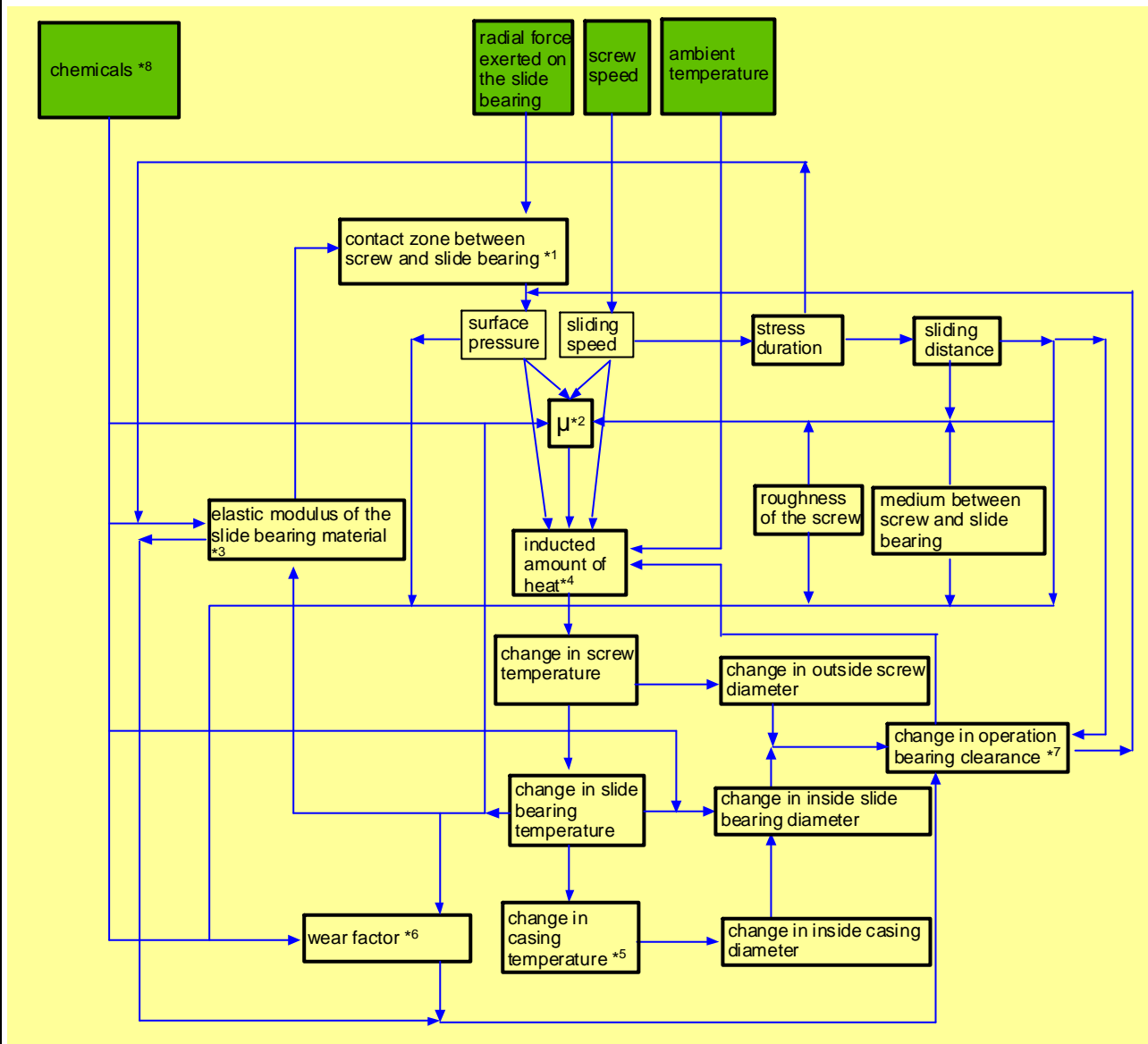
However, some ZX-materials are not resistant to hot water, for they are like other polycondensation products sensitive to hydrolysis and gradually embrittle.



Ill. 18: Hydrolysis resistance

11. Correlations on slide bearing operation

The following illustration shows the courses and the direct and indirect correlations (influences) on slide bearing operation represented by arrows.



Ill. 19 : Correlations on slide bearing operation

Abbreviations:

***1:** *contact zone between screw and slide bearing*

dependent on the radial force, the operation bearing clearance and the elastic modulus of the slide bearing material, because e.g. a low elastic modulus causes a deeper subsiding of the screw into the slide bearing and therefore an increase of the contact zone.

***2:** *coefficient of friction of the system screw- intermedium-slide bearing* dependent on:

- the surface pressure:

the coefficient of friction of most polymers decreases with increasing surface pressure (see ill. 41)

- the sliding speed:

the coefficient of friction μ_{stat} of most polymers is bigger than the coefficient of friction μ_{dyn} .

The dynamic coefficient of friction of anti-adhesive polymers (PTFE) is directly in proportion to the sliding speed. This influence of the sliding speed on the dynamic coefficient of friction can be ignored with most polymers.



Correlations on slide bearing operation

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- the temperature of the sliding surface:
 the coefficient of friction of most polymers increases with increasing temperature.
 the coefficient of friction of some materials e.g. ZX-324VMT decreases with increasing temperature (see ill. 64).

- the roughness of the screw:
 for some polymers correlations with the roughness have been ascertained, so that those polymers show an optimum roughness zone.

- the intermedium:
 depending on the intermedium the sliding partners become more or less separated.
 in case of hydrodynamics (e.g. due to highly viscous chemicals) the sliding partners become completely separated and there is pure liquid friction. Whereas lower viscous chemicals (e.g. water) often cause mixing friction, so that hydrodynamic conditions can hardly be achieved.

- the sliding distance:
 the dynamic coefficient of friction of almost every polymer decreases with increasing sliding distance which is due to the smoothing (see chapter 6.2).
 Whereas the static coefficient of friction increases with increasing sliding distance, because the adhesive friction is also increased due to the steadily increasing contact zone.

***3: Elastic modulus of the slide bearing material:**
 is for all polymers dependent on the temperature.
 Owing to the fact that polymers have viscoelastic properties, the **elastic modulus** depends also on the time which is called creep behaviour (see ill. 33-35).
 Moreover, chemicals affecting the polymer also have an influence on the elastic modulus.

***4: Inducted amount of heat to the system**
 is composed of the friction heat (drive energy converted due to internal and external friction of the slide bearing), the surrounding heat and eventually further side sources of heat (gear wheels, motors, ...)

***5: Change in slide bearing temperature**
 the temperature changes of the screw, the slide bearing and the slide bearing casing are dependent on the friction power Q introduced and the amount of heat which is carried off over the screw and the casing. Initially the heat is carried off only over the screw for the plastic slide bearing works as insulator. This process creates the so-called flash temperature (see ill.114, page 73). With increasing time of operation this temperature decreases to the operating temperature (caused by the temporally belated additional heat flow running over the slide bearing and the casing). The bigger the sliding speed the bigger the difference between flash temperature and operating temperature; therefore fast-running slide bearings quickly achieve dangerously high flash temperatures. Which contents of thermal energy are carried off over the screw or the casing on steady operation (when achieving the operating temperature) depend on the construction of the screw, the casing and the slide bearing (e.g. screw length, screw diameter, bushing width, wall thickness of the bushing, outside diameter of the slide bearing casing) and on the fact that the slide bearing casing is standing and the screw is rotating or vice versa (see chapter 5.1.1.3).

***6: The wear factor of the slide bearing material is dependent on:**

- the sliding distance
- the surface pressure (see ill. 32)
- the temperature (see ill. 31)
- the roughness (see ill. 30)
- the intermedium (dry run, solid friction, mixing friction, hydrodynamic lubrication)

***7: The change in operation bearing clearance depends on:**
 dimensional changes (thermal expansions), caused by changes in temperature of the screw, the casing and the slide bearing. Furthermore, *the change in operating bearing clearance* of hygroscopic polymers depends on the moisture content of the polymer (e.g. polyamide). This influence can be ignored with all ZEDEX-materials owing to their low water absorption (see table 2, page 10 "water absorption")

***8: Influence of eventually extant chemicals:**
 (or hot water) which can be affect the polymers



12. Construction and material selection of a radial slide bearing

12.1. Calculation by means of electronic data-processing

By means of electronic data-processing we are able to consider exactly the occurring stress on a slide bearing and the changing parameters on slide bearing operation such as temperature, strength, bearing clearance, friction and wear. With regard to the finite element method very reliable load-carrying capacity calculations can be effected. The aim of this calculation is to ascertain an optimum material selection on the given conditions of stress with a final estimation of temperature and working life. Please contact our application research department for an exact calculation of construction, load-carrying capacity and working life.

In order to guarantee a quick and exact calculation we ask you to complete the questionnaire enclosed and to send it back to us by fax.

12.2. Calculation by the constructeur

In the following we present you a calculation algorithm, by means of which the constructor can quickly and easily effect a rough calculation of a radial slide bearing. The aim of this mathematical equation is to select the optimum material and to check the general suitability.

In order to effect a quick calculation we ask you to use the mathematical model shown in the diagrams 1 to 3. This model has also been applied to the mathematical example given in chapter 13.



Flow diagram used for slide bearing calculation part 1

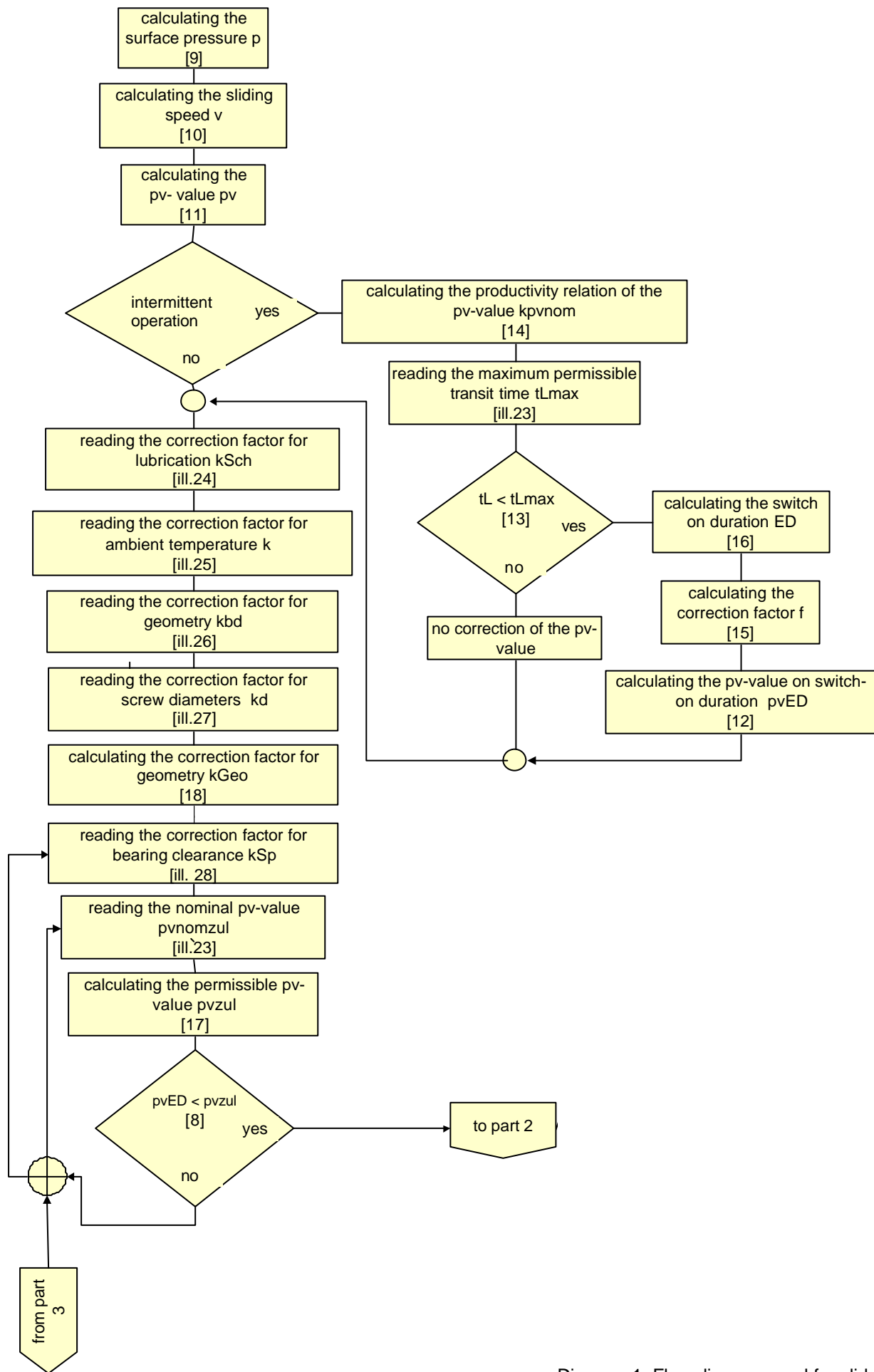


Diagram 1: Flow diagram used for slide bearing calculation part 1

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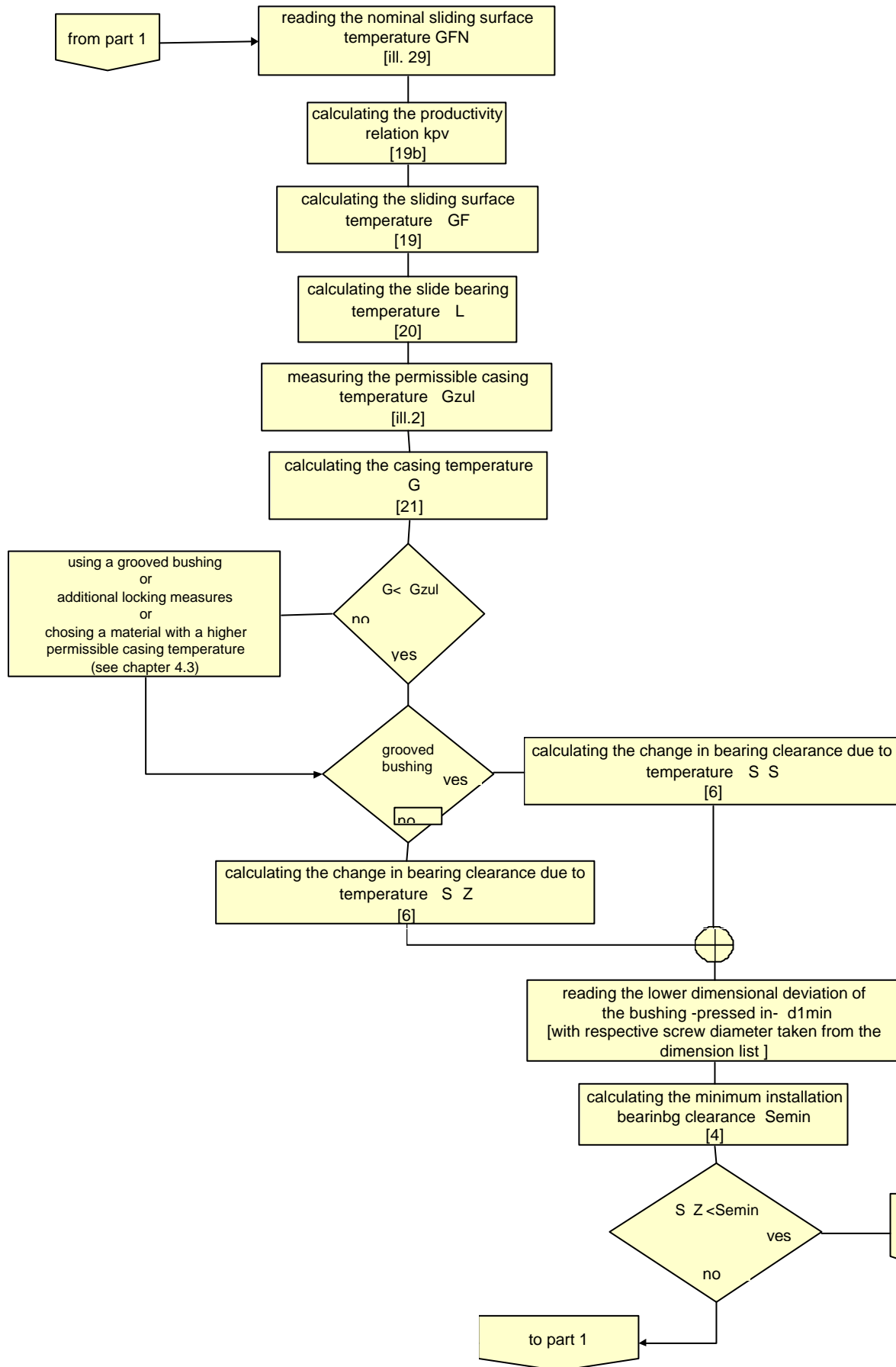
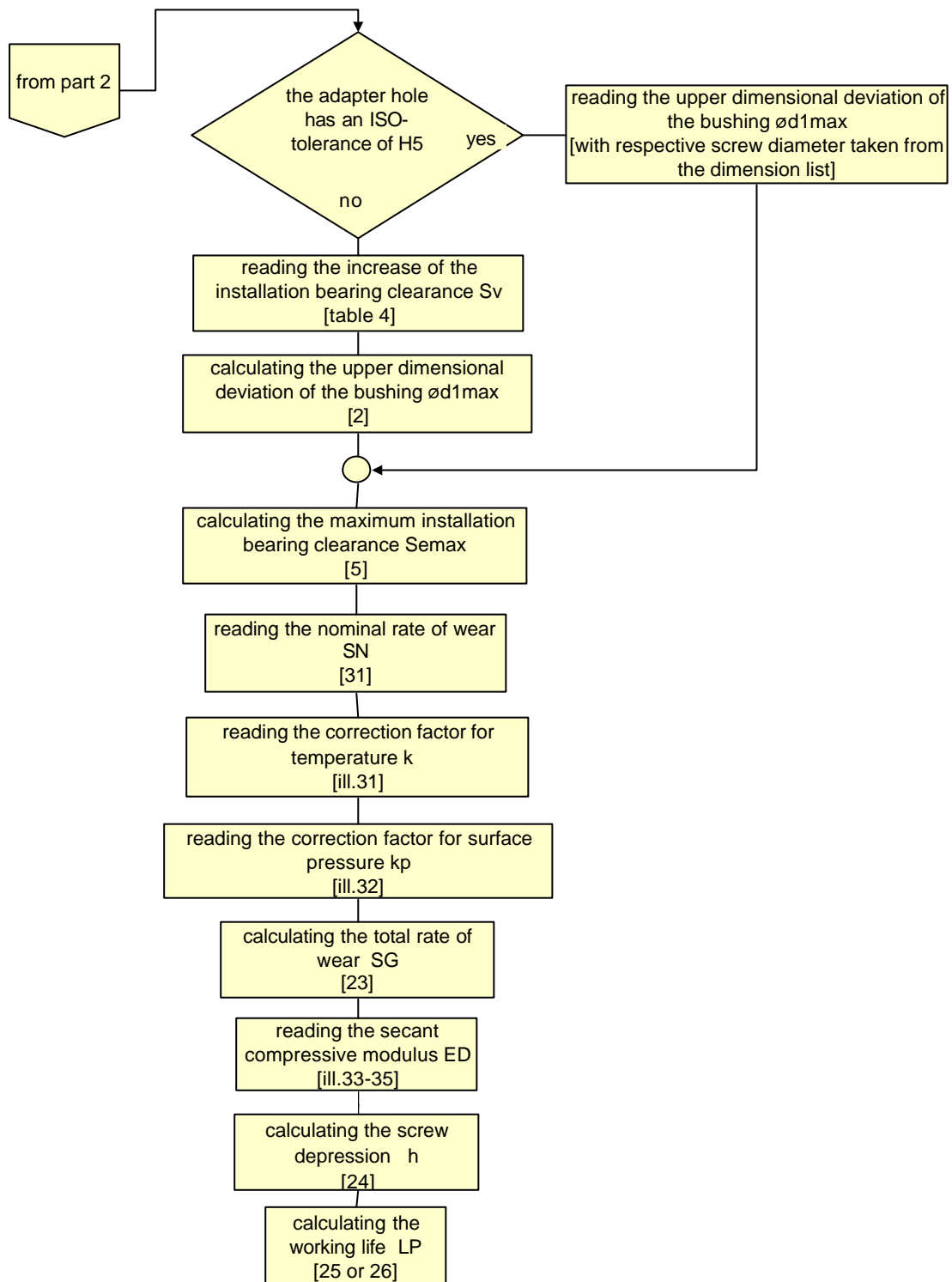


Diagram 2: Flow diagram used for slide bearing calculation part 2



Flow diagram used for slide bearing calculation part 3



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Diagram 3: Flow diagram used for slide bearing calculation part 3



Appearing pv-value

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12.2.1. pv-value check

In order to ascertain the occurring stress exerted on the slide bearing we have to calculate the pv-value. The pv-value reflects the power density inducted into the system casing-slide bearing-screw. The following condition must be complied in order to avoid a thermal overloading of the slide bearing:

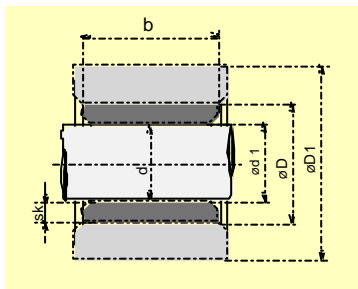
$$pv_{ED} \leq pv_{zul} \quad [8]$$

in which:

pv_{ED} = appearing pv-value [N/mm² • m/min]
 pv_{zul} = permissible pv-value [N/mm² • m/min]

12.2.1.1. pv-value (pv) of the radial slide bearing

12.2.1.1.1. Surface pressure



Ill. 20 Dimensions of the radial slide bearing

$$p = \frac{F}{b \cdot d} \quad [9]$$

in which:

p = medium surface pressure [N/mm²]
F = radial stress exerted on the slide bearing [N]
b = width of the slide bearing [mm]
d = screw diameter [mm]

12.2.1.1.2. Sliding speed

The sliding speed occurring between the screw and the slide bearing surface can be calculated according to formula (10).

$$v = \frac{d \cdot n}{1000} \quad [10]$$

in which:

v = occurring sliding speed [m/min]
d = screw diameter [mm]
n = screw speed [min⁻¹]

12.2.1.1.3. Maximum pv-value

$$pv = p \cdot v \quad [11]$$

in which:

pv = maximum pv-value [N/mm² • m/min]
p = surface pressure taken from 12.2.1.1.1 [N/mm²]
v = sliding speed taken from 12.2.1.1.2. [m/min]

12.2.1.1.4. Appearing pv-value pv_{ED}

The pv-value (pv_{ED}) appearing on respective switch-on duration (ED) can be calculated according to formula (12).

$$pv_{ED} = p \cdot v \cdot f \quad [12]$$

in which:

pv_{ED} = appearing pv-value [N/mm² • m/min]
p = surface pressure taken from 12.2.1.1.1. [N/mm²]
v = sliding speed taken from 12.2.1.1.2. [m/min]
f = correction factor for switch-on duration taken from 12.2.1.1.4.1. [-]

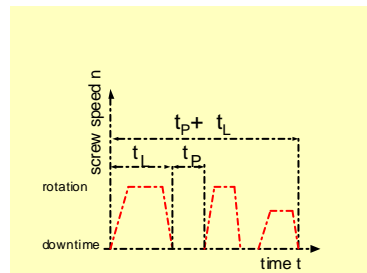
12.2.1.1.4.1. Correction factor f for intermittent operation

On intermittent operation the energy inducted into the system is reduced, so that the appearing pv-value can be corrected downwards. The correction factor f should only be applied when the following condition (13) is completed:

$$t_L < t_{Lmax} \quad [13]$$

in which:

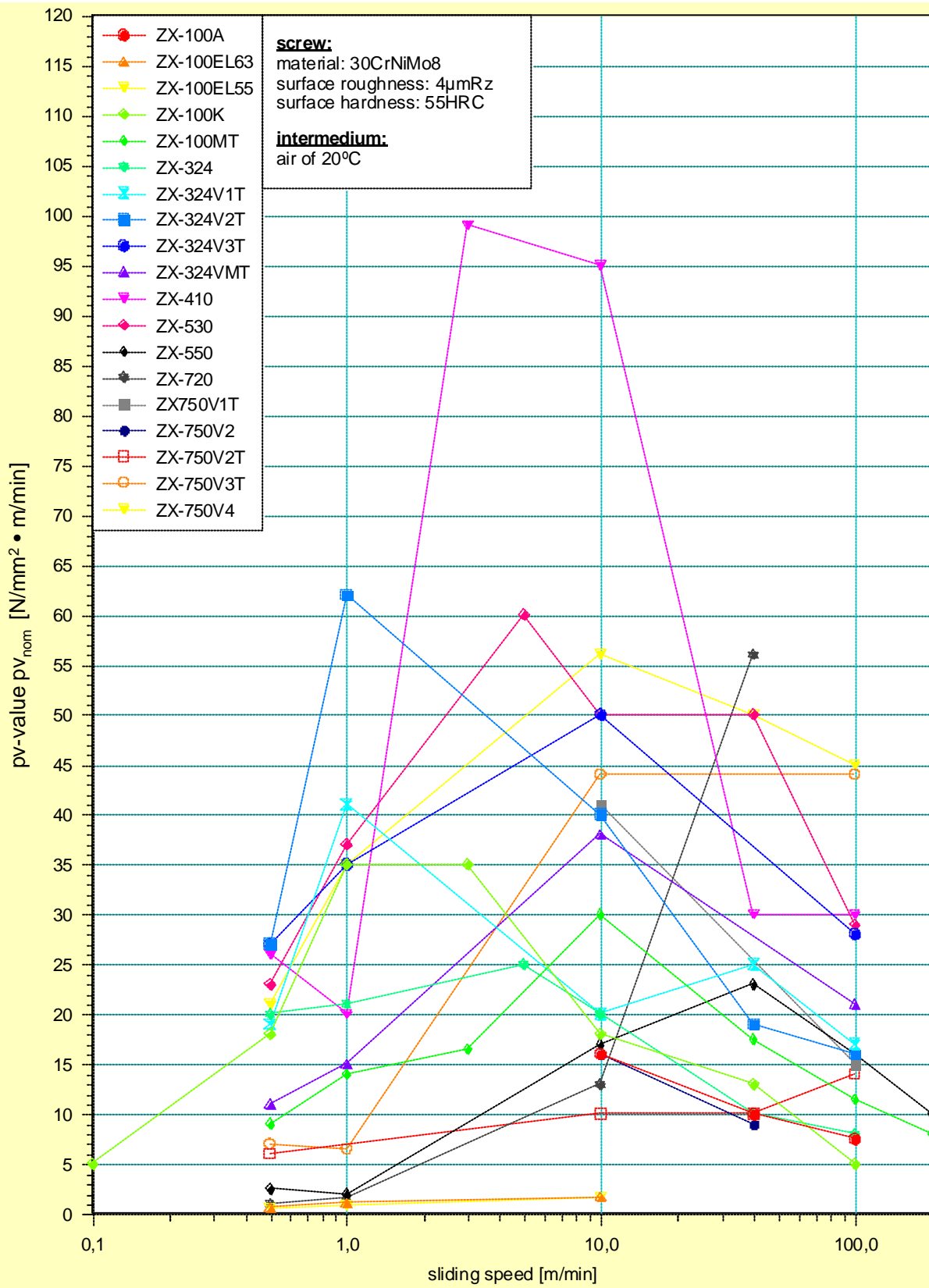
t_L = transit time [s]
 t_{Lmax} = max. permissible transit time taken from [s] ill. 23



Ill. 21: Exemplary course of screw speed above the time t



Permissible pv-value



III. 22: Permissible pv-value for ZX-materials

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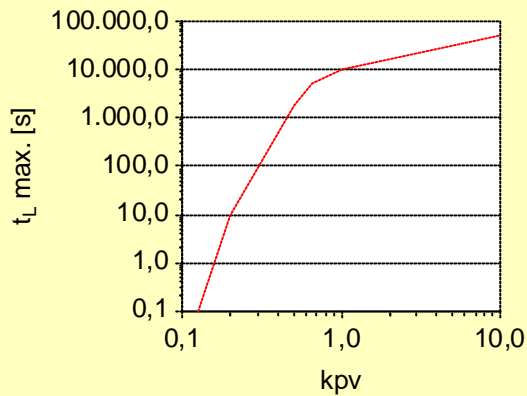
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Permissible pv-value



$$kp v_{nom} = \frac{pv_{nomzul}}{pv} \quad [14]$$

in which:

pv_{nomzul} = permissible nominal pv-value taken from ill.22 [N/mm * m/min]

pv = pv-value taken from equation 11 [N/mm * m/min]

Ill.23: Max. permissible transit time t_{Lmax}

The correction factor f can be calculated according to formula (15), so that the corrected pv-value can be calculated according to formula (14).

$$f = 0,02 \quad ED - (0,0001 \quad ED^2) \quad [15]$$

in which:

$$ED = \frac{t_L [s]}{t_L + t_p [s]} \cdot 100 \quad [%] \quad [16]$$

t_L = taken from ill.21

t_p = taken from ill.21

12.2.1.2 Permissible pv-value (pv_{zul}) of the radial slide bearing

The permissible pv-value of a radial slide bearing can be calculated according to formula (17).

$$pv_{zul} = pv_{nomzul} \cdot k_{sch} \cdot k \cdot k_{Geo} \cdot k_{Sp} \quad [17]$$

in which:

k_{sch} = correction factor for lubrication taken from 12.2.1.2.1

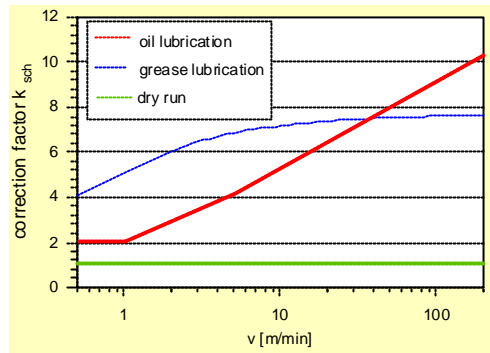
pv_{nomzul} = permissible nominal pv-value [N/mm² * m/min] taken from ill. 22

k_{Geo} = correction factor for geometry taken from 12.2.1.2.3

k_{Sp} = correction factor for bearing clearance taken from 12.2.1.2.4

12.2.1.2.1. Correction factor for lubrication k_{sch}

The correction factor for lubrication k_{sch} can be taken from ill. 24 in accordance with the sliding speed and the lubricant.

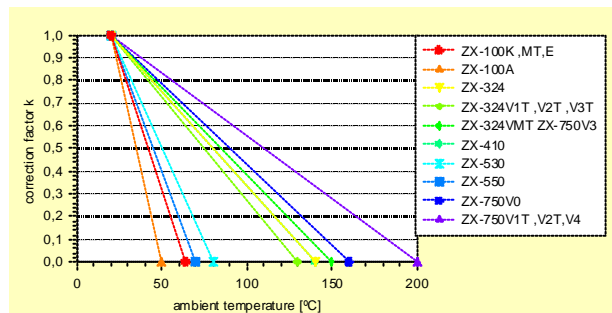


Ill. 24: Correction factor k_{sch}

12.2.1.2.2. Correction factor for ambient temperature

The correction factor considers an ambient temperature deviating from 20°C for bushings which should be fixed into the casing hole by means of simple pressing. **For bushing which are not pressed in (e.g. swimming or bonding bushings) the correction factor k is always = 1.**

The correction factor k can be taken from ill. 25 in function of the ambient temperature with a respective material.



Ill. 25: Correction factor k

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12.2.1.2.3. Correction factor for geometry k_{Geo}

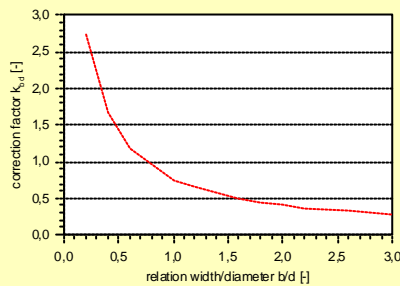
The correction factor k_{Geo} considers the geometry of the slide bearing and is calculated according to formula (18).

$$k_{Geo} = k_{bd} \cdot k_d \quad [18]$$

in which:

k_{bd} = taken from ill. 26

k_d = correction factor for screw diameter taken from ill. 27 [-]

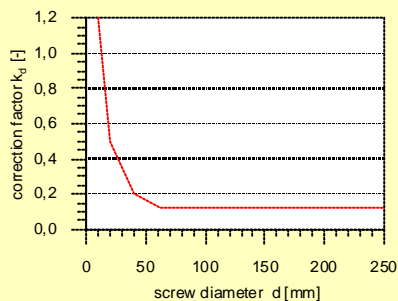


in which:

b = bearing width [mm]

d = screw diameter [mm]

Ill.26: Correction factor k_{bd}

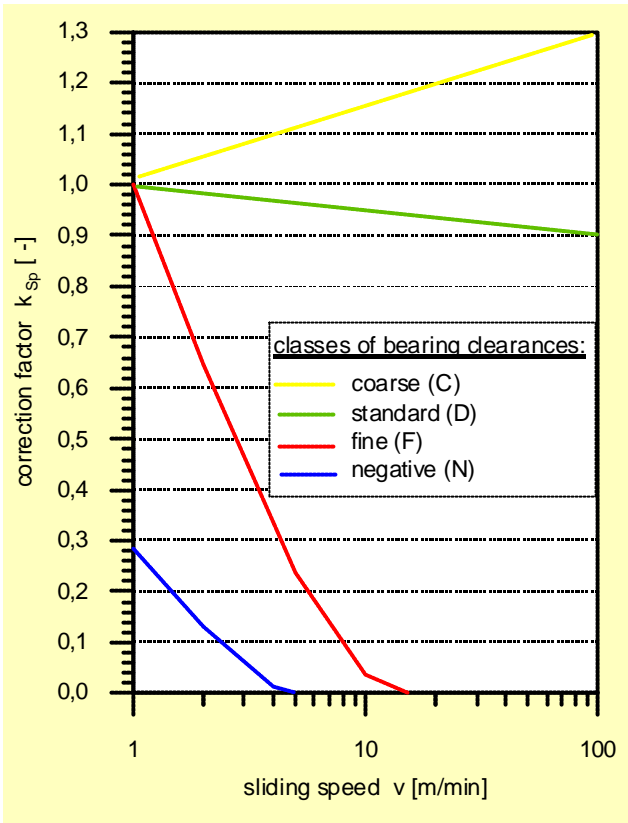


Ill.27: Correction factor k_d

12.2.1.2.4. Correction factor k_{Sp} for installation bearing clearance

The correction factor (k_{Sp}) for installation bearing clearance can be taken from ill.28 in accordance with the class of bearing clearances.

A reduced bearing clearance is only possible with sliding speeds up to 15 m/min.



Ill.28: Correction factor k_{Sp}



Temperature of the sliding surface and the slide bearing

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12.2.2. Assessment of the emerging temperatures for usual constructions

12.2.2.1. Temperature of the sliding surface

For usual constructions the emerging temperature of the sliding surface is calculated according to formula (19).

$$GF = \frac{GF_N}{k_{pv}} + \text{amb} - 20^\circ\text{C} \quad [19]$$

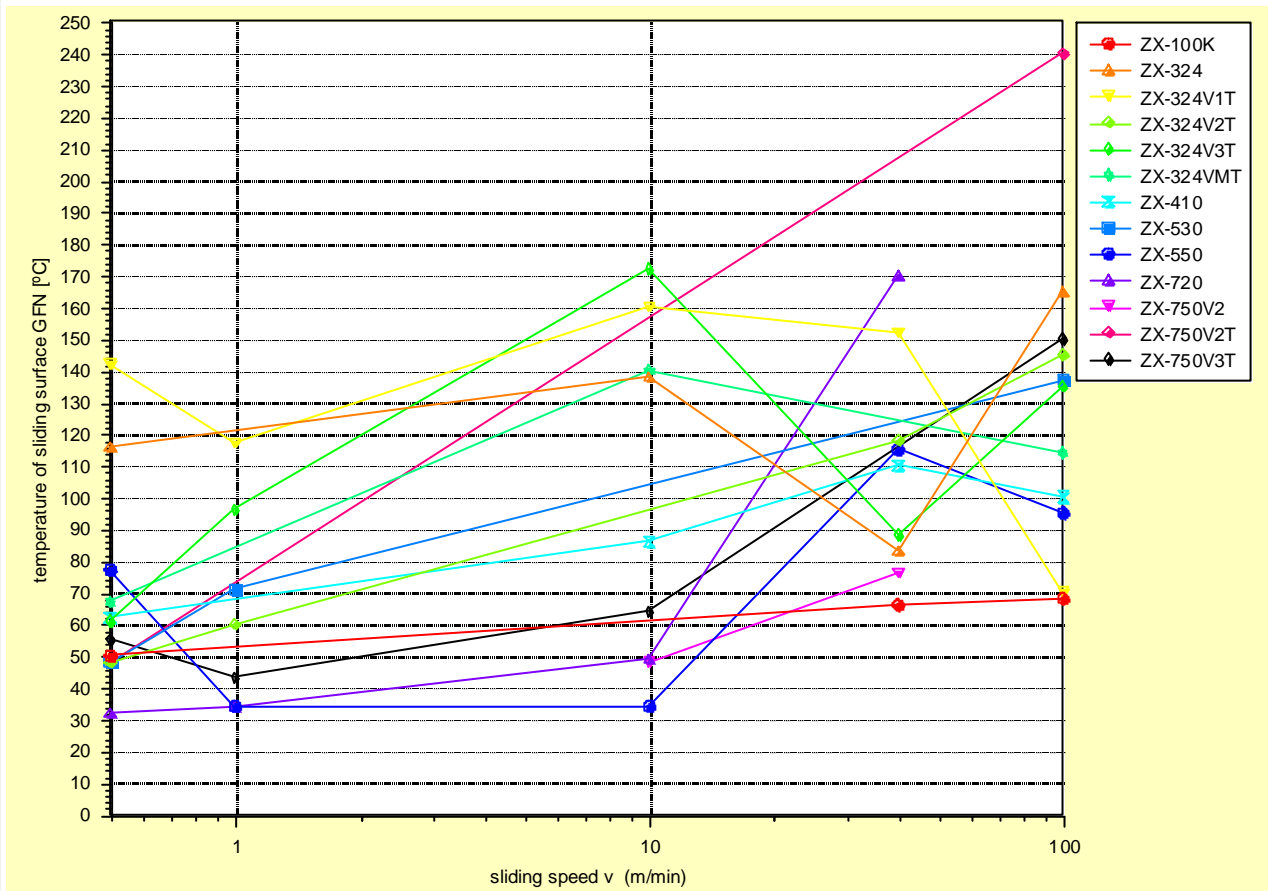
in which:

- GF = emerging temperature of sliding surface [°C]
- GF_N = temperature of sliding surface taken from ill.29 [°C]
- k_{pv} = taken from formula [19b]
- amb = ambient temperature [°C]

$$k_{pv} = \frac{pv_{zul}}{pv_{ED}} \quad [19b]$$

in which:

- pv_{zul} = permissible pv-value taken from [17] [N/mm * m/min]
- pv_{ED} = emerging üv-value taken from [12] [N/mm * m/min]



Ill. 29: Development of temperature on the sliding surface with maximum pv-value for usual constructions

12.2.2.2. Temperature of the slide bearing

The temperature of the slide bearing (measured inside the diameter of the slide bearing) is calculated according to formula (20).

$$L = \frac{GF + \text{amb}}{2} \quad [20]$$

in which:

- GF = emerging temperature of sliding surface [°C]
- L = emerging temperature of slide bearing [°C]
- amb = ambient temperature [°C]



Temperature of the slide bearing casing

12.2.2.3. Attachment check

First the emerging casing temperature must be estimated according to formula (21) in order to check the fixing manner of the slide bearing bush.

$$G = \frac{L + \text{amb}}{2} \quad [21]$$

in which:

- G = emerging temperature of casing [°C]
- L = emerging temperature of slide bearing [°C]
- amb = ambient temperature [°C]

In order to achieve a permanent attachment of the slide bearing bush by means of pressing the condition (22) must be completed.

$$G < G_{zul} \quad [22]$$

in which:

- G = emerging temperature of casing [°C]
- G_{zul} = permissible temperature of casing [°C] taken from ill.2

When exceeding this temperature the slide bearing bush must be provided with additional locking measures -see chapter 4.1.4.

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12.2.3. Assessment of working life

In order to calculate the working life the total wear rate S_G must be ascertained first.

The total wear rate contains the influence of the sliding surface temperature, the surface roughness of the screw and the surface pressure.

12.2.3.1. Total wear rate

The total wear rate S_G is calculated by means of formula [23].

$$S_G = S_N \cdot k \cdot k_p \quad [23]$$

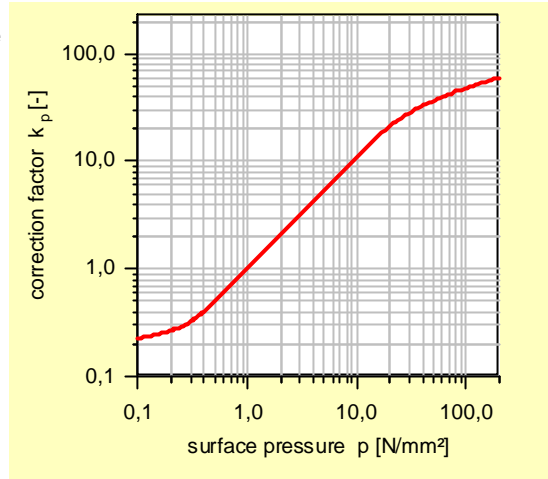
in which:

S_G = total wear rate [$\mu\text{m}/\text{km}$]

S_N = nominal wear rate [$\mu\text{m}/\text{km}$] taken from ill.30

k = correction factor for the sliding surface temperature taken from ill.31 with t_{GF} taken from chapter 12.2.2.1

k_p = correction factor for the surface pressure taken from ill.32 with p taken from formula [9]



Ill. 32: Correction factor k_p

12.2.3.2. Screw cavity

Owing to the viscoelastic properties of polymers the screw countersinks in course of time by means of influencing compressive stress and temperature. As a result the surface pressure decreases and the bearing clearance increases. The approximate screw cavity is calculated by means of formula (24).

$$h = \frac{p \cdot sk}{E_D} \quad [24]$$

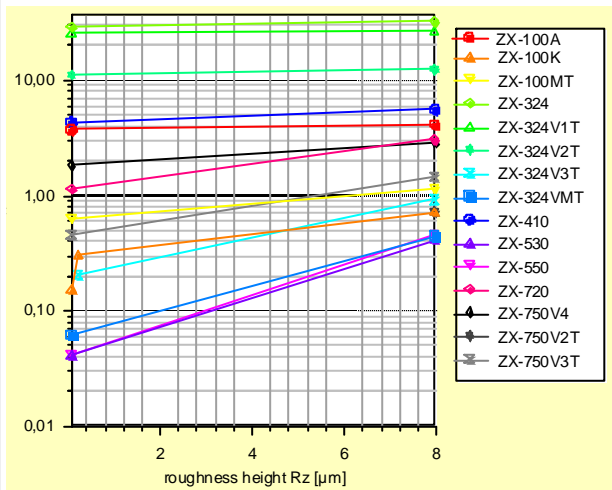
in which:

h = screw cavity [mm]

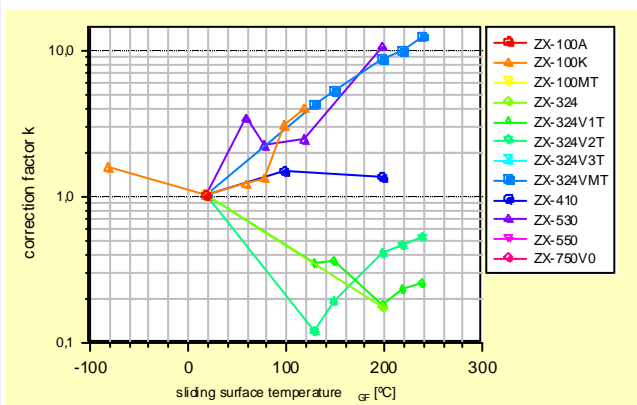
p = surface pressure [N/mm^2]

sk = wall thickness of the bushing [mm]

E_D = secant compressive modulus [N/mm^2] depending on the stress duration taken from ill. 33-35



Ill. 30: Nominal wear rate S_N



Ill. 31: Correction factor k

12.2.3.3. Working life

The working life of a slide bearing is limited by the permissible increase of the bearing clearance D . The permissible increase of the bearing clearance is determined by the requirements on the bearing. The occurring increase of the bearing clearance is composed of wear (abrasion) and plastic or elastic deformations of the stressed slide bearing surface. In order to calculate the working life the screw cavity must be calculated first owing to deformations of the slide bearing bush.



12.2.3.3.1. Working life at point stress

At **point stress** (bushing is standing, screw is rotating) the expected working life at point stress L_p is calculated by means of formula (25).

$$L_p = \frac{D - h - se_{max}}{0,06 \cdot v \cdot S_G} \quad [25]$$

in which:

L_p = working life for point stress [h]

D = permissible increase of bearing clearance [μm]

v = sliding speed [m/min]

S_G = total wear rate [$\mu\text{m}/\text{km}$] taken from chapter 12.2.3.1.

h = occurring screw cavity [μm]

se_{max} = max. installation bearing clearance [μm]

12.2.3.3.2. Working life at peripheral stress

At **peripheral stress** (bushing is rotating, screw is standing still) the working life L_u is longer than that at point stress.

As rule of thumb applies:

$$L_u = 2 \cdot L_p \quad [26]$$

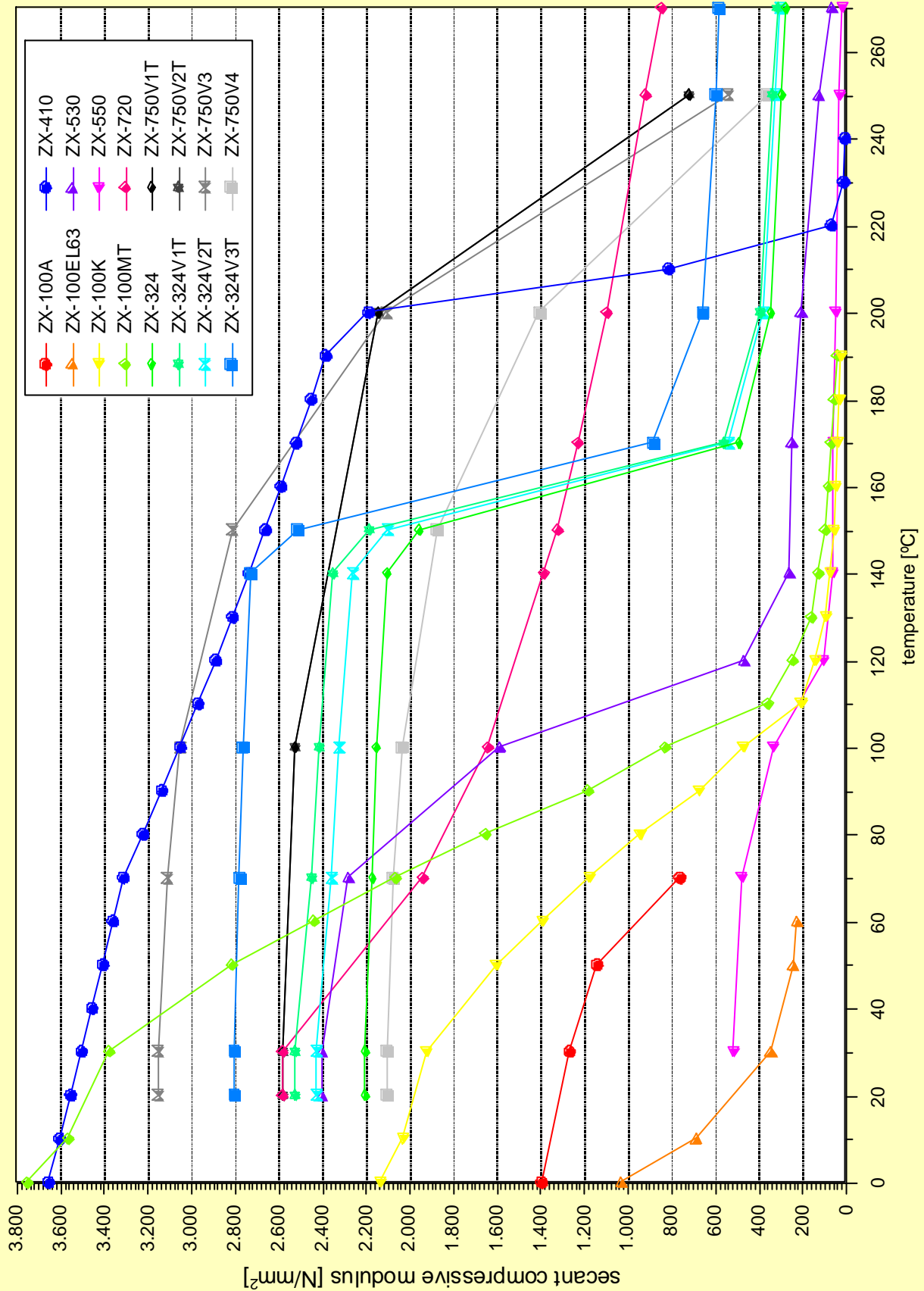
in which:

L_u = working life at peripheral stress [h]

L_p = working life at point stress [h]



12.2.4. Secant compressive modulus for stress duration < 0,01h



III. 33: Secant compressive modulus for stress duration < 0.01 h

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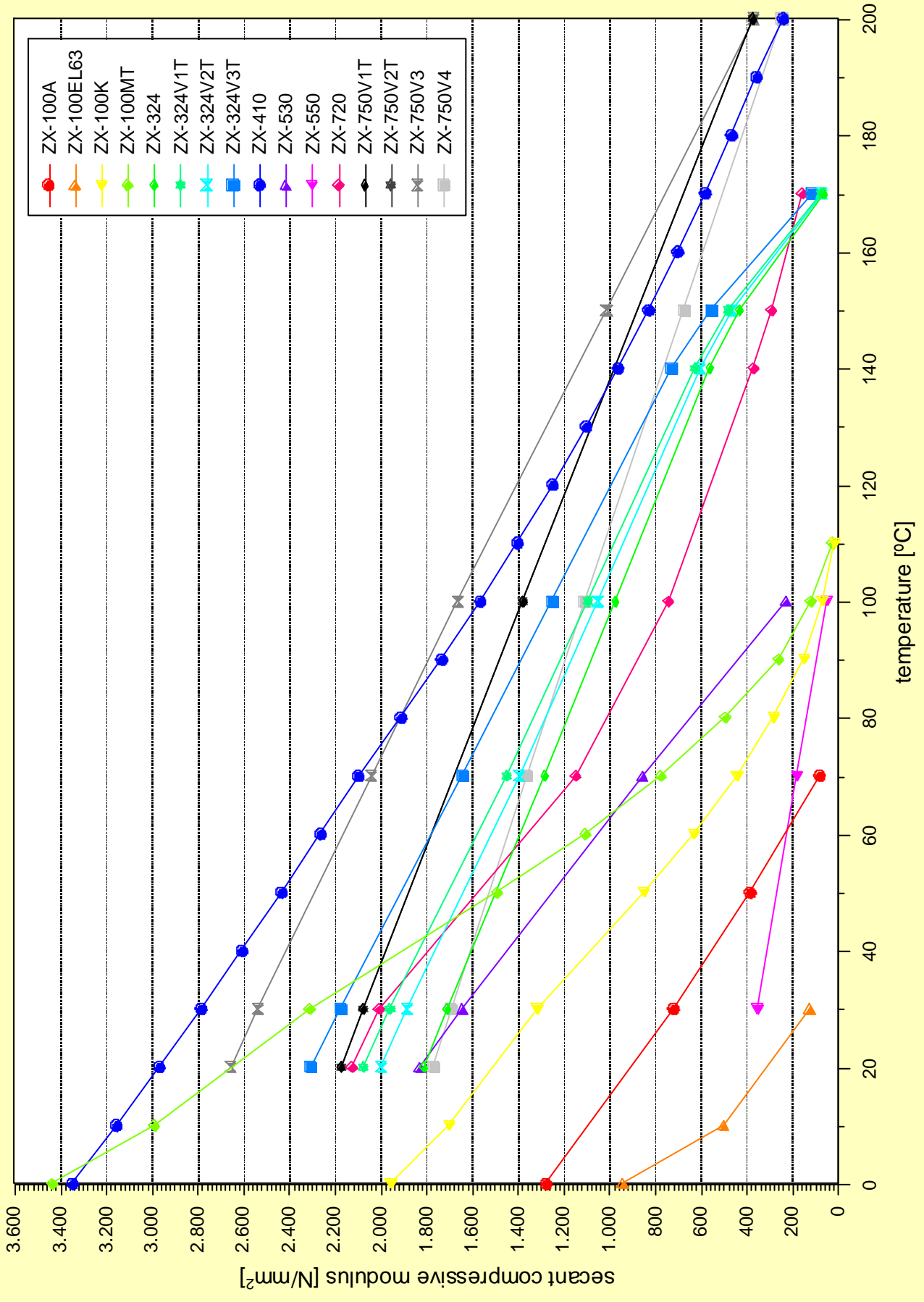
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12.2.5. Secant compressive modulus for stress duration < 100h

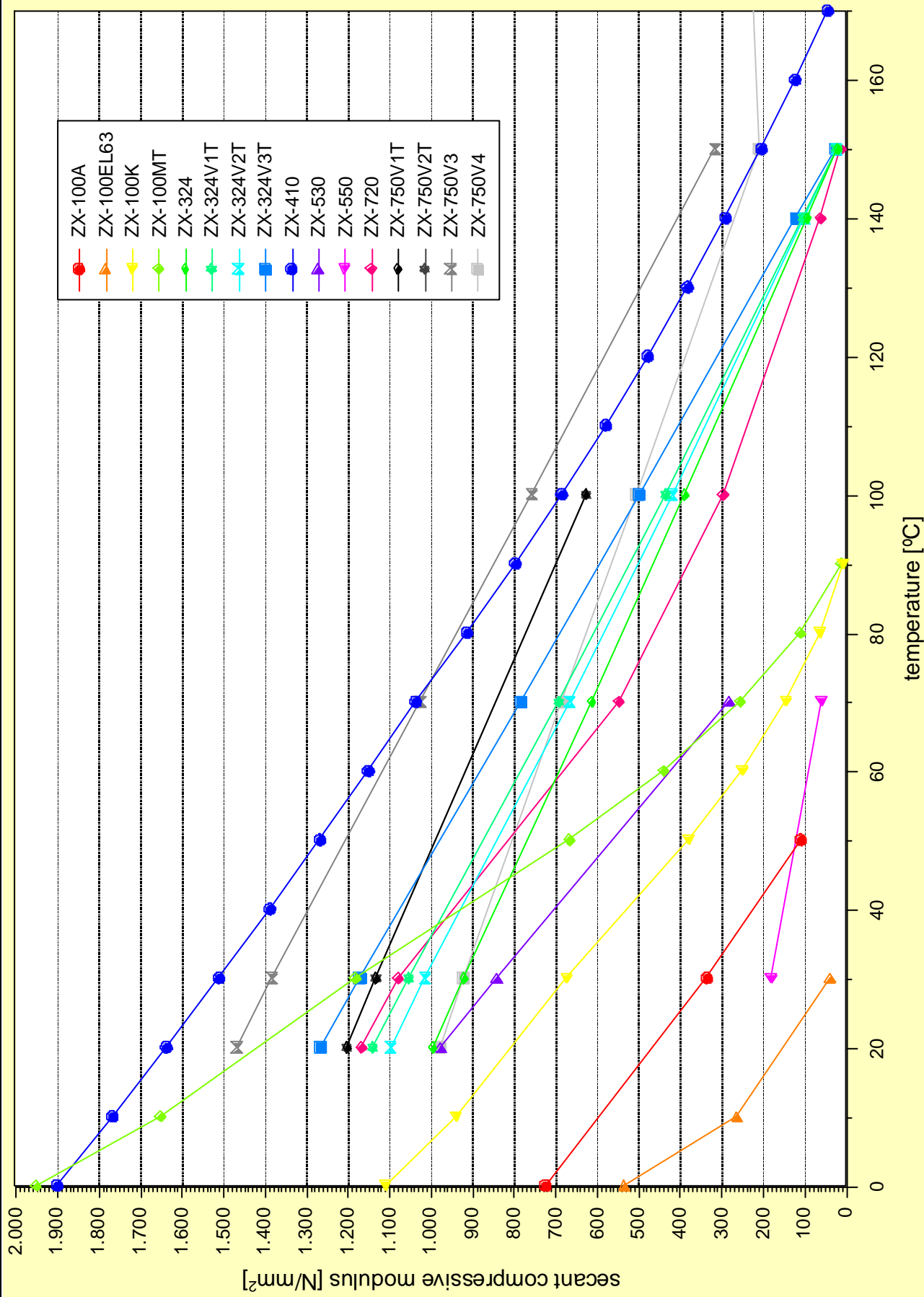
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III. 34: Secant compressive modulus for stress duration < 100 h



12.2.6. Secant compressive modulus for stress duration < 10000h



III. 35: Secant compressive modulus for stress duration < 10000 h

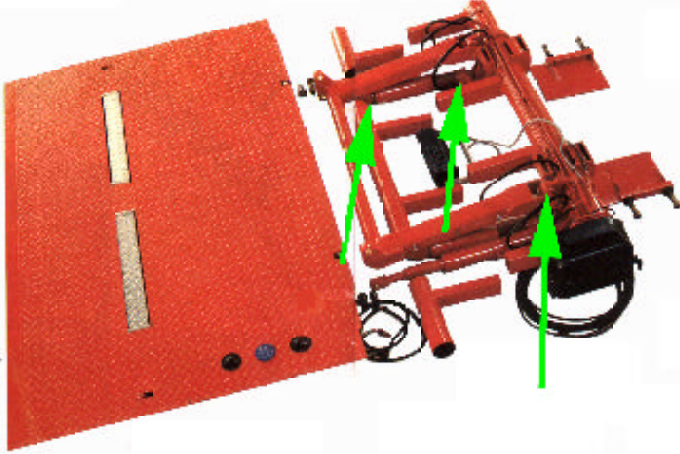
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13. Mathematical example

13.1. Task:

The hinged brackets inside the loading dropside of a truck should be arranged with maintenance-free slide bearing bushes.



13.2. Stress:

The maximum radial force exerted on a slide bearing bush amounts to **60000 N**.
The screw moves oscillatingly with a tilting angle of about **120°** and a maximum screw speed of **4 min⁻¹**.

Furthermore this application is subject to intermittent operation:
The loading dropside requires **15 s** for one stroke, then the loading dropside is loaded and remains for at least **300 s** in this position. After that it is moved downwards again.

Owing to the fact that this construction is welded the bearing seats contain geometry errors which could cause extremely high edge pressures. Moreover you have to consider a maximum ambient temperature of **65°C** and dirt, water or road salt penetrating the bearing seat.

13.3. Requirements:

Complete freedom from maintenance, that is a dry and quiet running operation, working life **40000 to 50000 strokes**.

13.4. Constructional presets:

screw diameter	d : \varnothing 30 ^{d9} mm
casing diameter	D : \varnothing 36 ^{H7} mm
bushing length	b : 30 mm



13.5. Calculation:

The calculation is effected successively to the flow diagram shown in chapter 12.2.

13.5.1. Surface pressure

First we calculate the emerging (medium) surface pressure by means of formula (9).

$$p = \frac{F}{b \cdot d} = \frac{60000 \text{ N}}{30 \text{ mm} \cdot 30 \text{ mm}} = \underline{\underline{66,66 \frac{\text{N}}{\text{mm}^2}}}$$

with:

F: radial force exerted on the slide bearing = 60000 N
 b: bushing width = 30 mm
 d: screw diameter = 30 mm

13.5.2. Sliding speed

Then we calculate the maximum emerging sliding speed by means of formula (10).

$$v = \frac{d \cdot n \times}{1000} = \frac{30 \text{ mm} \times 5 \text{ min}^{-1} \times}{1000} = 0,47 \frac{\text{m}}{\text{min}} = \underline{\underline{0,5 \frac{\text{m}}{\text{min}}}}$$

with:

n: maximum screw speed taken from 13.2 = 5 min⁻¹
 d: taken from 13.4 = 30 mm

13.5.3. Maximum pv-value

From p and v results the maximum pv-value according to formula (11).

$$pv = p \cdot v = 66,66 \frac{\text{N}}{\text{mm}^2} \cdot 0,5 \frac{\text{m}}{\text{min}} = \underline{\underline{33,33 \frac{\text{N}}{\text{mm}^2} \frac{\text{m}}{\text{min}}}}$$

with:

p: taken from 13.5.1. = 66,66 N/mm²
 v: taken from 13.5.2. = 0,5 m/min

13.5.4. pv-value emerging on intermittent operation

Owing to the fact that the screw is subject to intermittent operation, which means it rotates for only 15 s and then there follows an interval of 300 s the pv-value is calculated on intermittent operation.

Therefore we first calculate the nominal productivity of the pv-value by means of formula (14), in order to check if the condition (13) is fulfilled so that a correction may be effected.

13.5.4.1. Calculation of the nominal productivity kpvn_{nom}:

$$kpvn_{\text{nom}} = \frac{pv_{\text{nom zul}}}{pv} = \frac{27,5 \frac{\text{N}}{\text{mm}^2} \frac{\text{m}}{\text{min}}}{33,33 \frac{\text{N}}{\text{mm}^2} \frac{\text{m}}{\text{min}}} = \underline{\underline{0,825}}$$

with:

pv_{nomzul}: for a first calculation we take the highest possible value from ill. 22 with v = 0,5 m/min reveals ZX-324V2T = 27,5 N/mm² * m/min
 pv: taken from 13.5.3. = 33,33 N/mm² * m/min



13.5.4.2 Checking the condition [13]

We check the condition taken from formula (13) (page 32) by means of the calculated figures.

$$t_L < t_{Lmax} \quad \underline{\underline{15s < 6000s}}$$

with:

- t_L : transit time taken from the data of stress = 15 s for one stroke
- t_{Lmax} : maximum permissible transit time taken from ill. 22; with $k_{pv} = 0,825$ (see above) reveals $t_{Lmax} = 6000$ s.

As this condition is fulfilled the correction factor f can be applied as follows.

13.5.4.3 Calculation of the switch-on duration ED by means of formula (16):

$$ED = \frac{t_L}{(t_L + t_p)} \cdot 100 [\%] = \frac{15s}{15s + 300s} \cdot 100\% = \underline{\underline{4,76\%}}$$

with:

- t_L : transit time -taken from 13.2- = 15s
- t_p : interval -taken from 13.2- = 300s

13.5.4.4. Calculation of the correction factor f by means of formula (15):

$$f = 0,02 \cdot (0,0001 \times ED^2) = 0,02 \cdot (0,0001 \times 4,76^2) = \underline{\underline{0,092}}$$

with:

- ED : taken from 13.5.4.3 = 4,76%

Hence follows from formula (12) the emerging pv-value pv_{ED} on a switch-on duration of 4,76 %:

$$pv_{ED} = p \cdot v \cdot f = 66,66 \frac{N}{mm^2} \cdot 0,5 \frac{m}{min} \cdot 0,092 = \underline{\underline{3,07 \frac{N}{mm^2} \frac{m}{min}}}$$

with:

- p : taken from 13.5.1. = 66,66 N/mm²
- v : taken from 13.5.2. = 0,5 m/min
- f : taken from 13.5.4.4. = 0,092



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13.5.5. Calculation of the permissible pv-value:

In order to calculate the permissible pv-value ($p_{v_{zul}}$) of the radial slide bearing we have to determine the following correction factors:

- k_{Sch} : correction factor for lubrication taken from ill. 24 on dry run $k_{Sch} = 1$
- k : correction factor for ambient temperature, at an ambient temperature of 65°C and with the material ZX-324V2T taken from ill. 25 $k_j = 0,6$.
- k_{bd} : correction factor for the relation b/d (width / diameter) of the bushing with b/d = 30 mm / 30 mm = 1 follows from ill. 26 $k_{bd} = 0,75$
- k_d : correction factor for the screw diameter d. Ill. 27 with a screw diameter d of 30 mm reveals $k_d = 0,3$.
- k_{Geo} : the correction factor for the geometry of the bushing is calculated by means of formula (18); from $k_{Geo} = k_{bd} \cdot k_d$ results $0,75 \cdot 0,3 = 0,225$
- k_{SP} : correction factor for the installation bearing clearance. As this application does not require a reduced installation bearing clearance we choose the "standard" class. From ill. 28 with a sliding speed of 0,5 m/min reveals $k_{SP} = 1$
- $p_{v_{nomzul}}$: taken from section 13.5.4.1 = 27,5 N/mm² · m/min

The permissible pv-value of the radial slide bearing is determined by means of formula (17).

$$p_{v_{zul}} = p_{v_{nomzul}} \cdot k_{Sch} \cdot k \cdot k_{Geo} \cdot k_{SP} = 27,5 \frac{N}{mm^2} \times \frac{m}{min} \times 1 \times 0,6 \times 0,225 \times 1 = \underline{\underline{3,71 \frac{N}{mm^2} \times \frac{m}{min}}}$$

13.5.6. Checking the pv-value:

In order to avoid a thermal overloading of the slide bearing the following condition (8) must be fulfilled:

$$p_{v_{ED}} \leq p_{v_{zul}} \quad 3,07 \frac{N}{mm^2} \times \frac{m}{min} \leq 3,71 \frac{N}{mm^2} \times \frac{m}{min} \quad \underline{\underline{\text{erfüllt!}}}$$

with:

- $p_{v_{ED}}$: taken from 13.5.4 = 3,07 N/mm² · m/min
- $p_{v_{zul}}$: taken from 13.5.5 = 3,71 N/mm² · m/min

As the condition (8) is fulfilled we do not reckon with a thermal overloading.

13.5.7. Calculation of the emerging temperatures:

13.5.7.1 Calculation of the factor kp_v by means of formula (19b):

$$kp_v = \frac{p_{v_{zul}}}{p_{v_{ED}}} = \frac{3,71 \frac{N}{mm^2} \times \frac{m}{min}}{3,07 \frac{N}{mm^2} \times \frac{m}{min}} = \underline{\underline{1,21}}$$

with:

- $p_{v_{zul}}$: taken from section 13.5.5.
- $p_{v_{ED}}$: taken from section 13.5.4.



13.5.7.2. Calculation of the emerging sliding surface temperature

The emerging sliding surface temperature is determined by means of formula (19).

$$G_F = \frac{G_{FN}}{k_{pv}} + t_{amb} - 20^\circ\text{C}$$

$$G_F = \frac{G_{FN}}{k_{pv}} + t_{amb} = 20^\circ\text{C} \quad \frac{48^\circ\text{C}}{1,21} + 65^\circ\text{C} - 20^\circ\text{C} = \underline{\underline{85^\circ\text{C}}}$$

with:

G_{FN} : nominal temperature of the sliding surface; ill. 29 with $v = 0,5 \text{ m/min}$ reveals $G_{FN} = 48^\circ\text{C}$
 t_{amb} : ambient temperature; for this task $t_{amb} = 65^\circ\text{C}$ is given

13.5.7.3. Temperature of the slide bearing bush

The temperature of the slide bearing bush measured inside the cross-section of the slide bearing is calculated by means of formula (20).

$$L = \frac{G_F + t_{amb}}{2} = \frac{85^\circ\text{C} + 65^\circ\text{C}}{2} = \underline{\underline{75^\circ\text{C}}}$$

with:

G_F : temperature of the sliding surface, taken from 13.5.7.2 = 85°C
 t_{amb} : ambient temperature, for this task $t_{amb} = 65^\circ\text{C}$ is given

13.5.8. Attachment check of the slide bearing bush

In order to guarantee a secure attachment of the slide bearing bush by means of simple pressing the following condition must be fulfilled:

$$G < G_{zul}$$

First the maximum permissible casing temperature – for pressing-in attachment – for ZX-324V2T with $G_{zul} = 130^\circ\text{C}$ has to be taken from ill. (2) (page 13).

13.5.8.1. Calculation of the emerging casing temperature by means of formula (21)

$$G = \frac{L + t_{amb}}{2} = \frac{75^\circ\text{C} + 65^\circ\text{C}}{2} = \underline{\underline{70^\circ\text{C}}}$$

with:

L : temperature of the slide bearing bush, taken from 13.5.7.3 = 75°C
 t_{amb} : ambient temperature, for this task $t_{amb} = 65^\circ\text{C}$ is given

inserted into the above-mentioned condition it reveals:

$$G < G_{zul} \quad 70^\circ\text{C} < 130^\circ\text{C}$$

As this condition is fulfilled, the bushing can be attached by means of simple pressing.



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13.5.9. Check of the minimum operating bearing clearance:

13.5.9.1. Calculating the change of the operating bearing clearance due to temperature fluctuations

This mathematical example bases on an operation with a non-slitted bushing, therefore we must first calculate the necessary mold bearing clearance (change of the inside diameter of the stuffed bushing due to an increase of temperature) by means of formula (6):

$$S_z = (d_2 (\alpha_{Geh} \alpha_{Bu}) d_1 \alpha_w)$$

in which :

α_w : change in temperature measured from the installation temperature to the slide bearing temperature.

With an assumed installation temperature of 20 °C follows for α_w : 75°C - 20°C = 55°C

d_2 : outside diameter of the bushing = 36mm

α_{Bu} : coefficient of expansion of the bushing taken from table 6 for ZX-324V2T = $6,5 \cdot 10^{-5}$

α_{Geh} : coefficient of expansion of the casing taken from table 6 for steel = $1,2 \cdot 10^{-5}$

d_1 : outside diameter of the screw = 30 mm

α_w : coefficient of expansion of the screw taken from table 6 for steel = $1,2 \cdot 10^{-5}$

yields to a change of the inside diameter of the stuffed bushing:

$$S_z = 55^\circ\text{C} (36 (1,2 \cdot 10^{-5} \cdot 6,5 \cdot 10^{-5}) + 30 \text{ mm} \cdot 1,2 \cdot 10^{-5}) = \underline{0,0851 \text{ mm}}$$

This change of the inside diameter must be existing as minimum mold bearing clearance, in order to avoid a clamping/grip of the bearing on operation.

13.5.9.2 Calculating the minimum operating bearing clearance

The minimum operating bearing clearance can be calculated by means of formula (4):

$$S_{emin} = \varnothing d_{1min} A_{oscrew}$$

in which :

$\varnothing d_{1min}$: after pressing the bushing into a casing of an ISO-tolerance H5 follows for the "standard" class of bearing clearances according to table 1 an inside diameter of an ISO-tolerance D8. Consequently follows a lower dimensional deviation of 30,065 mm according to ISO.

A_{oscrew} : for the screw – handicap $\varnothing 30d9$ – follows an upper dimensional deviation of 29,935 mm according to ISO.

follows:

$$S_{emin} = 30,065 \text{ mm} - 29,935 \text{ mm} = \underline{0,13 \text{ mm}}$$

The check of the minimum mold bearing clearance is effected on the following condition:

$$| S_z | \geq S_{emin} \quad | 0,0851 | \text{ mm} \geq | 0,13 \text{ mm}$$

As this condition is fulfilled, a secure operation is possible for the required ambient temperature of 65 °C.



13.5.10. Calculation of the maximum mold bearing clearance

The maximum mold bearing clearance yields from formula (5):

$$S_{e_{max}} = \overset{A_{uScrew}}{\overset{A_{uWelle}}{\overset{\wedge}{\delta}d1_{max}}}$$

in which:

A_{uScrew} : for the lower dimensional deviation of the screw 30d9 follows according to ISO: : **29,883mm**
 $\overset{\wedge}{\delta}d1_{max}$: after pressing the bushing into a casing of an ISO-tolerance H5 follows for the "standard" class of bearing clearances an inside diameter of the stuffed bushing of an ISO-tolerance D8 according to table 1.

Consequently follows an upper dimensional deviation of 30,098 mm according to ISO.

As on operation the bushing does not become pressed into a casing of a tolerance H5 but into an absorption hole of a tolerance H7 according to the construction details, we have to consider the correction of the absorption hole.

by means of formula (1) we calculate the upper dimensional deviation of the bushing pressed into H7:

$$d1_{max} = Sv + \overset{\wedge}{\delta}d1_{H5}$$

in which:

S_v : increase of the bearing clearance, taken from table 4 with a casing diameter of 36 mm follows an increase of the absorption hole of H7 = **14µm**

$\overset{\wedge}{\delta}d1_{max}$: according to the dimension list follows a maximum dimension of **30,098 mm** for a bushing with $d1 = 30$ mm

follows:

$$d1_{max} = 0,014\text{mm} + 30,098\text{mm} = 30,112\text{mm}$$

from that follows a maximum mold bearing clearance of:

$$S_{e_{max}} = 30,112 \text{ mm} - 29,883 \text{ mm} = \underline{\underline{0,229 \text{ mm}}}$$

13.5.11. Calculation of the expected wave cavity caused through the deformation of the bushing

The expected wave cavity caused through deformation can be calculated by means of formula (24):

$$h = \frac{p \times sk}{E_d}$$

in which:

sk : wall thickness sk , yields from $(D - d1) / 2 = (36\text{mm} - 30\text{mm}) / 2 = 3\text{mm}$

p : taken from section 13.5.1. = 66,66 N/mm²

E_d : secant compressive modulus, taken from ill. 36 for stress durations > 100 h at a temperature of $t_L = 75$ °C and with a material of ZX-324V2T = 1320 N/mm²

follows:

$$h = \frac{66,66 \frac{\text{N}}{\text{mm}^2} \times 3\text{mm}}{1320 \frac{\text{N}}{\text{mm}^2}} = \underline{\underline{0,1515 \text{ mm}}}$$



13.5.12. Estimation of working life

The determination of working life requires the total wear rate, which can be calculated by means of formula (23):

$$S_G = S_N \times k_J \times k_p$$

in which:

S_N : nominal wear rate, from ill. 30 follows a wear rate of 11 $\mu\text{m}/\text{km}$ at a roughness height of the screw of 8 μm RZ and the material ZX-324V2T
 k : correction factor for temperature, from ill. 31 follows $k = 0,3$ at a sliding surface temperature of 85 °C
 k_p : from ill. 32 follows $k_p = 40$ with a surface pressure of 66 N/mm²

follows:

$$S_G = S_N \times k \times k_p = 11 \frac{\mu\text{m}}{\text{km}} \times 0,3 \times 40 = \underline{\underline{132 \frac{\mu\text{m}}{\text{km}}}}$$

The expected working life for point load then yields from formula (21):

$$L_P = \frac{D \quad h \quad S_{e_{\max}}}{0,06 \times v \times S_G} = \frac{1500 [\mu\text{m}] \quad 151,5 [\mu\text{m}] \quad 229 [\mu\text{m}]}{0,06 \times 0,47 [\text{m}/\text{min}] \times 132 [\mu\text{m}/\text{km}]} = \underline{\underline{300\text{h}}}$$

in which:

D = permissible screw displacement – In this application case a permissible screw displacement of 1,5 mm has been determined by the construction department. –

This corresponds to a transit time of 15 s per stroke for about 72000 strokes.

13.5.13. Summary of the results

material chosen	ZX-324V2T		
class of bearing clearances	standard		
inside diameter of the bushing	d1	30	mm
outside diameter of the bushing	d2	36	mm
bushing width	b1	30	mm
surface pressure	p	66,66	N/mm ²
sliding speed	v	0,5	m/min
maximum pv-value	pv	33,33	N/mm ² * m/min
switch-on duration	ED	4,76	%
pv-value at ED	pv _{ED}	3,07	N/mm ² * m/min
permissible pv-value	pv _{zul}	3,71	N/mm ² * m/min
sliding surface temperature		85	°C
slide bearing temperature	G _F	75	°C
casing temperature	L	70	°C
permissible casing temperature	G	130	°C
necessary mold bearing clearance	S _Z ^{Gzul}	-0,0851	mm
minimum mold bearing clearance	Se _{min}	0,130	mm
maximum mold bearing clearance	Se _{max}	0,229	mm
wave cavity caused through deformations	h	0,1515	mm
working life	L _p	300	h = 72000 strokes



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13.5.14. Data for the order – article numbers –

We have chosen a bushing with the following dimensions:

$\varnothing d1 = 30\text{mm}$, $\varnothing d2 = 36\text{mm}$, $b = 30\text{mm}$

a corresponding slide bearing bush has the following article number shown in the dimension list:

Z _ _ _ _ _ 030036009

for the material ZX-324V2T the material contraction "3F", according to the key taken from ill. 1, has to be inserted into the order number.

Z **3F** _ _ _ 030036009

and the "standard" class of bearing clearances chosen – article contraction **D09** taken from table 1 – result in:

Z**3FD09**030036009

13.5.15. Selection of a suitable screw material

Suitable screw materials can be taken from chapter 6.2.

For the material ZX-324V2T of a ball indentation hardness of 175 N/mm^2 (see table 7) we recommend a Vickers hardness of at least $\text{HV} = 380$ according to ill. 12.

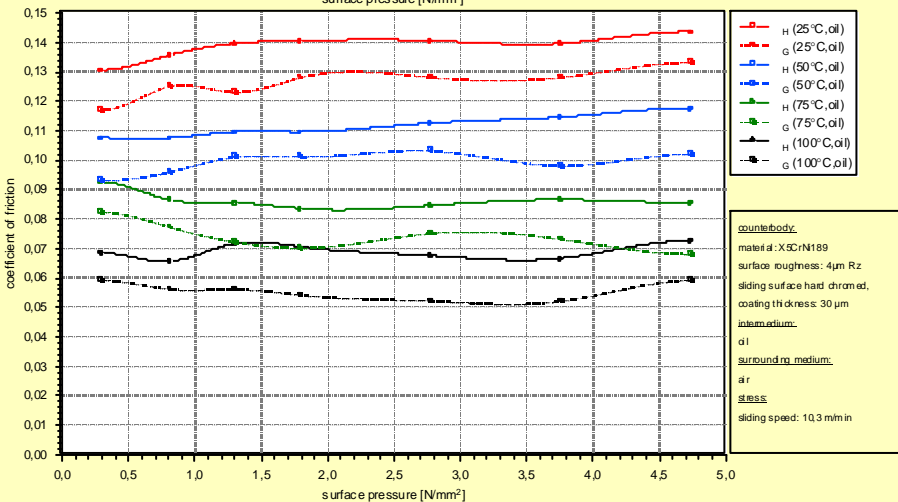
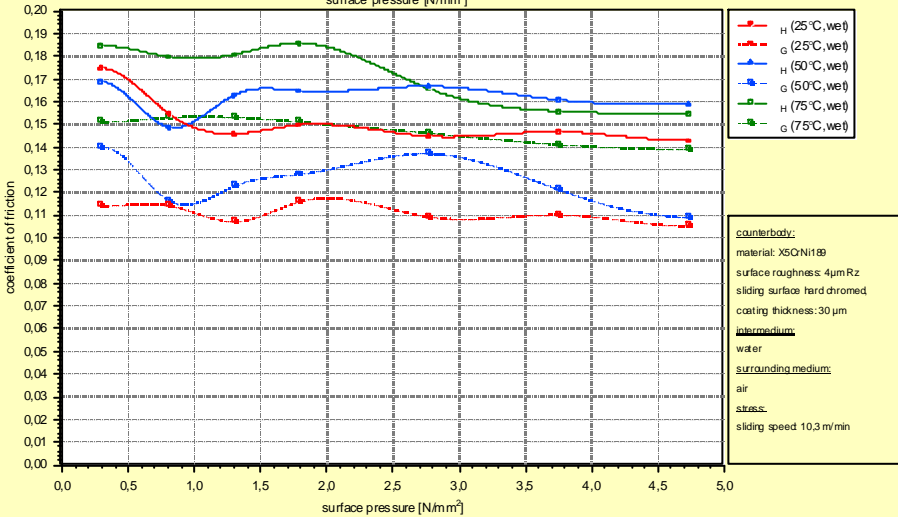
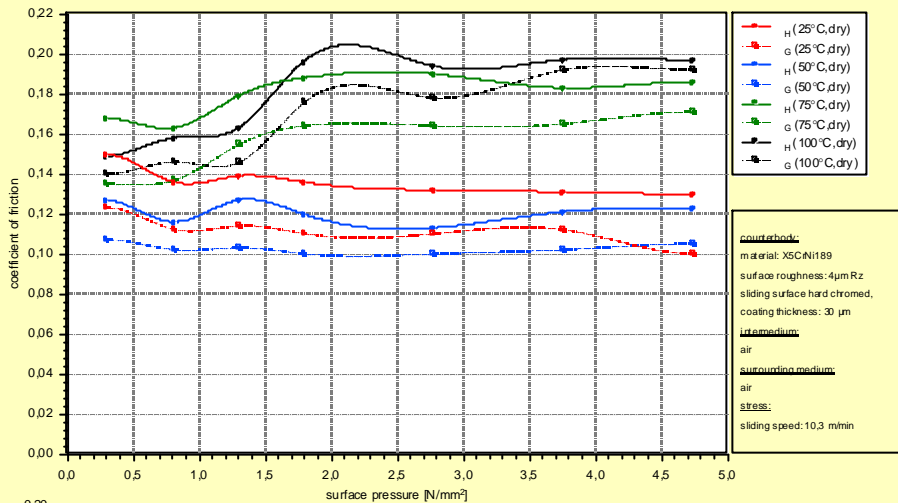
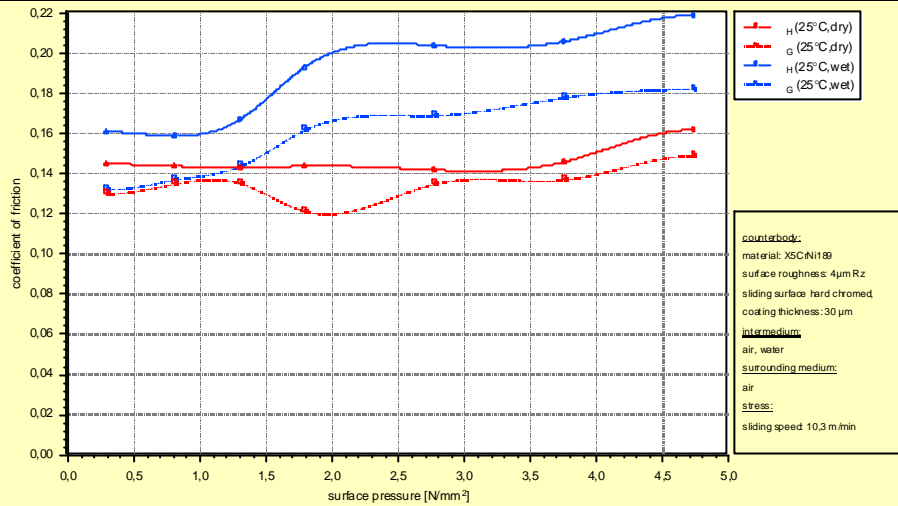
Furthermore, the screw should be provided with a corrosion protection against penetrating water.

For these reasons we choose a non-alloyed structural steel St52-3 with a hard nickel-plated surface (as described in 6.1.1.11.).



14. Coefficients of friction:

14.1. Coefficients of friction of ZX-100A



III.36
Coefficient of friction of ZX-100A measured as supplied

III.37
Coefficient of friction of ZX-100A in dry runs measured after feed

III.38
Coefficient of friction of ZX-100A with water lubrication measured after feed

III.39
Coefficient of friction of ZX-100A with oil lubrication measured after feed

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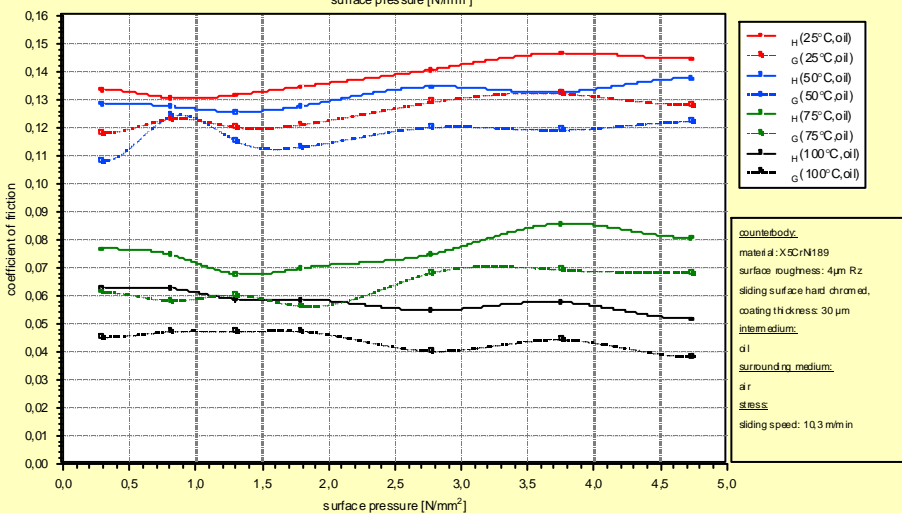
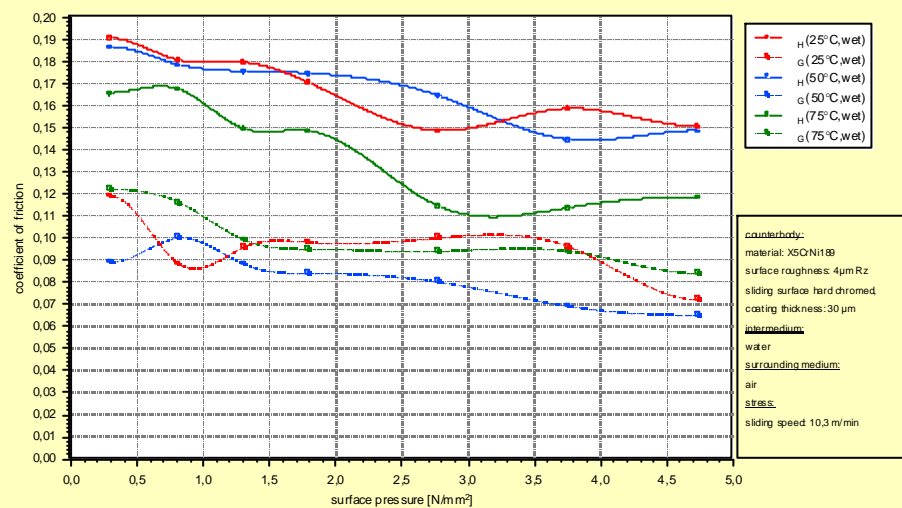
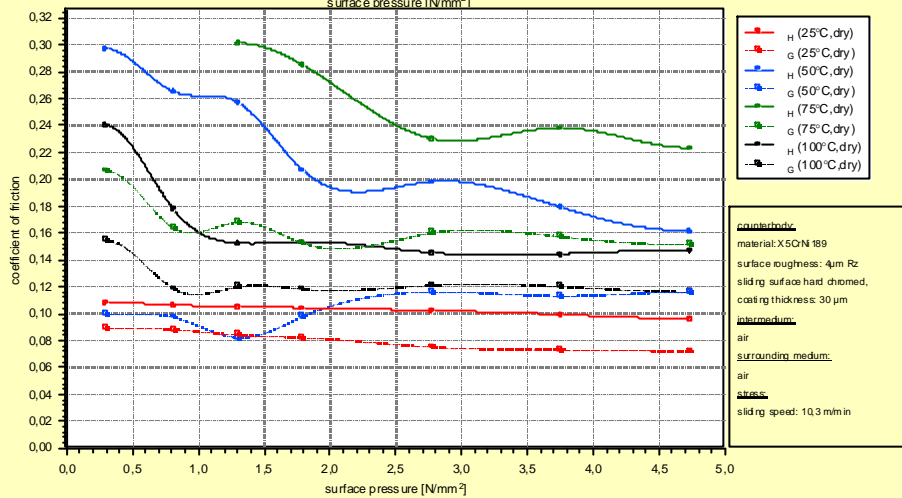
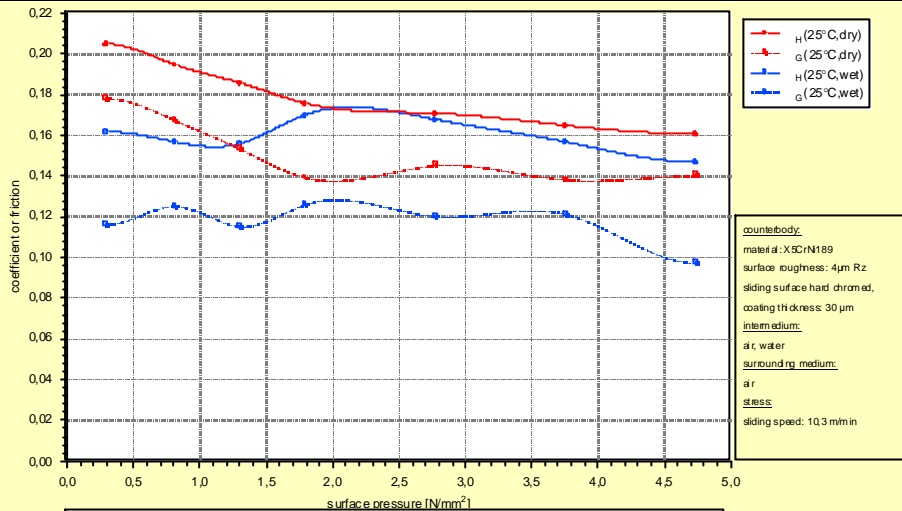
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14.2. Coefficients of friction of ZEDEX-100K



III.40
Coefficient of friction of ZX-100K measured as supplied

III.41
Coefficient of friction of ZX-100K in dry runs measured after feed

III.42
Coefficient of friction of ZX-100K with water lubrication measured after feed

III.43
Coefficient of friction of ZX-100K with oil lubrication measured after feed

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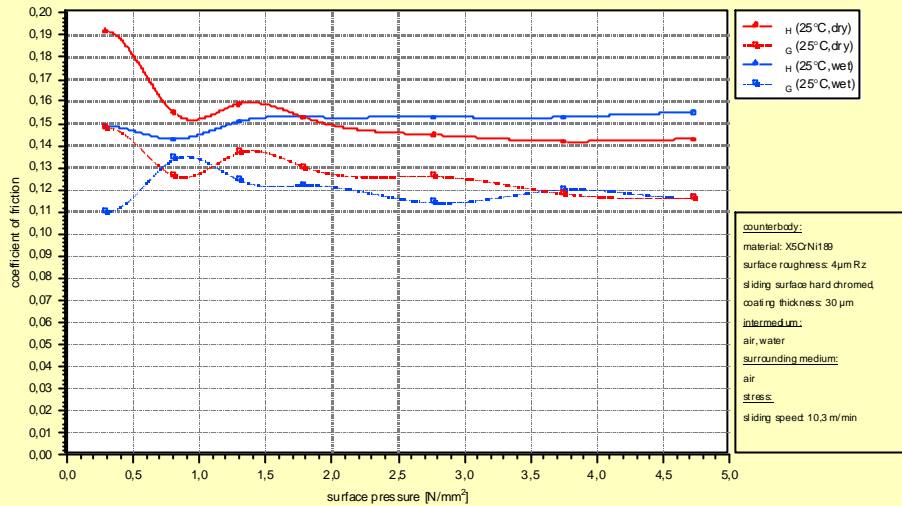
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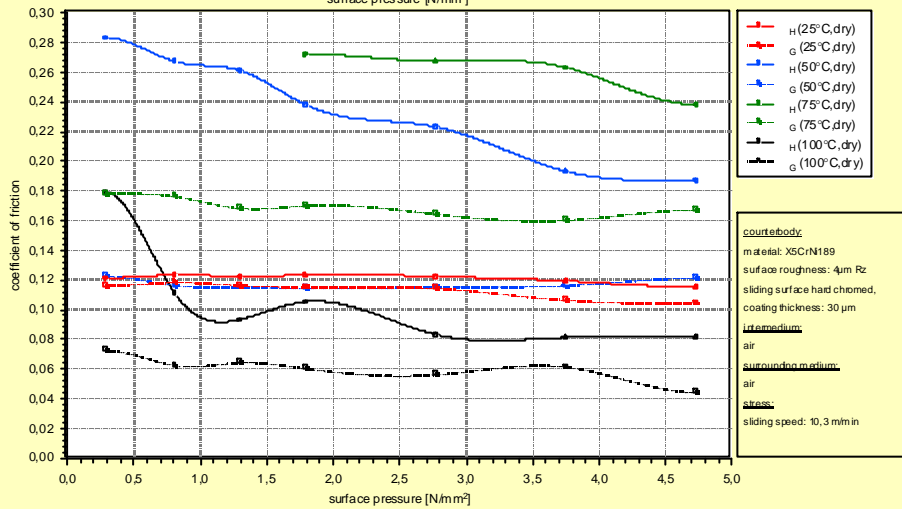


14.3. Coefficients of friction of ZEDEX-100MT



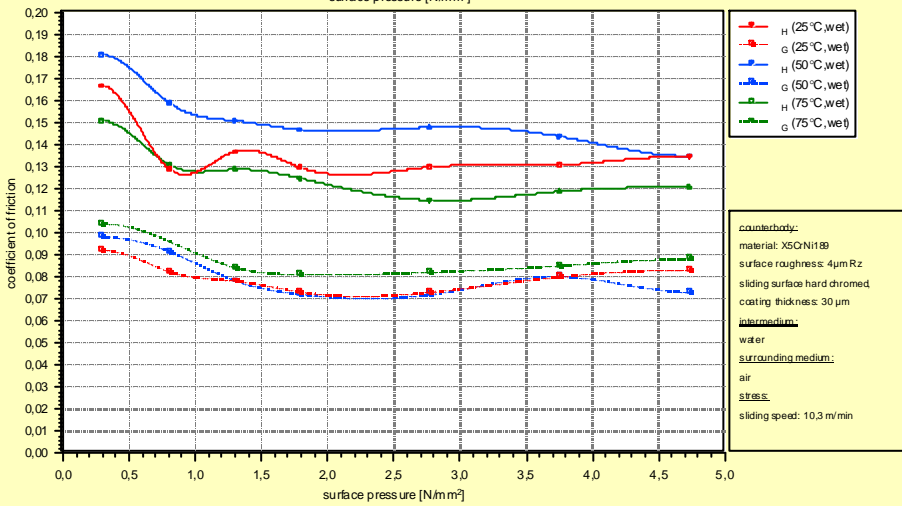
III.44

Coefficient of friction of ZX-100MT measured as supplied



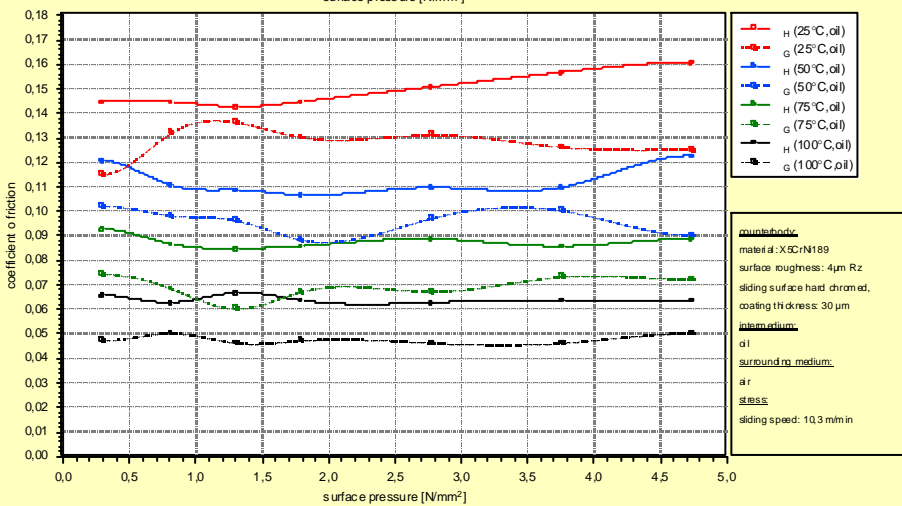
III.45

Coefficient of friction of ZX-100MT in dry runs measured after feed



III.46

Coefficient of friction of ZX-100MT with water lubrication measured after feed



III.47

Coefficient of friction of ZX-100MT with oil lubrication measured after feed

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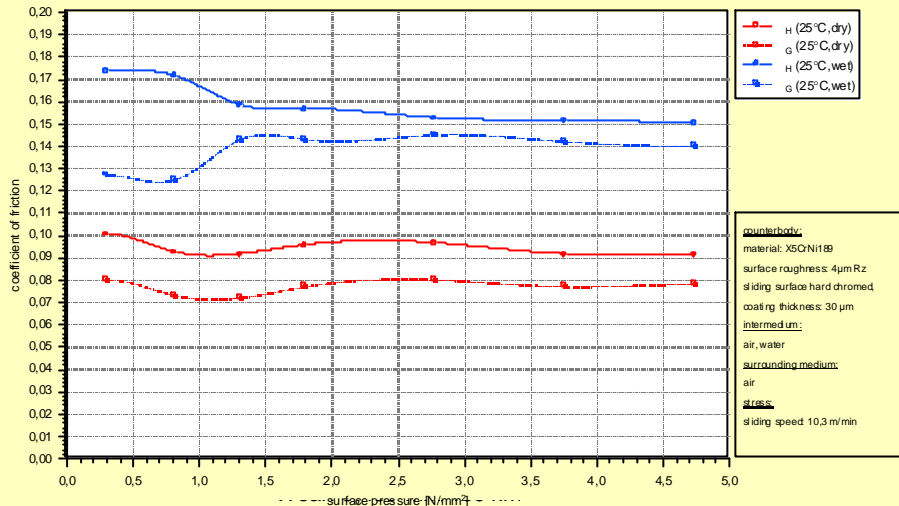
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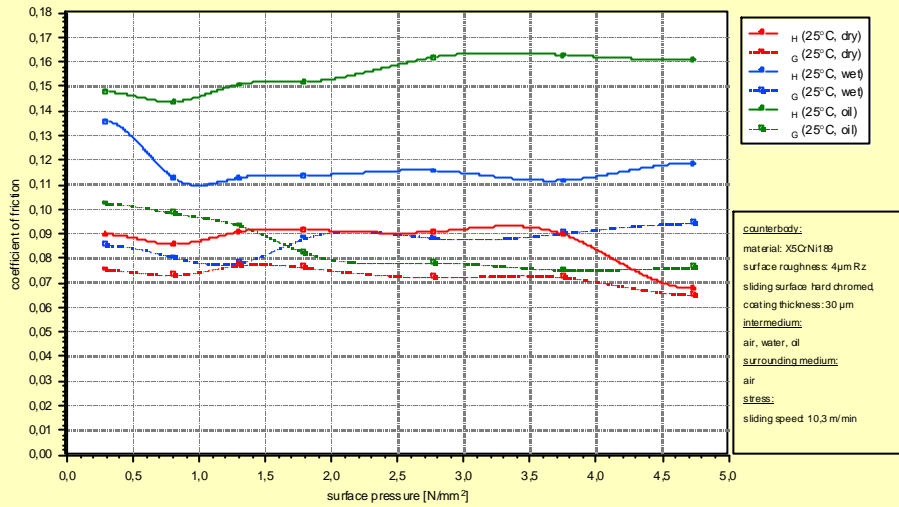
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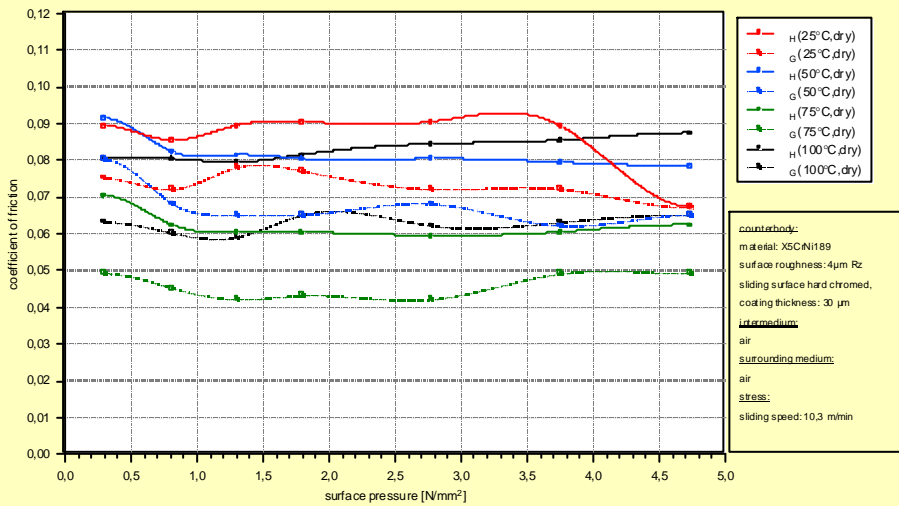
14.4. Coefficients of friction of ZEDEX-324



III. 48
Coefficient of friction of ZX-324 measured as supplied



III.49
Coefficient of friction of ZX-324 measured after feed

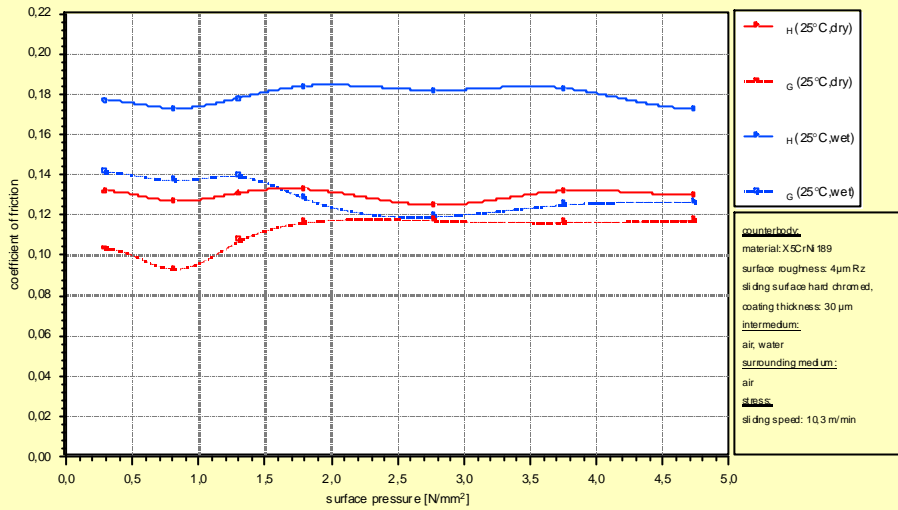


III.50
Coefficient of friction of ZX-324 in dry runs measured after feed

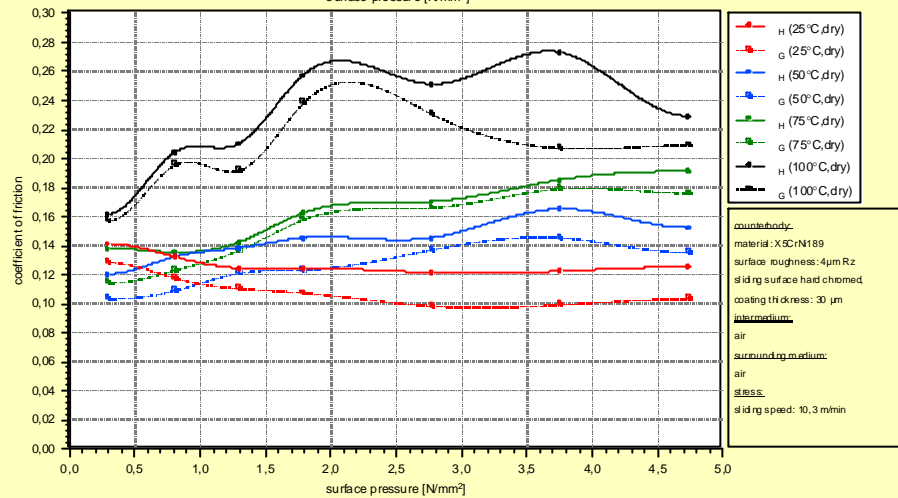
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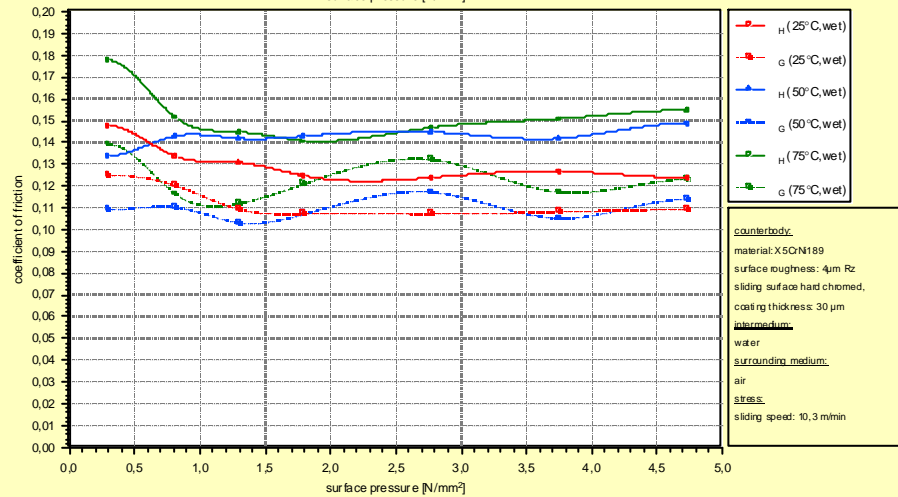
14.5. Coefficients of friction of ZEDEX-324V1T



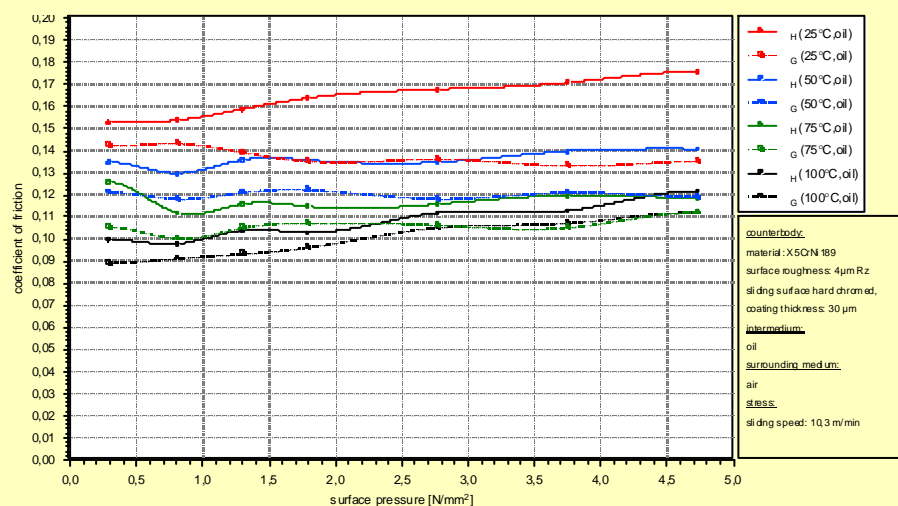
III.51
Coefficient of friction of ZX-324V1T measured as supplied



III.52
Coefficient of friction of ZX-324V1T in dry runs measured after feed



III.53
Coefficient of friction of ZX-324V1T with water lubrication measured after feed



III.54
Coefficient of friction of ZX-324V1T with oil lubrication measured after feed

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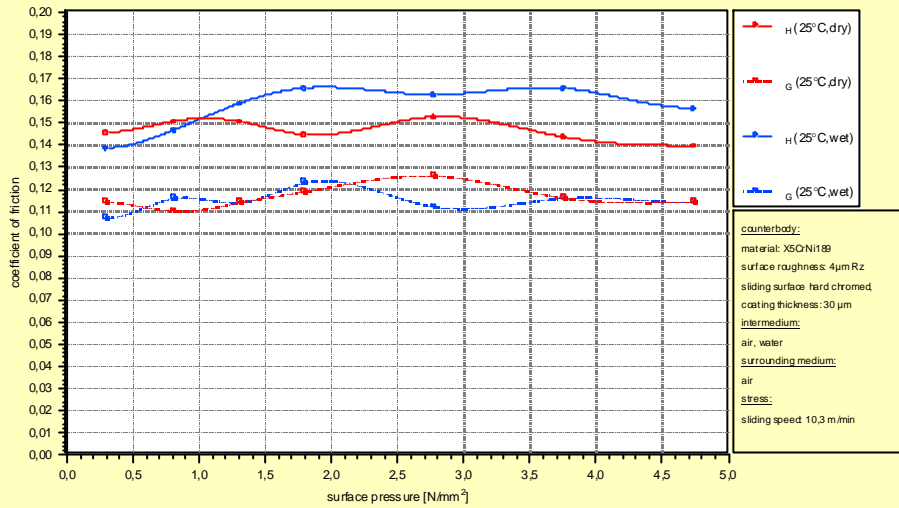
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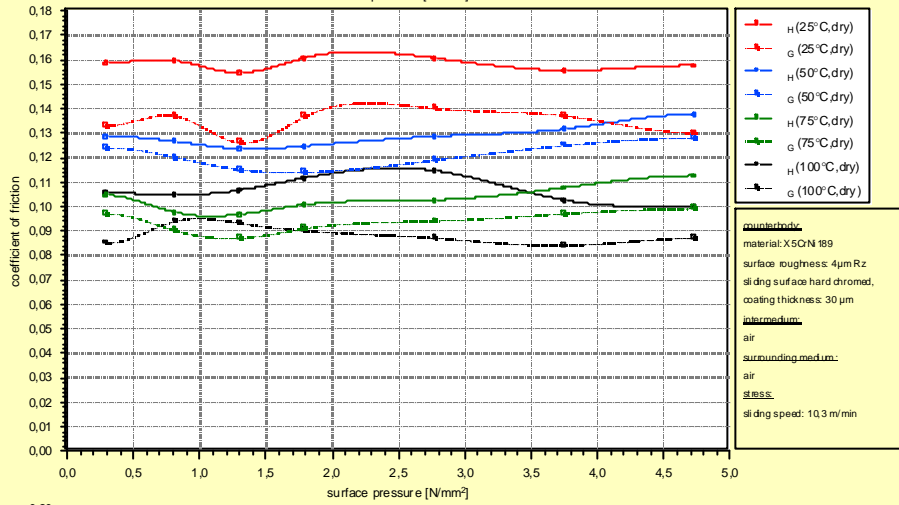
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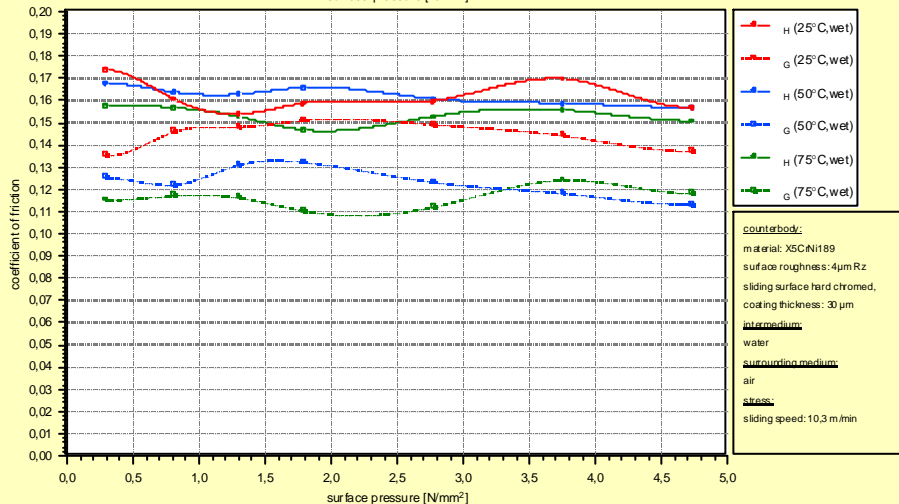
14.6. Coefficients of friction of ZEDEX-324V2T



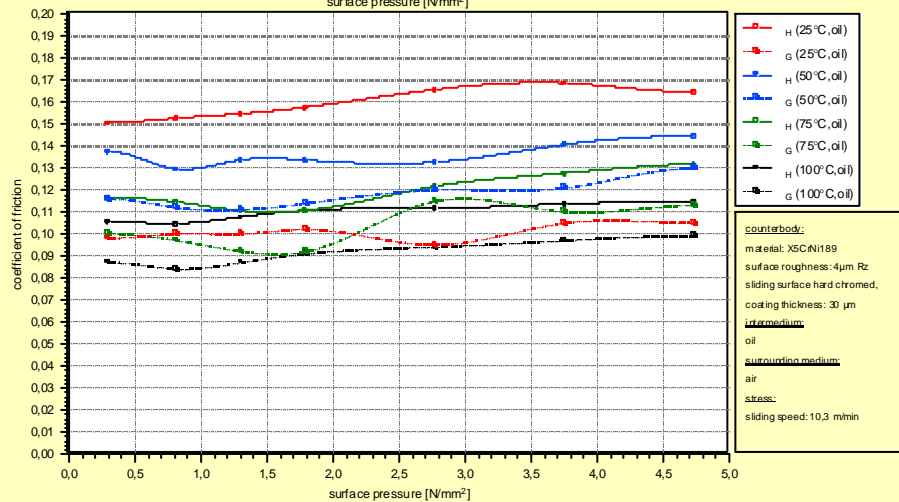
III.55
 Coefficient of friction of ZX-324V2T measured as supplied



III.56
 Coefficient of friction of ZX-324V2T in dry runs measured after feed



III.57
 Coefficient of friction of ZX-324V2T with water lubrication measured after feed



III.58
 Coefficient of friction of ZX-324V2T with oil lubrication measured after feed

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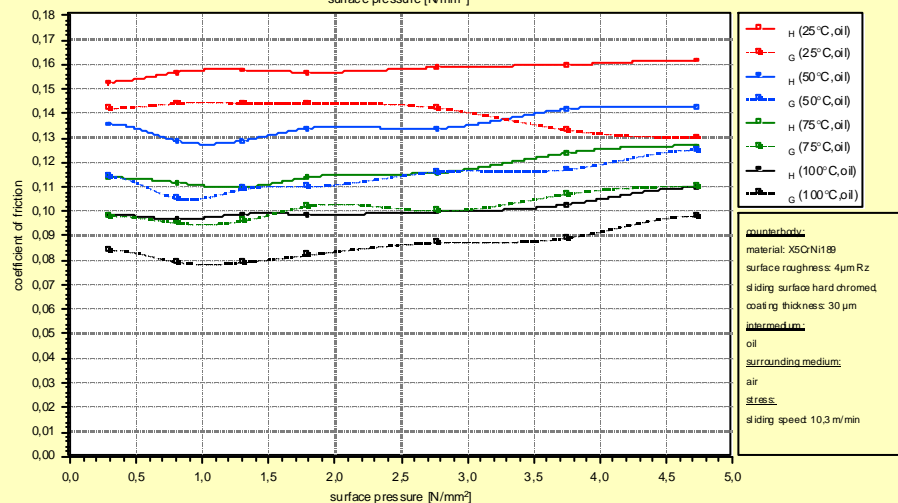
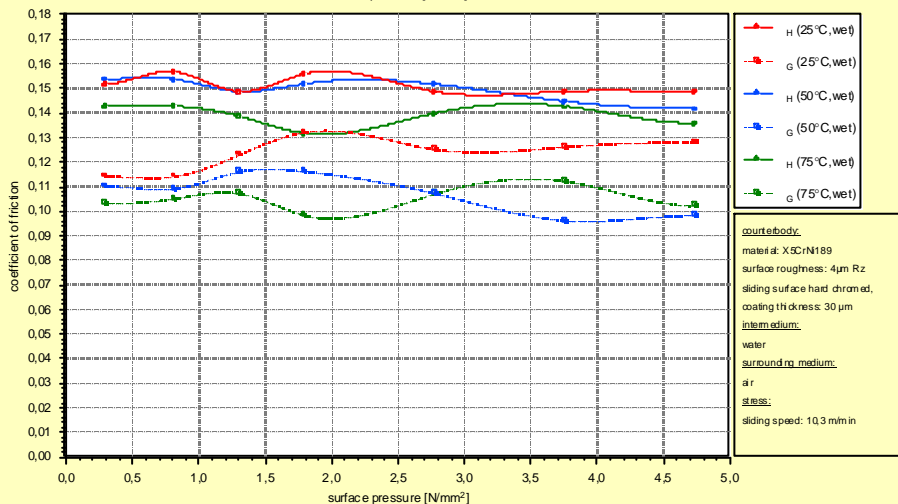
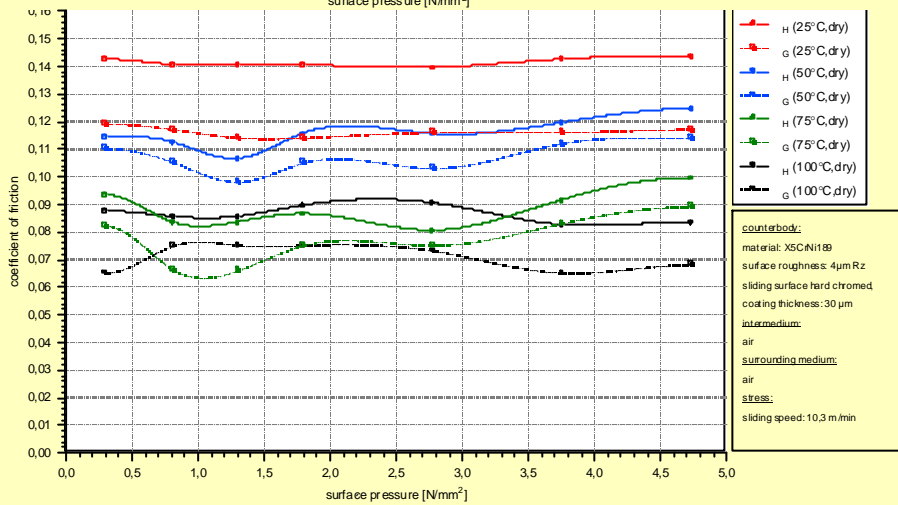
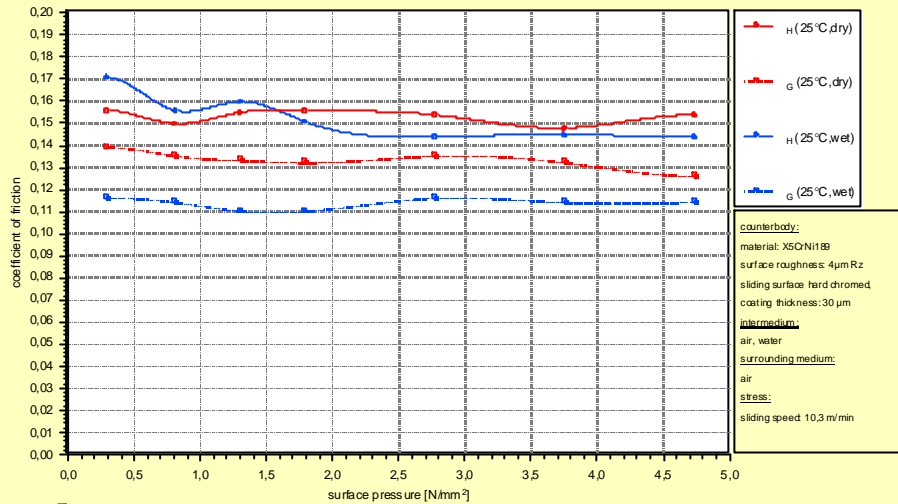
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14.7. Coefficients of friction of ZEDEX-324V3T



III.59
Coefficient of friction of ZX-324V3T measured as supplied

III.60
Coefficient of friction of ZX-324V3T in dry runs measured after feed

III.61
Coefficient of friction of ZX-324V3T with water lubrication measured after feed

III.62
Coefficient of friction of ZX-324V3T with oil lubrication measured after feed

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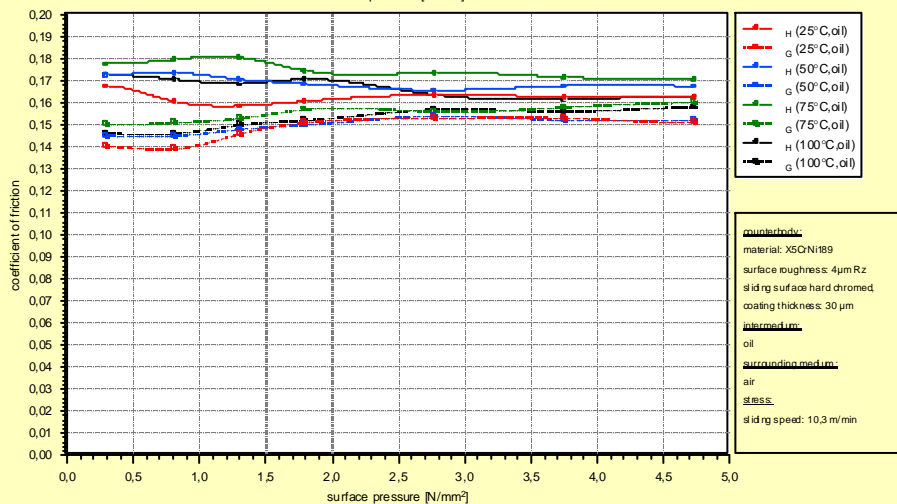
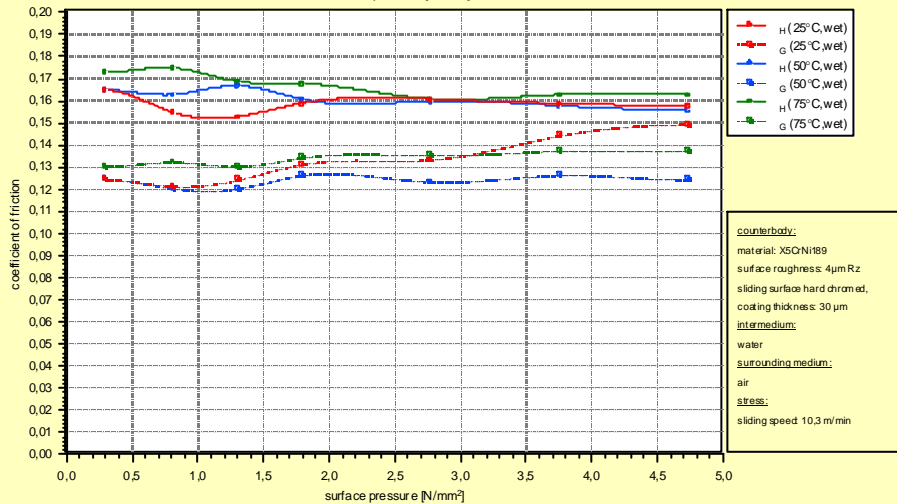
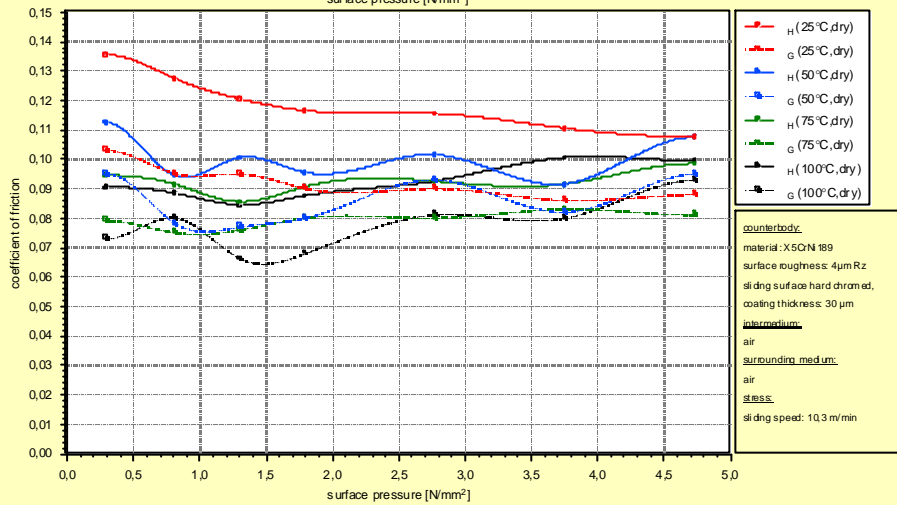
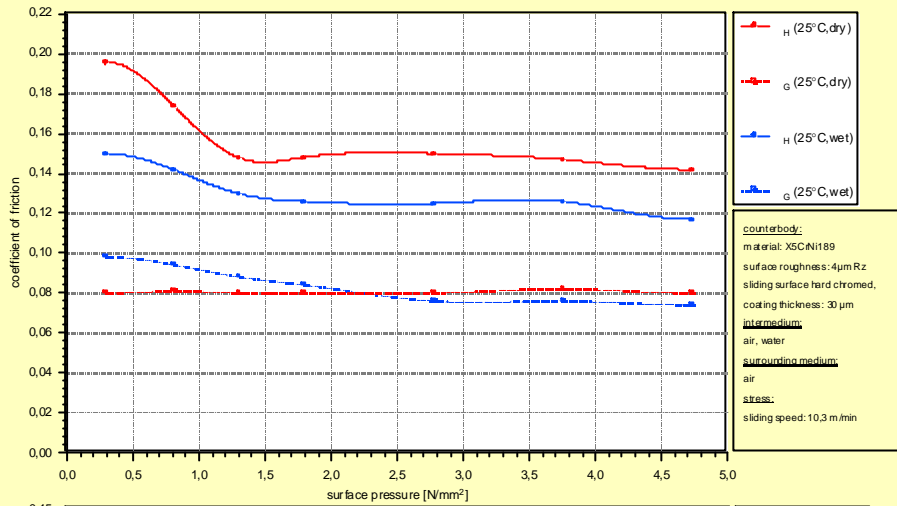
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14.8. Coefficients of friction of ZEDEX-324VMT



III.63
Coefficient of friction of ZX-324VMT measured as supplied

III.64
Coefficient of friction of ZX-324VMT in dry runs measured after feed

III.65
Coefficient of friction of ZX-324VMT with water lubrication measured after feed

III.66
Coefficient of friction of ZX-324VMT with oil lubrication measured after feed

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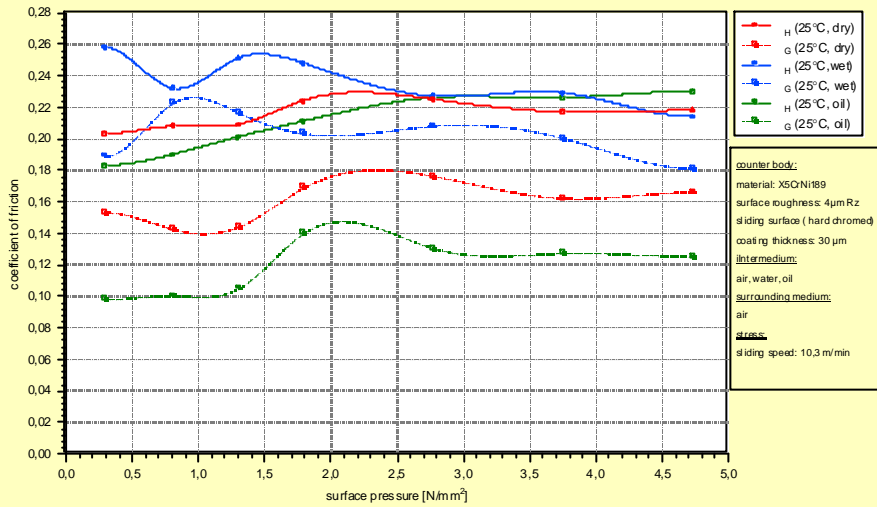
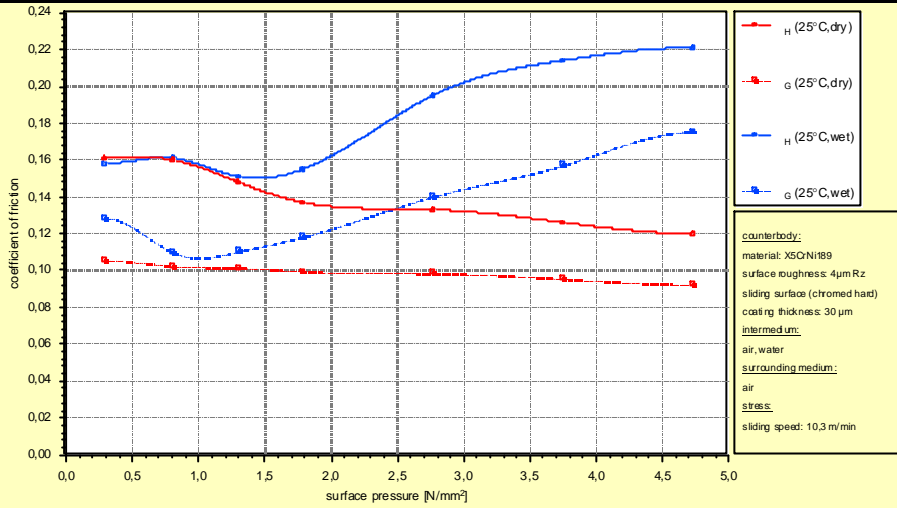
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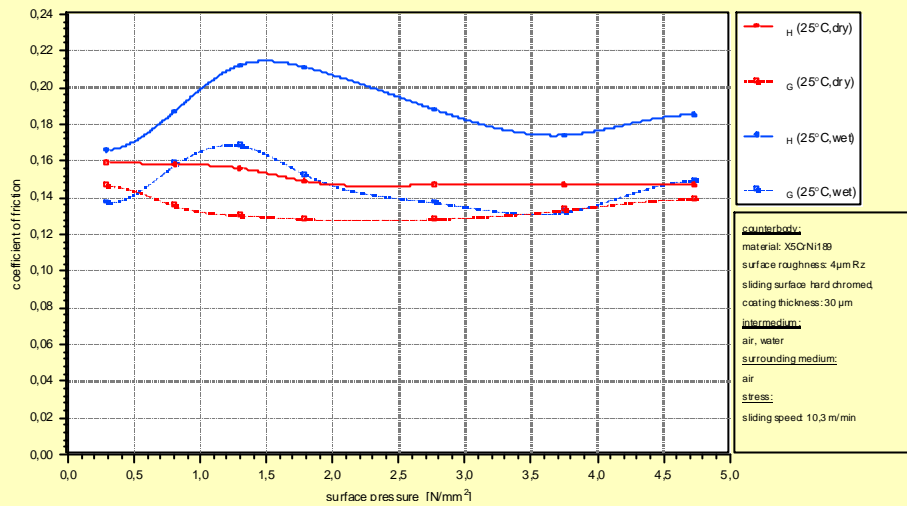
14.9. Coefficients of friction of ZEDEX-410



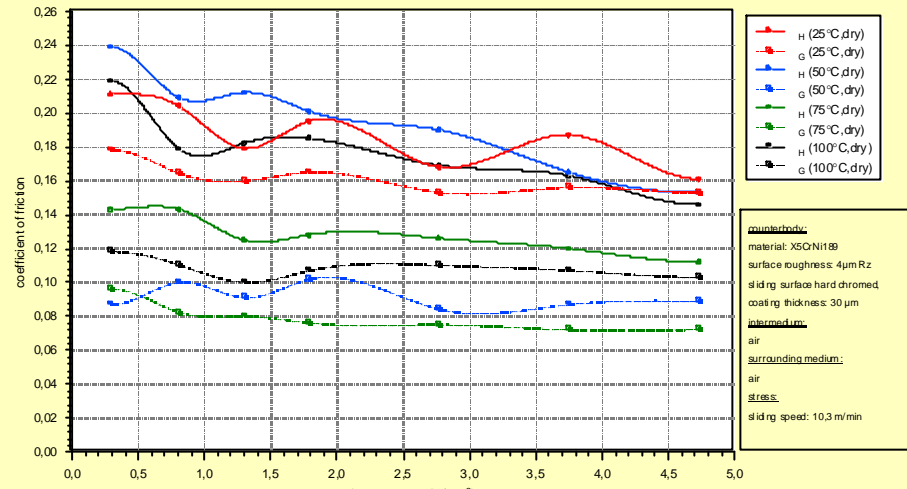
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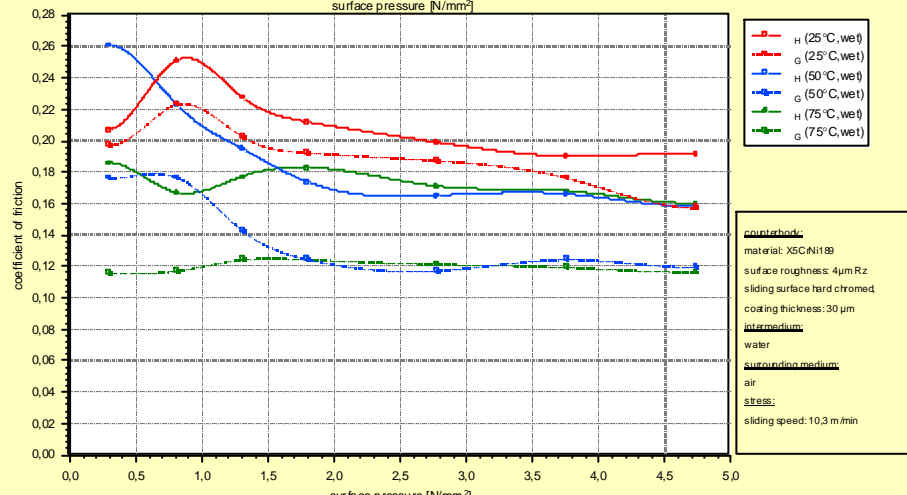
14.10. Coefficients of friction of ZEDEX-530



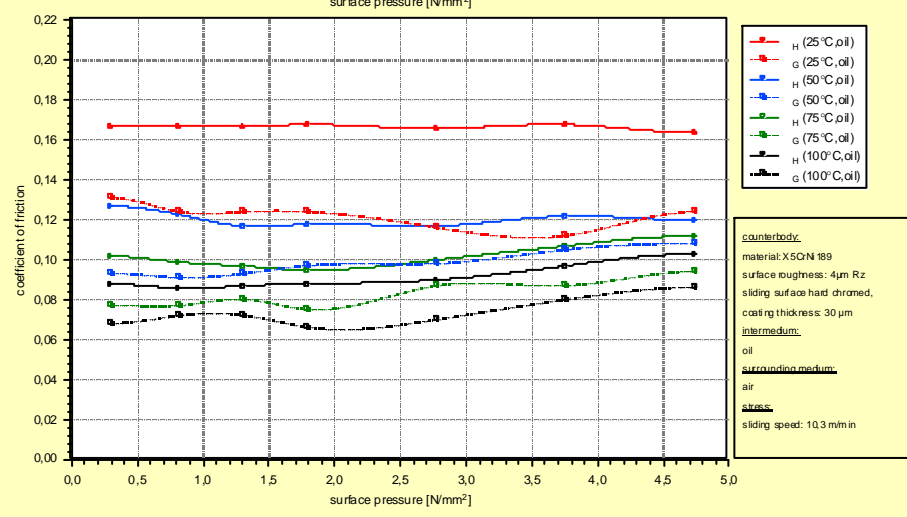
III.69
Coefficient of friction of ZX-530 measured as supplied



III.70
Coefficient of friction of ZX-530 in dry runs measured after feed



III.71
Coefficient of friction of ZX-530 with water lubrication measured after feed

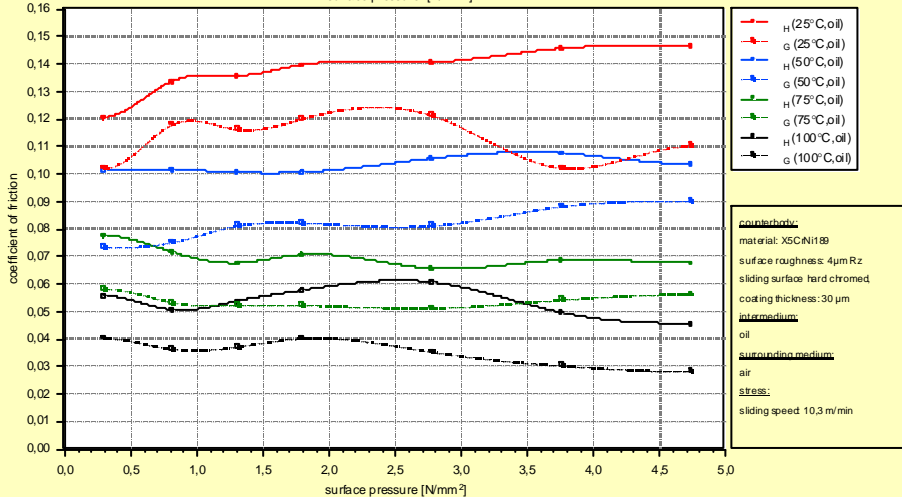
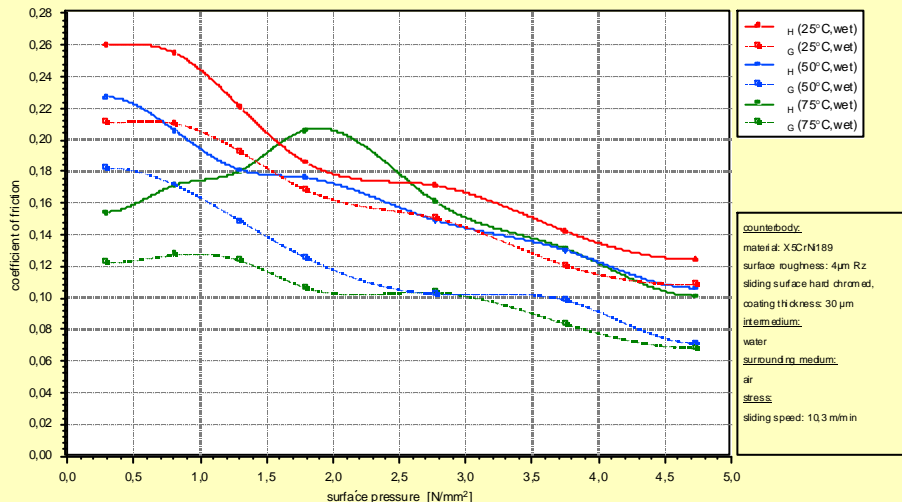
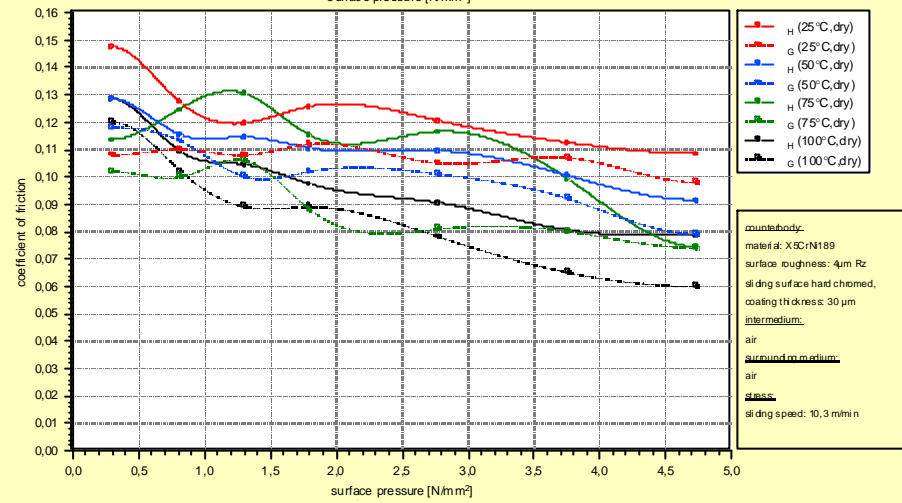
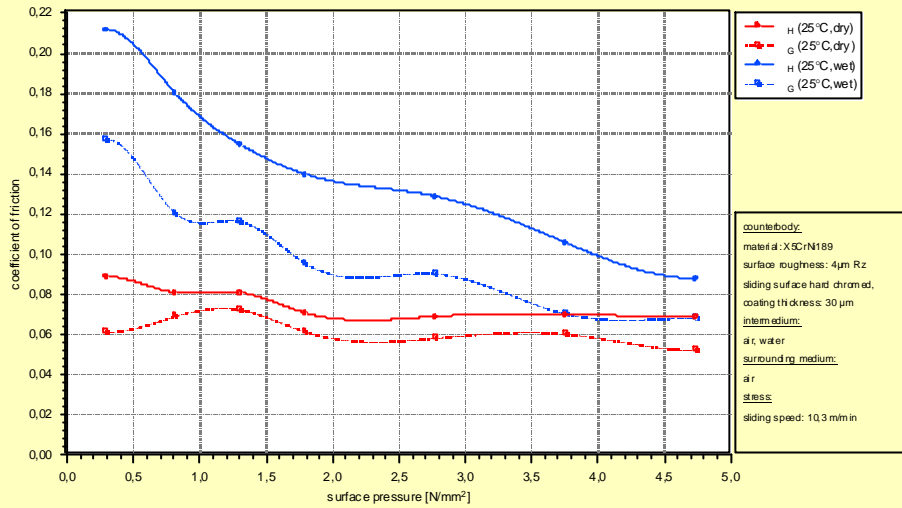


III.72
Coefficient of friction of ZX-530 with oil lubrication measured after feed

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14.11. Coefficients of friction of ZEDEX-550



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Coefficient of friction of ZX-550 measured as supplied

III.74
Coefficient of friction of ZX-550 in dry runs measured after feed

III.75
Coefficient of friction of ZX-550 with water lubrication measured after feed

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Coefficient of friction of ZX-550 with oil lubrication measured after feed

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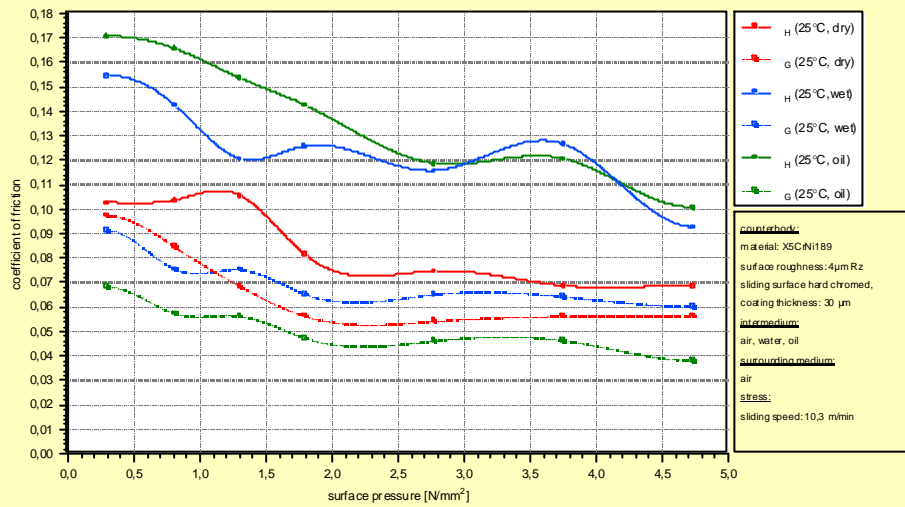
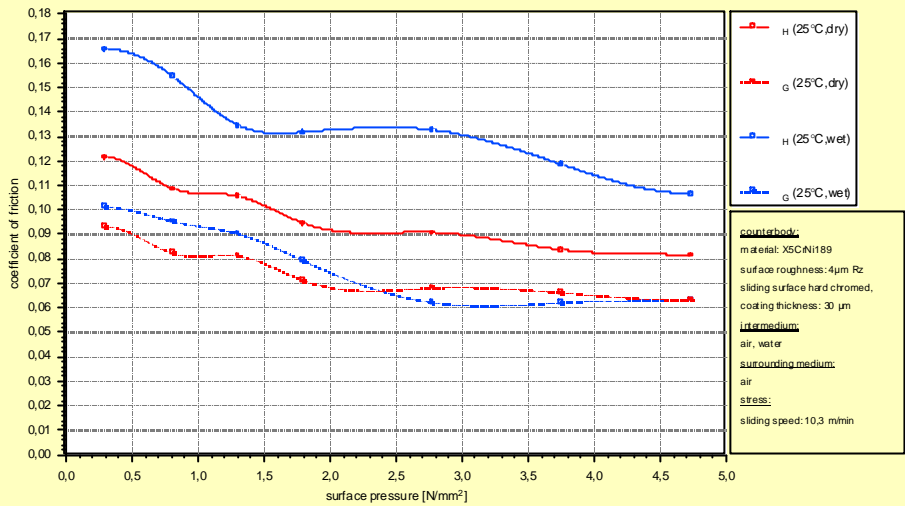
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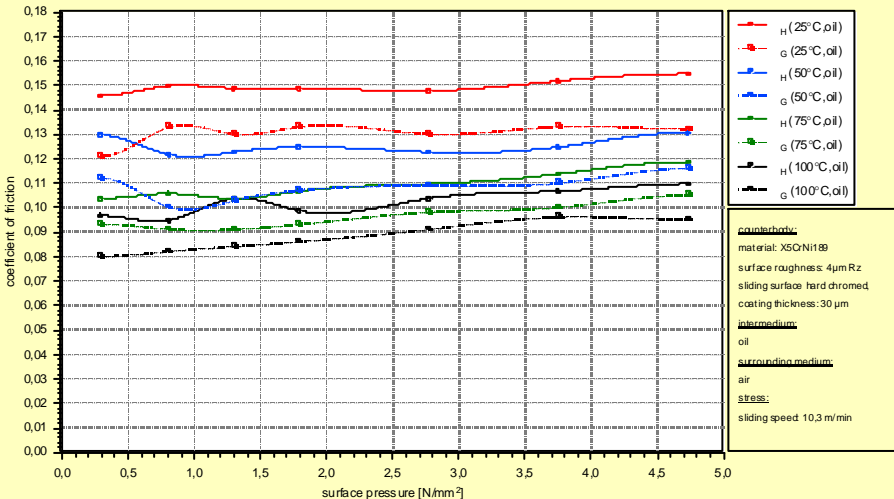
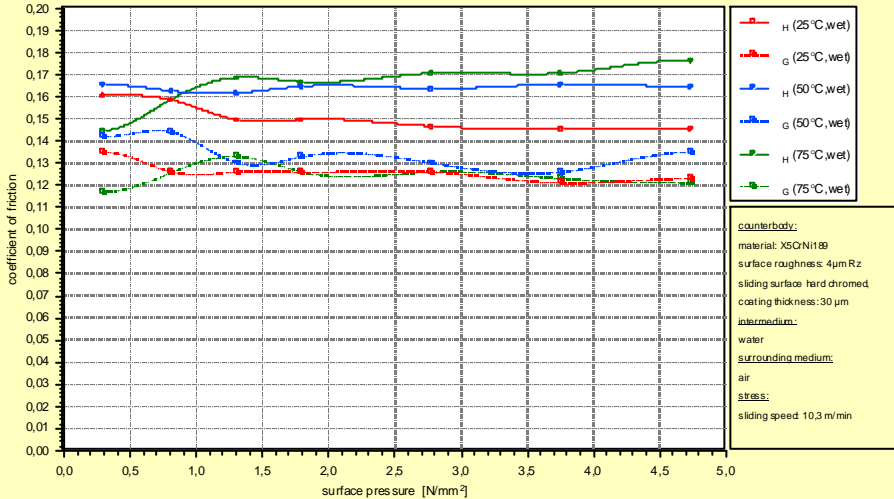
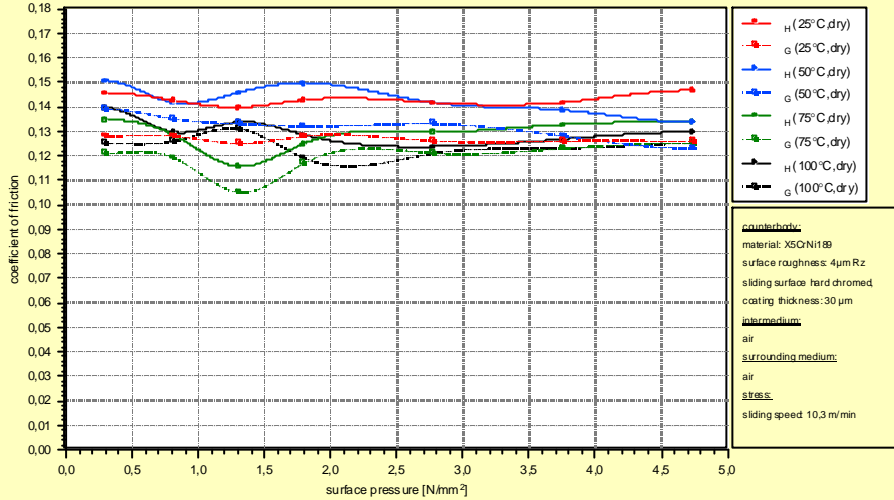
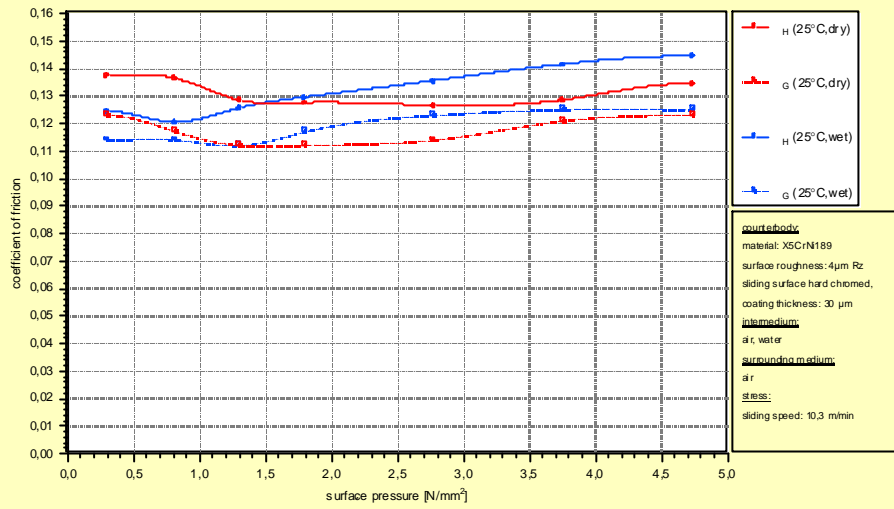
14.12. Coefficients of friction of ZEDEX-720



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Coefficient of friction of ZX-750V1T measured as supplied

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Coefficient of friction of ZX-750V1T in dry runs measured after feed

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Coefficient of friction of ZX-750V1T with oil lubrication measured after feed

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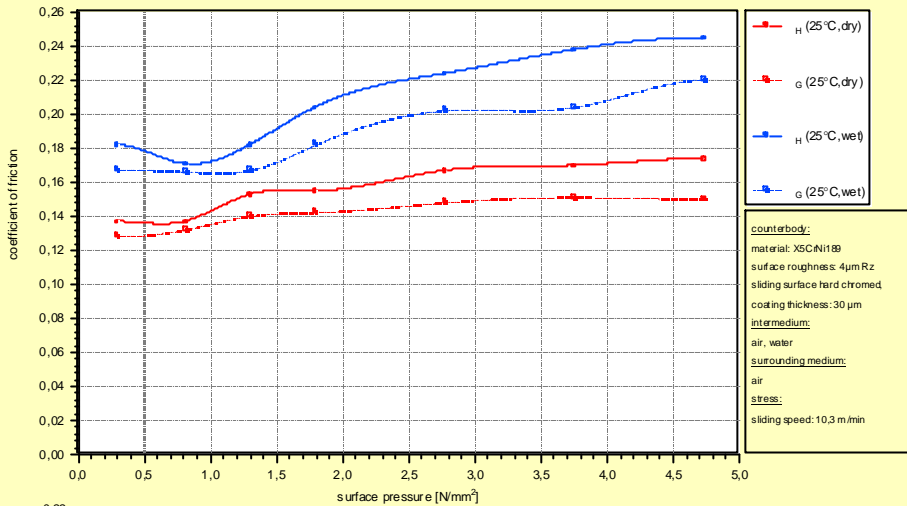
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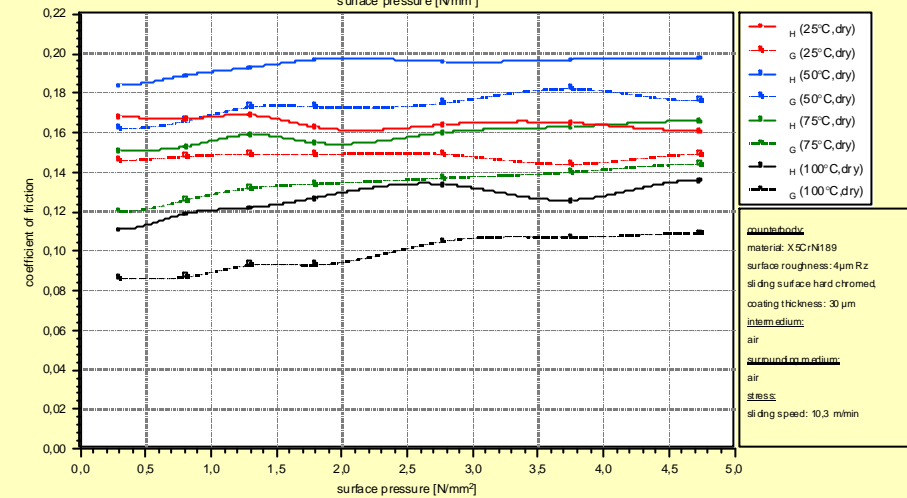


14.14. Coefficients of friction of ZEDEX-750V2T



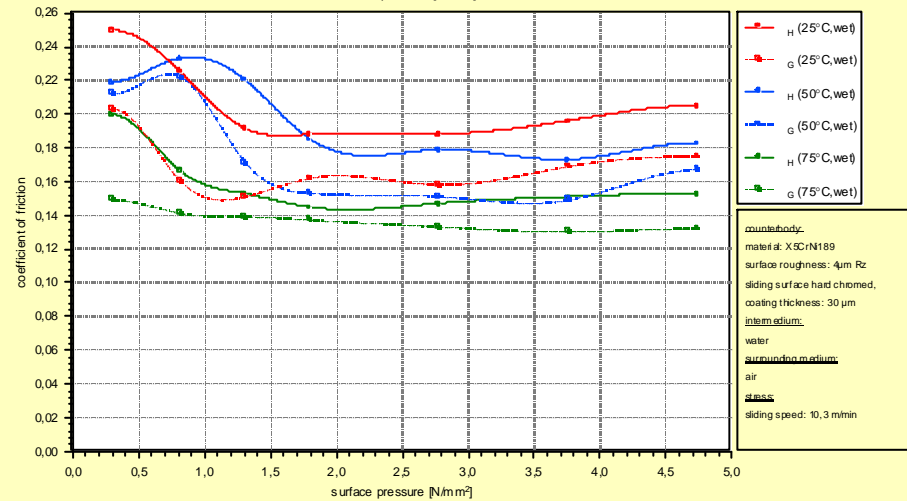
III.83

Coefficient of friction of ZX-750V2T measured as supplied



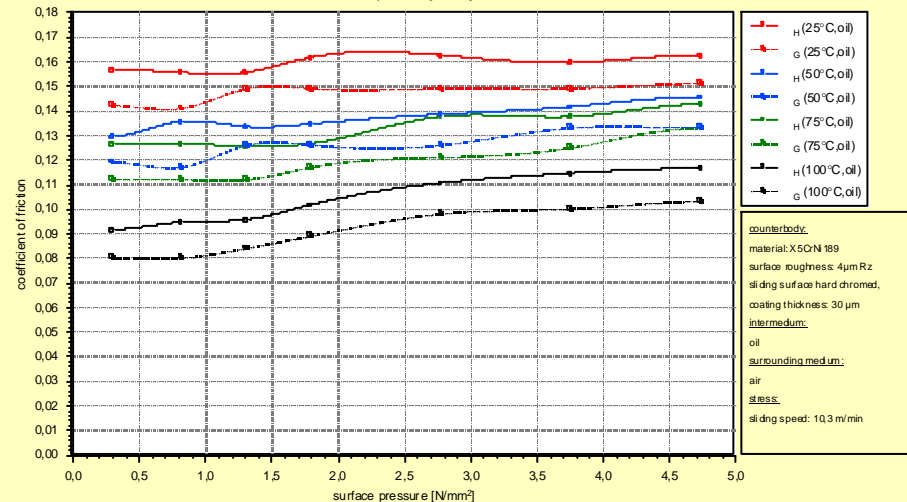
III.84

Coefficient of friction of ZX-750V2T in dry runs measured after feed



III.85

Coefficient of friction of ZX-750V2T with water lubrication measured after feed

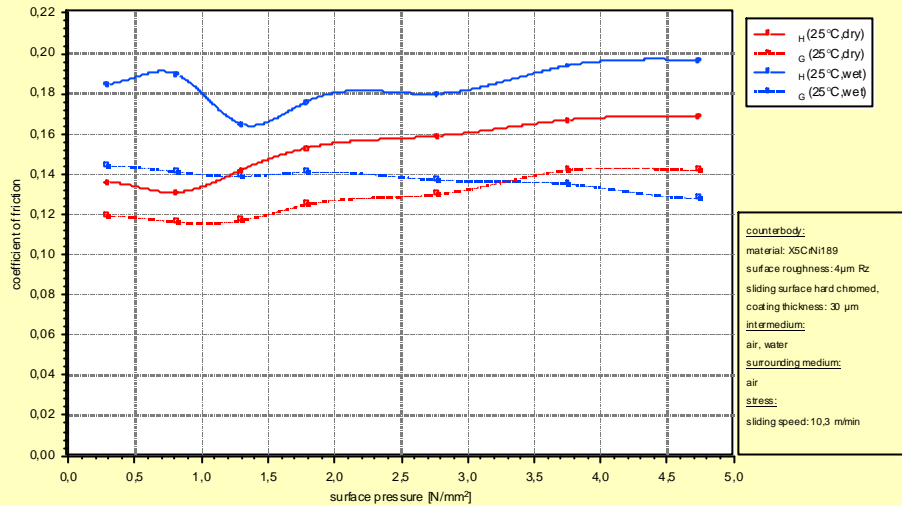


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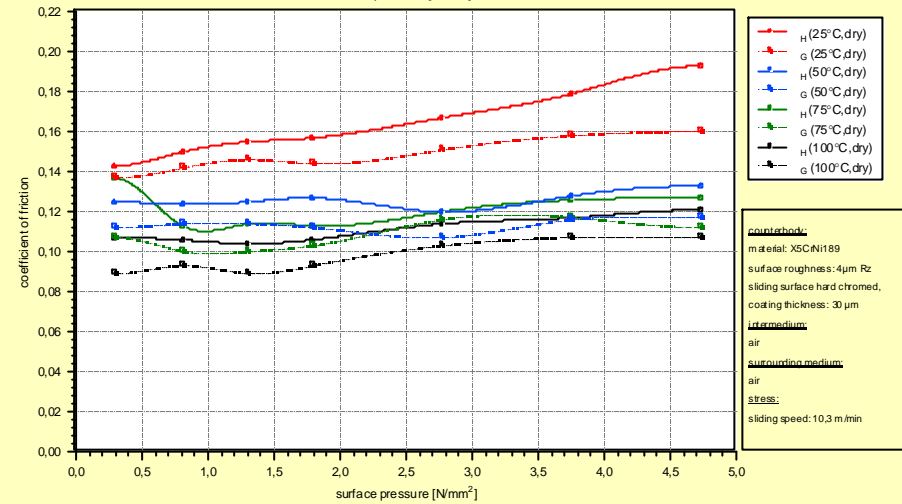
Coefficient of friction of ZX-750V2T with oil lubrication measured after feed



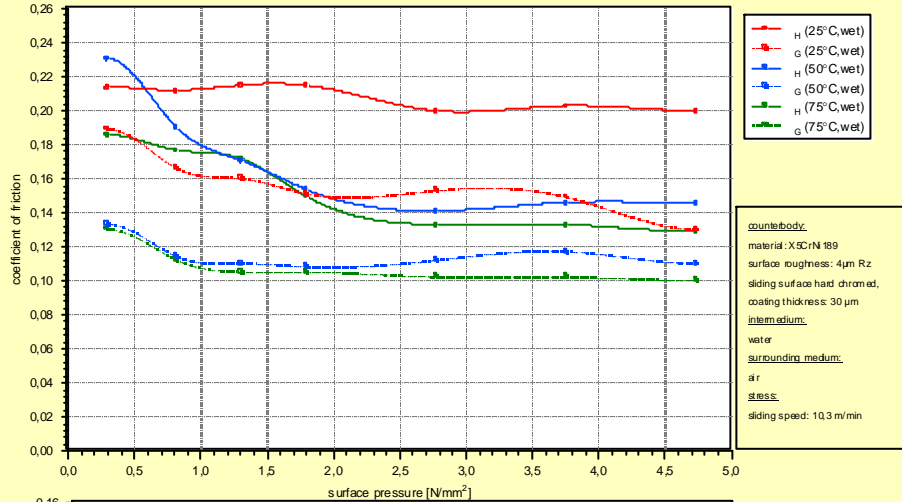
14.15. Coefficients of friction of ZEDEX-750V3



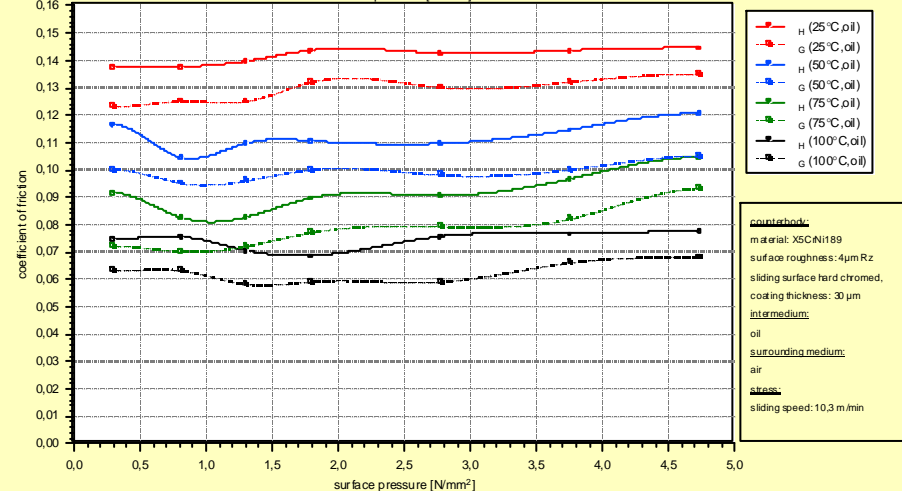
III.87
Coefficient of friction of ZX-750V3 measured as supplied



III.88
Coefficient of friction of ZX-750V3 in dry runs measured after feed



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Coefficient of friction of ZX-750V3 with water lubrication measured after feed



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Coefficient of friction of ZX-750V3 with oil lubrication measured after feed

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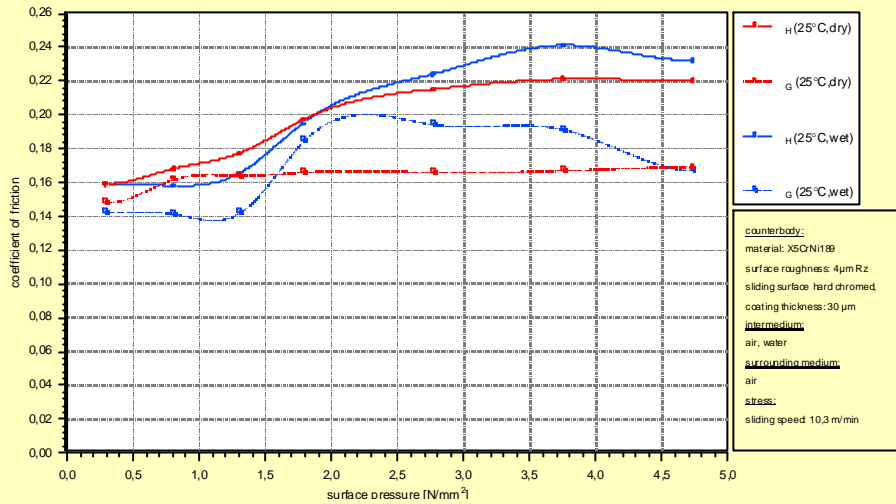
Slide bearings (cylindrical)

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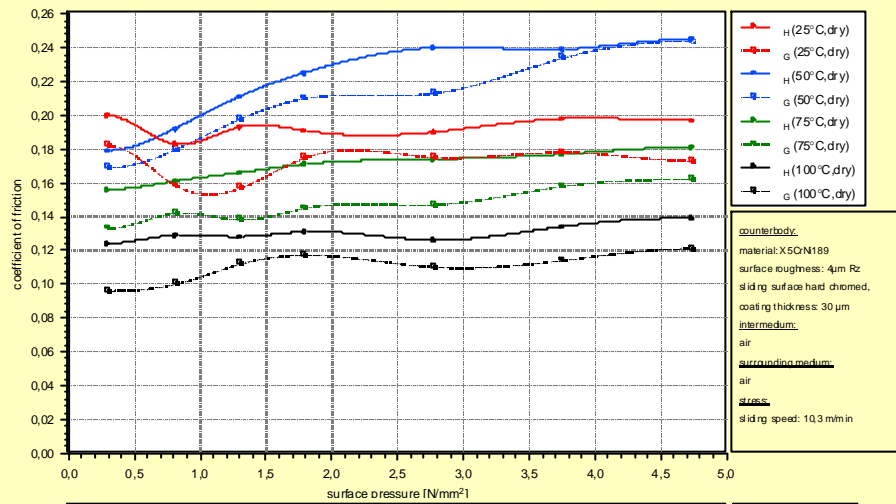
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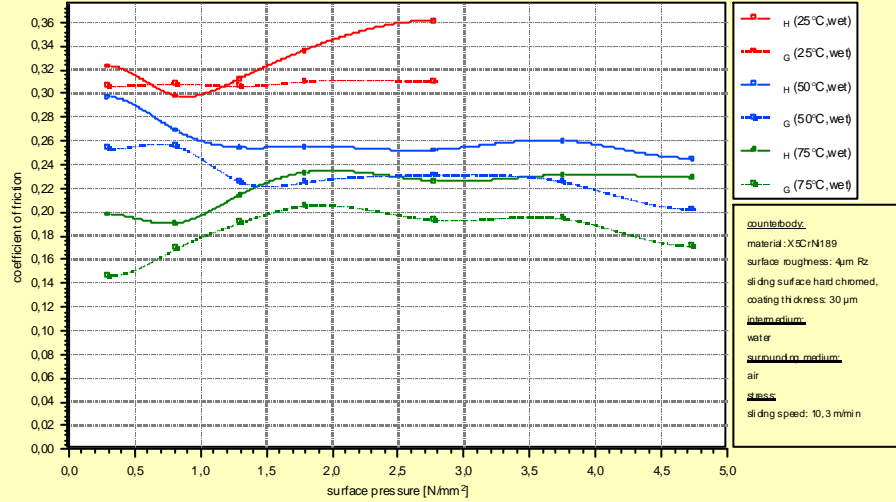
14.16. Coefficients of friction of ZEDEX-750V4



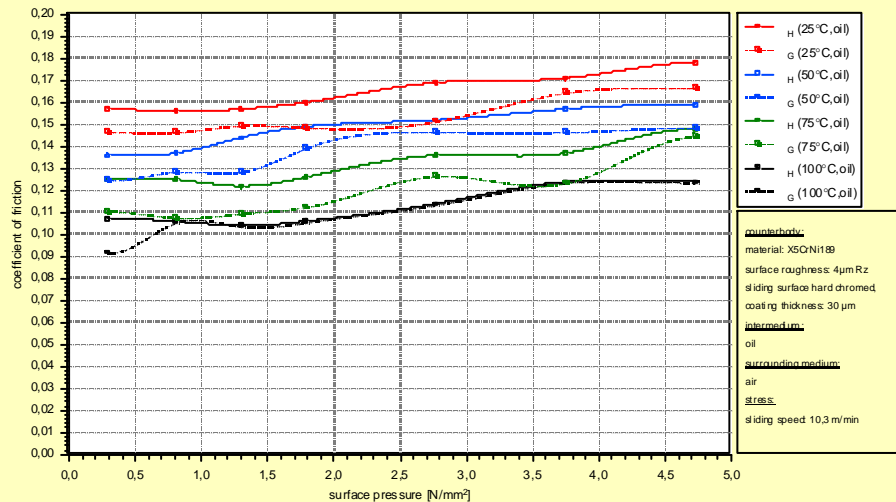
III.91
Coefficient of friction of ZX-750V4 measured as supplied



III.92
Coefficient of friction of ZX-750V4 in dry runs measured after feed



III.93
Coefficient of friction of ZX-750V4 with water lubrication measured after feed



III.94
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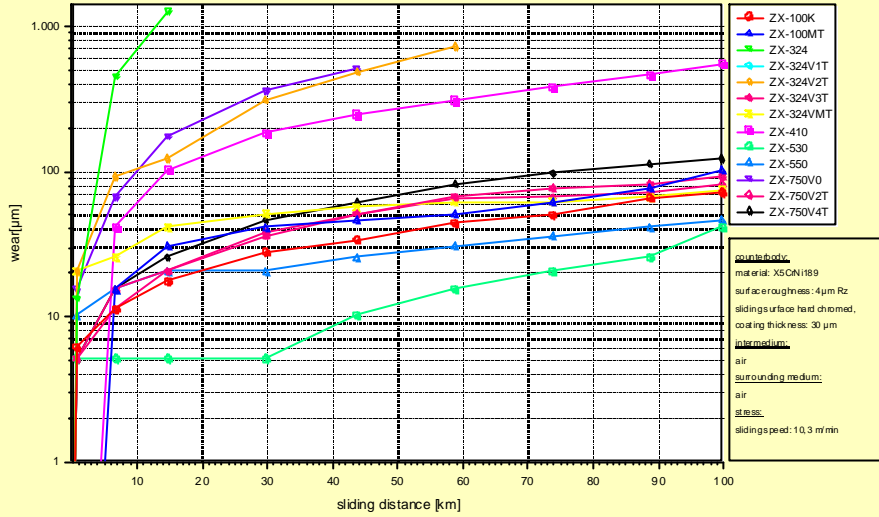
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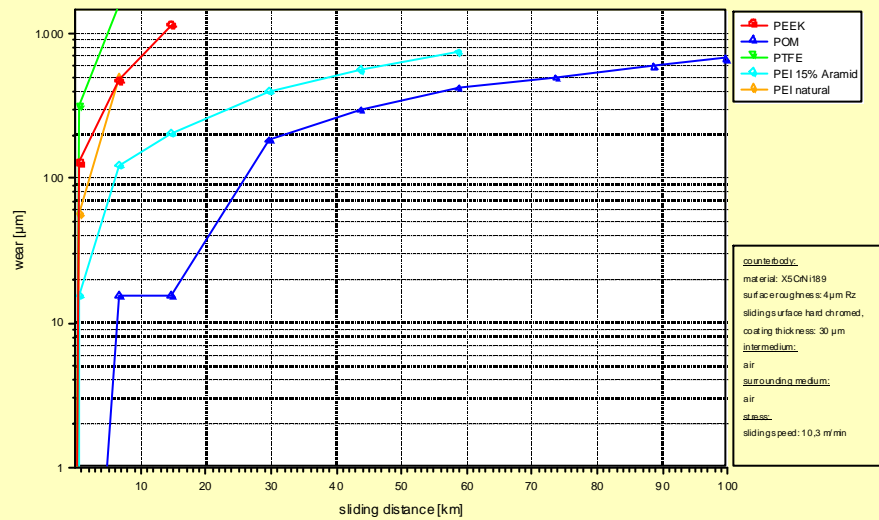


15. Curves of wear of materials taken from the ZEDEX-series



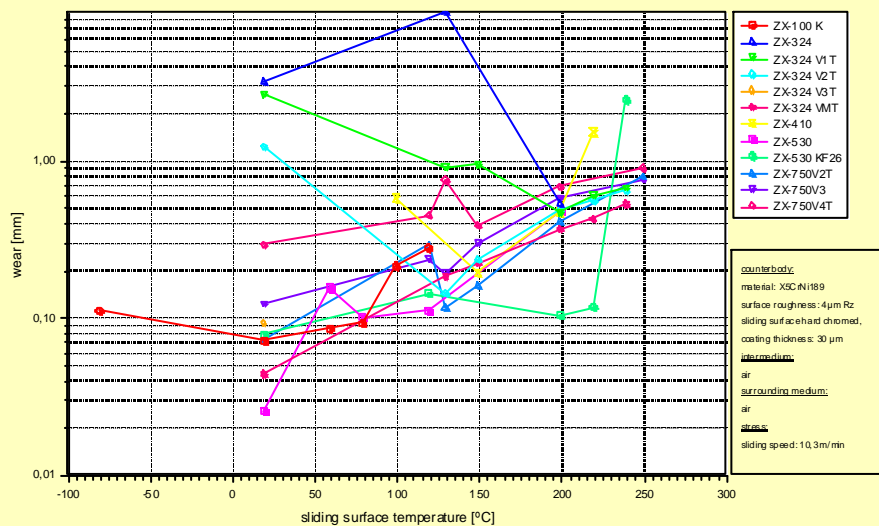
III.95

Flow of wear of materials taken from the Wolf-ZX-series depending on the sliding distance in dry runs and on an ambient temperature of 25°C.



III.96

Flow of wear of standard materials depending on the sliding distance in dry runs and on an ambient temperature of 25°C.



III.97

Flow of wear of materials taken from the Wolf ZX-series depending on the sliding surface temperature in dry runs. The wear rates are referring to a sliding distance of 100km.

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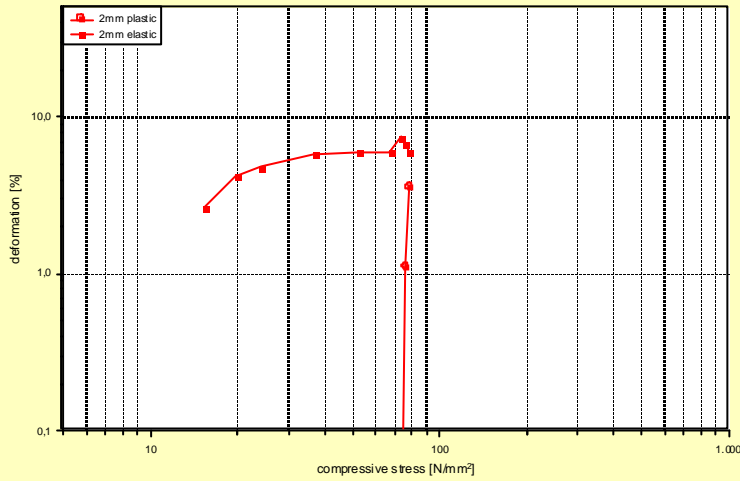
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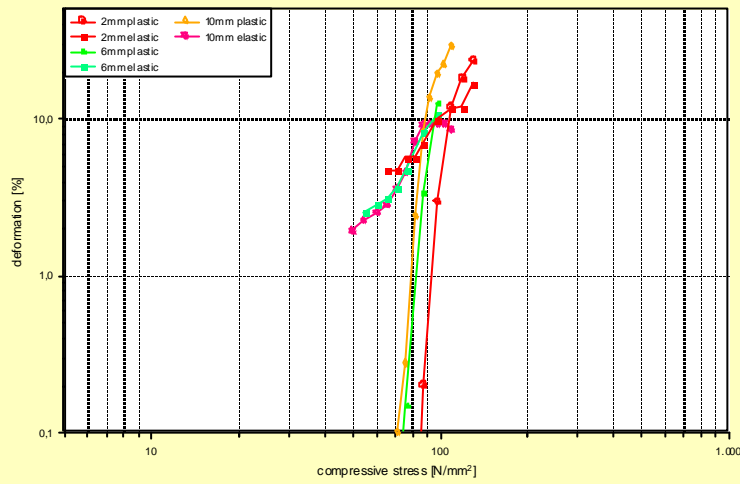


16. Short-term stress-strain functions



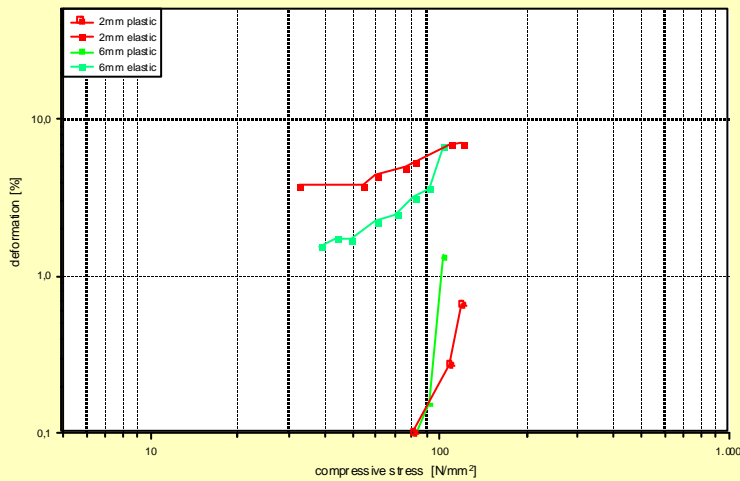
III.98

Short-term stress-strain function of **ZX-100A** in correlation with different material thickness -measured at 25°C-



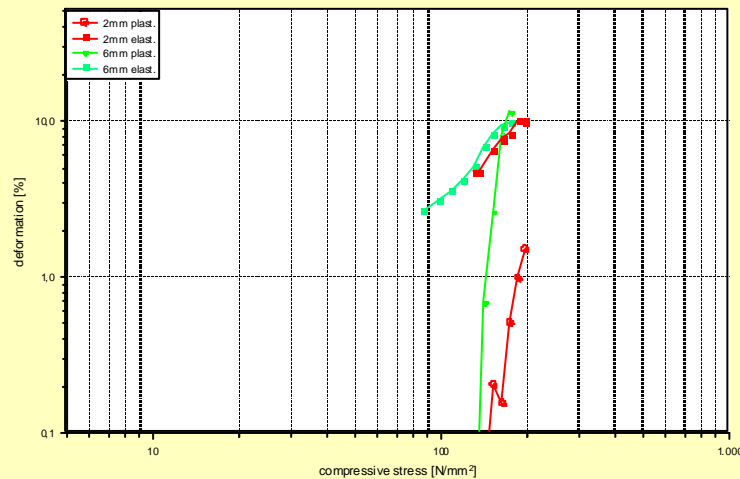
III.99

Short-term stress-strain function of **ZX-100K** in correlation with different material thickness -measured at 25°C-



III.100

Short-term stress-strain function of **ZX-100MT** in correlation with different material thickness -measured at 25°C-



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Short-term stress-strain function of **ZX-324** in correlation with different material thickness -measured at 25°C-

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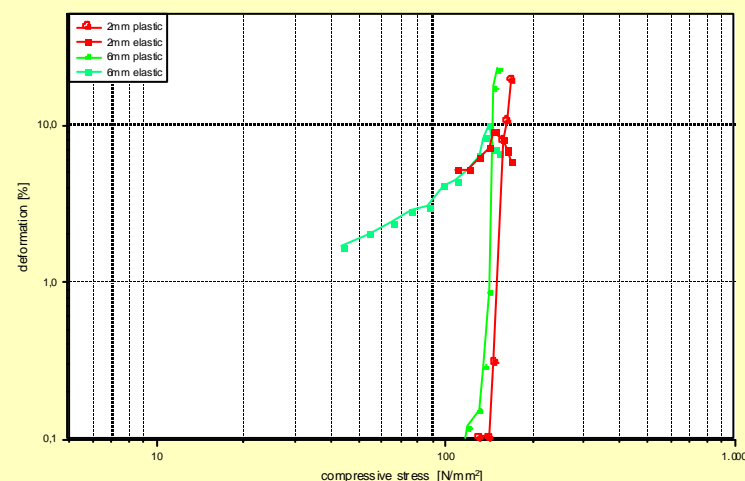
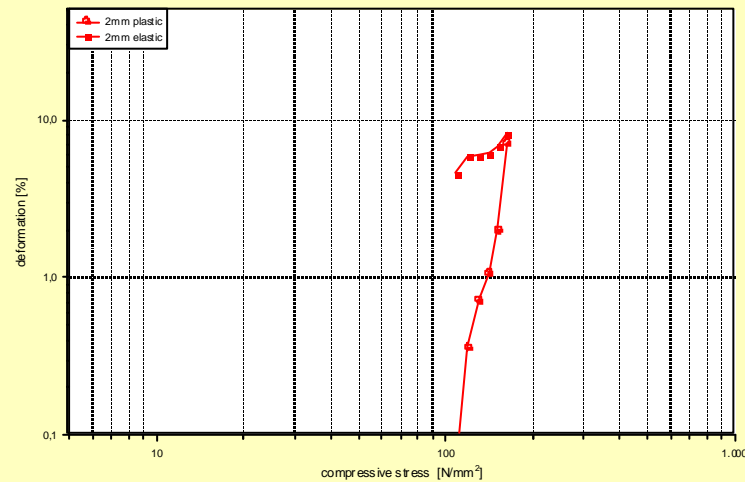
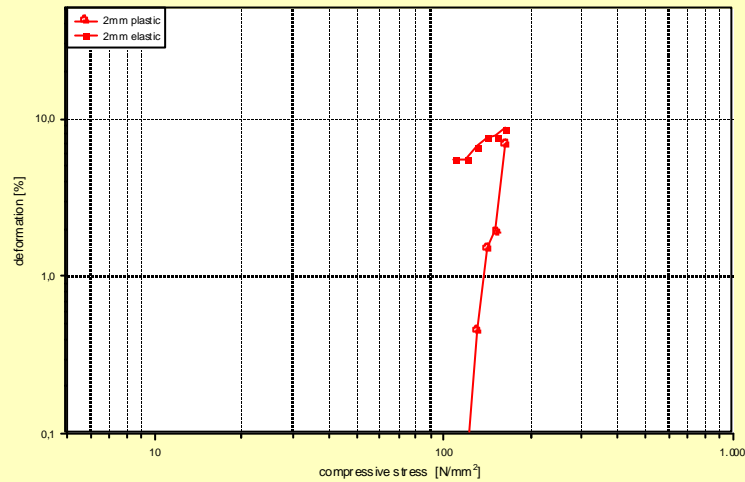
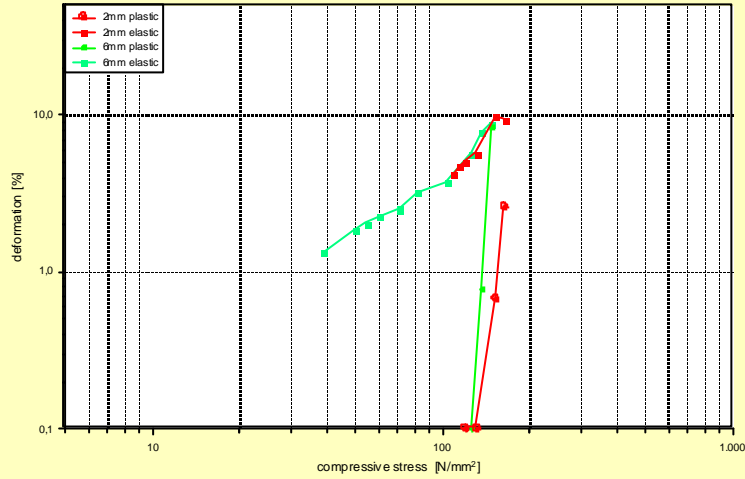
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16. Short-term stress-strain functions



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Short-term stress-strain function of **ZX-324V1T** in correlation with different material thickness -measured at 25°C-

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Short-term stress-strain function of **ZX-324V2T** in correlation with different material thickness -measured at 25°C-

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Short-term stress-strain function of **ZX-324V3T** in correlation with different material thickness -measured at 25°C-

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Short-term stress-strain function of **ZX-410** in correlation with different material thickness -measured at 25°C-

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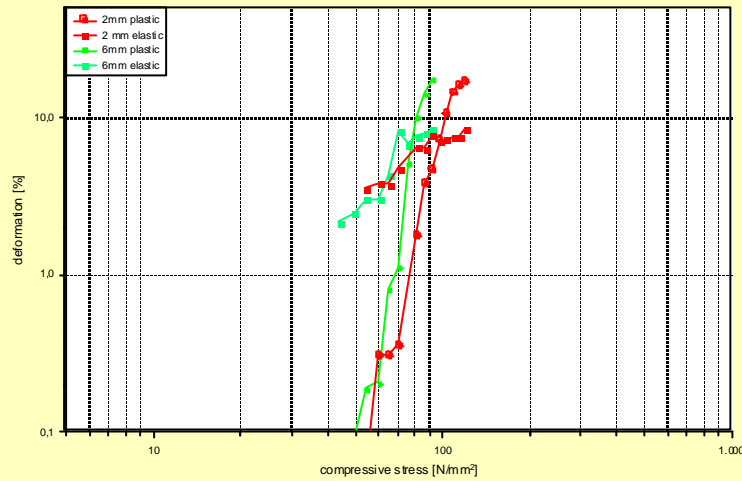
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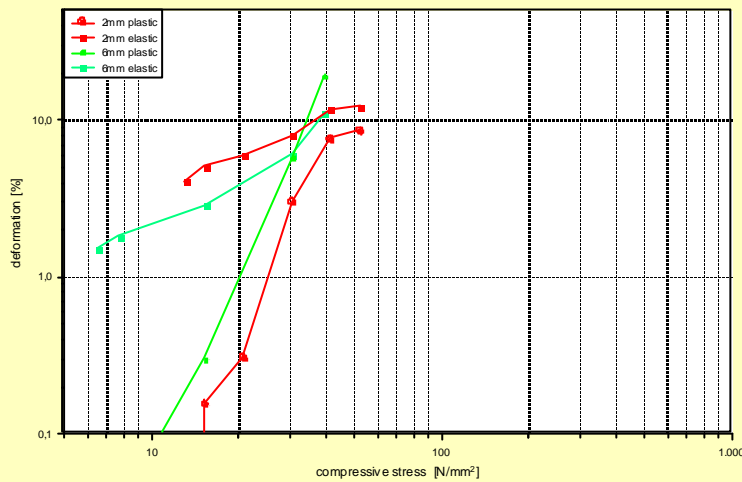


16. Short-term stress-strain functions



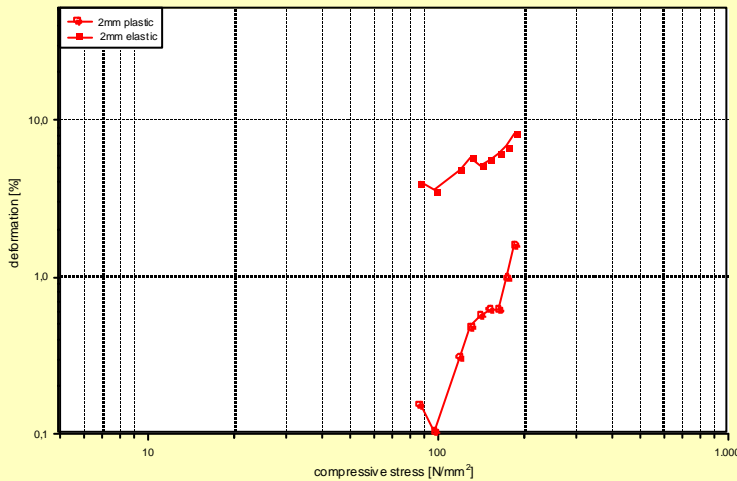
III.106

Short-term stress-strain function of **ZX-530** in correlation with different material thickness
-measured at 25°C-



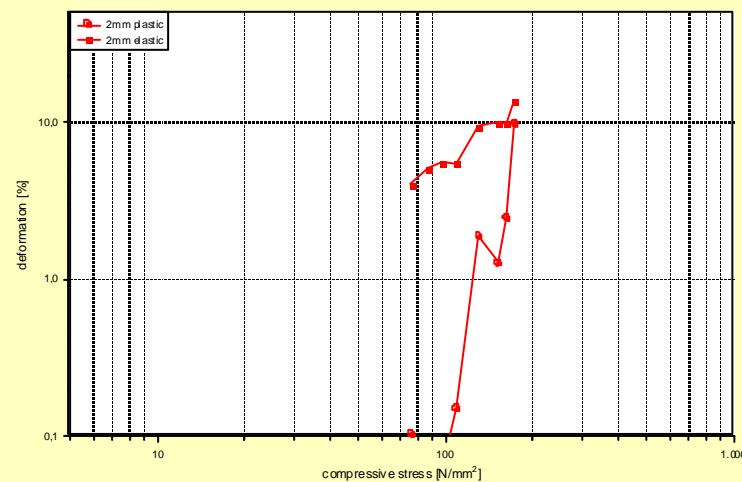
III.107

Short-term stress-strain function of **ZX-550** in correlation with different material thickness
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Short-term stress-strain function of **ZX-750V1T** in correlation with different material thickness
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III.109

Short-term stress-strain function of **ZX-750V4** in correlation with different material thickness
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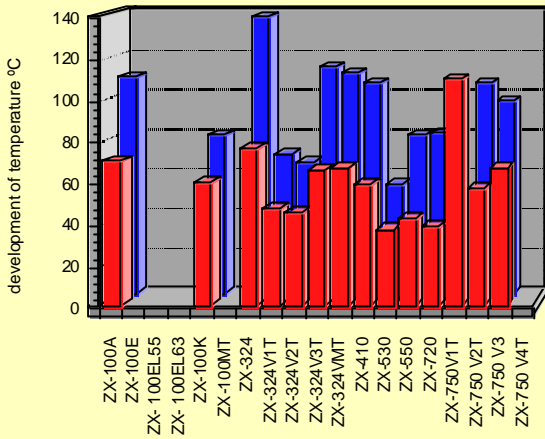
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17. Development of temperature of radial slide bearings



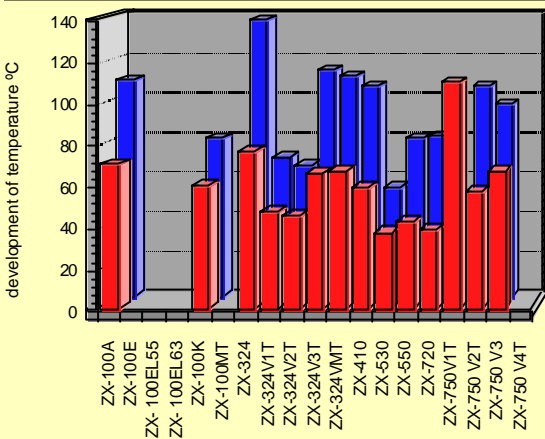
III.110

Development of temperature of radial slide bearings made from ZX-materials with $v = 0,5 \text{ m/min}$ $pv = 8 \text{ N/mm}^2 * \text{m/min}$ -measured at 25°C-

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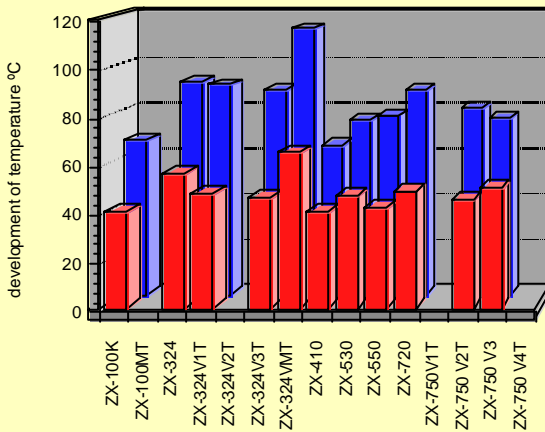


III.111

Development of temperature of radial slide bearings made from ZX-materials with $v = 10\text{m/min}$ $pv = 20 \text{ N/mm}^2 * \text{m/min}$ -measured at 25°C-

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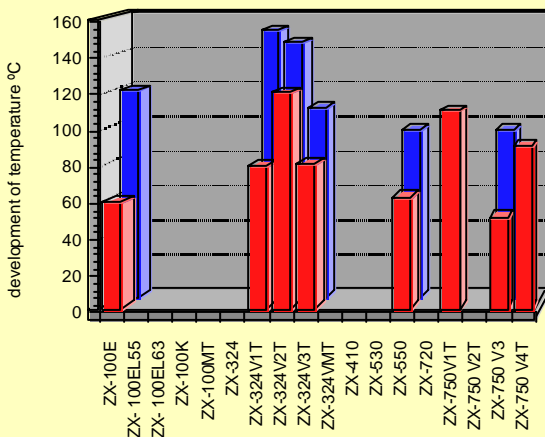


III.112

Development of temperature of radial slide bearings made from ZX-materials with $v = 40 \text{ m/min}$ $pv = 10 \text{ N/mm}^2 * \text{m/min}$ -measured at 25°C-

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III.113

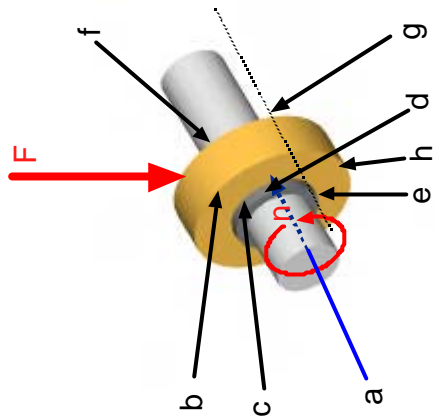
Development of temperature of radial slide bearings made from ZX-materials with $v = 100 \text{ m/min}$ $pv = 16\text{N/mm}^2 * \text{m/min}$ -measured at 25°C-

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temperature measuring points:



parameter:

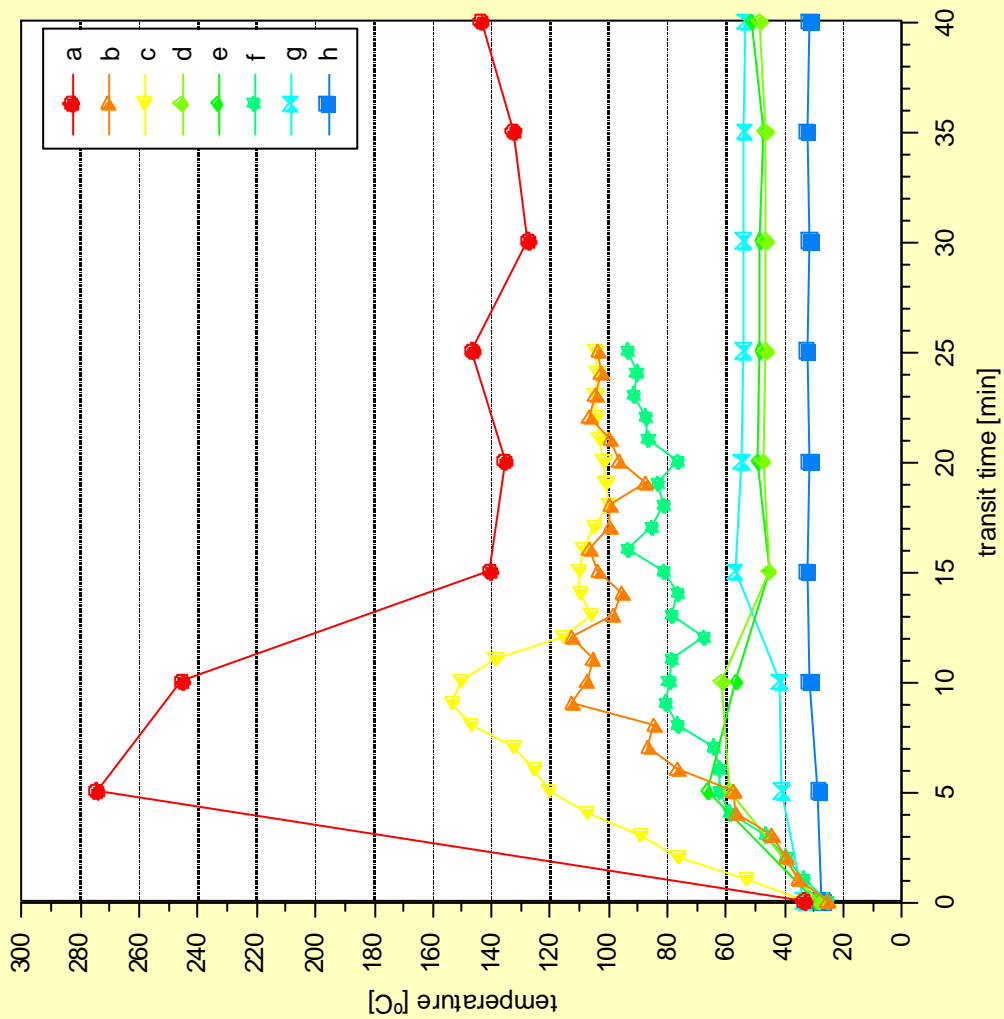
$F = 345\text{N}$

$v = 5,65\text{ m/min}$

$p = 2,97\text{N/mm}^2$

slide bearing material: ZX-324

screw: 16MnCr5



III.114

Development of temperature observed at different measuring points of radial slide bearings made from ZX-324 with $v = 5,65\text{ m/min}$ $p_v = 16,7\text{N/mm}^2 \cdot \text{m/min}$
 -measured at 25°C-

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19. Installation conditions

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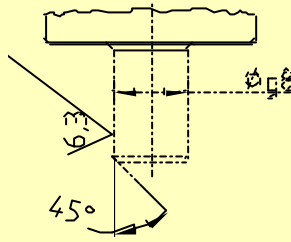
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Stuffing mandrel:

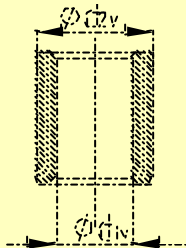
The bushings must be stuffed into the bearing seat by means of a press in accordance with the mandrel tolerances (recommended ISO-tolerance g8), in order to guarantee a perfect fit of the bushings as well as the definitive tolerances.



Oversized bushing before installation:

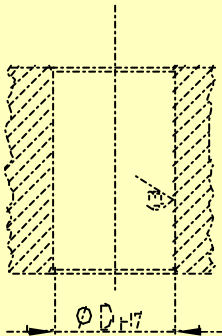
The bushings are supplied with an oversized outside diameter in order to guarantee a secure attachment through the press-fit. The permissible oversizes are dependent on the outside diameter and are shown in the marginal table.

outside diameter ϕd_{2v} (mm)	oversize min (mm)	oversize max (mm)
6 - 10	0,05	0,08
12 - 20	0,08	0,12
22 - 50	0,10	0,15
55 - 100	0,15	0,20
105 - 150	0,20	0,28
160 - 230	0,25	0,35



Bearing seat made from metal:

The bushing hole is designed for a bearing seat of a bore tolerance H5. Other bore tolerances are possible. Please consider the advices given in chapter 4.1.

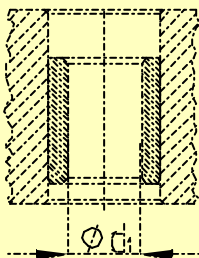


Bore tolerances of the bushings after stuffing:

The maximum and minimum diameters ($d1_{max}$ and $d1_{min}$) recommended for the standard designs are shown in the dimension lists.

Please take the figures for other classes of bearing clearances from the ISO-tolerance table (see preface).

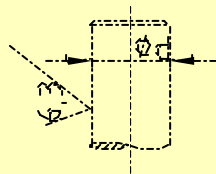
When using an other bore tolerance for the casing besides H5 please consider the advices given in chapter 4.1.3.2.



Screw:

- optimum: diameter tolerance h6 (h7)
- optimum: steel cured (> 50HRC) and ground

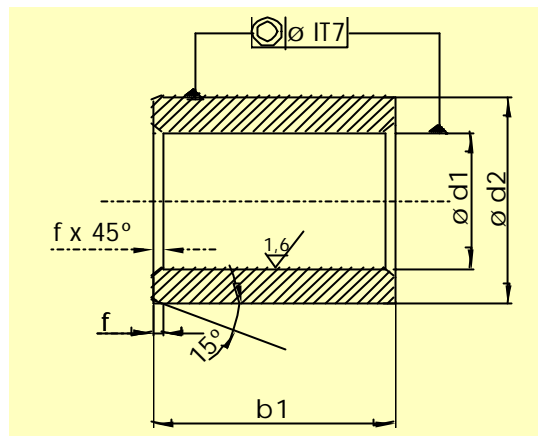
Other tolerances for the screw and other materials are possible. You can find further information about this in the respective chapters or get into contact with our application research department.





20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
1	3	1	0.40	0,2x45°	DIN 1850 part 3	1.02	1.034	Z_D08001003001
1	3	2	0.40	0,2x45°	DIN 1850 part 3	1.02	1.034	Z_D08001003002
1.5	4	1	0.40	0,2x45°	DIN 1850 part 3	1.52	1.534	Z_D08001004003
1.5	4	2	0.40	0,2x45°	DIN 1850 part 3	1.52	1.534	Z_D08001004004
2	5	2	0.40	0,2x45°	DIN 1850 part 3	2.02	2.034	Z_D08002005001
2	5	3	0.40	0,2x45°	DIN 1850 part 3	2.02	2.034	Z_D08002005002
2.5	6	2	0.40	0,2x45°	DIN 1850 part 3	2.52	2.534	Z_D08002006003
2.5	6	3	0.40	0,2x45°	DIN 1850 part 3	2.52	2.534	Z_D08002006004
3	5	3	0.40	0,2x45°	DIN 1850 part 3	3.02	3.034	Z_D08003007005
3	5	4	0.80	0,2x45°	DIN 1850 part 3	3.02	3.034	Z_D08003005001
3	6	3	0.40	0,2x45°	DIN 1850 part 5	3.02	3.034	Z_D08003009002
3	6	4	0.80	0,2x45°	DIN 1850 part 5	3.02	3.034	Z_D08003006003
3	7	3	0.40	0,2x45°	DIN 1495 part 2	3.02	3.034	Z_D08003008004
3	8	4	0.80	0,2x45°	DIN 1495 part 2	3.02	3.034	Z_D08003005005
3	9	3	0.40	0,2x45°	DIN 1850 part 4	3.02	3.034	Z_D08003009006
3	9	4	0.80	0,2x45°	DIN 1850 part 4	3.02	3.034	Z_D08003006007
4	5.5	4	0.80	0,2x45°	DIN 1494 part 1	4.03	4.048	Z_D08004007008
4	5.5	6	0.80	0,2x45°	DIN 1494 part 1	4.03	4.048	Z_D08004008009
4	7	3	0.40	0,2x45°	DIN 1850 part 3	4.03	4.048	Z_D08004005001
4	7	4	0.80	0,2x45°	DIN 1850 part 3	4.03	4.048	Z_D08004009002
4	7	6	0.80	0,2x45°	DIN 1850 part 3	4.03	4.048	Z_D08004007003
4	8	3	0.80	0,2x45°	DIN 1850 part 3	4.03	4.048	Z_D08004010004
4	8	4	0.80	0,2x45°	DIN 1850 part 5	4.03	4.048	Z_D08004008005
4	8	6	0.80	0,2x45°	DIN 1850 part 3	4.03	4.048	Z_D08004013006
4	9	4	0.80	0,2x45°	DIN 1495 part 2	4.03	4.048	Z_D08004005007
4	10	4	0.80	0,2x45°	DIN 1850 part 4	4.03	4.048	Z_D08004007008
4	10	6	1.00	0,2x45°	DIN 1850 part 4	4.03	4.048	Z_D08004008009
4	13	5	1.00	0,2x45°	DIN 1495 part 2	4.03	4.048	Z_D08004010010
5	8	4	0.80	0,2x45°	DIN 1850 part 3	5.03	5.048	Z_D08005008001
5	8	5	0.80	0,2x45°	DIN 1850 part 3	5.03	5.048	Z_D08005011002
5	8	8	0.80	0,2x45°	DIN 1850 part 3	5.03	5.048	Z_D08005009003
5	9	4	0.80	0,2x45°	DIN 1850 part 5	5.03	5.048	Z_D08005008004
5	9	5	0.80	0,2x45°	DIN 1850 part 3	5.03	5.048	Z_D08005009005
5	9	6	0.80	0,2x45°	DIN 1850 part 5	5.03	5.048	Z_D08005011006
5	9	8	0.80	0,2x45°	DIN 1850 part 3	5.03	5.048	Z_D08005009007
5	11	4	0.80	0,2x45°	DIN 1850 part 4	5.03	5.048	Z_D08005008008
5	11	6	1.00	0,2x45°	DIN 1850 part 4	5.03	5.048	Z_D08005009009

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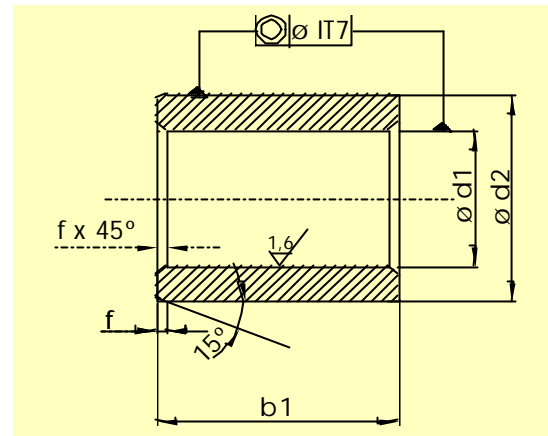
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
6	8	6	0.80	0,3x45°	DIN 1494 part 1	6.03	6.048	Z_D08006009010
6	8	10	0.80	0,3x45°	DIN 1850 part 1	6.03	6.048	Z_D08006010011
6	9	4	0.80	0,3x45°	DIN 1850 part 3	6.03	6.048	Z_D08006012012
6	9	10	0.80	0,3x45°	DIN 1850 part 3	6.03	6.048	Z_D08006008001
6	10	4	0.80	0,3x45°	DIN 1850 part 3	6.03	6.048	Z_D08006012002
6	10	6	1.00	0,3x45°	DIN 1850 part 5	6.03	6.048	Z_D08006010003
6	10	10	1.00	0,3x45°	DIN 1850 part 5	6.03	6.048	Z_D08006008004
6	12	4	0.80	0,3x45°	DIN 1850 part 4	6.03	6.048	Z_D08006012005
6	12	6	1.00	0,3x45°	DIN 1850 part 1	6.03	6.048	Z_D08006009006
6	12	10	1.00	0,3x45°	DIN 1850 part 1	6.03	6.048	Z_D08006010007
7	10	5	1.00	0,3x45°	DIN 1850 part 3	7.04	7.062	Z_D08007010001
7	10	8	1.00	0,3x45°	DIN 1850 part 3	7.04	7.062	Z_D08007011002
7	10	10	1.00	0,3x45°	DIN 1850 part 3	7.04	7.062	Z_D08007010003
7	11	5	1.00	0,3x45°	DIN 1850 part 3	7.04	7.062	Z_D08007011004
7	11	8	1.00	0,3x45°	DIN 1850 part 3	7.04	7.062	Z_D08007010005
7	11	10	1.00	0,3x45°	DIN 1850 part 3	7.04	7.062	Z_D08007011006
8	10	6	1.00	0,3x45°	DIN 1850 part 1	8.04	8.062	Z_D08008010001
8	10	8	1.00	0,3x45°	DIN 1494 part 1	8.04	8.062	Z_D08008011002
8	10	10	1.00	0,3x45°	DIN 1850 part 1	8.04	8.062	Z_D08008014003
8	10	12	1.00	0,3x45°	DIN 1494 part 1	8.04	8.062	Z_D08008012004
8	11	6	1.00	0,3x45°	DIN 1850 part 3	8.04	8.062	Z_D08008010005
8	11	8	1.00	0,3x45°	DIN 1850 part 3	8.04	8.062	Z_D08008011006
8	11	12	1.00	0,3x45°	DIN 1850 part 3	8.04	8.062	Z_D08008012007
8	12	6	1.00	0,3x45°	DIN 1850 part 5	8.04	8.062	Z_D08008014008
8	12	8	1.00	0,3x45°	DIN 1850 part 3	8.04	8.062	Z_D08008010009
8	12	10	1.00	0,3x45°	DIN 1850 part 5	8.04	8.062	Z_D08008014010
8	12	12	1.00	0,3x45°	DIN 1850 part 3	8.04	8.062	Z_D08008012011
8	14	6	1.00	0,3x45°	DIN 1850 part 4	8.04	8.062	Z_D08008010012
8	14	8	1.00	0,3x45°	DIN 1850 part 4	8.04	8.062	Z_D08008011013
8	14	10	1.00	0,3x45°	DIN 1850 part 1	8.04	8.062	Z_D08008012014
9	12	6	1.00	0,3x45°	DIN 1850 part 3	9.04	9.062	Z_D08009012001
9	12	10	1.00	0,3x45°	DIN 1850 part 3	9.04	9.062	Z_D08009014002
9	12	14	1.00	0,3x45°	DIN 1850 part 3	9.04	9.062	Z_D08009012003
9	14	6	1.00	0,3x45°	DIN 1850 part 3	9.04	9.062	Z_D08009014004
9	14	10	1.00	0,3x45°	DIN 1850 part 3	9.04	9.062	Z_D08009012005
9	14	14	1.00	0,3x45°	DIN 1850 part 3	9.04	9.062	Z_D08009014006
10	12	6	1.00	0,3x45°	DIN 1850 part 1	10.04	10.062	Z_D08010012001

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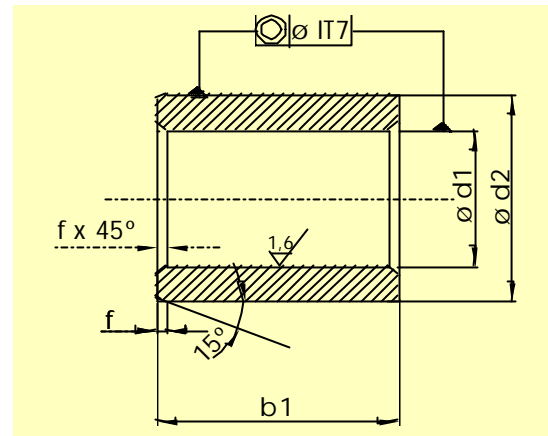
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
10	12	10	1.00	0,3x45°	DIN 1494 part 1	10.04	10.062	Z_D08010014002
10	12	12	1.00	0,3x45°	DIN 1494 part 1	10.04	10.062	Z_D08010016003
10	12	15	1.00	0,3x45°	DIN 1494 part 1	10.04	10.062	Z_D08010014004
10	14	6	1.00	0,3x45°	DIN 1850 part 1	10.04	10.062	Z_D08010016005
10	14	8	1.00	0,3x45°	DIN 1850 part 3	10.04	10.062	Z_D08010012006
10	14	10	1.00	0,3x45°	DIN 1498 frame F	10.04	10.062	Z_D08010014007
10	14	14	1.00	0,3x45°	DIN 1498 frame F	10.04	10.062	Z_D08010016008
10	14	16	1.00	0,3x45°	DIN 1850 part 3	10.04	10.062	Z_D08010012009
10	14	20	1.00	0,3x45°	DIN 1498 frame F	10.04	10.062	Z_D08010014010
10	16	6	1.00	0,3x45°	DIN 1850 part 4	10.04	10.062	Z_D08010012011
10	16	8	1.00	0,3x45°	DIN 1850 part 3	10.04	10.062	Z_D08010016012
10	16	10	1.00	0,3x45°	DIN 1850 part 1	10.04	10.062	Z_D08010014013
10	16	15	1.00	0,3x45°	DIN 1552 part 1	10.04	10.062	Z_D08010016014
10	16	16	1.00	0,3x45°	DIN 1850 part 3	10.04	10.062	Z_D08010016015
10	16	18	1.00	0,3x45°	DIN 1552 part 1	10.04	10.062	Z_D08010014016
10	16	20	1.00	0,3x45°	DIN 1498 frame F	10.04	10.062	Z_D08010016017
12	14	10	1.00	0,5x45°	DIN 1494 part 1	12.05	12.077	Z_D08012016018
12	14	15	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	Z_D08012018019
12	14	20	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	Z_D08012014001
12	16	8	1.00	0,5x45°	DIN 1850 part 3	12.05	12.077	Z_D08012016002
12	16	10	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	Z_D08012018003
12	16	14	1.00	0,5x45°	DIN 1498 frame F	12.05	12.077	Z_D08012018004
12	16	15	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	Z_D08012016005
12	16	20	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	Z_D08012018006
12	18	8	1.00	0,5x45°	DIN 1850 part 4	12.05	12.077	Z_D08012014007
12	18	10	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	Z_D08012016008
12	18	12	1.00	0,5x45°	DIN 1850 part 4	12.05	12.077	Z_D08012018009
12	18	14	1.00	0,5x45°	DIN 1552 part 1	12.05	12.077	Z_D08012018010
12	18	15	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	Z_D08012014011
12	18	18	1.00	0,5x45°	DIN 1552 part 1	12.05	12.077	Z_D08012016012
12	18	20	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	Z_D08012018013
12	18	22	1.00	0,5x45°	DIN 1552 part 1	12.05	12.077	Z_D08012018014
12	18	25	1.00	0,5x45°	DIN 1552 part 1	12.05	12.077	Z_D08012018015
13	15	10	1.00	0,5x45°	DIN 1494 part 1	13.05	13.077	Z_D08013015001
13	15	15	1.00	0,5x45°	DIN 1494 part 1	13.05	13.077	Z_D08013015002
13	15	20	1.00	0,5x45°	DIN 1494 part 1	13.05	13.077	Z_D08013015003
14	16	10	1.00	0,5x45°	DIN 1850 part 1	14.05	14.077	Z_D08014020004

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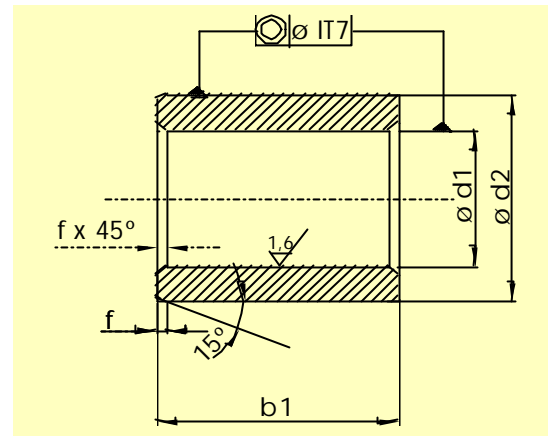
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
14	16	15	1.00	0,5x45°	DIN 1494 part 1	14.05	14.077	Z_D08014016005
14	16	20	1.00	0,5x45°	DIN 1850 part 1	14.05	14.077	Z_D08014018006
14	16	25	1.00	0,5x45°	DIN 1494 part 1	14.05	14.077	Z_D08014020007
14	18	10	1.00	0,5x45°	DIN 1850 part 3	14.05	14.077	Z_D08014020008
14	18	15	1.00	0,5x45°	DIN 1850 part 1	14.05	14.077	Z_D08014020009
14	18	20	1.00	0,5x45°	DIN 1850 part 1	14.05	14.077	Z_D08014016010
14	20	8	1.00	0,5x45°	DIN 1552 part 1	14.05	14.077	Z_D08014018011
14	20	10	1.00	0,5x45°	DIN 1850 part 4	14.05	14.077	Z_D08014020012
14	20	12	1.00	0,5x45°	DIN 1552 part 1	14.05	14.077	Z_D08014016013
14	20	14	1.00	0,5x45°	DIN 1850 part 4	14.05	14.077	Z_D08014018014
14	20	20	1.00	0,5x45°	DIN 1552 part 1	14.05	14.077	Z_D08014020015
14	20	22	1.00	0,5x45°	DIN 1552 part 1	14.05	14.077	Z_D08014016016
14	20	25	1.00	0,5x45°	DIN 1552 part 1	14.05	14.077	Z_D08014020017
14	20	28	1.00	0,5x45°	DIN 1552 part 1	14.05	14.077	Z_D08014020018
15	17	10	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	Z_D08015017001
15	17	15	1.00	0,5x45°	DIN 1494 part 1	15.05	15.077	Z_D08015019002
15	17	20	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	Z_D08015021003
15	17	25	1.00	0,5x45°	DIN 1494 part 1	15.05	15.077	Z_D08015017004
15	19	10	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	Z_D08015019005
15	19	15	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	Z_D08015021006
15	19	20	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	Z_D08015021007
15	19	25	1.00	0,5x45°	DIN 1850 part 3	15.05	15.077	Z_D08015017008
15	21	10	1.00	0,5x45°	DIN 1850 part 4	15.05	15.077	Z_D08015019009
15	21	15	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	Z_D08015021010
15	21	16	1.00	0,5x45°	DIN 1850 part 4	15.05	15.077	Z_D08015017011
15	21	20	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	Z_D08015019012
15	21	25	1.00	0,5x45°	DIN 1850 part 3	15.05	15.077	Z_D08015021013
16	18	12	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	Z_D08016022014
16	18	15	1.00	0,5x45°	DIN 1494 part 1	16.05	16.077	Z_D08016022015
16	18	20	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	Z_D08016018001
16	18	25	1.00	0,5x45°	DIN 1494 part 1	16.05	16.077	Z_D08016022002
16	20	12	1.00	0,5x45°	DIN 1850 part 3	16.05	16.077	Z_D08016020003
16	20	15	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	Z_D08016018004
16	20	16	1.00	0,5x45°	DIN 1498 frame F	16.05	16.077	Z_D08016022005
16	20	20	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	Z_D08016020006
16	20	25	1.00	0,5x45°	DIN 1850 part 3	16.05	16.077	Z_D08016020007
16	22	8	1.00	0,5x45°	DIN 1552 part 1	16.05	16.077	Z_D08016022008

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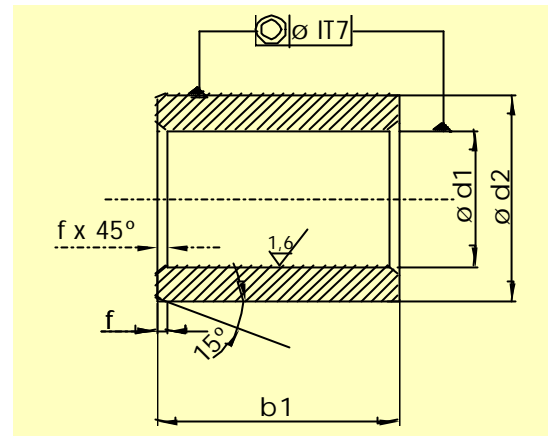
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
16	22	10	1.00	0,5x45°	DIN 1850 part 4	16.05	16.077	Z_D08016022009
16	22	12	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	Z_D08016018010
16	22	15	1.00	0,5x45°	DIN 1552 part 1	16.05	16.077	Z_D08016020011
16	22	16	1.00	0,5x45°	DIN 1850 part 4	16.05	16.077	Z_D08016022012
16	22	18	1.00	0,5x45°	DIN 1552 part 1	16.05	16.077	Z_D08016022013
16	22	20	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	Z_D08016018014
16	22	22	1.00	0,5x45°	DIN 1552 part 1	16.05	16.077	Z_D08016020015
16	22	25	1.00	0,5x45°	DIN 1850 part 3	16.05	16.077	Z_D08016022016
16	22	28	1.00	0,5x45°	DIN 1552 part 1	16.05	16.077	Z_D08016022017
16	22	30	1.00	0,5x45°	DIN 1552 part 1	16.05	16.077	Z_D08016022018
16.5	22	8	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022019
16.5	22	10	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022020
16.5	22	12	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022021
16.5	22	14	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022022
16.5	22	15	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022023
16.5	22	18	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022024
16.5	22	20	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022025
16.5	22	22	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022026
16.5	22	25	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022027
16.5	22	28	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022028
16.5	22	30	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022029
16.5	22	36	1.00	0,5x45°	DIN 1552 part 1	16.55	16.577	Z_D08016022030
18	20	12	1.00	0,5x45°	DIN 1850 part 1	18.05	18.077	Z_D08018024031
18	20	15	1.00	0,5x45°	DIN 1494 part 1	18.05	18.077	Z_D08018024032
18	20	20	1.00	0,5x45°	DIN 1494 part 1	18.05	18.077	Z_D08018020001
18	20	25	1.00	0,5x45°	DIN 1494 part 1	18.05	18.077	Z_D08018022002
18	20	30	1.00	0,5x45°	DIN 1850 part 1	18.05	18.077	Z_D08018024003
18	21	15	1.00	0,5x45°	DIN 1494 part 1	18.05	18.077	Z_D08018024004
18	21	20	1.00	0,5x45°	DIN 1494 part 1	18.05	18.077	Z_D08018020005
18	21	25	1.00	0,5x45°	DIN 1494 part 1	18.05	18.077	Z_D08018021006
18	22	12	1.00	0,5x45°	DIN 1850 part 3	18.05	18.077	Z_D08018024007
18	22	18	1.00	0,5x45°	DIN 1850 part 3	18.05	18.077	Z_D08018022008
18	22	20	1.00	0,5x45°	DIN 1850 part 1	18.05	18.077	Z_D08018024009
18	22	30	1.00	0,5x45°	DIN 1850 part 1	18.05	18.077	Z_D08018020010
18	24	8	1.00	0,5x45°	DIN 1552 part 1	18.05	18.077	Z_D08018021011
18	24	10	1.00	0,5x45°	DIN 1552 part 1	18.05	18.077	Z_D08018022012
18	24	12	1.00	0,5x45°	DIN 1850 part 4	18.05	18.077	Z_D08018024013

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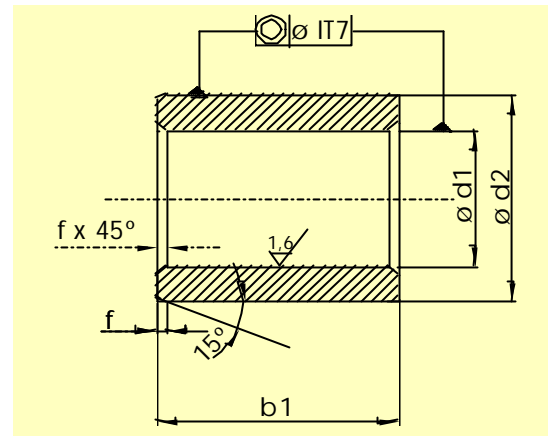
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
18	24	14	1.00	0,5x45°	DIN 1498 frame F	18.05	18.077	Z_D08018024014
18	24	15	1.00	0,5x45°	DIN 1552 part 1	18.05	18.077	Z_D08018020015
18	24	18	1.00	0,5x45°	DIN 1850 part 4	18.05	18.077	Z_D08018021016
18	24	20	1.00	0,5x45°	DIN 1850 part 5	18.05	18.077	Z_D08018024017
18	24	22	1.00	0,5x45°	DIN 1552 part 1	18.05	18.077	Z_D08018024018
18	24	25	1.00	0,5x45°	DIN 1552 part 1	18.05	18.077	Z_D08018020019
18	24	28	1.00	0,5x45°	DIN 1498 frame F	18.05	18.077	Z_D08018022020
18	24	30	1.00	0,5x45°	DIN 1850 part 5	18.05	18.077	Z_D08018024021
18	24	36	1.00	0,5x45°	DIN 1552 part 1	18.05	18.077	Z_D08018024022
20	22	15	1.00	0,5x45°	DIN 1494 part 1	20.065	20.098	Z_D08020026023
20	22	20	1.00	0,5x45°	DIN 1494 part 1	20.065	20.098	Z_D08020026024
20	22	25	1.00	0,5x45°	DIN 1494 part 1	20.065	20.098	Z_D08020026025
20	23	15	1.00	0,5x45°	DIN 1494 part 1	20.065	20.098	Z_D08020026026
20	23	20	1.00	0,5x45°	DIN 1494 part 1	20.065	20.098	Z_D08020028027
20	23	25	1.00	0,5x45°	DIN 1494 part 1	20.065	20.098	Z_D08020022001
20	23	30	1.00	0,5x45°	DIN 1494 part 1	20.065	20.098	Z_D08020023002
20	24	15	1.00	0,5x45°	DIN 1850 part 1	20.065	20.098	Z_D08020024003
20	24	20	1.00	0,5x45°	DIN 1850 part 1	20.065	20.098	Z_D08020025004
20	24	30	1.00	0,5x45°	DIN 1850 part 1	20.065	20.098	Z_D08020026005
20	25	15	1.00	0,5x45°	DIN 1850 part 3	20.065	20.098	Z_D08020026006
20	25	20	1.00	0,5x45°	DIN 1850 part 3	20.065	20.098	Z_D08020026007
20	25	30	1.00	0,5x45°	DIN 1850 part 3	20.065	20.098	Z_D08020028008
20	26	8	1.00	0,5x45°	DIN 1552 part 1	20.065	20.098	Z_D08020022009
20	26	10	1.00	0,5x45°	DIN 1552 part 1	20.065	20.098	Z_D08020023010
20	26	12	1.00	0,5x45°	DIN 1850 part 4	20.065	20.098	Z_D08020026011
20	26	14	1.00	0,5x45°	DIN 1498 frame F	20.065	20.098	Z_D08020024012
20	26	15	1.00	0,5x45°	DIN 1850 part 3	20.065	20.098	Z_D08020025013
20	26	16	1.00	0,5x45°	DIN 1850 part 4	20.065	20.098	Z_D08020028046
20	26	18	1.00	0,5x45°	DIN 1498 frame F	20.065	20.098	Z_D08020026047
20	26	20	1.00	0,5x45°	DIN 1552 part 1	20.065	20.098	Z_D08020022048
20	26	22	1.00	0,5x45°	DIN 1552 part 1	20.065	20.098	Z_D08020023049
20	26	25	1.00	0,5x45°	DIN 1552 part 1	20.065	20.098	Z_D08020026050
20	26	28	1.00	0,5x45°	DIN 1498 frame F	20.065	20.098	Z_D08020026051
20	26	30	1.00	0,5x45°	DIN 1850 part 3	20.065	20.098	Z_D08020028052
20	26	36	1.00	0,5x45°	DIN 1552 part 1	20.065	20.098	Z_D08020023053
20	26	40	1.00	0,5x45°	DIN 1552 part 1	20.065	20.098	Z_D08020024054
20	26	45	1.00	0,5x45°	DIN 1552 part 1	20.065	20.098	Z_D08020025055

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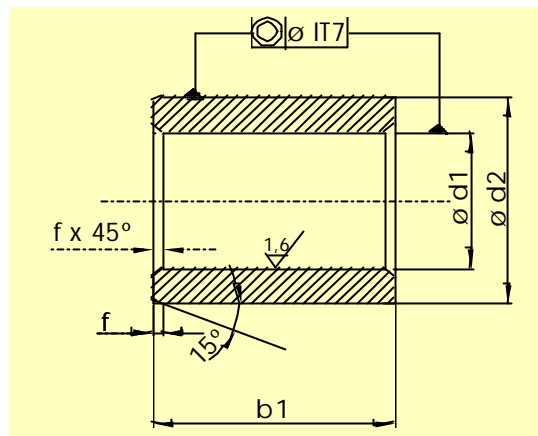
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
20	28	20	1.00	0,5x45°		20.065	20.098	Z_D08020026056
20	28.5	14	1.00	0,5x45°	DIN 1498 frame F	20.065	20.098	Z_D08020026057
20	28.5	18	1.00	0,5x45°	DIN 1498 frame F	20.065	20.098	Z_D08020026058
20	28.5	28	1.00	0,5x45°	DIN 1498 frame F	20.065	20.098	Z_D08020026059
20.5	28	8	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028060
20.5	28	10	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028061
20.5	28	12	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028062
20.5	28	14	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028063
20.5	28	15	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028064
20.5	28	18	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028065
20.5	28	20	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028066
20.5	28	22	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028067
20.5	28	25	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028068
20.5	28	28	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028069
20.5	28	30	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028070
20.5	28	36	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028071
20.5	28	40	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028072
20.5	28	45	1.00	0,5x45°	DIN 1552 part 1	20.565	20.598	Z_D08020028073
21	28	8	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028001
21	28	10	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028002
21	28	12	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028003
21	28	14	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028004
21	28	15	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028005
21	28	18	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028006
21	28	20	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028007
21	28	22	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028008
21	28	25	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028009
21	28	28	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028010
21	28	30	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028011
21	28	36	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028012
21	28	40	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028013
21	28	45	1.00	0,5x45°	DIN 1552 part 1	21.065	21.098	Z_D08021028014
22	25	15	1.00	0,5x45°	DIN 1494 part 1	22.065	22.098	Z_D08022028015
22	25	20	1.00	0,5x45°	DIN 1494 part 1	22.065	22.098	Z_D08022028016
22	25	25	1.00	0,5x45°	DIN 1494 part 1	22.065	22.098	Z_D08022028017
22	25	30	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	Z_D08022028018
22	26	15	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	Z_D08022025001

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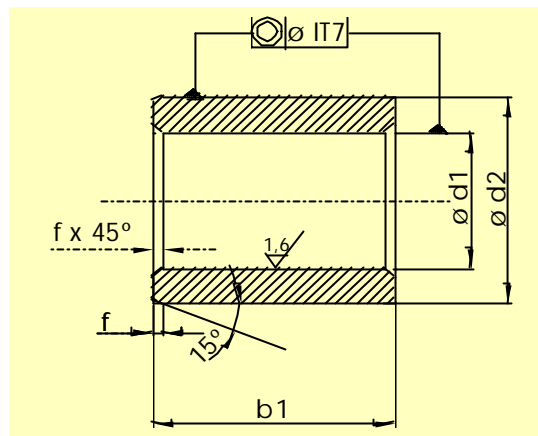
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
22	26	20	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	Z_D08022026002
22	26	30	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	Z_D08022028003
22	27	15	1.00	0,5x45°	DIN 1850 part 3	22.065	22.098	Z_D08022027004
22	27	20	1.00	0,5x45°	DIN 1850 part 3	22.065	22.098	Z_D08022028005
22	27	25	1.00	0,5x45°	DIN 1850 part 3	22.065	22.098	Z_D08022028006
22	27	30	1.00	0,5x45°	DIN 1850 part 3	22.065	22.098	Z_D08022025007
22	28	8	1.00	0,5x45°	DIN 1552 part 1	22.065	22.098	Z_D08022026008
22	28	10	1.00	0,5x45°	DIN 1552 part 1	22.065	22.098	Z_D08022028009
22	28	12	1.00	0,5x45°	DIN 1850 part 4	22.065	22.098	Z_D08022027010
22	28	14	1.00	0,5x45°	DIN 1552 part 1	22.065	22.098	Z_D08022025011
22	28	15	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	Z_D08022028012
22	28	16	1.00	0,5x45°	DIN 1850 part 4	22.065	22.098	Z_D08022027013
22	28	18	1.00	0,5x45°	DIN 1552 part 1	22.065	22.098	Z_D08022028014
22	28	20	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	Z_D08022025015
22	28	25	1.00	0,5x45°	DIN 1552 part 1	22.065	22.098	Z_D08022026016
22	28	28	1.00	0,5x45°	DIN 1498 frame F	22.065	22.098	Z_D08022028017
22	28	30	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	Z_D08022027018
22	28	36	1.00	0,5x45°	DIN 1552 part 1	22.065	22.098	Z_D08022028019
22	28	40	1.00	0,5x45°	DIN 1552 part 1	22.065	22.098	Z_D08022028020
22	28	45	1.00	0,5x45°	DIN 1552 part 1	22.065	22.098	Z_D08022028021
22.5	30	8	2.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030022
22.5	30	10	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030023
22.5	30	12	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030024
22.5	30	14	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030025
22.5	30	15	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030026
22.5	30	18	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030027
22.5	30	20	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030028
22.5	30	22	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030029
22.5	30	25	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030030
22.5	30	28	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030031
22.5	30	30	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030032
22.5	30	36	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030033
22.5	30	40	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030034
22.5	30	45	1.00	0,5x45°	DIN 1552 part 1	22.565	22.598	Z_D08022030035
23	30	8	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030001
23	30	10	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030002
23	30	12	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030003

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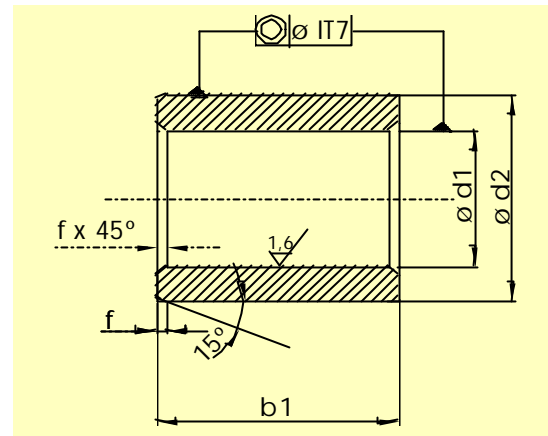
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
23	30	14	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030004
23	30	15	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030005
23	30	18	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030006
23	30	20	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030007
23	30	22	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030008
23	30	25	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030009
23	30	28	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030010
23	30	30	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030011
23	30	36	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030012
23	30	40	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030013
23	30	45	1.00	0,5x45°	DIN 1552 part 1	23.065	23.098	Z_D08023030014
24	27	15	1.00	0,5x45°	DIN 1494 part 1	24.065	24.098	Z_D08024033015
24	27	20	1.00	0,5x45°	DIN 1494 part 1	24.065	24.098	Z_D08024033016
24	27	25	1.00	0,5x45°	DIN 1494 part 1	24.065	24.098	Z_D08024033017
24	27	30	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	Z_D08024033018
24	28	15	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	Z_D08024030019
24	28	20	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	Z_D08024027001
24	28	30	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	Z_D08024033002
24	30	14	1.00	0,5x45°	DIN 1850 part 4	24.065	24.098	Z_D08024028003
24	30	15	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	Z_D08024030004
24	30	20	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	Z_D08024033005
24	30	25	1.00	0,5x45°	DIN 1850 part 4	24.065	24.098	Z_D08024027006
24	30	30	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	Z_D08024033007
24	33	8	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024028008
24	33	10	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024030009
24	33	12	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024033010
24	33	14	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024027011
24	33	15	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024033012
24	33	18	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024030013
24	33	20	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024033014
24	33	22	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024033015
24	33	25	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024027016
24	33	28	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024028017
24	33	30	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024030018
24	33	36	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024033019
24	33	40	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024033020
24	33	45	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024033021

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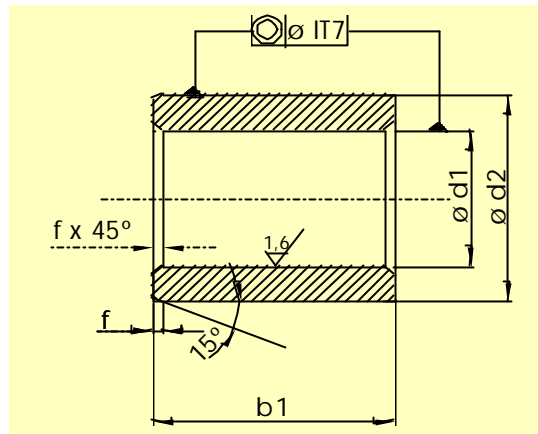
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
24	33	50	1.00	0,5x45°	DIN 1552 part 1	24.065	24.098	Z_D08024033022
24.5	33	8	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033023
24.5	33	10	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033024
24.5	33	12	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033025
24.5	33	14	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033026
24.5	33	15	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033027
24.5	33	18	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033028
24.5	33	20	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033029
24.5	33	22	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033030
24.5	33	25	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033031
24.5	33	28	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033032
24.5	33	30	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033033
24.5	33	36	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033034
24.5	33	40	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033035
24.5	33	45	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033036
24.5	33	50	1.00	0,5x45°	DIN 1552 part 1	24.565	24.598	Z_D08024033037
25	28	15	1.00	0,5x45°	DIN 1494 part 1	25.065	25.098	Z_D08025033038
25	28	20	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	Z_D08025033039
25	28	30	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	Z_D08025033040
25	28	40	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	Z_D08025035041
25	30	20	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	Z_D08025033042
25	30	25	1.00	0,5x45°	DIN 1850 part 3	25.065	25.098	Z_D08025032043
25	30	30	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	Z_D08025028001
25	30	35	1.00	0,5x45°	DIN 1850 part 3	25.065	25.098	Z_D08025033002
25	30	40	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	Z_D08025033003
25	32	14	1.00	0,5x45°	DIN 1850 part 4	25.065	25.098	Z_D08025035004
25	32	20	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	Z_D08025033005
25	32	25	1.00	0,5x45°	DIN 1850 part 4	25.065	25.098	Z_D08025028006
25	32	28	1.00	0,5x45°	DIN 1498 frame F	25.065	25.098	Z_D08025030007
25	32	30	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	Z_D08025032008
25	32	35	1.00	0,5x45°	DIN 1850 part 3	25.065	25.098	Z_D08025033009
25	32	40	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	Z_D08025033010
25	33	8	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025030011
25	33	10	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025032012
25	33	12	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025032013
25	33	14	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025035014
25	33	15	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025033015

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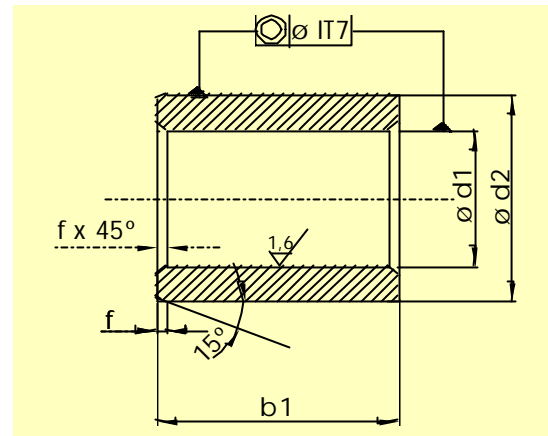
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
25	33	18	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025033016
25	33	20	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025028017
25	33	22	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025030018
25	33	25	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025032019
25	33	28	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025030020
25	33	30	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025032021
25	33	36	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025033022
25	33	40	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025033023
25	33	45	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025028024
25	33	50	1.00	0,5x45°	DIN 1552 part 1	25.065	25.098	Z_D08025030025
25	35	14	1.00	0,5x45°	DIN 1498 frame F	25.065	25.098	Z_D08025032026
25	35	20	1.00	0,5x45°	DIN 1498 frame F	25.065	25.098	Z_D08025033027
25	35	28	1.00	0,5x45°	DIN 1498 frame F	25.065	25.098	Z_D08025033028
26	33	8	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033001
26	33	10	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033002
26	33	12	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033003
26	33	14	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033004
26	33	15	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033005
26	33	18	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033006
26	33	20	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033007
26	33	22	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033008
26	33	25	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033009
26	33	28	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033010
26	33	30	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033011
26	33	36	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033012
26	33	40	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033013
26	33	45	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033014
26	33	50	1.00	0,5x45°	DIN 1552 part 1	26.065	26.098	Z_D08026033015
27	30	20	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	Z_D08027034016
27	30	30	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	Z_D08027034017
27	30	40	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	Z_D08027034018
27	32	20	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	Z_D08027035019
27	32	30	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	Z_D08027034020
27	32	40	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	Z_D08027034021
27	34	8	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027034022
27	34	10	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027034023
27	34	12	1.00	0,5x45°	DIN 1850 part 4	27.065	27.098	Z_D08027035024

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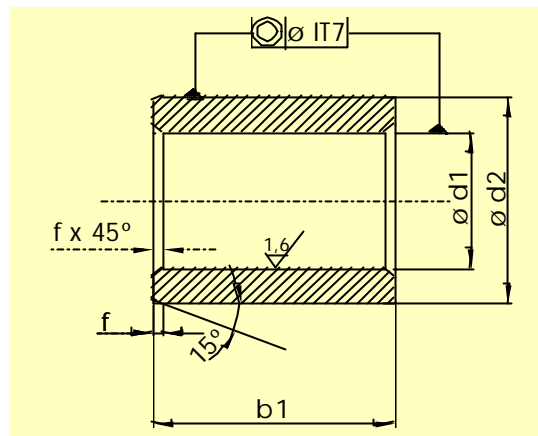
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
27	34	14	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027034025
27	34	15	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027030001
27	34	16	1.00	0,5x45°	DIN 1850 part 4	27.065	27.098	Z_D08027032002
27	34	18	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027034003
27	34	20	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027034004
27	34	22	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027035005
27	34	25	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027034006
27	34	28	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027030007
27	34	30	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	Z_D08027032008
27	34	36	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027034009
27	34	40	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	Z_D08027034010
27	34	45	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027035011
27	34	50	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027030012
27	34	56	1.00	0,5x45°	DIN 1552 part 1	27.065	27.098	Z_D08027032013
27	35	14	1.00	0,5x45°	DIN 1498 frame F	27.065	27.098	Z_D08027034014
27	35	20	1.00	0,5x45°	DIN 1498 frame F	27.065	27.098	Z_D08027034015
27	35	28	1.00	0,5x45°	DIN 1498 frame F	27.065	27.098	Z_D08027034016
27	35	40	1.00	0,5x45°	DIN 1498 frame F	27.065	27.098	Z_D08027034017
27.5	36	8	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036018
27.5	36	10	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036019
27.5	36	12	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036020
27.5	36	14	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036021
27.5	36	15	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036022
27.5	36	18	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036023
27.5	36	20	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036024
27.5	36	22	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036025
27.5	36	25	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036026
27.5	36	28	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036027
27.5	36	30	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036028
27.5	36	36	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036029
27.5	36	40	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036030
27.5	36	45	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036031
27.5	36	50	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036032
27.5	36	56	1.00	0,5x45°	DIN 1552 part 1	27.565	27.598	Z_D08027036033
28	31	20	1.00	0,5x45°	DIN 1494 part 1	28.065	28.098	Z_D08028036034
28	31	25	1.00	0,5x45°	DIN 1494 part 1	28.065	28.098	Z_D08028036035
28	31	30	1.00	0,5x45°	DIN 1494 part 1	28.065	28.098	Z_D08028036036

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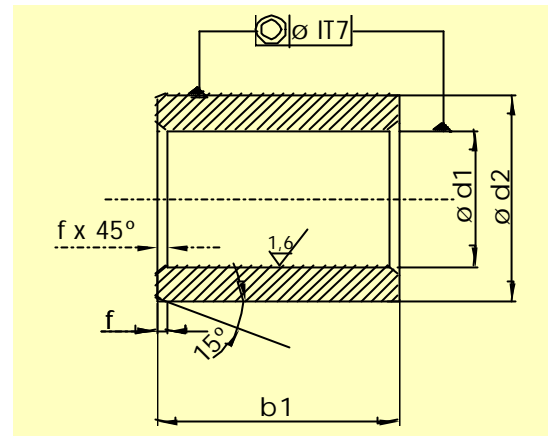
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
28	32	20	1.00	0,5x45°	DIN 1850 part 1	28.065	28.098	Z_D08028035037
28	32	25	1.00	0,5x45°	DIN 1494 part 1	28.065	28.098	Z_D08028036038
28	32	30	1.00	0,5x45°	DIN 1850 part 1	28.065	28.098	Z_D08028036039
28	32	40	1.00	0,5x45°	DIN 1850 part 1	28.065	28.098	Z_D08028036040
28	33	20	1.00	0,5x45°	DIN 1850 part 3	28.065	28.098	Z_D08028036041
28	33	25	1.00	0,5x45°	DIN 1850 part 3	28.065	28.098	Z_D08028031001
28	33	30	1.00	0,5x45°	DIN 1850 part 3	28.065	28.098	Z_D08028035002
28	33	40	1.00	0,5x45°	DIN 1850 part 3	28.065	28.098	Z_D08028036003
28	34	20	1.00	0,5x45°	DIN 1850 part 1	28.065	28.098	Z_D08028032004
28	34	30	1.00	0,5x45°	DIN 1850 part 1	28.065	28.098	Z_D08028034005
28	34	40	1.00	0,5x45°	DIN 1850 part 1	28.065	28.098	Z_D08028033006
28	35	14	1.00	0,5x45°	DIN 1498 frame F	28.065	28.098	Z_D08028036007
28	35	20	1.00	0,5x45°	DIN 1498 frame F	28.065	28.098	Z_D08028031008
28	35	28	1.00	0,5x45°	DIN 1498 frame F	28.065	28.098	Z_D08028032009
28	35	40	1.00	0,5x45°	DIN 1498 frame F	28.065	28.098	Z_D08028036010
28	36	8	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028033011
28	36	10	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028035012
28	36	12	1.00	0,5x45°	DIN 1850 part 4	28.065	28.098	Z_D08028036013
28	36	14	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028031014
28	36	15	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028032015
28	36	16	1.00	0,5x45°	DIN 1850 part 4	28.065	28.098	Z_D08028034016
28	36	18	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028033017
28	36	20	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028036018
28	36	22	1.00	0,5x45°	DIN 1850 part 4	28.065	28.098	Z_D08028036019
28	36	25	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028035020
28	36	28	1.00	0,5x45°	DIN 1850 part 4	28.065	28.098	Z_D08028032021
28	36	30	1.00	0,5x45°	DIN 1850 part 5	28.065	28.098	Z_D08028034022
28	36	36	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028033023
28	36	40	1.00	0,5x45°	DIN 1850 part 5	28.065	28.098	Z_D08028036024
28	36	45	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028036025
28	36	50	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028036026
28	36	56	1.00	0,5x45°	DIN 1552 part 1	28.065	28.098	Z_D08028036027
30	34	20	1.00	0,5x45°	DIN 1850 part 1	30.065	30.098	Z_D08030038028
30	34	30	1.00	0,5x45°	DIN 1850 part 1	30.065	30.098	Z_D08030040029
30	34	40	1.00	0,5x45°	DIN 1850 part 1	30.065	30.098	Z_D08030038030
30	35	20	1.00	0,5x45°	DIN 1850 part 3	30.065	30.098	Z_D08030040031
30	35	25	1.00	0,5x45°	DIN 1850 part 3	30.065	30.098	Z_D08030040032

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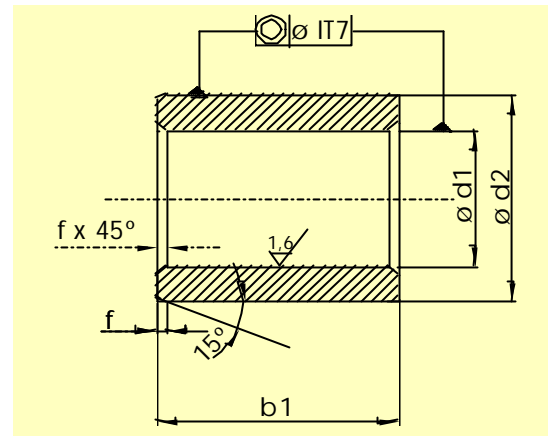
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
30	35	30	1.00	0,5x45°	DIN 1850 part 3	30.065	30.098	Z_D08030038033
30	35	40	1.00	0,5x45°	DIN 1850 part 3	30.065	30.098	Z_D08030038034
30	36	20	1.00	0,5x45°	DIN 1850 part 1	30.065	30.098	Z_D08030040035
30	36	30	1.00	0,5x45°	DIN 1850 part 1	30.065	30.098	Z_D08030038036
30	36	40	1.00	0,5x45°	DIN 1850 part 1	30.065	30.098	Z_D08030040037
30	38	8	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030040038
30	38	10	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030038039
30	38	12	1.50	0,5x45°	DIN 1850 part 4	30.065	30.098	Z_D08030040040
30	38	14	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030034001
30	38	15	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030036002
30	38	18	1.50	0,5x45°	DIN 1850 part 4	30.065	30.098	Z_D08030035003
30	38	20	1.50	0,5x45°	DIN 1850 part 5	30.065	30.098	Z_D08030038004
30	38	22	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030038005
30	38	25	1.50	0,5x45°	DIN 1850 part 4	30.065	30.098	Z_D08030040006
30	38	28	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030040007
30	38	30	1.50	0,5x45°	DIN 1850 part 5	30.065	30.098	Z_D08030035008
30	38	32	1.50	0,5x45°	DIN 1850 part 4	30.065	30.098	Z_D08030038009
30	38	36	1.50	0,5x45°	DIN 1498 frame F	30.065	30.098	Z_D08030038010
30	38	40	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030040011
30	38	45	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030040012
30	38	50	1.50	0,5x45°	DIN 1498 frame F	30.065	30.098	Z_D08030034013
30	38	56	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030036014
30	38	63	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030035015
30	40	8	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030038016
30	40	10	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030038017
30	40	12	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030038018
30	40	14	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030040019
30	40	15	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030038020
30	40	18	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030040021
30	40	20	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030034022
30	40	22	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030036023
30	40	25	1.50	0,5x45°	DIN 1498 frame F	30.065	30.098	Z_D08030035024
30	40	28	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030038025
30	40	30	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030040026
30	40	36	1.50	0,5x45°	DIN 1498 frame F	30.065	30.098	Z_D08030038027
30	40	40	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030040028
30	40	45	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030038029

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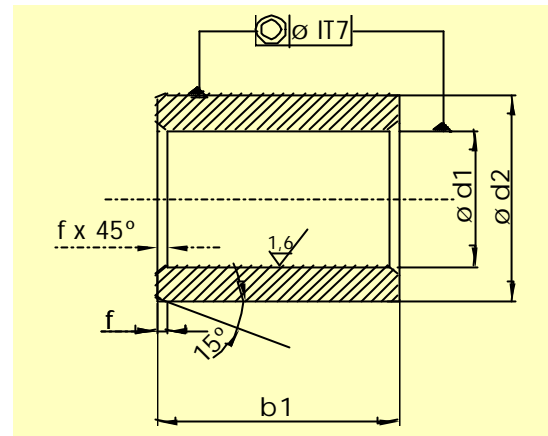
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
30	40	50	1.50	0,5x45°	DIN 1498 frame F	30.065	30.098	Z_D08030040030
30	40	56	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030038031
30	40	63	1.50	0,5x45°	DIN 1552 part 1	30.065	30.098	Z_D08030040032
30.5	38	8	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038033
30.5	38	10	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038034
30.5	38	12	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038035
30.5	38	14	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038036
30.5	38	15	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038037
30.5	38	18	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038038
30.5	38	20	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038039
30.5	38	22	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038040
30.5	38	25	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038041
30.5	38	28	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038042
30.5	38	30	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038043
30.5	38	36	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038044
30.5	38	40	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038045
30.5	38	45	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038046
30.5	38	50	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038047
30.5	38	56	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038048
30.5	38	63	1.50	0,5x45°	DIN 1552 part 1	30.58	30.619	Z_D08030038049
31	38	8	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038001
31	38	10	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038002
31	38	12	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038003
31	38	14	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038004
31	38	15	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038005
31	38	18	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038006
31	38	20	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038007
31	38	22	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038008
31	38	25	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038009
31	38	28	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038010
31	38	30	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038011
31	38	36	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038012
31	38	40	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038013
31	38	45	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038014
31	38	50	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038015
31	38	56	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038016
31	38	63	1.50	0,5x45°	DIN 1552 part 1	31.08	31.119	Z_D08031038017

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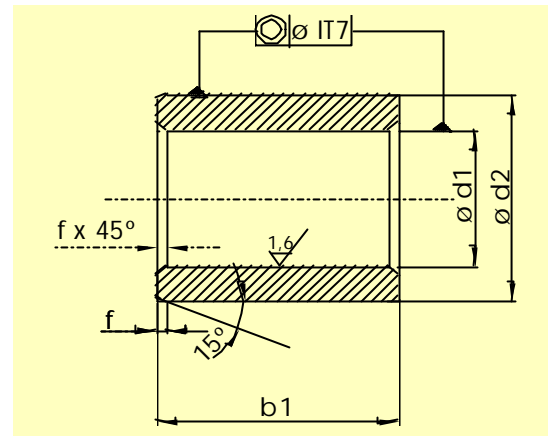
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
32	36	20	1.00	0,8x45°	DIN 1850 part 1	32.08	32.119	Z_D08032040018
32	36	30	1.00	0,8x45°	DIN 1850 part 1	32.08	32.119	Z_D08032040019
32	36	40	1.00	0,8x45°	DIN 1850 part 1	32.08	32.119	Z_D08032036001
32	38	20	1.50	0,8x45°	DIN 1850 part 3	32.08	32.119	Z_D08032040002
32	38	25	1.50	0,8x45°	DIN 1850 part 3	32.08	32.119	Z_D08032038003
32	38	30	1.50	0,8x45°	DIN 1850 part 1	32.08	32.119	Z_D08032038004
32	38	40	1.50	0,8x45°	DIN 1850 part 1	32.08	32.119	Z_D08032040005
32	40	14	1.50	0,8x45°	DIN 1850 part 4	32.08	32.119	Z_D08032036006
32	40	18	1.50	0,8x45°	DIN 1850 part 4	32.08	32.119	Z_D08032038007
32	40	20	1.50	0,8x45°	DIN 1850 part 1	32.08	32.119	Z_D08032040008
32	40	25	1.50	0,8x45°	DIN 1850 part 4	32.08	32.119	Z_D08032040009
32	40	30	1.50	0,8x45°	DIN 1850 part 3	32.08	32.119	Z_D08032040010
32	40	32	1.50	0,8x45°	DIN 1850 part 4	32.08	32.119	Z_D08032036011
32	40	36	1.50	0,8x45°	DIN 1498 frame F	32.08	32.119	Z_D08032038012
32	40	40	1.50	0,8x45°	DIN 1850 part 1	32.08	32.119	Z_D08032040013
32	40	50	1.50	0,8x45°	DIN 1498 frame F	32.08	32.119	Z_D08032040014
33	37	20	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	Z_D08033042015
33	37	30	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	Z_D08033042016
33	37	40	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	Z_D08033042017
33	40	20	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	Z_D08033042018
33	40	30	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	Z_D08033042019
33	40	40	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	Z_D08033042020
33	42	10	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033037001
33	42	12	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033040002
33	42	14	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033042003
33	42	15	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033042004
33	42	16	1.50	0,8x45°	DIN 1850 part 4	33.08	33.119	Z_D08033042005
33	42	18	1.50	0,8x45°	DIN 1498 frame F	33.08	33.119	Z_D08033042006
33	42	20	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	Z_D08033037007
33	42	22	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033040008
33	42	25	1.50	0,8x45°	DIN 1498 frame F	33.08	33.119	Z_D08033042009
33	42	28	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033042010
33	42	30	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	Z_D08033042011
33	42	32	1.50	0,8x45°	DIN 1850 part 4	33.08	33.119	Z_D08033037012
33	42	36	1.50	0,8x45°	DIN 1498 frame F	33.08	33.119	Z_D08033040013
33	42	40	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	Z_D08033042014
33	42	45	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033042015

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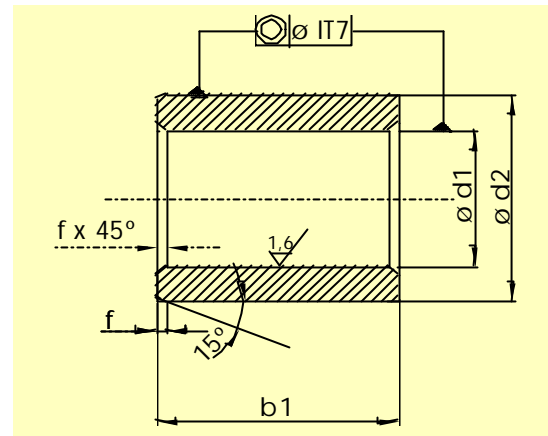
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
33	42	50	1.50	0,8x45°	DIN 1498 frame F	33.08	33.119	Z_D08033042016
33	42	56	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033042017
33	42	63	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033042018
33	42	70	1.50	0,8x45°	DIN 1552 part 1	33.08	33.119	Z_D08033042019
33.5	42	10	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042020
33.5	42	12	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042021
33.5	42	14	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042022
33.5	42	15	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042023
33.5	42	18	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042024
33.5	42	20	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042025
33.5	42	22	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042026
33.5	42	25	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042027
33.5	42	28	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042028
33.5	42	30	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042029
33.5	42	36	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042030
33.5	42	40	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042031
33.5	42	45	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042032
33.5	42	50	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042033
33.5	42	56	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042034
33.5	42	63	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042035
33.5	42	70	1.50	0,8x45°	DIN 1552 part 1	33.58	33.619	Z_D08033042036
35	39	20	1.50	0,8x45°	DIN 1494 part 1	35.08	35.119	Z_D08035044037
35	39	30	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	Z_D08035042038
35	39	40	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	Z_D08035045039
35	39	50	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	Z_D08035039001
35	41	25	1.50	0,8x45°	DIN 1850 part 3	35.08	35.119	Z_D08035044002
35	41	30	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	Z_D08035042003
35	41	35	1.50	0,8x45°	DIN 1850 part 3	35.08	35.119	Z_D08035045004
35	41	40	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	Z_D08035041005
35	41	50	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	Z_D08035044006
35	42	18	1.50	0,8x45°	DIN 1498 frame F	35.08	35.119	Z_D08035039007
35	42	25	1.50	0,8x45°	DIN 1498 frame F	35.08	35.119	Z_D08035041008
35	42	36	1.50	0,8x45°	DIN 1498 frame F	35.08	35.119	Z_D08035045009
35	42	50	1.50	0,8x45°	DIN 1498 frame F	35.08	35.119	Z_D08035041010
35	44	16	1.50	0,8x45°	DIN 1850 part 4	35.08	35.119	Z_D08035045011
35	44	22	1.50	0,8x45°	DIN 1850 part 4	35.08	35.119	Z_D08035042012
35	44	28	1.50	0,8x45°	DIN 1850 part 4	35.08	35.119	Z_D08035045013

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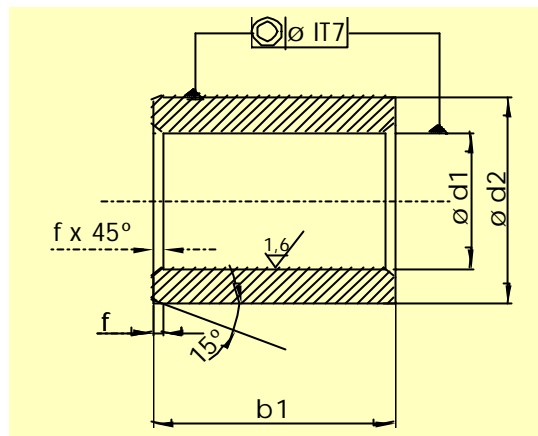
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
35	44	36	1.50	0,8x45°	DIN 1850 part 4	35.08	35.119	Z_D08035044014
35	45	18	1.50	0,8x45°	DIN 1498 frame F	35.08	35.119	Z_D08035039015
35	45	25	1.50	0,8x45°	DIN 1498 frame F	35.08	35.119	Z_D08035041016
35	45	30	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	Z_D08035045017
35	45	35	1.50	0,8x45°	DIN 1850 part 3	35.08	35.119	Z_D08035042018
35	45	36	1.50	0,8x45°	DIN 1498 frame F	35.08	35.119	Z_D08035039019
35	45	40	1.50	0,8x45°	DIN 1850 part 3	35.08	35.119	Z_D08035041020
35	45	50	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	Z_D08035045021
36	40	30	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	Z_D08036045022
36	40	40	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	Z_D08036045023
36	40	50	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	Z_D08036045024
36	42	30	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	Z_D08036045025
36	42	40	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	Z_D08036045026
36	42	50	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	Z_D08036045027
36	45	10	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036045028
36	45	12	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036045029
36	45	14	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036045030
36	45	15	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036045031
36	45	16	1.50	0,8x45°	DIN 1850 part 4	36.08	36.119	Z_D08036045032
36	45	18	1.50	0,8x45°	DIN 1498 frame F	36.08	36.119	Z_D08036040001
36	45	20	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036042002
36	45	22	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036046003
36	45	25	1.50	0,8x45°	DIN 1498 frame F	36.08	36.119	Z_D08036045004
36	45	28	1.50	0,8x45°	DIN 1850 part 4	36.08	36.119	Z_D08036045005
36	45	30	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036045006
36	45	32	1.50	0,8x45°	DIN 1850 part 4	36.08	36.119	Z_D08036040007
36	45	36	1.50	0,8x45°	DIN 1498 frame F	36.08	36.119	Z_D08036042008
36	45	40	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036046009
36	45	45	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036045010
36	45	50	1.50	0,8x45°	DIN 1498 frame F	36.08	36.119	Z_D08036045011
36	45	56	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036040012
36	45	63	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036042013
36	45	70	1.50	0,8x45°	DIN 1552 part 1	36.08	36.119	Z_D08036046014
36	46	30	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	Z_D08036045015
36	46	40	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	Z_D08036045016
36	46	50	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	Z_D08036045017
36.5	45	10	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045018

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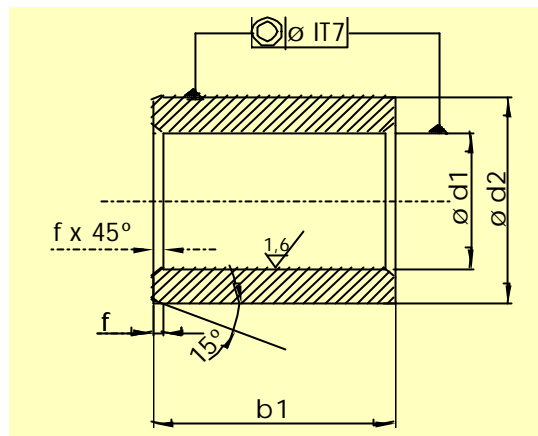
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
36.5	45	12	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045019
36.5	45	14	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045020
36.5	45	15	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045021
36.5	45	18	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045022
36.5	45	20	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045023
36.5	45	22	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045024
36.5	45	25	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045025
36.5	45	28	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045026
36.5	45	30	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045027
36.5	45	36	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045028
36.5	45	40	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045029
36.5	45	45	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045030
36.5	45	50	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045031
36.5	45	56	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045032
36.5	45	63	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045033
36.5	45	70	1.50	0,8x45°	DIN 1552 part 1	36.58	36.619	Z_D08036045034
37	45	10	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045001
37	45	12	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045002
37	45	14	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045003
37	45	15	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045004
37	45	18	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045005
37	45	20	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045006
37	45	22	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045007
37	45	25	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045008
37	45	28	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045009
37	45	30	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045010
37	45	36	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045011
37	45	40	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045012
37	45	45	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045013
37	45	50	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045014
37	45	56	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045015
37	45	63	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045016
37	45	70	1.50	0,8x45°	DIN 1552 part 1	37.08	37.119	Z_D08037045017
38	42	20	1.50	0,8x45°	DIN 1494 part 1	38.08	38.119	Z_D08038048018
38	42	30	1.50	0,8x45°	DIN 1494 part 1	38.08	38.119	Z_D08038042001
38	42	40	1.50	0,8x45°	DIN 1494 part 1	38.08	38.119	Z_D08038044002
38	44	25	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	Z_D08038048003

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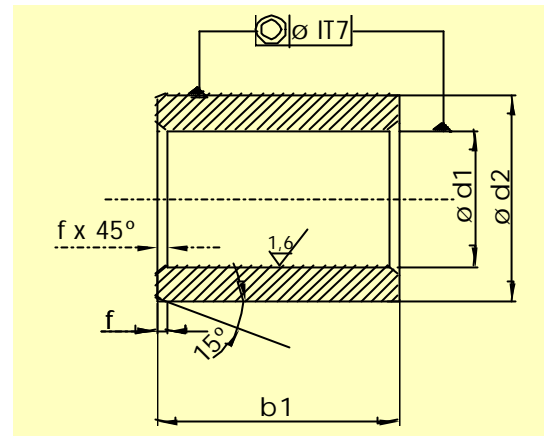
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
38	44	35	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	Z_D08038042004
38	44	45	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	Z_D08038045005
38	44	55	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	Z_D08038048006
38	45	30	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	Z_D08038048007
38	45	40	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	Z_D08038044008
38	45	50	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	Z_D08038048009
38	48	16	1.50	0,8x45°	DIN 1850 part 4	38.08	38.119	Z_D08038042010
38	48	25	1.50	0,8x45°	DIN 1850 part 4	38.08	38.119	Z_D08038045011
38	48	30	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	Z_D08038048012
38	48	32	1.50	0,8x45°	DIN 1850 part 4	38.08	38.119	Z_D08038044013
38	48	35	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	Z_D08038048014
38	48	40	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	Z_D08038045015
38	48	45	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	Z_D08038048016
38	48	50	1.50	0,8x45°	DIN 1850 part 5	38.08	38.119	Z_D08038044017
38	48	55	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	Z_D08038048018
38	48	60	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	Z_D08038048019
40	44	20	1.50	0,8x45°	DIN 1494 part 1	40.08	40.119	Z_D08040050020
40	44	30	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	Z_D08040050021
40	44	40	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	Z_D08040050022
40	44	50	1.50	0,8x45°	DIN 1494 part 1	40.08	40.119	Z_D08040050023
40	44	60	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	Z_D08040050024
40	46	30	1.50	0,8x45°	DIN 1850 part 3	40.08	40.119	Z_D08040050025
40	46	40	1.50	0,8x45°	DIN 1850 part 3	40.08	40.119	Z_D08040044001
40	46	50	1.50	0,8x45°	DIN 1850 part 3	40.08	40.119	Z_D08040050002
40	46	60	1.50	0,8x45°	DIN 1850 part 3	40.08	40.119	Z_D08040050003
40	47	65	1.50	0,8x45°		40.08	40.119	Z_D08040050004
40	48	30	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	Z_D08040050005
40	48	40	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	Z_D08040044006
40	48	60	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	Z_D08040048007
40	50	10	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040050008
40	50	12	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040046009
40	50	14	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040050010
40	50	15	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040050011
40	50	16	1.50	0,8x45°	DIN 1850 part 4	40.08	40.119	Z_D08040044012
40	50	18	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040048013
40	50	20	1.50	0,8x45°	DIN 1498 frame F	40.08	40.119	Z_D08040050014
40	50	22	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040046015

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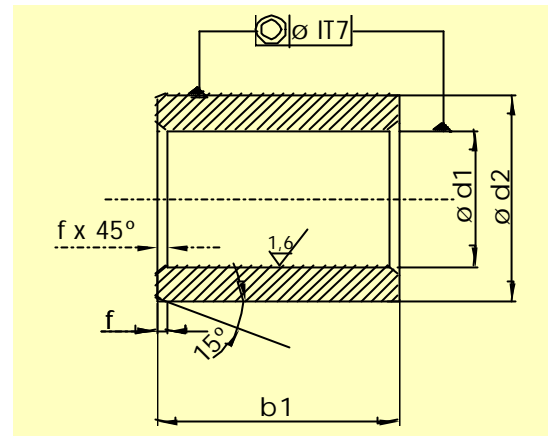
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
40	50	25	1.50	0,8x45°	DIN 1850 part 4	40.08	40.119	Z_D08040050016
40	50	28	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040044017
40	50	30	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	Z_D08040046018
40	50	32	1.50	0,8x45°	DIN 1850 part 4	40.08	40.119	Z_D08040050019
40	50	36	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040050020
40	50	40	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	Z_D08040044021
40	50	45	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040048022
40	50	50	1.50	0,8x45°	DIN 1850 part 5	40.08	40.119	Z_D08040050023
40	50	56	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040046024
40	50	60	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	Z_D08040050025
40	50	63	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040047052
40	50	70	1.50	0,8x45°	DIN 1552 part 1	40.08	40.119	Z_D08040050053
40	50	80	1.50	0,8x45°	DIN 1498 frame F	40.08	40.119	Z_D08040050054
40.5	50	10	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050055
40.5	50	12	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050056
40.5	50	14	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050057
40.5	50	15	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050058
40.5	50	18	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050059
40.5	50	20	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050060
40.5	50	22	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050061
40.5	50	25	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050062
40.5	50	28	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050063
40.5	50	30	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050064
40.5	50	36	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050065
40.5	50	40	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050066
40.5	50	45	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050067
40.5	50	50	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050068
40.5	50	56	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050069
40.5	50	63	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050070
40.5	50	70	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050071
40.5	50	80	1.50	0,8x45°	DIN 1552 part 1	40.58	40.619	Z_D08040050072
41	50	10	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050001
41	50	12	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050002
41	50	14	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050003
41	50	15	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050004
41	50	18	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050005
41	50	20	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050006

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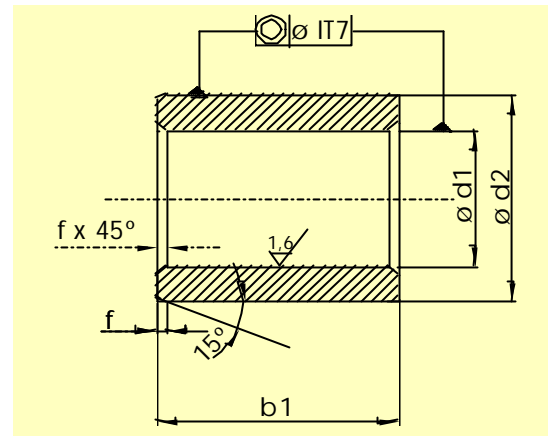
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
41	50	22	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050007
41	50	25	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050008
41	50	28	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050009
41	50	30	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050010
41	50	36	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050011
41	50	40	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050012
41	50	45	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050013
41	50	50	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050014
41	50	56	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050015
41	50	63	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050016
41	50	70	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050017
41	50	80	1.50	0,8x45°	DIN 1552 part 1	41.08	41.119	Z_D08041050018
42	46	30	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	Z_D08042050019
42	46	40	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	Z_D08042052020
42	46	60	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	Z_D08042050021
42	48	30	1.50	0,8x45°	DIN 1850 part 3	42.08	42.119	Z_D08042052022
42	48	40	1.50	0,8x45°	DIN 1850 part 3	42.08	42.119	Z_D08042046001
42	48	50	1.50	0,8x45°	DIN 1850 part 3	42.08	42.119	Z_D08042050002
42	48	60	1.50	0,8x45°	DIN 1850 part 3	42.08	42.119	Z_D08042052003
42	50	8	1.50	0,8x45°	DIN 1498 frame F	42.08	42.119	Z_D08042048004
42	50	22	1.50	0,8x45°	DIN 1498 frame F	42.08	42.119	Z_D08042052005
42	50	30	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	Z_D08042046006
42	50	40	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	Z_D08042050007
42	50	60	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	Z_D08042052008
42	52	18	1.50	0,8x45°	DIN 1850 part 4	42.08	42.119	Z_D08042048009
42	52	25	1.50	0,8x45°	DIN 1850 part 4	42.08	42.119	Z_D08042052010
42	52	30	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	Z_D08042048011
42	52	36	1.50	0,8x45°	DIN 1850 part 4	42.08	42.119	Z_D08042052012
42	52	40	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	Z_D08042046013
42	52	45	1.50	0,8x45°	DIN 1850 part 4	42.08	42.119	Z_D08042050014
42	52	50	1.50	0,8x45°	DIN 1850 part 3	42.08	42.119	Z_D08042052015
42	52	60	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	Z_D08042048016
45	50	20	1.50	0,8x45°	DIN 1494 part 1	45.08	45.119	Z_D08045055017
45	50	30	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	Z_D08045055018
45	50	40	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	Z_D08045055019
45	50	50	1.50	0,8x45°	DIN 1494 part 1	45.08	45.119	Z_D08045055020
45	50	60	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	Z_D08045055021

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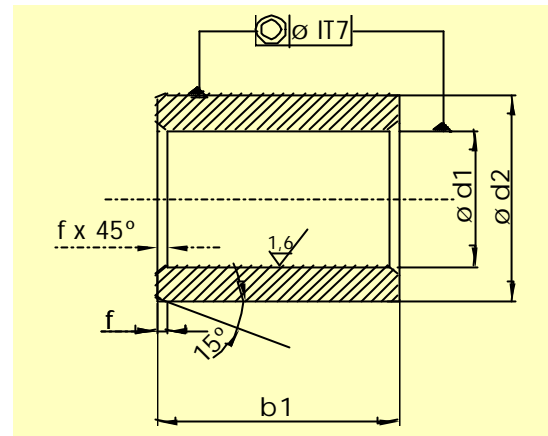
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
45	51	35	1.50	0,8x45°	DIN 1850 part 3	45.08	45.119	Z_D08045050001
45	51	45	1.50	0,8x45°	DIN 1850 part 3	45.08	45.119	Z_D08045055002
45	51	55	1.50	0,8x45°	DIN 1850 part 3	45.08	45.119	Z_D08045054003
45	51	65	1.50	0,8x45°	DIN 1850 part 3	45.08	45.119	Z_D08045055004
45	53	30	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	Z_D08045055005
45	53	40	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	Z_D08045055006
45	53	60	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	Z_D08045050007
45	54	22	1.50	0,8x45°	DIN 1498 frame F	45.08	45.119	Z_D08045053008
45	54	40	1.50	0,8x45°	DIN 1498 frame F	45.08	45.119	Z_D08045055009
45	54	60	1.50	0,8x45°	DIN 1498 frame F	45.08	45.119	Z_D08045051010
45	54	80	1.50	0,8x45°	DIN 1498 frame F	45.08	45.119	Z_D08045055011
45	55	10	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045055012
45	55	12	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045054013
45	55	14	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045050014
45	55	15	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045053015
45	55	18	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045055016
45	55	20	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045051017
45	55	22	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045055018
45	55	25	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045050019
45	55	28	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045055020
45	55	30	1.50	0,8x45°	DIN 1850 part 5	45.08	45.119	Z_D08045051021
45	55	35	1.50	0,8x45°	DIN 1850 part 3	45.08	45.119	Z_D08045055022
45	55	36	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045055023
45	55	40	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	Z_D08045054024
45	55	45	1.50	0,8x45°	DIN 1850 part 4	45.08	45.119	Z_D08045050025
45	55	50	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	Z_D08045053026
45	55	55	1.50	0,8x45°	DIN 1850 part 3	45.08	45.119	Z_D08045055027
45	55	56	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045055028
45	55	60	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	Z_D08045051029
45	55	63	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045055030
45	55	65	1.50	0,8x45°	DIN 1850 part 3	45.08	45.119	Z_D08045055031
45	55	70	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045054032
45	55	80	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045055033
45	55	90	1.50	0,8x45°	DIN 1552 part 1	45.08	45.119	Z_D08045055034
45.1	52.1	64	1.50	0,8x45°		45.18	45.219	Z_D08045052059
45.5	55	10	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055060
45.5	55	12	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055061

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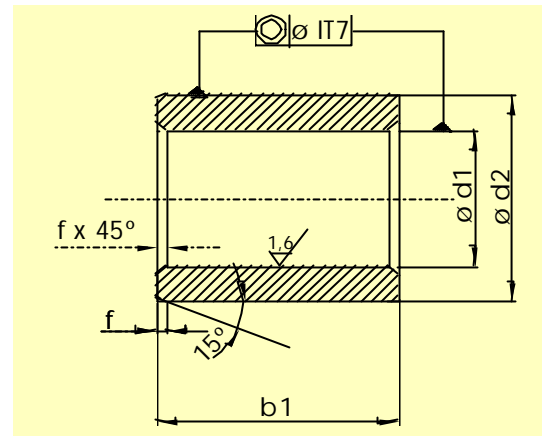
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
45.5	55	14	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055062
45.5	55	15	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055063
45.5	55	18	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055064
45.5	55	20	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055065
45.5	55	22	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055066
45.5	55	25	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055067
45.5	55	28	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055068
45.5	55	30	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055069
45.5	55	36	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055070
45.5	55	40	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055071
45.5	55	45	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055072
45.5	55	50	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055073
45.5	55	56	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055074
45.5	55	63	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055075
45.5	55	70	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055076
45.5	55	80	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055077
45.5	55	90	1.50	0,8x45°	DIN 1552 part 1	45.58	45.619	Z_D08045055078
46	55	10	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055001
46	55	12	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055002
46	55	14	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055003
46	55	15	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055004
46	55	18	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055005
46	55	20	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055006
46	55	22	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055007
46	55	25	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055008
46	55	28	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055009
46	55	30	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055010
46	55	36	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055011
46	55	40	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055012
46	55	45	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055013
46	55	50	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055014
46	55	56	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055015
46	55	63	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055016
46	55	70	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055017
46	55	80	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055018
46	55	90	1.50	0,8x45°	DIN 1552 part 1	46.08	46.119	Z_D08046055019
48	53	40	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	Z_D08048058020

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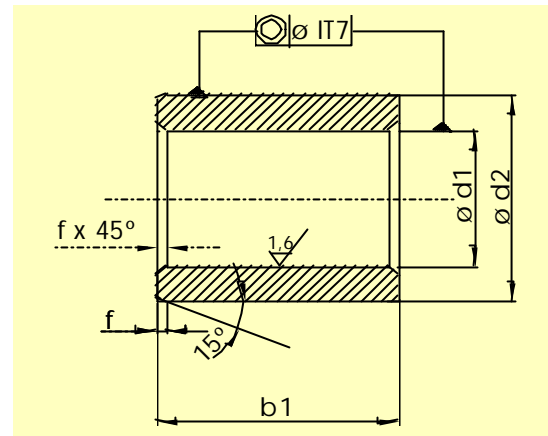
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
48	53	50	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	Z_D08048058021
48	53	60	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	Z_D08048055022
48	55	35	1.50	0,8x45°	DIN 1850 part 3	48.08	48.119	Z_D08048058023
48	55	50	1.50	0,8x45°	DIN 1850 part 3	48.08	48.119	Z_D08048053001
48	55	70	1.50	0,8x45°	DIN 1850 part 3	48.08	48.119	Z_D08048056002
48	56	40	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	Z_D08048058003
48	56	50	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	Z_D08048053004
48	56	60	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	Z_D08048056005
48	58	20	2.00	0,8x45°	DIN 1850 part 4	48.08	48.119	Z_D08048055006
48	58	28	1.50	0,8x45°	DIN 1850 part 4	48.08	48.119	Z_D08048058007
48	58	35	1.50	0,8x45°	DIN 1850 part 3	48.08	48.119	Z_D08048053008
48	58	40	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	Z_D08048056009
48	58	50	1.50	0,8x45°	DIN 1850 part 4	48.08	48.119	Z_D08048058010
48	58	60	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	Z_D08048055011
48	58	70	1.50	0,8x45°	DIN 1850 part 3	48.08	48.119	Z_D08048058012
50	55	25	1.50	0,8x45°	DIN 1494 part 1	50.08	50.119	Z_D08050060013
50	55	40	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	Z_D08050060014
50	55	50	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	Z_D08050060015
50	55	60	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	Z_D08050060016
50	58	25	1.50	0,8x45°	DIN 1498 frame F	50.08	50.119	Z_D08050060017
50	58	35	1.50	0,8x45°	DIN 1850 part 3	50.08	50.119	Z_D08050060018
50	58	40	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	Z_D08050060019
50	58	50	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	Z_D08050055001
50	58	60	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	Z_D08050058002
50	58	70	1.50	0,8x45°	DIN 1498 frame F	50.08	50.119	Z_D08050060003
50	58	100	1.50	0,8x45°	DIN 1498 frame F	50.08	50.119	Z_D08050060004
50	60	10	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050060005
50	60	12	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050058006
50	60	14	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050060007
50	60	15	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050060008
50	60	18	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050055009
50	60	20	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050058010
50	60	22	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050060011
50	60	25	1.50	0,8x45°	DIN 1498 frame F	50.08	50.119	Z_D08050055012
50	60	28	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050058013
50	60	30	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050060014
50	60	35	1.50	0,8x45°	DIN 1850 part 3	50.08	50.119	Z_D08050060015

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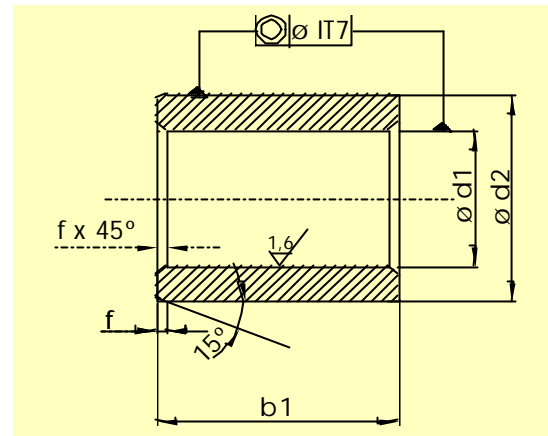
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
50	60	36	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050055016
50	60	40	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	Z_D08050058017
50	60	50	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	Z_D08050060018
50	60	56	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050060019
50	60	60	1.50	0,8x45°	DIN 1850 part 5	50.08	50.119	Z_D08050058020
50	60	63	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050060021
50	60	70	1.50	0,8x45°	DIN 1850 part 3	50.08	50.119	Z_D08050060022
50	60	80	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050060023
50	60	90	1.50	0,8x45°	DIN 1552 part 1	50.08	50.119	Z_D08050058024
50	60	100	1.50	0,8x45°	DIN 1498 frame F	50.08	50.119	Z_D08050060025
50.5	60	10	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060026
50.5	60	12	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060027
50.5	60	14	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060028
50.5	60	15	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060029
50.5	60	18	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060030
50.5	60	20	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060031
50.5	60	22	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060032
50.5	60	25	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060033
50.5	60	28	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060034
50.5	60	30	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060035
50.5	60	36	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060036
50.5	60	40	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060037
50.5	60	45	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060038
50.5	60	50	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060039
50.5	60	56	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060040
50.5	60	63	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060041
50.5	60	70	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060042
50.5	60	80	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060043
50.5	60	90	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060044
50.5	60	100	1.50	0,8x45°	DIN 1552 part 1	50.6	50.646	Z_D08050060045
51	60	10	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060001
51	60	12	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060002
51	60	14	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060003
51	60	15	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060004
51	60	18	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060005
51	60	20	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060006
51	60	22	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060007

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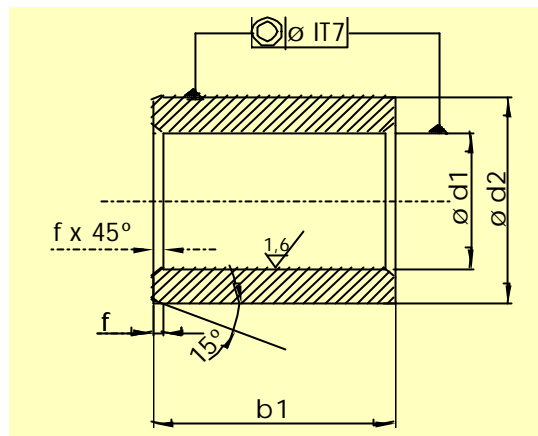
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
51	60	25	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060008
51	60	28	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060009
51	60	30	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060010
51	60	36	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060011
51	60	40	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060012
51	60	45	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060013
51	60	50	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060014
51	60	56	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060015
51	60	63	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060016
51	60	70	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060017
51	60	80	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060018
51	60	90	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060019
51	60	100	1.50	0,8x45°	DIN 1552 part 1	51.1	51.146	Z_D08051060020
55	60	30	1.50	0,8x45°	DIN 1494 part 1	55.1	55.146	Z_D08055065021
55	60	40	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	Z_D08055065022
55	60	50	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	Z_D08055065023
55	60	60	1.50	0,8x45°	DIN 1494 part 1	55.1	55.146	Z_D08055065024
55	60	70	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	Z_D08055065025
55	63	40	1.50	0,8x45°	DIN 1850 part 3	55.1	55.146	Z_D08055065026
55	63	50	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	Z_D08055065027
55	63	55	1.50	0,8x45°	DIN 1850 part 3	55.1	55.146	Z_D08055065028
55	63	70	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	Z_D08055066029
55	65	10	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055065030
55	65	12	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055060001
55	65	14	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055065002
55	65	15	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055065003
55	65	18	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055066004
55	65	20	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055060005
55	65	22	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055065006
55	65	25	1.50	0,8x45°	DIN 1498 frame F	55.1	55.146	Z_D08055063007
55	65	28	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055065008
55	65	30	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055066009
55	65	36	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055065010
55	65	40	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	Z_D08055060011
55	65	45	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055063012
55	65	50	1.50	0,8x45°	DIN 1498 frame F	55.1	55.146	Z_D08055063013
55	65	55	1.50	0,8x45°	DIN 1850 part 3	55.1	55.146	Z_D08055065014

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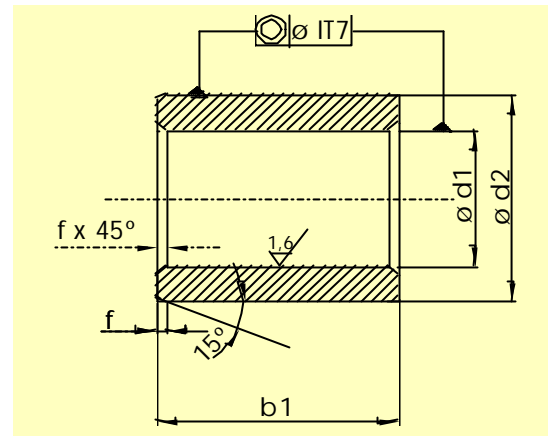
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
55	65	56	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055065015
55	65	60	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	Z_D08055066016
55	65	63	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055060017
55	65	70	1.50	0,8x45°	DIN 1498 frame F	55.1	55.146	Z_D08055065018
55	65	80	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	Z_D08055065019
55	65	90	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055065020
55	65	100	1.50	0,8x45°	DIN 1498 frame F	55.1	55.146	Z_D08055060021
55	65	110	1.50	0,8x45°	DIN 1552 part 1	55.1	55.146	Z_D08055063022
55	66	25	1.50	0,8x45°	DIN 1850 part 4	55.1	55.146	Z_D08055065023
55	66	36	1.50	0,8x45°	DIN 1850 part 4	55.1	55.146	Z_D08055065024
55	66	45	1.50	0,8x45°	DIN 1850 part 4	55.1	55.146	Z_D08055065025
55	66	56	1.50	0,8x45°	DIN 1850 part 4	55.1	55.146	Z_D08055065026
60	65	30	1.50	0,8x45°	DIN 1494 part 1	60.1	60.146	Z_D08060075027
60	65	40	1.50	0,8x45°	DIN 1850 part 1	60.1	60.146	Z_D08060075028
60	65	50	1.50	0,8x45°	DIN 1494 part 1	60.1	60.146	Z_D08060075029
60	65	60	1.50	0,8x45°	DIN 1850 part 1	60.1	60.146	Z_D08060075030
60	65	70	1.50	0,8x45°	DIN 1494 part 1	60.1	60.146	Z_D08060075031
60	65	80	1.50	0,8x45°	DIN 1850 part 1	60.1	60.146	Z_D08060075032
60	68	50	1.50	0,8x45°	DIN 1850 part 3	60.1	60.146	Z_D08060075033
60	68	60	1.50	0,8x45°	DIN 1850 part 3	60.1	60.146	Z_D08060070034
60	68	70	1.50	0,8x45°	DIN 1850 part 3	60.1	60.146	Z_D08060075035
60	70	25	2.00	0,8x45°	DIN 1498 frame F	60.1	60.146	Z_D08060075036
60	70	40	2.00	0,8x45°	DIN 1850 part 1	60.1	60.146	Z_D08060065001
60	70	50	2.00	0,8x45°	DIN 1498 frame F	60.1	60.146	Z_D08060075002
60	70	60	2.00	0,8x45°	DIN 1850 part 1	60.1	60.146	Z_D08060075003
60	70	70	2.00	0,8x45°	DIN 1498 frame F	60.1	60.146	Z_D08060065004
60	70	80	2.00	0,8x45°	DIN 1850 part 1	60.1	60.146	Z_D08060070005
60	70	100	2.00	0,8x45°	DIN 1498 frame F	60.1	60.146	Z_D08060075006
60	72	50	2.00	0,8x45°	DIN 1850 part 3	60.1	60.146	Z_D08060075007
60	72	60	2.00	0,8x45°	DIN 1850 part 3	60.1	60.146	Z_D08060065008
60	72	70	2.00	0,8x45°	DIN 1850 part 3	60.1	60.146	Z_D08060070009
60	75	10	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060075010
60	75	12	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060068011
60	75	14	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060072012
60	75	15	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060075013
60	75	18	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060065014
60	75	20	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060070015

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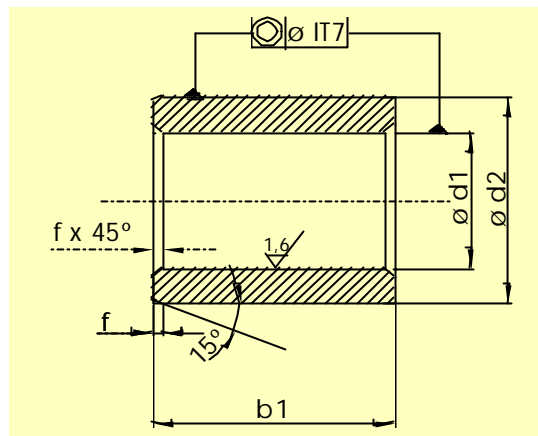
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
60	75	22	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060068016
60	75	25	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060072017
60	75	28	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060075018
60	75	30	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060075019
60	75	36	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060065020
60	75	40	2.00	0,8x45°	DIN 1850 part 5	60.1	60.146	Z_D08060070021
60	75	45	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060075022
60	75	50	2.00	0,8x45°	DIN 1850 part 1	60.1	60.146	Z_D08060068023
60	75	56	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060072024
60	75	60	2.00	0,8x45°	DIN 1850 part 5	60.1	60.146	Z_D08060065025
60	75	63	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060070026
60	75	70	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060075027
60	75	80	2.00	0,8x45°	DIN 1850 part 5	60.1	60.146	Z_D08060075028
60	75	90	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060070029
60	75	100	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060075030
60	75	110	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060075031
60	75	120	2.00	0,8x45°	DIN 1552 part 1	60.1	60.146	Z_D08060075032
60.5	75	10	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075033
60.5	75	12	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075034
60.5	75	14	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075035
60.5	75	15	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075036
60.5	75	18	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075037
60.5	75	20	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075038
60.5	75	22	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075039
60.5	75	25	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075040
60.5	75	28	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075041
60.5	75	30	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075042
60.5	75	36	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075043
60.5	75	40	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075044
60.5	75	45	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075045
60.5	75	50	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075046
60.5	75	56	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075047
60.5	75	63	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075048
60.5	75	70	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075049
60.5	75	80	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075050
60.5	75	90	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075051
60.5	75	100	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075052

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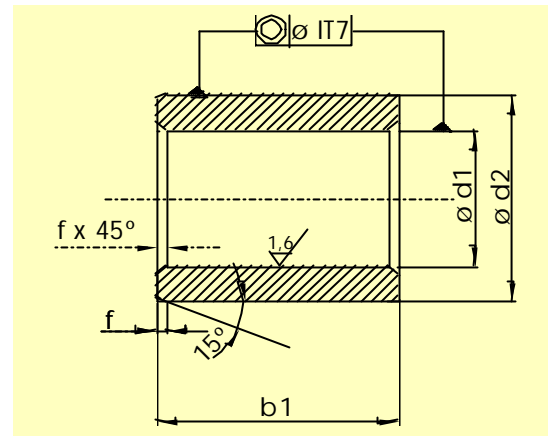
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
60.5	75	110	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075053
60.5	75	120	2.00	0,8x45°	DIN 1552 part 1	60.6	60.646	Z_D08060075054
61	75	10	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075001
61	75	12	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075002
61	75	14	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075003
61	75	15	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075004
61	75	18	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075005
61	75	20	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075006
61	75	22	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075007
61	75	25	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075008
61	75	28	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075009
61	75	30	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075010
61	75	36	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075011
61	75	40	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075012
61	75	45	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075013
61	75	50	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075014
61	75	56	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075015
61	75	63	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075016
61	75	70	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075017
61	75	80	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075018
61	75	90	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075019
61	75	100	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075020
61	75	110	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075021
61	75	120	2.00	0,8x45°	DIN 1552 part 1	61.1	61.146	Z_D08061075022
65	70	30	2.00	1x45°	DIN 1494 part 1	65.1	65.146	Z_D08065075023
65	70	50	2.00	1x45°	DIN 1850 part 1	65.1	65.146	Z_D08065080024
65	70	60	2.00	1x45°	DIN 1850 part 1	65.1	65.146	Z_D08065070001
65	70	70	2.00	1x45°	DIN 1494 part 1	65.1	65.146	Z_D08065080002
65	70	80	2.00	1x45°	DIN 1850 part 1	65.1	65.146	Z_D08065070003
65	75	25	2.00	1x45°	DIN 1498 frame F	65.1	65.146	Z_D08065075004
65	75	50	2.00	1x45°	DIN 1850 part 1	65.1	65.146	Z_D08065080005
65	75	60	2.00	1x45°	DIN 1850 part 1	65.1	65.146	Z_D08065070006
65	75	70	2.00	1x45°	DIN 1498 frame F	65.1	65.146	Z_D08065075007
65	75	80	2.00	1x45°	DIN 1850 part 1	65.1	65.146	Z_D08065080008
65	75	100	2.00	1x45°	DIN 1498 frame F	65.1	65.146	Z_D08065080009
65	80	25	2.00	1x45°	DIN 1850 part 4	65.1	65.146	Z_D08065070010
65	80	40	2.00	1x45°	DIN 1850 part 4	65.1	65.146	Z_D08065075011

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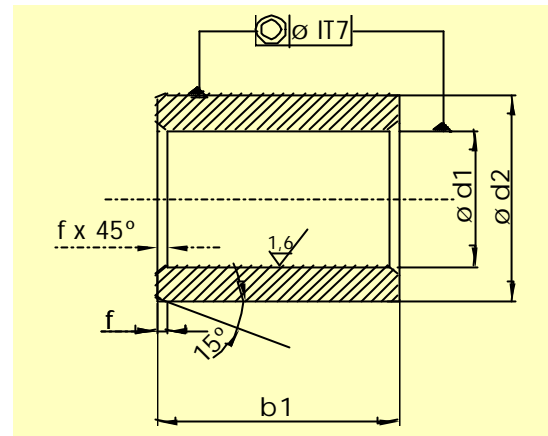
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
65	80	50	2.00	1x45°	DIN 1850 part 1	65.1	65.146	Z_D08065070012
65	80	60	2.00	1x45°	DIN 1850 part 1	65.1	65.146	Z_D08065075013
65	80	63	2.00	1x45°	DIN 1850 part 4	65.1	65.146	Z_D08065080014
65	80	80	2.00	1x45°	DIN 1850 part 1	65.1	65.146	Z_D08065075015
70	75	30	2.00	1x45°	DIN 1494 part 1	70.1	70.146	Z_D08070085016
70	75	50	2.00	1x45°	DIN 1850 part 1	70.1	70.146	Z_D08070085017
70	75	70	2.00	1x45°	DIN 1850 part 1	70.1	70.146	Z_D08070085018
70	75	90	2.00	1x45°	DIN 1850 part 1	70.1	70.146	Z_D08070085019
70	80	50	2.00	1x45°	DIN 1850 part 1	70.1	70.146	Z_D08070085020
70	80	70	2.00	1x45°	DIN 1850 part 1	70.1	70.146	Z_D08070085021
70	80	90	2.00	1x45°	DIN 1850 part 1	70.1	70.146	Z_D08070085022
70	85	14	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070075001
70	85	15	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085002
70	85	18	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085003
70	85	20	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085004
70	85	22	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085005
70	85	25	2.00	1x45°	DIN 1498 frame F	70.1	70.146	Z_D08070075006
70	85	28	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070080007
70	85	30	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085008
70	85	36	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085009
70	85	40	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085010
70	85	45	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070075011
70	85	50	2.00	1x45°	DIN 1850 part 1	70.1	70.146	Z_D08070080012
70	85	56	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085013
70	85	63	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085014
70	85	70	2.00	1x45°	DIN 1850 part 1	70.1	70.146	Z_D08070075015
70	85	80	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070080016
70	85	90	2.00	1x45°	DIN 1850 part 1	70.1	70.146	Z_D08070085017
70	85	100	2.00	1x45°	DIN 1498 frame F	70.1	70.146	Z_D08070085018
70	85	110	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085019
70	85	120	2.00	1x45°	DIN 1552 part 1	70.1	70.146	Z_D08070085020
70.5	85	14	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085021
70.5	85	15	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085022
70.5	85	18	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085023
70.5	85	20	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085024
70.5	85	22	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085025
70.5	85	25	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085026

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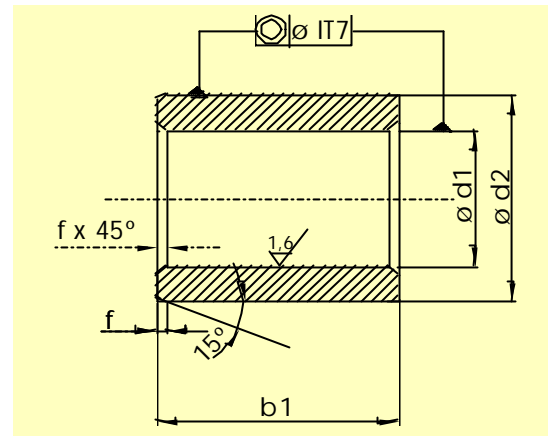
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
70.5	85	28	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085027
70.5	85	30	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085028
70.5	85	36	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085029
70.5	85	40	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085030
70.5	85	45	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085031
70.5	85	50	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085032
70.5	85	56	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085033
70.5	85	63	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085034
70.5	85	70	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085035
70.5	85	80	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085036
70.5	85	90	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085037
70.5	85	100	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085038
70.5	85	110	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085039
70.5	85	120	2.00	1x45°	DIN 1552 part 1	70.6	70.646	Z_D08070085040
71	85	14	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085001
71	85	15	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085002
71	85	18	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085003
71	85	20	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085004
71	85	22	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085005
71	85	25	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085006
71	85	28	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085007
71	85	30	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085008
71	85	36	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085009
71	85	40	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085010
71	85	45	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085011
71	85	50	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085012
71	85	56	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085013
71	85	63	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085014
71	85	70	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085015
71	85	80	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085016
71	85	90	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085017
71	85	100	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085018
71	85	110	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085019
71	85	120	2.00	1x45°	DIN 1552 part 1	71.1	71.146	Z_D08071085020
75	80	40	2.00	1x45°	DIN 1494 part 1	75.1	75.146	Z_D08075090021
75	80	50	2.00	1x45°	DIN 1850 part 1	75.1	75.146	Z_D08075095022
75	80	60	2.00	1x45°	DIN 1494 part 1	75.1	75.146	Z_D08075080001

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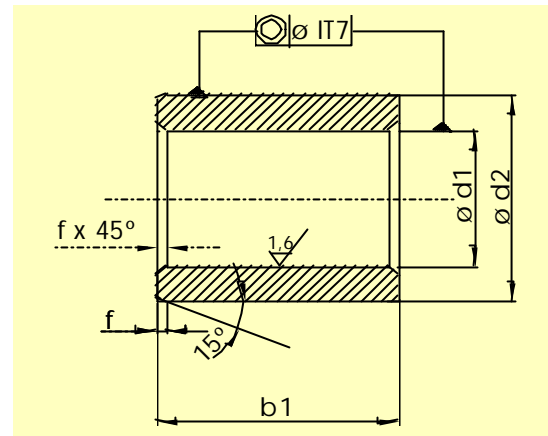
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
75	80	70	2.00	1x45°	DIN 1850 part 1	75.1	75.146	Z_D08075095002
75	80	80	2.00	1x45°	DIN 1494 part 1	75.1	75.146	Z_D08075080003
75	80	90	2.00	1x45°	DIN 1850 part 1	75.1	75.146	Z_D08075085004
75	85	50	2.00	1x45°	DIN 1850 part 1	75.1	75.146	Z_D08075090005
75	85	70	2.00	1x45°	DIN 1850 part 1	75.1	75.146	Z_D08075080006
75	85	90	2.00	1x45°	DIN 1850 part 1	75.1	75.146	Z_D08075095007
75	90	25	2.00	1x45°	DIN 1498 frame F	75.1	75.146	Z_D08075080008
75	90	50	2.00	1x45°	DIN 1850 part 1	75.1	75.146	Z_D08075085009
75	90	70	2.00	1x45°	DIN 1850 part 1	75.1	75.146	Z_D08075090010
75	90	90	2.00	1x45°	DIN 1850 part 5	75.1	75.146	Z_D08075080011
75	90	100	2.00	1x45°	DIN 1498 frame F	75.1	75.146	Z_D08075095012
75	95	32	2.00	1x45°	DIN 1850 part 4	75.1	75.146	Z_D08075080013
75	95	45	2.00	1x45°	DIN 1850 part 4	75.1	75.146	Z_D08075085014
75	95	63	2.00	1x45°	DIN 1850 part 4	75.1	75.146	Z_D08075090015
75	95	80	2.00	1x45°	DIN 1850 part 4	75.1	75.146	Z_D08075090016
80	85	40	2.00	1x45°	DIN 1494 part 1	80.1	80.146	Z_D08080095017
80	85	60	2.00	1x45°	DIN 1850 part 1	80.1	80.146	Z_D08080095018
80	85	80	2.00	1x45°	DIN 1850 part 1	80.1	80.146	Z_D08080095019
80	85	100	2.00	1x45°	DIN 1850 part 1	80.1	80.146	Z_D08080095020
80	90	60	2.00	1x45°	DIN 1850 part 1	80.1	80.146	Z_D08080095021
80	90	80	2.00	1x45°	DIN 1850 part 1	80.1	80.146	Z_D08080095022
80	90	100	2.00	1x45°	DIN 1850 part 1	80.1	80.146	Z_D08080095023
80	95	14	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095024
80	95	15	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080100025
80	95	18	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095026
80	95	20	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080085001
80	95	22	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095002
80	95	25	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095003
80	95	28	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095004
80	95	30	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080100005
80	95	36	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095006
80	95	40	2.00	1x45°	DIN 1498 frame F	80.1	80.146	Z_D08080085007
80	95	45	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080090008
80	95	50	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095009
80	95	56	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095010
80	95	60	2.00	1x45°	DIN 1850 part 1	80.1	80.146	Z_D08080100011
80	95	63	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095012

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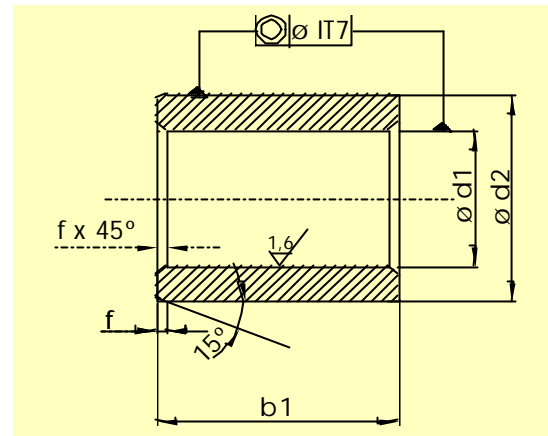
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
80	95	70	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080085013
80	95	80	2.00	1x45°	DIN 1850 part 1	80.1	80.146	Z_D08080090014
80	95	90	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095015
80	95	100	2.00	1x45°	DIN 1850 part 1	80.1	80.146	Z_D08080100016
80	95	110	2.00	1x45°	DIN 1552 part 1	80.1	80.146	Z_D08080095017
80	95	120	2.00	1x45°	DIN 1498 frame F	80.1	80.146	Z_D08080085018
80	100	32	2.50	1x45°	DIN 1850 part 4	80.1	80.146	Z_D08080090019
80	100	50	2.50	1x45°	DIN 1850 part 4	80.1	80.146	Z_D08080095020
80	100	63	2.50	1x45°	DIN 1850 part 4	80.1	80.146	Z_D08080095021
80	100	80	2.50	1x45°	DIN 1850 part 4	80.1	80.146	Z_D08080095022
85	90	40	2.00	1x45°	DIN 1494 part 1	85.12	85.174	Z_D08085105023
85	90	60	2.00	1x45°	DIN 1850 part 1	85.12	85.174	Z_D08085090001
85	90	80	2.00	1x45°	DIN 1850 part 1	85.12	85.174	Z_D08085100002
85	90	100	2.00	1x45°	DIN 1850 part 1	85.12	85.174	Z_D08085105003
85	95	60	2.00	1x45°	DIN 1850 part 1	85.12	85.174	Z_D08085090004
85	95	80	2.00	1x45°	DIN 1850 part 1	85.12	85.174	Z_D08085095005
85	95	100	2.00	1x45°	DIN 1850 part 1	85.12	85.174	Z_D08085100006
85	100	40	2.50	1x45°	DIN 1498 frame F	85.12	85.174	Z_D08085105007
85	100	60	2.50	1x45°	DIN 1850 part 1	85.12	85.174	Z_D08085090008
85	100	80	2.50	1x45°	DIN 1850 part 1	85.12	85.174	Z_D08085095009
85	100	100	2.50	1x45°	DIN 1850 part 5	85.12	85.174	Z_D08085100010
85	100	120	2.50	1x45°	DIN 1498 frame F	85.12	85.174	Z_D08085105011
85	105	36	2.50	1x45°	DIN 1850 part 4	85.12	85.174	Z_D08085090012
85	105	50	2.50	1x45°	DIN 1850 part 4	85.12	85.174	Z_D08085095013
85	105	70	2.50	1x45°	DIN 1850 part 4	85.12	85.174	Z_D08085100014
85	105	90	2.50	1x45°	DIN 1850 part 4	85.12	85.174	Z_D08085100015
90	95	40	2.00	1x45°	DIN 1494 part 1	90.12	90.174	Z_D08090110016
90	95	60	2.00	1x45°	DIN 1494 part 1	90.12	90.174	Z_D08090095001
90	95	100	2.00	1x45°	DIN 1494 part 1	90.12	90.174	Z_D08090105002
90	100	60	2.50	1x45°	DIN 1850 part 1	90.12	90.174	Z_D08090110003
90	100	80	2.50	1x45°	DIN 1850 part 1	90.12	90.174	Z_D08090095004
90	100	100	2.50	1x45°	DIN 1850 part 1	90.12	90.174	Z_D08090100005
90	105	45	2.50	1x45°	DIN 1498 frame F	90.12	90.174	Z_D08090105006
90	105	60	2.50	1x45°	DIN 1850 part 1	90.12	90.174	Z_D08090110007
90	105	80	2.50	1x45°	DIN 1850 part 1	90.12	90.174	Z_D08090110008
90	105	100	2.50	1x45°	DIN 1850 part 1	90.12	90.174	Z_D08090100009
90	105	120	2.50	1x45°	DIN 1498 frame F	90.12	90.174	Z_D08090105010

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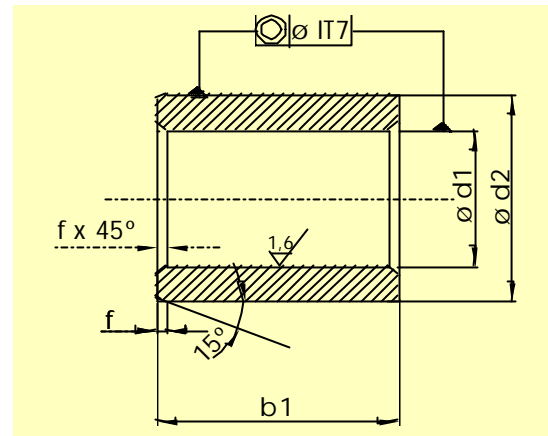
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
90	110	36	2.50	1x45°	DIN 1850 part 4	90.12	90.174	Z_D08090110011
90	110	56	2.50	1x45°	DIN 1850 part 4	90.12	90.174	Z_D08090110012
90	110	60	2.50	1x45°	DIN 1850 part 1	90.12	90.174	Z_D08090095013
90	110	70	2.50	1x45°	DIN 1850 part 4	90.12	90.174	Z_D08090100014
90	110	80	2.50	1x45°	DIN 1850 part 1	90.12	90.174	Z_D08090105015
90	110	90	2.50	1x45°	DIN 1850 part 4	90.12	90.174	Z_D08090105016
90	110	120	2.50	1x45°	DIN 1850 part 1	90.12	90.174	Z_D08090110017
95	100	60	2.50	1x45°	DIN 1494 part 1	95.12	95.174	Z_D08095115018
95	100	100	2.50	1x45°	DIN 1494 part 1	95.12	95.174	Z_D08095110019
95	105	60	2.50	1x45°	DIN 1850 part 1	95.12	95.174	Z_D08095115020
95	105	100	2.50	1x45°	DIN 1850 part 1	95.12	95.174	Z_D08095100001
95	105	120	2.50	1x45°	DIN 1850 part 1	95.12	95.174	Z_D08095105002
95	110	45	2.50	1x45°	DIN 1498 frame F	95.12	95.174	Z_D08095110003
95	110	60	2.50	1x45°	DIN 1850 part 1	95.12	95.174	Z_D08095115004
95	110	100	2.50	1x45°	DIN 1850 part 1	95.12	95.174	Z_D08095115005
95	110	120	2.50	1x45°	DIN 1498 frame F	95.12	95.174	Z_D08095100006
95	115	40	2.50	1x45°	DIN 1850 part 4	95.12	95.174	Z_D08095105007
95	115	56	2.50	1x45°	DIN 1850 part 4	95.12	95.174	Z_D08095110008
95	115	60	2.50	1x45°	DIN 1850 part 1	95.12	95.174	Z_D08095115009
95	115	80	2.50	1x45°	DIN 1850 part 4	95.12	95.174	Z_D08095110010
95	115	100	2.50	1x45°	DIN 1850 part 1	95.12	95.174	Z_D08095105011
95	115	120	2.50	1x45°	DIN 1850 part 1	95.12	95.174	Z_D08095115012
100	105	50	2.50	1x45°	DIN 1494 part 1	100.12	100.174	Z_D08100120013
100	105	60	2.50	1x45°	DIN 1494 part 1	100.12	100.174	Z_D08100115014
100	105	100	2.50	1x45°	DIN 1494 part 1	100.12	100.174	Z_D08100105001
100	110	80	2.50	1x45°	DIN 1850 part 1	100.12	100.174	Z_D08100105002
100	110	100	2.50	1x45°	DIN 1850 part 1	100.12	100.174	Z_D08100115003
100	110	120	2.50	1x45°	DIN 1850 part 1	100.12	100.174	Z_D08100120004
100	115	45	2.50	1x45°	DIN 1498 frame F	100.12	100.174	Z_D08100110005
100	115	60	2.50	1x45°	DIN 1498 frame F	100.12	100.174	Z_D08100115006
100	115	80	2.50	1x45°	DIN 1850 part 1	100.12	100.174	Z_D08100120007
100	115	100	2.50	1x45°	DIN 1850 part 1	100.12	100.174	Z_D08100105008
100	115	120	2.50	1x45°	DIN 1498 frame F	100.12	100.174	Z_D08100110009
100	120	40	2.50	1x45°	DIN 1850 part 4	100.12	100.174	Z_D08100115010
100	120	63	2.50	1x45°	DIN 1850 part 4	100.12	100.174	Z_D08100120011
100	120	80	2.50	1x45°	DIN 1850 part 5	100.12	100.174	Z_D08100115012
100	120	100	2.50	1x45°	DIN 1850 part 5	100.12	100.174	Z_D08100110013

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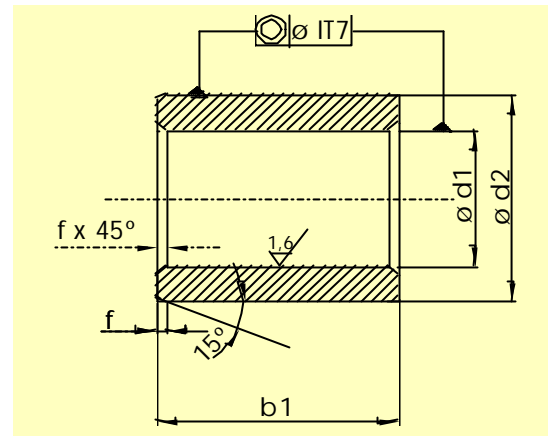
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
100	120	120	2.50	1x45°	DIN 1850 part 5	100.12	100.174	Z_D08100120014
105	110	60	2.50	1x45°	DIN 1494 part 1	105.12	105.174	Z_D08105120015
105	110	100	2.50	1x45°	DIN 1494 part 1	105.12	105.174	Z_D08105110001
105	115	80	2.50	1x45°	DIN 1850 part 1	105.12	105.174	Z_D08105115002
105	115	100	2.50	1x45°	DIN 1850 part 1	105.12	105.174	Z_D08105120003
105	115	120	2.50	1x45°	DIN 1850 part 1	105.12	105.174	Z_D08105125004
105	120	50	2.50	1x45°	DIN 1498 frame F	105.12	105.174	Z_D08105110005
105	120	80	2.50	1x45°	DIN 1850 part 1	105.12	105.174	Z_D08105115006
105	120	100	2.50	1x45°	DIN 1850 part 1	105.12	105.174	Z_D08105120007
105	120	120	2.50	1x45°	DIN 1850 part 1	105.12	105.174	Z_D08105125008
105	120	140	2.50	1x45°	DIN 1498 frame F	105.12	105.174	Z_D08105115009
105	125	80	3.00	1x45°	DIN 1850 part 1	105.12	105.174	Z_D08105120010
105	125	100	3.00	1x45°	DIN 1850 part 1	105.12	105.174	Z_D08105125011
105	125	120	3.00	1x45°	DIN 1850 part 1	105.12	105.174	Z_D08105120012
110	115	60	2.50	1x45°	DIN 1494 part 1	110.12	110.174	Z_D08110125013
110	115	100	2.50	1x45°	DIN 1494 part 1	110.12	110.174	Z_D08110115001
110	120	80	2.50	1x45°	DIN 1850 part 1	110.12	110.174	Z_D08110120002
110	120	100	2.50	1x45°	DIN 1850 part 1	110.12	110.174	Z_D08110125003
110	120	120	2.50	1x45°	DIN 1850 part 1	110.12	110.174	Z_D08110130004
110	125	50	3.00	1x45°	DIN 1498 frame F	110.12	110.174	Z_D08110115005
110	125	80	3.00	1x45°	DIN 1850 part 1	110.12	110.174	Z_D08110120006
110	125	100	3.00	1x45°	DIN 1850 part 1	110.12	110.174	Z_D08110125007
110	125	120	3.00	1x45°	DIN 1850 part 1	110.12	110.174	Z_D08110130008
110	125	140	3.00	1x45°	DIN 1498 frame F	110.12	110.174	Z_D08110120009
110	130	80	3.00	1x45°	DIN 1850 part 5	110.12	110.174	Z_D08110125010
110	130	100	3.00	1x45°	DIN 1850 part 5	110.12	110.174	Z_D08110130011
110	130	120	3.00	1x45°	DIN 1850 part 1	110.12	110.174	Z_D08110125012
115	120	60	2.50	1x45°	DIN 1494 part 1	115.12	115.174	Z_D08115130013
115	120	100	2.50	1x45°	DIN 1494 part 1	115.12	115.174	Z_D08115120001
115	130	50	3.00	1x45°	DIN 1498 frame F	115.12	115.174	Z_D08115130002
115	130	80	3.00	1x45°	DIN 1498 frame F	115.12	115.174	Z_D08115120003
115	130	100	3.00	1x45°	DIN 1498 frame F	115.12	115.174	Z_D08115130004
115	130	140	3.00	1x45°	DIN 1498 frame F	115.12	115.174	Z_D08115130005
120	125	60	3.00	1x45°	DIN 1494 part 1	120.12	120.174	Z_D08120135006
120	125	100	3.00	1x45°	DIN 1494 part 1	120.12	120.174	Z_D08120125001
120	130	100	3.00	1x45°	DIN 1850 part 1	120.12	120.174	Z_D08120135002
120	130	120	3.00	1x45°	DIN 1850 part 1	120.12	120.174	Z_D08120125003

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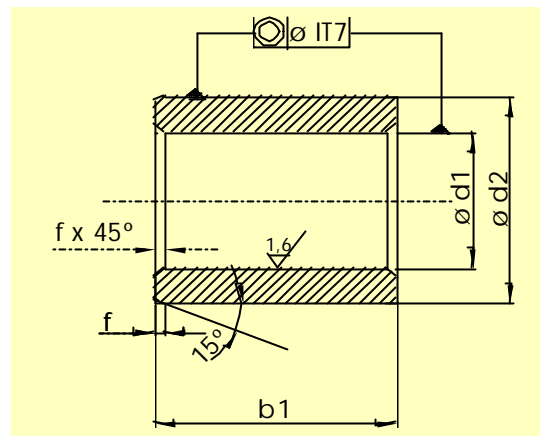
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
120	130	150	3.00	1x45°	DIN 1850 part 1	120.12	120.174	Z_D08120130004
120	135	50	3.00	1x45°	DIN 1498 frame F	120.12	120.174	Z_D08120135005
120	135	80	3.00	1x45°	DIN 1498 frame F	120.12	120.174	Z_D08120140006
120	135	100	3.00	1x45°	DIN 1850 part 1	120.12	120.174	Z_D08120130007
120	135	120	3.00	1x45°	DIN 1850 part 1	120.12	120.174	Z_D08120135008
120	135	140	3.00	1x45°	DIN 1498 frame F	120.12	120.174	Z_D08120140009
120	135	150	3.00	1x45°	DIN 1850 part 1	120.12	120.174	Z_D08120135010
120	140	100	3.00	1x45°	DIN 1850 part 5	120.12	120.174	Z_D08120130011
120	140	120	3.00	1x45°	DIN 1850 part 5	120.12	120.174	Z_D08120135012
120	140	150	3.00	1x45°	DIN 1850 part 1	120.12	120.174	Z_D08120140013
125	130	60	3.00	1x45°	DIN 1494 part 1	125.145	125.208	Z_D08125140014
125	130	100	3.00	1x45°	DIN 1494 part 1	125.145	125.208	Z_D08125130001
125	140	50	3.00	1x45°	DIN 1498 frame F	125.145	125.208	Z_D08125140002
125	140	80	3.00	1x45°	DIN 1498 frame F	125.145	125.208	Z_D08125130003
125	140	100	3.00	1x45°	DIN 1498 frame F	125.145	125.208	Z_D08125140004
125	140	140	3.00	1x45°	DIN 1498 frame F	125.145	125.208	Z_D08125140005
130	135	60	3.00	2x45°	DIN 1494 part 1	130.145	130.208	Z_D08130145006
130	135	100	3.00	2x45°	DIN 1494 part 1	130.145	130.208	Z_D08130135001
130	140	100	3.00	2x45°	DIN 1850 part 1	130.145	130.208	Z_D08130145002
130	140	120	3.00	2x45°	DIN 1850 part 1	130.145	130.208	Z_D08130135003
130	140	150	3.00	2x45°	DIN 1850 part 1	130.145	130.208	Z_D08130140004
130	145	50	3.00	2x45°	DIN 1498 frame F	130.145	130.208	Z_D08130145005
130	145	80	3.00	2x45°	DIN 1498 frame F	130.145	130.208	Z_D08130150006
130	145	100	3.00	2x45°	DIN 1850 part 1	130.145	130.208	Z_D08130140007
130	145	120	3.00	2x45°	DIN 1850 part 1	130.145	130.208	Z_D08130145008
130	145	140	3.00	2x45°	DIN 1498 frame F	130.145	130.208	Z_D08130150009
130	145	150	3.00	2x45°	DIN 1850 part 1	130.145	130.208	Z_D08130145010
130	150	100	3.00	2x45°	DIN 1850 part 5	130.145	130.208	Z_D08130140011
130	150	120	3.00	2x45°	DIN 1850 part 5	130.145	130.208	Z_D08130145012
130	150	150	3.00	2x45°	DIN 1850 part 1	130.145	130.208	Z_D08130150013
135	140	60	3.00	2x45°	DIN 1494 part 1	135.145	135.208	Z_D08135140001
135	140	100	3.00	2x45°	DIN 1494 part 1	135.145	135.208	Z_D08135150002
135	150	60	3.00	2x45°	DIN 1498 frame F	135.145	135.208	Z_D08135150003
135	150	80	3.00	2x45°	DIN 1498 frame F	135.145	135.208	Z_D08135140004
135	150	110	3.00	2x45°	DIN 1498 frame F	135.145	135.208	Z_D08135150005
135	150	160	3.00	2x45°	DIN 1498 frame F	135.145	135.208	Z_D08135150006
140	145	60	3.00	2x45°	DIN 1494 part 1	140.145	140.208	Z_D08140145001

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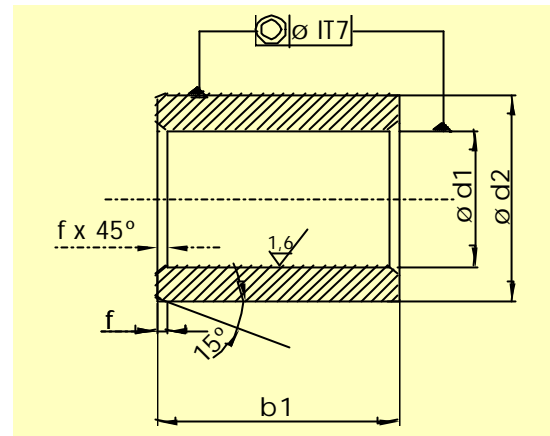
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
140	145	100	3.00	2x45°	DIN 1494 part 1	140.145	140.208	Z_D08140155002
140	150	100	3.00	2x45°	DIN 1850 part 1	140.145	140.208	Z_D08140155003
140	150	150	3.00	2x45°	DIN 1850 part 1	140.145	140.208	Z_D08140145004
140	150	180	3.00	2x45°	DIN 1850 part 1	140.145	140.208	Z_D08140150005
140	155	60	3.00	2x45°	DIN 1498 frame F	140.145	140.208	Z_D08140155006
140	155	80	3.00	2x45°	DIN 1498 frame F	140.145	140.208	Z_D08140160007
140	155	100	3.00	2x45°	DIN 1850 part 1	140.145	140.208	Z_D08140155008
140	155	110	3.00	2x45°	DIN 1498 frame F	140.145	140.208	Z_D08140150009
140	155	150	3.00	2x45°	DIN 1850 part 1	140.145	140.208	Z_D08140155010
140	155	160	3.00	2x45°	DIN 1498 frame F	140.145	140.208	Z_D08140160011
140	155	180	3.00	2x45°	DIN 1850 part 1	140.145	140.208	Z_D08140155012
140	160	100	3.00	2x45°	DIN 1850 part 5	140.145	140.208	Z_D08140150013
140	160	150	3.00	2x45°	DIN 1850 part 5	140.145	140.208	Z_D08140155014
140	160	180	3.00	2x45°	DIN 1850 part 1	140.145	140.208	Z_D08140160015
145	160	60	3.00	2x45°	DIN 1498 frame F	145.145	145.208	Z_D08145160001
145	160	80	3.00	2x45°	DIN 1498 frame F	145.145	145.208	Z_D08145160002
145	160	110	3.00	2x45°	DIN 1498 frame F	145.145	145.208	Z_D08145160003
145	160	160	3.00	2x45°	DIN 1498 frame F	145.145	145.208	Z_D08145160004
150	155	60	3.00	2x45°	DIN 1494 part 1	150.145	150.208	Z_D08150155001
150	155	100	3.00	2x45°	DIN 1494 part 1	150.145	150.208	Z_D08150165002
150	160	120	3.00	2x45°	DIN 1850 part 1	150.145	150.208	Z_D08150155003
150	160	150	3.00	2x45°	DIN 1850 part 1	150.145	150.208	Z_D08150165004
150	160	180	3.00	2x45°	DIN 1850 part 1	150.145	150.208	Z_D08150160005
150	165	70	3.00	2x45°	DIN 1498 frame F	150.145	150.208	Z_D08150165006
150	165	100	3.00	2x45°	DIN 1498 frame F	150.145	150.208	Z_D08150170007
150	165	120	3.00	2x45°	DIN 1850 part 1	150.145	150.208	Z_D08150160008
150	165	150	3.00	2x45°	DIN 1850 part 1	150.145	150.208	Z_D08150165009
150	165	160	3.00	2x45°	DIN 1498 frame F	150.145	150.208	Z_D08150170010
150	165	180	3.00	2x45°	DIN 1850 part 1	150.145	150.208	Z_D08150165011
150	165	200	3.00	2x45°	DIN 1498 frame F	150.145	150.208	Z_D08150160012
150	170	120	3.50	2x45°	DIN 1850 part 5	150.145	150.208	Z_D08150165013
150	170	150	3.50	2x45°	DIN 1850 part 5	150.145	150.208	Z_D08150170014
150	170	180	3.50	2x45°	DIN 1850 part 1	150.145	150.208	Z_D08150165015
155	175	70	3.50	2x45°	DIN 1498 frame F	155.145	155.208	Z_D08155175001
155	175	100	3.50	2x45°	DIN 1498 frame F	155.145	155.208	Z_D08155175002
155	175	160	3.50	2x45°	DIN 1498 frame F	155.145	155.208	Z_D08155175003
155	175	200	3.50	2x45°	DIN 1498 frame F	155.145	155.208	Z_D08155175004

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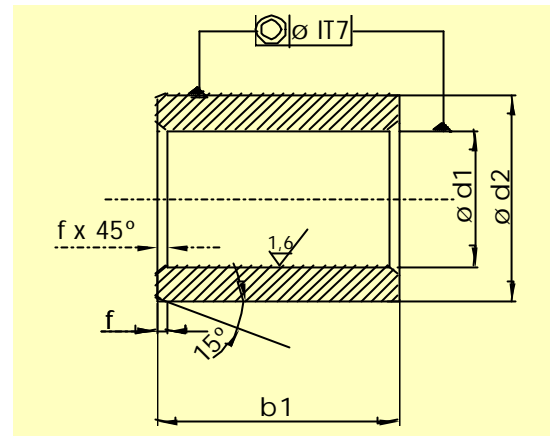
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material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
160	165	60	3.00	2x45°	DIN 1494 part 1	160.145	160.208	Z_D08160165001
160	165	100	3.00	2x45°	DIN 1494 part 1	160.145	160.208	Z_D08160180002
160	170	120	3.50	2x45°	DIN 1850 part 1	160.145	160.208	Z_D08160165003
160	170	160	3.50	2x45°	DIN 1850 part 1	160.145	160.208	Z_D08160180004
160	170	180	3.50	2x45°	DIN 1850 part 1	160.145	160.208	Z_D08160170005
160	180	70	3.50	2x45°	DIN 1498 frame F	160.145	160.208	Z_D08160180006
160	180	100	3.50	2x45°	DIN 1498 frame F	160.145	160.208	Z_D08160185007
160	180	120	3.50	2x45°	DIN 1850 part 1	160.145	160.208	Z_D08160185008
160	180	160	3.50	2x45°	DIN 1850 part 1	160.145	160.208	Z_D08160170009
160	180	180	3.50	2x45°	DIN 1850 part 1	160.145	160.208	Z_D08160180010
160	180	200	3.50	2x45°	DIN 1498 frame F	160.145	160.208	Z_D08160170011
160	185	120	3.50	2x45°	DIN 1850 part 5	160.145	160.208	Z_D08160180012
160	185	150	3.50	2x45°	DIN 1850 part 5	160.145	160.208	Z_D08160185013
160	185	180	3.50	2x45°	DIN 1850 part 1	160.145	160.208	Z_D08160180014
165	185	70	3.50	2x45°	DIN 1498 frame F	165.145	165.208	Z_D08165185001
165	185	100	3.50	2x45°	DIN 1498 frame F	165.145	165.208	Z_D08165185002
165	185	160	3.50	2x45°	DIN 1498 frame F	165.145	165.208	Z_D08165185003
165	185	200	3.50	2x45°	DIN 1498 frame F	165.145	165.208	Z_D08165185004
170	175	100	3.50	2x45°	DIN 1494 part 1	170.145	170.208	Z_D08170190005
170	180	120	3.50	2x45°	DIN 1850 part 1	170.145	170.208	Z_D08170175001
170	180	180	3.50	2x45°	DIN 1850 part 1	170.145	170.208	Z_D08170190002
170	180	200	3.50	2x45°	DIN 1850 part 1	170.145	170.208	Z_D08170180003
170	190	80	3.50	2x45°	DIN 1498 frame F	170.145	170.208	Z_D08170190004
170	190	110	3.50	2x45°	DIN 1498 frame F	170.145	170.208	Z_D08170195005
170	190	120	3.50	2x45°	DIN 1850 part 1	170.145	170.208	Z_D08170190006
170	190	160	3.50	2x45°	DIN 1498 frame F	170.145	170.208	Z_D08170180007
170	190	180	3.50	2x45°	DIN 1850 part 1	170.145	170.208	Z_D08170190008
170	190	200	3.50	2x45°	DIN 1850 part 1	170.145	170.208	Z_D08170195009
170	195	120	3.50	2x45°	DIN 1850 part 5	170.145	170.208	Z_D08170180010
170	195	180	3.50	2x45°	DIN 1850 part 5	170.145	170.208	Z_D08170190011
170	195	200	3.50	2x45°	DIN 1850 part 1	170.145	170.208	Z_D08170195012
175	195	80	3.50	2x45°	DIN 1498 frame F	175.145	175.208	Z_D08175195001
175	195	110	3.50	2x45°	DIN 1498 frame F	175.145	175.208	Z_D08175195002
175	195	160	3.50	2x45°	DIN 1498 frame F	175.145	175.208	Z_D08175195003
175	195	200	3.50	2x45°	DIN 1498 frame F	175.145	175.208	Z_D08175195004
180	190	150	3.50	2x45°	DIN 1850 part 1	180.145	180.208	Z_D08180200005
180	190	180	3.50	2x45°	DIN 1850 part 1	180.145	180.208	Z_D08180200006

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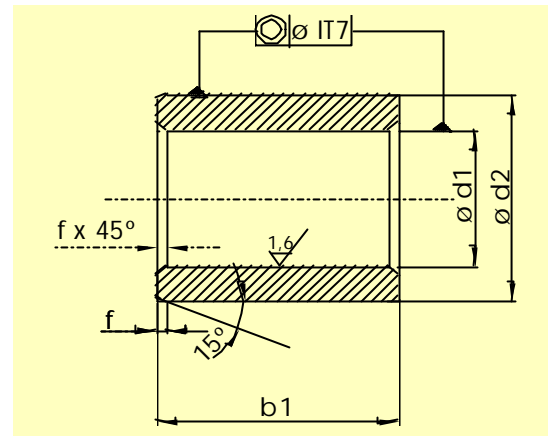
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
180	190	250	3.50	2x45°	DIN 1850 part 1	180.145	180.208	Z_D08180190007
180	200	80	3.50	2x45°	DIN 1498 frame F	180.145	180.208	Z_D08180200008
180	200	110	3.50	2x45°	DIN 1498 frame F	180.145	180.208	Z_D08180210009
180	200	150	3.50	2x45°	DIN 1850 part 1	180.145	180.208	Z_D08180200010
180	200	160	3.50	2x45°	DIN 1498 frame F	180.145	180.208	Z_D08180190011
180	200	180	3.50	2x45°	DIN 1850 part 1	180.145	180.208	Z_D08180200012
180	200	200	3.50	2x45°	DIN 1498 frame F	180.145	180.208	Z_D08180210013
180	200	250	3.50	2x45°	DIN 1850 part 1	180.145	180.208	Z_D08180200014
180	210	150	4.00	2x45°	DIN 1850 part 5	180.145	180.208	Z_D08180190015
180	210	180	4.00	2x45°	DIN 1850 part 5	180.145	180.208	Z_D08180200016
180	210	250	4.00	2x45°	DIN 1850 part 1	180.145	180.208	Z_D08180210017
190	200	150	3.50	2x45°	DIN 1850 part 1	190.17	190.242	Z_D08190200001
190	200	180	3.50	2x45°	DIN 1850 part 1	190.17	190.242	Z_D08190210002
190	200	250	3.50	2x45°	DIN 1850 part 1	190.17	190.242	Z_D08190220003
190	210	150	4.00	2x45°	DIN 1850 part 1	190.17	190.242	Z_D08190200004
190	210	180	4.00	2x45°	DIN 1850 part 1	190.17	190.242	Z_D08190210005
190	210	250	4.00	2x45°	DIN 1850 part 1	190.17	190.242	Z_D08190220006
190	220	150	4.00	2x45°	DIN 1850 part 5	190.17	190.242	Z_D08190200007
190	220	180	4.00	2x45°	DIN 1850 part 5	190.17	190.242	Z_D08190210008
190	220	250	4.00	2x45°	DIN 1850 part 5	190.17	190.242	Z_D08190220009
200	210	180	4.00	2x45°	DIN 1850 part 1	200.17	200.242	Z_D08200210001
200	210	200	4.00	2x45°	DIN 1850 part 1	200.17	200.242	Z_D08200220002
200	210	250	4.00	2x45°	DIN 1850 part 1	200.17	200.242	Z_D08200230003
200	220	180	4.00	2x45°	DIN 1850 part 1	200.17	200.242	Z_D08200210004
200	220	200	4.00	2x45°	DIN 1850 part 1	200.17	200.242	Z_D08200220005
200	220	250	4.00	2x45°	DIN 1850 part 1	200.17	200.242	Z_D08200230006
200	230	180	4.00	2x45°	DIN 1850 part 5	200.17	200.242	Z_D08200210007
200	230	200	4.00	2x45°	DIN 1850 part 5	200.17	200.242	Z_D08200220008
200	230	250	4.00	2x45°	DIN 1850 part 5	200.17	200.242	Z_D08200230009
210	240	180	4.00	2x45°	DIN 1850 part 5	210.17	210.242	Z_D08210240001
210	240	200	4.00	2x45°	DIN 1850 part 5	210.17	210.242	Z_D08210240002
210	240	250	4.00	2x45°	DIN 1850 part 5	210.17	210.242	Z_D08210240003
220	250	180	4.00	2x45°	DIN 1850 part 5	220.17	220.242	Z_D08220250001
220	250	200	4.00	2x45°	DIN 1850 part 5	220.17	220.242	Z_D08220250002
220	250	250	4.00	2x45°	DIN 1850 part 5	220.17	220.242	Z_D08220250003
230	260	200	4.00	2x45°	DIN 1850 part 5	230.17	230.242	Z_D08230260001
230	260	250	4.00	2x45°	DIN 1850 part 5	230.17	230.242	Z_D08230260002

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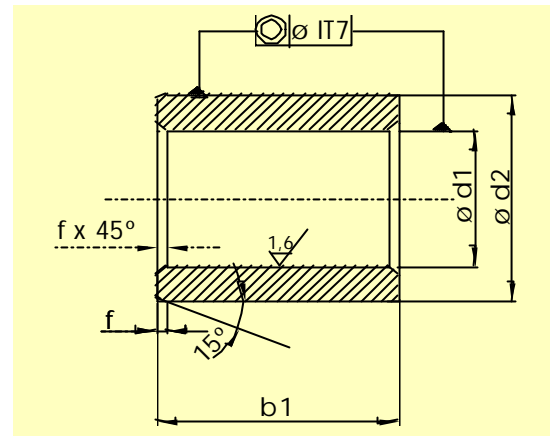
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20.Dimension list of bushings for slide bearings (cylindrical)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



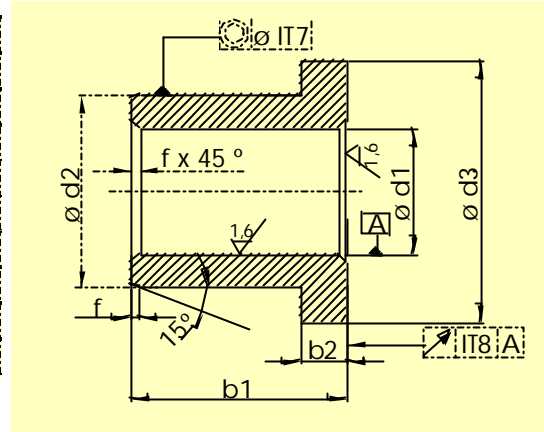
d1 mm	d2 mm	b1 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
230	260	300	4.00	2x45°	DIN 1850 part 5	230.17	230.242	Z_D08230260003
240	270	200	4.00	2x45°	DIN 1850 part 5	240.17	240.242	Z_D08240270001
240	270	250	4.00	2x45°	DIN 1850 part 5	240.17	240.242	Z_D08240270002
240	270	300	4.00	2x45°	DIN 1850 part 5	240.17	240.242	Z_D08240270003
250	280	200	4.00	2x45°	DIN 1850 part 5	250.17	250.242	Z_D08250280001
250	280	250	4.00	2x45°	DIN 1850 part 5	250.17	250.242	Z_D08250280002
250	280	300	4.00	2x45°	DIN 1850 part 5	250.17	250.242	Z_D08250280003

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21. Dimension list of bushings for slide bearings (with collar)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
1	3	5	2	1.00	0.40	0,2x45°	DIN 1850 part 3	1.02	1.034	B__D08001003001
1.5	4	6	2	1.00	0.40	0,2x45°	DIN 1850 part 3	1.52	1.534	B__D08001004002
2	5	8	3	1.50	0.40	0,2x45°	DIN 1850 part 3	2.02	2.034	B__D08002005001
2.5	6	9	3	1.50	0.40	0,2x45°	DIN 1850 part 3	2.52	2.534	B__D08002006002
3	6	9	3	1.50	0.40	0,2x45°	DIN 1850 part 5	3.02	3.034	B__D08003009003
3	6	9	4	1.50	0.80	0,2x45°	DIN 1850 part 3	3.02	3.034	B__D08003006001
3	6	9	6	1.50	0.80	0,2x45°	DIN 1850 part 3	3.02	3.034	B__D08003006002
3	9	12	3	2.00	0.40	0,2x45°	DIN 1850 part 4	3.02	3.034	B__D08003009003
3	9	12	4	2.00	0.80	0,2x45°	DIN 1850 part 4	3.02	3.034	B__D08003006004
4	8	12	3	2.00	0.80	0,2x45°	DIN 1850 part 3	4.03	4.048	B__D08004008001
4	8	12	4	2.00	0.80	0,2x45°	DIN 1850 part 3	4.03	4.048	B__D08004008002
4	8	12	4	2.00	0.80	0,2x45°	DIN 1850 part 5	4.03	4.048	B__D08004010003
4	8	12	6	2.00	0.80	0,2x45°	DIN 1850 part 3	4.03	4.048	B__D08004008004
4	8	12	6	2.00	0.80	0,2x45°	DIN 1850 part 5	4.03	4.048	B__D08004008005
4	10	13	4	2.00	0.80	0,2x45°	DIN 1850 part 4	4.03	4.048	B__D08004010006
4	10	13	6	2.00	1.00	0,2x45°	DIN 1850 part 4	4.03	4.048	B__D08004008007
5	9	13	4	2.00	0.80	0,2x45°	DIN 1850 part 5	5.03	5.048	B__D08005011008
5	9	13	5	2.00	0.80	0,2x45°	DIN 1850 part 3	5.03	5.048	B__D08005009001
5	9	13	6	2.00	0.80	0,2x45°	DIN 1850 part 5	5.03	5.048	B__D08005009002
5	9	13	8	2.00	0.80	0,2x45°	DIN 1850 part 3	5.03	5.048	B__D08005011003
5	11	14	4	3.00	0.80	0,2x45°	DIN 1850 part 4	5.03	5.048	B__D08005009004
5	11	14	6	3.00	1.00	0,2x45°	DIN 1850 part 4	5.03	5.048	B__D08005009005
6	8	10	6	1.00	0.80	0,3x45°	DIN 1850 part 1	6.03	6.048	B__D08006010006
6	8	10	10	1.00	0.80	0,3x45°	DIN 1850 part 1	6.03	6.048	B__D08006012007
6	10	14	4	2.00	0.80	0,3x45°	DIN 1850 part 3	6.03	6.048	B__D08006008001
6	10	14	6	2.00	1.00	0,3x45°	DIN 1850 part 5	6.03	6.048	B__D08006012002
6	10	14	10	2.00	1.00	0,3x45°	DIN 1850 part 3	6.03	6.048	B__D08006012003
6	12	16	4	3.00	0.80	0,3x45°	DIN 1850 part 4	6.03	6.048	B__D08006010004
6	12	14	6	3.00	1.00	0,3x45°	DIN 1850 part 1	6.03	6.048	B__D08006008005
6	12	16	6	3.00	1.00	0,3x45°	DIN 1850 part 4	6.03	6.048	B__D08006012006
6	12	14	10	3.00	1.00	0,3x45°	DIN 1850 part 1	6.03	6.048	B__D08006010007
7	11	15	5	2.00	1.00	0,3x45°	DIN 1850 part 3	7.04	7.062	B__D08007011001
7	11	15	8	2.00	1.00	0,3x45°	DIN 1850 part 3	7.04	7.062	B__D08007011002
7	11	15	10	2.00	1.00	0,3x45°	DIN 1850 part 3	7.04	7.062	B__D08007011003
8	10	12	6	1.00	1.00	0,3x45°	DIN 1850 part 1	8.04	8.062	B__D08008010001
8	10	12	10	1.00	1.00	0,3x45°	DIN 1850 part 1	8.04	8.062	B__D08008012002
8	12	16	6	2.00	1.00	0,3x45°	DIN 1850 part 3	8.04	8.062	B__D08008014003

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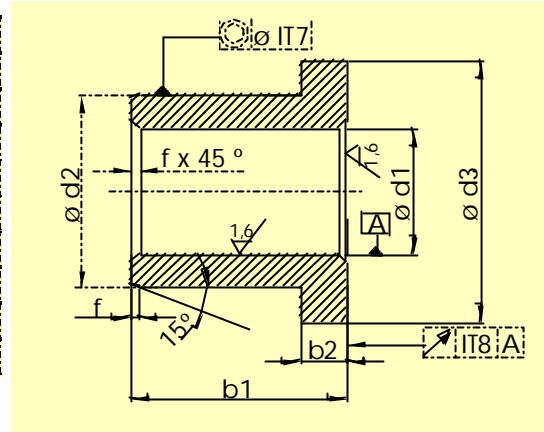
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21. Dimension list of bushings for slide bearings (with collar)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

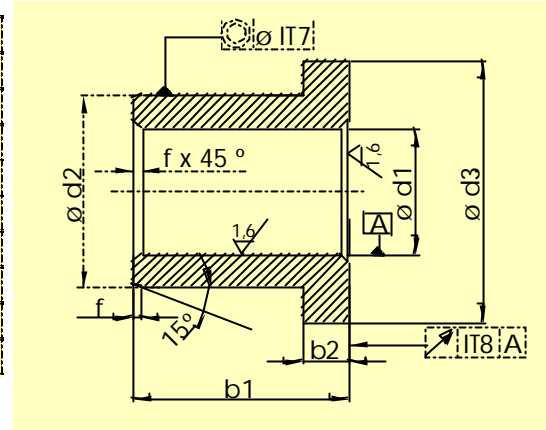


d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
8	12	16	8	2.00	1.00	0,3x45°	DIN 1850 part 3	8.04	8.062	B__D08008012004
8	12	16	10	2.00	1.00	0,3x45°	DIN 1850 part 5	8.04	8.062	B__D08008014005
8	12	16	12	2.00	1.00	0,3x45°	DIN 1850 part 3	8.04	8.062	B__D08008010006
8	14	18	6	3.00	1.00	0,3x45°	DIN 1850 part 4	8.04	8.062	B__D08008014007
8	14	18	8	3.00	1.00	0,3x45°	DIN 1850 part 4	8.04	8.062	B__D08008012008
8	14	18	10	3.00	1.00	0,3x45°	DIN 1850 part 1	8.04	8.062	B__D08008012009
9	14	19	6	2.50	1.00	0,3x45°	DIN 1850 part 3	9.04	9.062	B__D08009014001
9	14	19	10	2.50	1.00	0,3x45°	DIN 1850 part 3	9.04	9.062	B__D08009014002
9	14	19	14	2.50	1.00	0,3x45°	DIN 1850 part 3	9.04	9.062	B__D08009014003
10	12	14	6	1.00	1.00	0,3x45°	DIN 1850 part 1	10.04	10.062	B__D08010012001
10	12	14	10	1.00	1.00	0,3x45°	DIN 1850 part 1	10.04	10.062	B__D08010016002
10	16	20	6	3.00	1.00	0,3x45°	DIN 1850 part 4	10.04	10.062	B__D08010016003
10	16	22	8	3.00	1.00	0,3x45°	DIN 1850 part 3	10.04	10.062	B__D08010012004
10	16	20	10	3.00	1.00	0,3x45°	DIN 1850 part 1	10.04	10.062	B__D08010016005
10	16	22	10	3.00	1.00	0,3x45°	DIN 1850 part 3	10.04	10.062	B__D08010016006
10	16	22	16	3.00	1.00	0,3x45°	DIN 1850 part 3	10.04	10.062	B__D08010016007
12	14	16	10	1.00	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	B__D08012018008
12	14	16	15	1.00	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	B__D08012018009
12	14	16	20	1.00	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	B__D08012014001
12	18	24	8	3.00	1.00	0,5x45°	DIN 1850 part 3	12.05	12.077	B__D08012018002
12	18	22	8	4.00	1.00	0,5x45°	DIN 1850 part 4	12.05	12.077	B__D08012014003
12	18	22	12	4.00	1.00	0,5x45°	DIN 1850 part 4	12.05	12.077	B__D08012018004
12	18	22	15	3.00	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	B__D08012014005
12	18	22	20	3.00	1.00	0,5x45°	DIN 1850 part 1	12.05	12.077	B__D08012018006
12	18	24	20	3.00	1.00	0,5x45°	DIN 1850 part 3	12.05	12.077	B__D08012018007
14	16	18	10	1.00	1.00	0,5x45°	DIN 1850 part 1	14.05	14.077	B__D08014016001
14	16	18	15	1.00	1.00	0,5x45°	DIN 1850 part 1	14.05	14.077	B__D08014020002
14	16	18	20	1.00	1.00	0,5x45°	DIN 1850 part 1	14.05	14.077	B__D08014020003
14	20	25	10	3.00	1.00	0,5x45°	DIN 1850 part 1	14.05	14.077	B__D08014020004
14	20	26	10	3.00	1.00	0,5x45°	DIN 1850 part 3	14.05	14.077	B__D08014020005
14	20	25	10	4.00	1.00	0,5x45°	DIN 1850 part 4	14.05	14.077	B__D08014020006
14	20	26	14	3.00	1.00	0,5x45°	DIN 1850 part 3	14.05	14.077	B__D08014016007
14	20	25	14	4.00	1.00	0,5x45°	DIN 1850 part 4	14.05	14.077	B__D08014016008
14	20	25	20	3.00	1.00	0,5x45°	DIN 1850 part 1	14.05	14.077	B__D08014020009
14	20	26	20	3.00	1.00	0,5x45°	DIN 1850 part 3	14.05	14.077	B__D08014020010
15	17	19	10	1.00	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	B__D08015017001
15	17	19	15	1.00	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	B__D08015021002



21. Dimension list of bushings for slide bearings (with collar)

materiao indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
15	17	19	20	1.00	1.00	0,5x45°	DIN 1850 part 1	15.05	15.077	B__D08015021003
15	21	27	10	3.00	1.00	0,5x45°	DIN 1850 part 3	15.05	15.077	B__D08015017004
15	21	26	10	5.00	1.00	0,5x45°	DIN 1850 part 4	15.05	15.077	B__D08015021005
15	21	27	15	3.00	1.00	0,5x45°	DIN 1850 part 3	15.05	15.077	B__D08015021006
15	21	26	16	5.00	1.00	0,5x45°	DIN 1850 part 4	15.05	15.077	B__D08015017007
15	21	27	20	3.00	1.00	0,5x45°	DIN 1850 part 5	15.05	15.077	B__D08015021008
15	21	27	25	3.00	1.00	0,5x45°	DIN 1850 part 3	15.05	15.077	B__D08015021009
16	18	20	12	1.00	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	B__D08016022010
16	18	20	15	1.00	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	B__D08016018001
16	18	20	20	1.00	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	B__D08016022002
16	22	28	10	5.00	1.00	0,5x45°	DIN 1850 part 4	16.05	16.077	B__D08016018003
16	22	28	12	3.00	1.00	0,5x45°	DIN 1850 part 3	16.05	16.077	B__D08016022004
16	22	28	16	3.00	1.00	0,5x45°	DIN 1850 part 3	16.05	16.077	B__D08016022005
16	22	28	16	5.00	1.00	0,5x45°	DIN 1850 part 4	16.05	16.077	B__D08016018006
16	22	28	20	3.00	1.00	0,5x45°	DIN 1850 part 1	16.05	16.077	B__D08016022007
16	22	28	25	3.00	1.00	0,5x45°	DIN 1850 part 3	16.05	16.077	B__D08016022008
18	20	22	12	1.00	1.00	0,5x45°	DIN 1850 part 1	18.05	18.077	B__D08018020001
18	20	22	20	1.00	1.00	0,5x45°	DIN 1850 part 1	18.05	18.077	B__D08018024002
18	20	22	30	1.00	1.00	0,5x45°	DIN 1850 part 1	18.05	18.077	B__D08018024003
18	24	30	12	3.00	1.00	0,5x45°	DIN 1850 part 3	18.05	18.077	B__D08018024004
18	24	30	12	5.00	1.00	0,5x45°	DIN 1850 part 4	18.05	18.077	B__D08018024005
18	24	30	18	3.00	1.00	0,5x45°	DIN 1850 part 3	18.05	18.077	B__D08018020006
18	24	30	18	5.00	1.00	0,5x45°	DIN 1850 part 4	18.05	18.077	B__D08018024007
18	24	30	20	3.00	1.00	0,5x45°	DIN 1850 part 5	18.05	18.077	B__D08018020008
18	24	30	30	3.00	1.00	0,5x45°	DIN 1850 part 3	18.05	18.077	B__D08018024009
20	23	26	15	1.50	1.00	0,5x45°	DIN 1850 part 1	20.065	20.098	B__D08020026010
20	23	26	20	1.50	1.00	0,5x45°	DIN 1850 part 1	20.065	20.098	B__D08020023011
20	23	26	30	1.50	1.00	0,5x45°	DIN 1850 part 1	20.065	20.098	B__D08020026012
20	26	32	12	5.00	1.00	0,5x45°	DIN 1850 part 4	20.065	20.098	B__D08020026013
20	26	32	15	3.00	1.00	0,5x45°	DIN 1850 part 3	20.065	20.098	B__D08020023014
20	26	32	16	5.00	1.00	0,5x45°	DIN 1850 part 4	20.065	20.098	B__D08020026015
20	26	32	20	3.00	1.00	0,5x45°	DIN 1850 part 3	20.065	20.098	B__D08020026016
20	26	32	20	5.00	1.00	0,5x45°	DIN 1850 part 4	20.065	20.098	B__D08020023017
20	26	32	30	3.00	1.00	0,5x45°	DIN 1850 part 3	20.065	20.098	B__D08020026018
22	25	26	15	1.50	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	B__D08022028019
22	25	26	20	1.50	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	B__D08022025001
22	25	26	30	1.50	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	B__D08022028002

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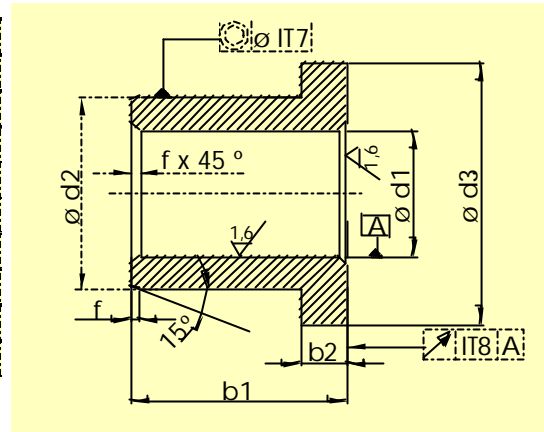
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21. Dimension list of bushings for slide bearings (with collar)

materiao indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

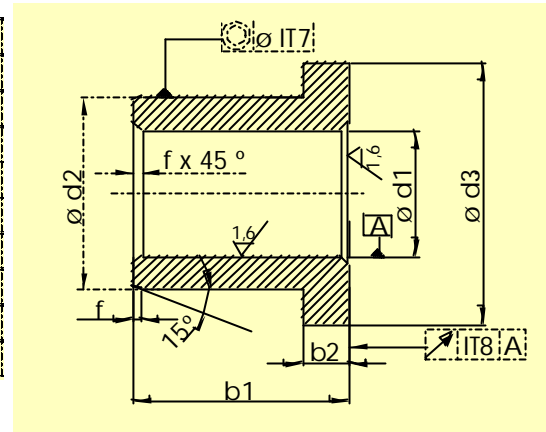


d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
22	28	34	12	5.00	1.00	0,5x45°	DIN 1850 part 4	22.065	22.098	B__D08022028003
22	28	34	15	3.00	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	B__D08022028004
22	28	34	15	3.00	1.00	0,5x45°	DIN 1850 part 3	22.065	22.098	B__D08022025005
22	28	34	16	5.00	1.00	0,5x45°	DIN 1850 part 4	22.065	22.098	B__D08022028006
22	28	34	20	3.00	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	B__D08022028007
22	28	34	20	3.00	1.00	0,5x45°	DIN 1850 part 3	22.065	22.098	B__D08022025008
22	28	34	30	3.00	1.00	0,5x45°	DIN 1850 part 1	22.065	22.098	B__D08022028009
22	28	34	30	3.00	1.00	0,5x45°	DIN 1850 part 3	22.065	22.098	B__D08022028010
24	27	30	15	1.50	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	B__D08024030011
24	27	30	20	1.50	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	B__D08024027001
24	27	30	30	1.50	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	B__D08024030002
24	30	36	14	5.00	1.00	0,5x45°	DIN 1850 part 4	24.065	24.098	B__D08024027003
24	30	36	15	3.00	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	B__D08024030004
24	30	36	20	3.00	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	B__D08024030005
24	30	36	20	5.00	1.00	0,5x45°	DIN 1850 part 4	24.065	24.098	B__D08024030006
24	30	36	25	5.00	1.00	0,5x45°	DIN 1850 part 4	24.065	24.098	B__D08024027007
24	30	36	30	3.00	1.00	0,5x45°	DIN 1850 part 1	24.065	24.098	B__D08024030008
25	28	31	20	1.50	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	B__D08025032009
25	28	31	30	1.50	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	B__D08025028001
25	28	31	40	1.50	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	B__D08025032002
25	32	38	14	6.00	1.00	0,5x45°	DIN 1850 part 4	25.065	25.098	B__D08025032003
25	32	38	20	4.00	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	B__D08025032004
25	32	39	20	3.50	1.00	0,5x45°	DIN 1850 part 3	25.065	25.098	B__D08025032005
25	32	38	20	6.00	1.00	0,5x45°	DIN 1850 part 4	25.065	25.098	B__D08025032006
25	32	39	25	3.50	1.00	0,5x45°	DIN 1850 part 3	25.065	25.098	B__D08025028007
25	32	38	25	6.00	1.00	0,5x45°	DIN 1850 part 4	25.065	25.098	B__D08025032008
25	32	38	30	4.00	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	B__D08025032009
25	32	39	30	3.50	1.00	0,5x45°	DIN 1850 part 3	25.065	25.098	B__D08025028010
25	32	38	40	4.00	1.00	0,5x45°	DIN 1850 part 1	25.065	25.098	B__D08025032011
27	30	33	20	1.50	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	B__D08027034012
27	30	33	30	1.50	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	B__D08027034013
27	30	33	40	1.50	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	B__D08027030001
27	34	40	12	6.00	1.00	0,5x45°	DIN 1850 part 4	27.065	27.098	B__D08027034002
27	34	40	16	6.00	1.00	0,5x45°	DIN 1850 part 4	27.065	27.098	B__D08027034003
27	34	40	20	4.00	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	B__D08027034004
27	34	40	22	6.00	1.00	0,5x45°	DIN 1850 part 4	27.065	27.098	B__D08027030005
27	34	40	28	6.00	1.00	0,5x45°	DIN 1850 part 4	27.065	27.098	B__D08027034006



21. Dimension list of bushings for slide bearings (with collar)

materiao indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

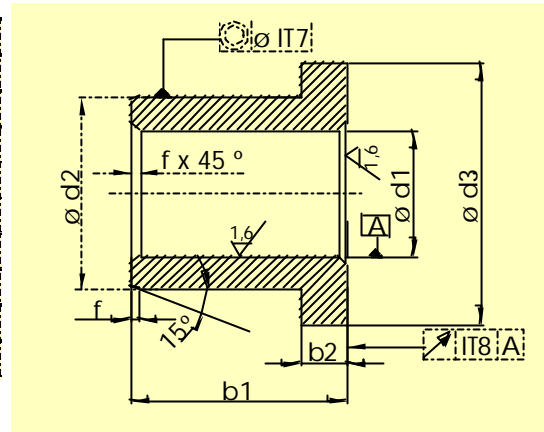


d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
27	34	40	30	4.00	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	B__D08027030007
27	34	40	40	4.00	1.00	0,5x45°	DIN 1850 part 1	27.065	27.098	B__D08027034008
28	32	36	20	2.00	1.00	0,5x45°	DIN 1850 part 1	28.065	28.098	B__D08028036009
28	32	36	30	2.00	1.00	0,5x45°	DIN 1850 part 1	28.065	28.098	B__D08028036010
28	32	36	40	2.00	1.00	0,5x45°	DIN 1850 part 1	28.065	28.098	B__D08028032001
28	36	42	12	6.00	1.00	0,5x45°	DIN 1850 part 4	28.065	28.098	B__D08028036002
28	36	42	16	6.00	1.00	0,5x45°	DIN 1850 part 4	28.065	28.098	B__D08028036003
28	36	44	20	4.00	1.00	0,5x45°	DIN 1850 part 3	28.065	28.098	B__D08028036004
28	36	42	20	4.00	1.00	0,5x45°	DIN 1850 part 5	28.065	28.098	B__D08028036005
28	36	42	22	6.00	1.00	0,5x45°	DIN 1850 part 4	28.065	28.098	B__D08028036006
28	36	44	25	4.00	1.00	0,5x45°	DIN 1850 part 3	28.065	28.098	B__D08028032007
28	36	42	28	6.00	1.00	0,5x45°	DIN 1850 part 4	28.065	28.098	B__D08028036008
28	36	44	30	4.00	1.00	0,5x45°	DIN 1850 part 3	28.065	28.098	B__D08028036009
28	36	42	30	4.00	1.00	0,5x45°	DIN 1850 part 5	28.065	28.098	B__D08028032010
28	36	42	40	4.00	1.00	0,5x45°	DIN 1850 part 5	28.065	28.098	B__D08028036011
30	34	38	20	2.00	1.00	0,5x45°	DIN 1850 part 1	30.065	30.098	B__D08030038012
30	34	38	30	2.00	1.00	0,5x45°	DIN 1850 part 1	30.065	30.098	B__D08030038013
30	34	38	40	2.00	1.00	0,5x45°	DIN 1850 part 1	30.065	30.098	B__D08030034001
30	38	44	12	6.00	1.50	0,5x45°	DIN 1850 part 4	30.065	30.098	B__D08030038002
30	38	44	18	6.00	1.50	0,5x45°	DIN 1850 part 4	30.065	30.098	B__D08030038003
30	38	46	20	4.00	1.50	0,5x45°	DIN 1850 part 3	30.065	30.098	B__D08030038004
30	38	44	20	4.00	1.50	0,5x45°	DIN 1850 part 5	30.065	30.098	B__D08030038005
30	38	46	25	4.00	1.50	0,5x45°	DIN 1850 part 3	30.065	30.098	B__D08030034006
30	38	44	25	6.00	1.50	0,5x45°	DIN 1850 part 4	30.065	30.098	B__D08030038007
30	38	46	30	4.00	1.50	0,5x45°	DIN 1850 part 3	30.065	30.098	B__D08030038008
30	38	44	30	4.00	1.50	0,5x45°	DIN 1850 part 5	30.065	30.098	B__D08030038009
30	38	44	32	6.00	1.50	0,5x45°	DIN 1850 part 4	30.065	30.098	B__D08030034010
30	38	44	40	4.00	1.50	0,5x45°	DIN 1850 part 5	30.065	30.098	B__D08030038011
32	36	40	20	2.00	1.00	0,8x45°	DIN 1850 part 1	32.08	32.119	B__D08032040012
32	36	40	30	2.00	1.00	0,8x45°	DIN 1850 part 1	32.08	32.119	B__D08032040013
32	36	40	40	2.00	1.00	0,8x45°	DIN 1850 part 1	32.08	32.119	B__D08032036001
32	40	46	14	6.00	1.50	0,8x45°	DIN 1850 part 4	32.08	32.119	B__D08032040002
32	40	46	18	6.00	1.50	0,8x45°	DIN 1850 part 4	32.08	32.119	B__D08032040003
32	40	46	20	4.00	1.50	0,8x45°	DIN 1850 part 1	32.08	32.119	B__D08032040004
32	40	48	20	4.00	1.50	0,8x45°	DIN 1850 part 3	32.08	32.119	B__D08032040005
32	40	48	25	4.00	1.50	0,8x45°	DIN 1850 part 3	32.08	32.119	B__D08032040014
32	40	46	25	6.00	1.50	0,8x45°	DIN 1850 part 4	32.08	32.119	B__D08032036015



21. Dimension list of bushings for slide bearings (with collar)

materiao indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

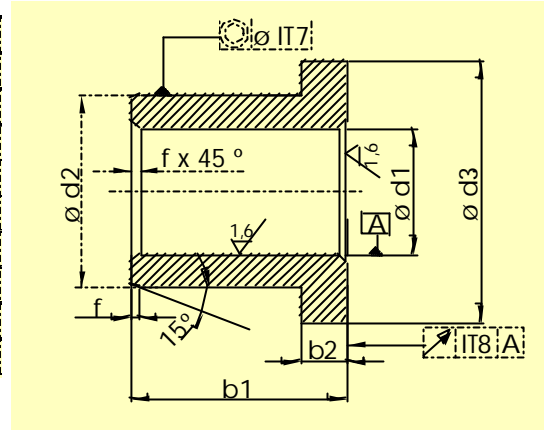


d1	d2	d3	b1	b2	f	f	dimensions	d1 _{min}	d1 _{max}	article number
mm	mm	mm	mm	mm	x 15°	x 45°	according to	mm	mm	
32	40	50	29	4.00	2.00	0,8x45°	-	32.08	32.119	B__D08032040016
32	40	46	30	4.00	1.50	0,8x45°	DIN 1850 part 1	32.08	32.119	B__D08032040017
32	40	48	30	4.00	1.50	0,8x45°	DIN 1850 part 3	32.08	32.119	B__D08032040018
32	40	46	32	6.00	1.50	0,8x45°	DIN 1850 part 4	32.08	32.119	B__D08032036019
32	40	46	40	4.00	1.50	0,8x45°	DIN 1850 part 1	32.08	32.119	B__D08032040020
33	37	41	20	2.00	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	B__D08033042021
33	37	41	30	2.00	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	B__D08033037001
33	37	41	40	2.00	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	B__D08033042002
33	42	48	16	6.00	1.50	0,8x45°	DIN 1850 part 4	33.08	33.119	B__D08033042003
33	42	48	20	5.00	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	B__D08033042004
33	42	48	20	6.00	1.50	0,8x45°	DIN 1850 part 4	33.08	33.119	B__D08033037005
33	42	48	25	6.00	1.50	0,8x45°	DIN 1850 part 4	33.08	33.119	B__D08033042006
33	42	48	30	5.00	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	B__D08033042007
33	42	48	32	6.00	1.50	0,8x45°	DIN 1850 part 4	33.08	33.119	B__D08033037008
33	42	48	40	5.00	1.50	0,8x45°	DIN 1850 part 1	33.08	33.119	B__D08033042009
35	39	43	30	2.00	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	B__D08035044010
35	39	43	40	2.00	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	B__D08035044011
35	39	43	50	2.00	1.50	0,8x45°	DIN 1850 part 1	35.08	35.119	B__D08035045012
35	44	50	16	6.00	1.50	0,8x45°	DIN 1850 part 4	35.08	35.119	B__D08035044013
35	44	50	22	6.00	1.50	0,8x45°	DIN 1850 part 4	35.08	35.119	B__D08035039001
35	44	50	28	6.00	1.50	0,8x45°	DIN 1850 part 4	35.08	35.119	B__D08035045002
35	44	50	36	6.00	1.50	0,8x45°	DIN 1850 part 4	35.08	35.119	B__D08035045003
35	45	55	25	5.00	1.50	0,8x45°	DIN 1850 part 3	35.08	35.119	B__D08035044004
35	45	50	30	5.00	1.50	0,8x45°	DIN 1850 part 5	35.08	35.119	B__D08035039005
35	45	55	35	5.00	1.50	0,8x45°	DIN 1850 part 3	35.08	35.119	B__D08035045006
35	45	55	40	5.00	1.50	0,8x45°	DIN 1850 part 3	35.08	35.119	B__D08035045007
35	45	50	40	5.00	1.50	0,8x45°	DIN 1850 part 5	35.08	35.119	B__D08035039008
35	45	50	50	5.00	1.50	0,8x45°	DIN 1850 part 5	35.08	35.119	B__D08035045009
36	40	44	30	2.00	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	B__D08036045010
36	40	44	40	2.00	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	B__D08036045011
36	40	44	50	2.00	1.50	0,8x45°	DIN 1850 part 1	36.08	36.119	B__D08036045012
36	45	52	16	6.00	1.50	0,8x45°	DIN 1850 part 4	36.08	36.119	B__D08036040001
36	45	52	22	6.00	1.50	0,8x45°	DIN 1850 part 4	36.08	36.119	B__D08036046002
36	45	52	28	6.00	1.50	0,8x45°	DIN 1850 part 4	36.08	36.119	B__D08036045003
36	45	52	32	6.00	1.50	0,8x45°	DIN 1850 part 4	36.08	36.119	B__D08036040004
36	46	52	30	5.00	1.50	0,8x45°	DIN 1850 part 5	36.08	36.119	B__D08036046005
36	46	52	40	5.00	1.50	0,8x45°	DIN 1850 part 5	36.08	36.119	B__D08036040006



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materiao indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1	d2	d3	b1	b2	f	f	dimensions	d1 _{min}	d1 _{max}	article number
mm	mm	mm	mm	mm	x 15°	x 45°	according to	mm	mm	
36	46	52	50	5.00	1.50	0,8x45°	DIN 1850 part 5	36.08	36.119	B__D08036046007
38	42	46	30	2.00	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	B__D08038048008
38	42	46	40	2.00	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	B__D08038048009
38	42	46	50	2.00	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	B__D08038048010
38	48	55	16	6.00	1.50	0,8x45°	DIN 1850 part 4	38.08	38.119	B__D08038042001
38	48	58	25	5.00	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	B__D08038048002
38	48	55	25	6.00	1.50	0,8x45°	DIN 1850 part 4	38.08	38.119	B__D08038048003
38	48	54	30	5.00	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	B__D08038048004
38	48	55	32	6.00	1.50	0,8x45°	DIN 1850 part 4	38.08	38.119	B__D08038042005
38	48	58	35	5.00	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	B__D08038048006
38	48	54	40	5.00	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	B__D08038048007
38	48	55	40	6.00	1.50	0,8x45°	DIN 1850 part 4	38.08	38.119	B__D08038048008
38	48	58	45	5.00	1.50	0,8x45°	DIN 1850 part 3	38.08	38.119	B__D08038042009
38	48	54	50	5.00	1.50	0,8x45°	DIN 1850 part 5	38.08	38.119	B__D08038048010
38	48	54	60	5.00	1.50	0,8x45°	DIN 1850 part 1	38.08	38.119	B__D08038048011
40	44	48	30	2.00	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	B__D08040050012
40	44	48	40	2.00	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	B__D08040050013
40	44	48	60	2.00	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	B__D08040044001
40	50	58	16	6.00	1.50	0,8x45°	DIN 1850 part 4	40.08	40.119	B__D08040050002
40	50	58	25	6.00	1.50	0,8x45°	DIN 1850 part 4	40.08	40.119	B__D08040050003
40	50	58	30	5.00	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	B__D08040050004
40	50	60	30	5.00	1.50	0,8x45°	DIN 1850 part 3	40.08	40.119	B__D08040044005
40	50	58	32	6.00	1.50	0,8x45°	DIN 1850 part 4	40.08	40.119	B__D08040050006
40	50	58	40	5.00	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	B__D08040050007
40	50	60	40	5.00	1.50	0,8x45°	DIN 1850 part 3	40.08	40.119	B__D08040050008
40	50	58	40	6.00	1.50	0,8x45°	DIN 1850 part 4	40.08	40.119	B__D08040050009
40	50	60	50	5.00	1.50	0,8x45°	DIN 1850 part 3	40.08	40.119	B__D08040050010
40	50	58	50	5.00	1.50	0,8x45°	DIN 1850 part 5	40.08	40.119	B__D08040044011
40	50	58	60	5.00	1.50	0,8x45°	DIN 1850 part 1	40.08	40.119	B__D08040050012
42	46	50	30	2.00	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	B__D08042052013
42	46	50	40	2.00	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	B__D08042052014
42	46	50	60	2.00	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	B__D08042046001
42	52	60	18	7.00	1.50	0,8x45°	DIN 1850 part 4	42.08	42.119	B__D08042052002
42	52	60	25	7.00	1.50	0,8x45°	DIN 1850 part 4	42.08	42.119	B__D08042052003
42	52	60	30	5.00	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	B__D08042046004
42	52	60	36	7.00	1.50	0,8x45°	DIN 1850 part 4	42.08	42.119	B__D08042052005
42	52	60	40	5.00	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	B__D08042052006

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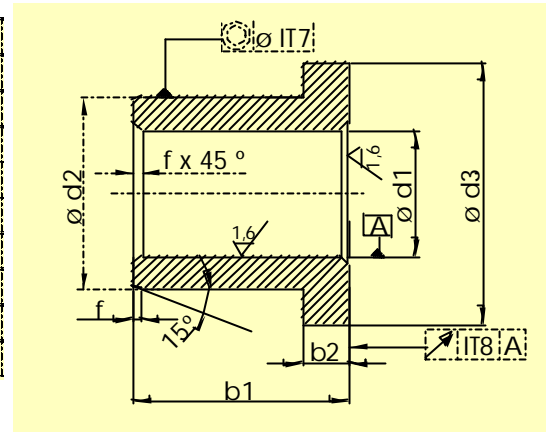
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21. Dimension list of bushings for slide bearings (with collar)

materiao indication	material contraction	materiao indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

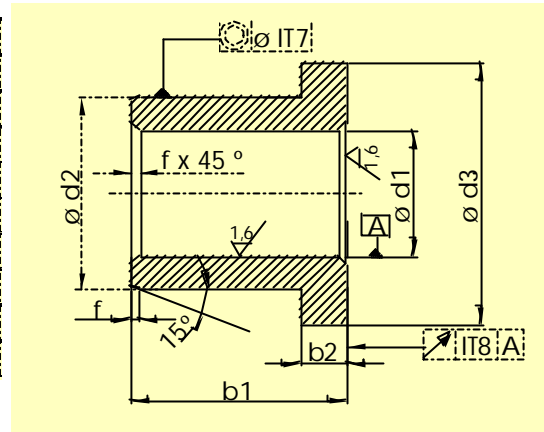


d1	d2	d3	b1	b2	f	f	dimensions	d1 _{min}	d1 _{max}	article number
mm	mm	mm	mm	mm	x 15°	x 45°	according to	mm	mm	
42	52	60	45	7.00	1.50	0,8x45°	DIN 1850 part 4	42.08	42.119	B__D08042046007
42	52	60	60	5.00	1.50	0,8x45°	DIN 1850 part 1	42.08	42.119	B__D08042052008
45	50	55	30	2.50	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	B__D08045055009
45	50	55	40	2.50	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	B__D08045055010
45	50	55	60	2.50	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	B__D08045050001
45	55	63	18	7.00	1.50	0,8x45°	DIN 1850 part 4	45.08	45.119	B__D08045055002
45	55	63	25	7.00	1.50	0,8x45°	DIN 1850 part 4	45.08	45.119	B__D08045055003
45	55	60	30	5.00	1.50	0,8x45°	DIN 1850 part 5	45.08	45.119	B__D08045050004
45	55	63	36	7.00	1.50	0,8x45°	DIN 1850 part 4	45.08	45.119	B__D08045055005
45	55	63	40	5.00	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	B__D08045055006
45	55	60	40	5.00	1.50	0,8x45°	DIN 1850 part 5	45.08	45.119	B__D08045055007
45	55	63	45	7.00	1.50	0,8x45°	DIN 1850 part 4	45.08	45.119	B__D08045055008
45	55	63	50	5.00	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	B__D08045050009
45	55	63	60	5.00	1.50	0,8x45°	DIN 1850 part 1	45.08	45.119	B__D08045055010
45	55	60	60	5.00	1.50	0,8x45°	DIN 1850 part 5	45.08	45.119	B__D08045055011
48	53	58	40	2.50	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	B__D08048053001
48	53	58	50	2.50	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	B__D08048058002
48	53	58	60	2.50	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	B__D08048053003
48	58	66	40	5.00	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	B__D08048058004
48	58	66	50	5.00	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	B__D08048053005
48	58	66	60	5.00	1.50	0,8x45°	DIN 1850 part 1	48.08	48.119	B__D08048058006
50	55	60	40	2.50	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	B__D08050060007
50	55	60	50	2.50	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	B__D08050060008
50	55	60	60	2.50	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	B__D08050055001
50	60	68	20	7.00	1.50	0,8x45°	DIN 1850 part 4	50.08	50.119	B__D08050060002
50	60	68	28	7.00	1.50	0,8x45°	DIN 1850 part 4	50.08	50.119	B__D08050060003
50	60	68	40	5.00	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	B__D08050055004
50	60	68	40	7.00	1.50	0,8x45°	DIN 1850 part 4	50.08	50.119	B__D08050060005
50	60	68	50	7.00	1.50	0,8x45°	DIN 1850 part 4	50.08	50.119	B__D08050055006
50	60	68	60	5.00	1.50	0,8x45°	DIN 1850 part 5	50.08	50.119	B__D08050060007
50	60	68	70	5.00	1.50	0,8x45°	DIN 1850 part 1	50.08	50.119	B__D08050060008
55	60	65	40	2.50	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	B__D08055066009
55	60	65	50	2.50	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	B__D08055066010
55	60	65	70	2.50	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	B__D08055060001
55	65	73	40	5.00	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	B__D08055065002
55	65	73	50	5.00	1.50	0,8x45°	DIN 1850 part 5	55.1	55.146	B__D08055066003
55	65	73	60	5.00	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	B__D08055060004



21. Dimension list of bushings for slide bearings (with collar)

materiao indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

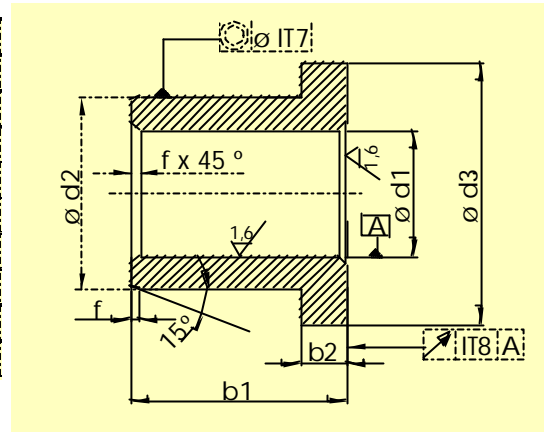


d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
55	65	73	70	5.00	1.50	0,8x45°	DIN 1850 part 5	55.1	55.146	B__D08055065005
55	65	73	80	5.00	1.50	0,8x45°	DIN 1850 part 1	55.1	55.146	B__D08055066006
55	66	74	25	7.00	1.50	0,8x45°	DIN 1850 part 4	55.1	55.146	B__D08055065007
55	66	74	36	7.00	1.50	0,8x45°	DIN 1850 part 4	55.1	55.146	B__D08055060008
55	66	74	45	7.00	1.50	0,8x45°	DIN 1850 part 4	55.1	55.146	B__D08055065009
55	66	74	56	7.00	1.50	0,8x45°	DIN 1850 part 4	55.1	55.146	B__D08055065010
60	65	70	40	2.50	1.50	0,8x45°	DIN 1850 part 1	60.1	60.146	B__D08060075011
60	65	70	60	2.50	1.50	0,8x45°	DIN 1850 part 1	60.1	60.146	B__D08060075012
60	65	70	80	2.50	1.50	0,8x45°	DIN 1850 part 1	60.1	60.146	B__D08060065001
60	75	83	25	7.00	2.00	0,8x45°	DIN 1850 part 4	60.1	60.146	B__D08060075002
60	75	83	36	7.00	2.00	0,8x45°	DIN 1850 part 4	60.1	60.146	B__D08060075003
60	75	83	40	7.50	2.00	0,8x45°	DIN 1850 part 5	60.1	60.146	B__D08060075004
60	75	83	50	7.50	2.00	0,8x45°	DIN 1850 part 1	60.1	60.146	B__D08060065005
60	75	83	50	7.00	2.00	0,8x45°	DIN 1850 part 4	60.1	60.146	B__D08060075006
60	75	83	60	7.50	2.00	0,8x45°	DIN 1850 part 5	60.1	60.146	B__D08060075007
60	75	83	63	7.00	2.00	0,8x45°	DIN 1850 part 4	60.1	60.146	B__D08060065008
60	75	83	80	7.50	2.00	0,8x45°	DIN 1850 part 5	60.1	60.146	B__D08060075009
65	70	75	50	2.50	2.00	1x45°	DIN 1850 part 1	65.1	65.146	B__D08065080010
65	70	75	60	2.50	2.00	1x45°	DIN 1850 part 1	65.1	65.146	B__D08065080011
65	70	75	80	2.50	2.00	1x45°	DIN 1850 part 1	65.1	65.146	B__D08065070001
65	80	88	25	7.00	2.00	1x45°	DIN 1850 part 4	65.1	65.146	B__D08065080002
65	80	88	40	7.00	2.00	1x45°	DIN 1850 part 4	65.1	65.146	B__D08065080003
65	80	88	50	7.50	2.00	1x45°	DIN 1850 part 1	65.1	65.146	B__D08065070004
65	80	88	50	7.00	2.00	1x45°	DIN 1850 part 4	65.1	65.146	B__D08065080005
65	80	88	60	7.50	2.00	1x45°	DIN 1850 part 1	65.1	65.146	B__D08065080006
65	80	88	63	7.00	2.00	1x45°	DIN 1850 part 4	65.1	65.146	B__D08065070007
65	80	88	80	7.50	2.00	1x45°	DIN 1850 part 1	65.1	65.146	B__D08065080008
70	75	80	50	2.50	2.00	1x45°	DIN 1850 part 1	70.1	70.146	B__D08070085009
70	75	80	70	2.50	2.00	1x45°	DIN 1850 part 1	70.1	70.146	B__D08070085010
70	75	80	90	2.50	2.00	1x45°	DIN 1850 part 1	70.1	70.146	B__D08070075001
70	85	95	28	8.00	2.00	1x45°	DIN 1850 part 4	70.1	70.146	B__D08070085002
70	85	95	40	8.00	2.00	1x45°	DIN 1850 part 4	70.1	70.146	B__D08070085003
70	85	95	50	7.50	2.00	1x45°	DIN 1850 part 1	70.1	70.146	B__D08070075004
70	85	95	56	8.00	2.00	1x45°	DIN 1850 part 4	70.1	70.146	B__D08070085005
70	85	95	70	7.50	2.00	1x45°	DIN 1850 part 1	70.1	70.146	B__D08070085006
70	85	95	70	8.00	2.00	1x45°	DIN 1850 part 4	70.1	70.146	B__D08070075007
70	85	95	90	7.50	2.00	1x45°	DIN 1850 part 1	70.1	70.146	B__D08070085008



21. Dimension list of bushings for slide bearings (with collar)

materiao indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

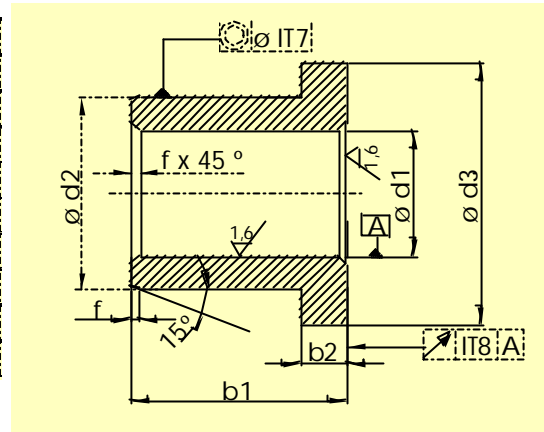


d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
75	80	85	50	2.50	2.00	1x45°	DIN 1850 part 1	75.1	75.146	B__D08075095009
75	80	85	70	2.50	2.00	1x45°	DIN 1850 part 1	75.1	75.146	B__D08075095010
75	80	85	90	2.50	2.00	1x45°	DIN 1850 part 1	75.1	75.146	B__D08075080001
75	90	100	50	7.50	2.00	1x45°	DIN 1850 part 1	75.1	75.146	B__D08075090002
75	90	100	70	7.50	2.00	1x45°	DIN 1850 part 1	75.1	75.146	B__D08075095003
75	90	100	90	7.50	2.00	1x45°	DIN 1850 part 1	75.1	75.146	B__D08075080004
75	95	105	32	8.00	2.00	1x45°	DIN 1850 part 4	75.1	75.146	B__D08075090005
75	95	105	45	8.00	2.00	1x45°	DIN 1850 part 4	75.1	75.146	B__D08075095006
75	95	105	63	8.00	2.00	1x45°	DIN 1850 part 4	75.1	75.146	B__D08075080007
75	95	105	80	8.00	2.00	1x45°	DIN 1850 part 4	75.1	75.146	B__D08075090008
80	85	90	60	2.50	2.00	1x45°	DIN 1850 part 1	80.1	80.146	B__D08080100009
80	85	90	80	2.50	2.00	1x45°	DIN 1850 part 1	80.1	80.146	B__D08080100010
80	85	90	100	2.50	2.00	1x45°	DIN 1850 part 1	80.1	80.146	B__D08080085001
80	95	105	60	7.50	2.00	1x45°	DIN 1850 part 1	80.1	80.146	B__D08080095002
80	95	105	60	7.50	2.00	1x45°	DIN 1850 part 5	80.1	80.146	B__D08080095003
80	95	105	80	7.50	2.00	1x45°	DIN 1850 part 1	80.1	80.146	B__D08080100004
80	95	105	80	7.50	2.00	1x45°	DIN 1850 part 5	80.1	80.146	B__D08080085005
80	95	105	100	7.50	2.00	1x45°	DIN 1850 part 1	80.1	80.146	B__D08080095006
80	95	105	100	7.50	2.00	1x45°	DIN 1850 part 5	80.1	80.146	B__D08080100007
80	100	110	32	8.00	2.50	1x45°	DIN 1850 part 4	80.1	80.146	B__D08080095008
80	100	110	50	8.00	2.50	1x45°	DIN 1850 part 4	80.1	80.146	B__D08080085009
80	100	110	63	8.00	2.50	1x45°	DIN 1850 part 4	80.1	80.146	B__D08080095010
80	100	110	80	8.00	2.50	1x45°	DIN 1850 part 4	80.1	80.146	B__D08080095011
85	90	95	60	2.50	2.00	1x45°	DIN 1850 part 1	85.12	85.174	B__D08085105012
85	90	95	80	2.50	2.00	1x45°	DIN 1850 part 1	85.12	85.174	B__D08085105013
85	90	95	100	2.50	2.00	1x45°	DIN 1850 part 1	85.12	85.174	B__D08085090001
85	100	110	60	7.50	2.50	1x45°	DIN 1850 part 1	85.12	85.174	B__D08085100002
85	100	110	80	7.50	2.50	1x45°	DIN 1850 part 1	85.12	85.174	B__D08085105003
85	100	110	100	7.50	2.50	1x45°	DIN 1850 part 1	85.12	85.174	B__D08085090004
85	105	115	36	10.00	2.50	1x45°	DIN 1850 part 4	85.12	85.174	B__D08085100005
85	105	115	50	10.00	2.50	1x45°	DIN 1850 part 4	85.12	85.174	B__D08085105006
85	105	115	70	10.00	2.50	1x45°	DIN 1850 part 4	85.12	85.174	B__D08085090007
85	105	115	90	10.00	2.50	1x45°	DIN 1850 part 4	85.12	85.174	B__D08085100008
90	100	110	60	5.00	2.50	1x45°	DIN 1850 part 1	90.12	90.174	B__D08090110009
90	100	110	80	5.00	2.50	1x45°	DIN 1850 part 1	90.12	90.174	B__D08090110010
90	100	110	100	5.00	2.50	1x45°	DIN 1850 part 1	90.12	90.174	B__D08090100001
90	110	120	36	10.00	2.50	1x45°	DIN 1850 part 4	90.12	90.174	B__D08090110002



21. Dimension list of bushings for slide bearings (with collar)

materiao indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

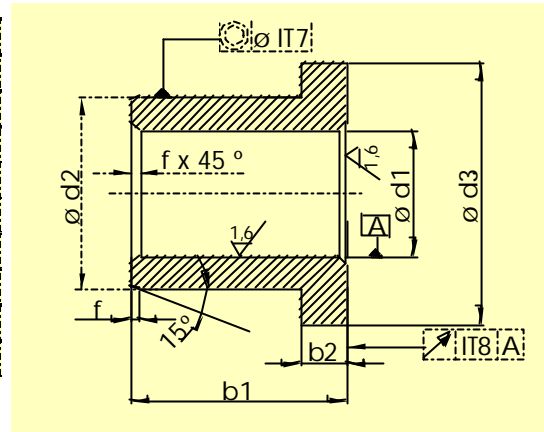


d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
90	110	120	56	10.00	2.50	1x45°	DIN 1850 part 4	90.12	90.174	B__D08090110003
90	110	120	60	10.00	2.50	1x45°	DIN 1850 part 1	90.12	90.174	B__D08090100004
90	110	120	70	10.00	2.50	1x45°	DIN 1850 part 4	90.12	90.174	B__D08090110005
90	110	120	80	10.00	2.50	1x45°	DIN 1850 part 1	90.12	90.174	B__D08090110006
90	110	120	90	10.00	2.50	1x45°	DIN 1850 part 4	90.12	90.174	B__D08090100007
90	110	120	120	10.00	2.50	1x45°	DIN 1850 part 1	90.12	90.174	B__D08090110008
95	105	115	60	5.00	2.50	1x45°	DIN 1850 part 1	95.12	95.174	B__D08095115009
95	105	115	100	5.00	2.50	1x45°	DIN 1850 part 1	95.12	95.174	B__D08095115010
95	105	115	120	5.00	2.50	1x45°	DIN 1850 part 1	95.12	95.174	B__D08095105001
95	115	125	40	10.00	2.50	1x45°	DIN 1850 part 4	95.12	95.174	B__D08095115002
95	115	125	56	10.00	2.50	1x45°	DIN 1850 part 4	95.12	95.174	B__D08095115003
95	115	125	60	10.00	2.50	1x45°	DIN 1850 part 1	95.12	95.174	B__D08095105004
95	115	125	80	10.00	2.50	1x45°	DIN 1850 part 4	95.12	95.174	B__D08095115005
95	115	125	100	10.00	2.50	1x45°	DIN 1850 part 1	95.12	95.174	B__D08095105006
95	115	125	120	10.00	2.50	1x45°	DIN 1850 part 1	95.12	95.174	B__D08095115007
100	110	120	80	5.00	2.50	1x45°	DIN 1850 part 1	100.12	100.174	B__D08100120008
100	110	120	100	5.00	2.50	1x45°	DIN 1850 part 1	100.12	100.174	B__D08100120009
100	110	120	120	5.00	2.50	1x45°	DIN 1850 part 1	100.12	100.174	B__D08100110001
100	120	130	40	10.00	2.50	1x45°	DIN 1850 part 4	100.12	100.174	B__D08100120002
100	120	130	63	10.00	2.50	1x45°	DIN 1850 part 4	100.12	100.174	B__D08100110003
100	120	130	80	10.00	2.50	1x45°	DIN 1850 part 1	100.12	100.174	B__D08100120004
100	120	130	100	10.00	2.50	1x45°	DIN 1850 part 1	100.12	100.174	B__D08100110005
100	120	130	120	10.00	2.50	1x45°	DIN 1850 part 1	100.12	100.174	B__D08100120006
105	115	125	80	5.00	2.50	1x45°	DIN 1850 part 1	105.12	105.174	B__D08105115001
105	115	125	100	5.00	2.50	1x45°	DIN 1850 part 1	105.12	105.174	B__D08105125002
105	115	125	120	5.00	2.50	1x45°	DIN 1850 part 1	105.12	105.174	B__D08105115003
105	125	135	80	10.00	3.00	1x45°	DIN 1850 part 1	105.12	105.174	B__D08105125004
105	125	135	100	10.00	3.00	1x45°	DIN 1850 part 1	105.12	105.174	B__D08105115005
105	125	135	120	10.00	3.00	1x45°	DIN 1850 part 1	105.12	105.174	B__D08105125006
110	120	130	80	10.00	2.50	1x45°	DIN 1850 part 1	110.12	110.174	B__D08110120001
110	120	130	100	10.00	2.50	1x45°	DIN 1850 part 1	110.12	110.174	B__D08110130002
110	120	130	120	10.00	2.50	1x45°	DIN 1850 part 1	110.12	110.174	B__D08110120003
110	130	140	80	10.00	3.00	1x45°	DIN 1850 part 1	110.12	110.174	B__D08110130004
110	130	140	100	10.00	3.00	1x45°	DIN 1850 part 1	110.12	110.174	B__D08110120005
110	130	140	120	10.00	3.00	1x45°	DIN 1850 part 1	110.12	110.174	B__D08110130006
120	130	140	100	5.00	3.00	1x45°	DIN 1850 part 1	120.12	120.174	B__D08120130001
120	130	140	120	5.00	3.00	1x45°	DIN 1850 part 1	120.12	120.174	B__D08120140002



21. Dimension list of bushings for slide bearings (with collar)

materiao indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D

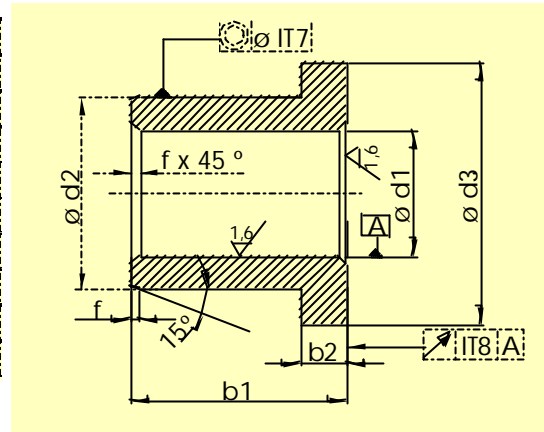


d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
120	130	140	150	5.00	3.00	1x45°	DIN 1850 part 1	120.12	120.174	B__D08120130003
120	140	150	100	10.00	3.00	1x45°	DIN 1850 part 1	120.12	120.174	B__D08120140004
120	140	150	120	10.00	3.00	1x45°	DIN 1850 part 1	120.12	120.174	B__D08120130005
120	140	150	150	10.00	3.00	1x45°	DIN 1850 part 1	120.12	120.174	B__D08120140006
130	140	150	100	5.00	3.00	2x45°	DIN 1850 part 1	130.145	130.208	B__D08130140001
130	140	150	120	5.00	3.00	2x45°	DIN 1850 part 1	130.145	130.208	B__D08130150002
130	140	150	150	5.00	3.00	2x45°	DIN 1850 part 1	130.145	130.208	B__D08130140003
130	150	160	100	10.00	3.00	2x45°	DIN 1850 part 1	130.145	130.208	B__D08130150004
130	150	160	120	10.00	3.00	2x45°	DIN 1850 part 1	130.145	130.208	B__D08130140005
130	150	160	150	10.00	3.00	2x45°	DIN 1850 part 1	130.145	130.208	B__D08130150006
140	150	160	100	5.00	3.00	2x45°	DIN 1850 part 1	140.145	140.208	B__D08140150001
140	150	160	150	5.00	3.00	2x45°	DIN 1850 part 1	140.145	140.208	B__D08140160002
140	150	160	180	5.00	3.00	2x45°	DIN 1850 part 1	140.145	140.208	B__D08140150003
140	160	170	100	10.00	3.00	2x45°	DIN 1850 part 1	140.145	140.208	B__D08140160004
140	160	170	150	10.00	3.00	2x45°	DIN 1850 part 1	140.145	140.208	B__D08140150005
140	160	170	180	10.00	3.00	2x45°	DIN 1850 part 1	140.145	140.208	B__D08140160006
150	160	170	120	5.00	3.00	2x45°	DIN 1850 part 1	150.145	150.208	B__D08150160001
150	160	170	150	5.00	3.00	2x45°	DIN 1850 part 1	150.145	150.208	B__D08150170002
150	160	170	180	5.00	3.00	2x45°	DIN 1850 part 1	150.145	150.208	B__D08150160003
150	170	180	120	10.00	3.50	2x45°	DIN 1850 part 1	150.145	150.208	B__D08150170004
150	170	180	150	10.00	3.50	2x45°	DIN 1850 part 1	150.145	150.208	B__D08150160005
150	170	180	180	10.00	3.50	2x45°	DIN 1850 part 1	150.145	150.208	B__D08150170006
160	170	180	120	5.00	3.50	2x45°	DIN 1850 part 1	160.145	160.208	B__D08160170001
160	170	180	160	5.00	3.50	2x45°	DIN 1850 part 1	160.145	160.208	B__D08160185002
160	170	180	180	5.00	3.50	2x45°	DIN 1850 part 1	160.145	160.208	B__D08160185003
160	185	200	120	12.50	3.50	2x45°	DIN 1850 part 1	160.145	160.208	B__D08160170004
160	185	200	150	12.50	3.50	2x45°	DIN 1850 part 1	160.145	160.208	B__D08160170005
160	185	200	180	12.50	3.50	2x45°	DIN 1850 part 1	160.145	160.208	B__D08160185006
170	180	190	120	5.00	3.50	2x45°	DIN 1850 part 1	170.145	170.208	B__D08170180001
170	180	190	180	5.00	3.50	2x45°	DIN 1850 part 1	170.145	170.208	B__D08170195002
170	180	190	200	5.00	3.50	2x45°	DIN 1850 part 1	170.145	170.208	B__D08170180003
170	195	210	120	12.50	3.50	2x45°	DIN 1850 part 1	170.145	170.208	B__D08170195004
170	195	210	180	12.50	3.50	2x45°	DIN 1850 part 1	170.145	170.208	B__D08170180005
170	195	210	200	12.50	3.50	2x45°	DIN 1850 part 1	170.145	170.208	B__D08170195006
180	190	200	150	5.00	3.50	2x45°	DIN 1850 part 1	180.145	180.208	B__D08180190001
180	190	200	180	5.00	3.50	2x45°	DIN 1850 part 1	180.145	180.208	B__D08180210002
180	190	200	250	5.00	3.50	2x45°	DIN 1850 part 1	180.145	180.208	B__D08180190003



21. Dimension list of bushings for slide bearings (with collar)

material indication	material contraction	material indication	material contraction
ZX-100A	1A	ZX-410	4A
ZX-100EL63	1G	ZX-530	5D
ZX-100K	1K	ZX-550	5L
ZX-100MT	1M	ZX-720	7A
ZX-324	3A	ZX-750V1T	9A
ZX-324V1T	3H	ZX-750V2T	9C
ZX-324V2T	3F	ZX-750V3	9B
ZX-324V3T	3J	ZX-750V3T	9F
ZX-324VMT	3B	ZX-750V4	9D



d1 mm	d2 mm	d3 mm	b1 mm	b2 mm	f x 15°	f x 45°	dimensions according to	d1 _{min} mm	d1 _{max} mm	article number
180	210	220	150	15.00	4.00	2x45°	DIN 1850 part 1	180.145	180.208	B__D08180210004
180	210	220	180	15.00	4.00	2x45°	DIN 1850 part 1	180.145	180.208	B__D08180190005
180	210	220	250	15.00	4.00	2x45°	DIN 1850 part 1	180.145	180.208	B__D08180210006
190	200	210	150	5.00	3.50	2x45°	DIN 1850 part 1	190.17	190.242	B__D08190200001
190	200	210	180	5.00	3.50	2x45°	DIN 1850 part 1	190.17	190.242	B__D08190220002
190	200	210	250	5.00	3.50	2x45°	DIN 1850 part 1	190.17	190.242	B__D08190200003
190	220	230	150	15.00	4.00	2x45°	DIN 1850 part 1	190.17	190.242	B__D08190220004
190	220	230	180	15.00	4.00	2x45°	DIN 1850 part 1	190.17	190.242	B__D08190200005
190	220	230	250	15.00	4.00	2x45°	DIN 1850 part 1	190.17	190.242	B__D08190220006
200	210	220	180	5.00	4.00	2x45°	DIN 1850 part 1	200.17	200.242	B__D08200210001
200	210	220	200	5.00	4.00	2x45°	DIN 1850 part 1	200.17	200.242	B__D08200230002
200	210	220	250	5.00	4.00	2x45°	DIN 1850 part 1	200.17	200.242	B__D08200210003
200	230	240	180	15.00	4.00	2x45°	DIN 1850 part 1	200.17	200.242	B__D08200230004
200	230	240	200	15.00	4.00	2x45°	DIN 1850 part 1	200.17	200.242	B__D08200210005
200	230	240	250	15.00	4.00	2x45°	DIN 1850 part 1	200.17	200.242	B__D08200230006
210	240	260	180	15.00	4.00	2x45°	DIN 1850 part 5	210.17	210.242	B__D08210240001
210	240	260	200	15.00	4.00	2x45°	DIN 1850 part 5	210.17	210.242	B__D08210240002
210	240	260	250	15.00	4.00	2x45°	DIN 1850 part 5	210.17	210.242	B__D08210240003
220	250	270	180	15.00	4.00	2x45°	DIN 1850 part 5	220.17	220.242	B__D08220250001
220	250	270	200	15.00	4.00	2x45°	DIN 1850 part 5	220.17	220.242	B__D08220250002
220	250	270	250	15.00	4.00	2x45°	DIN 1850 part 5	220.17	220.242	B__D08220250003
230	260	280	200	15.00	4.00	2x45°	DIN 1850 part 5	230.17	230.242	B__D08230260001
230	260	280	250	15.00	4.00	2x45°	DIN 1850 part 5	230.17	230.242	B__D08230260002
230	260	280	300	15.00	4.00	2x45°	DIN 1850 part 5	230.17	230.242	B__D08230260003
240	270	290	200	15.00	4.00	2x45°	DIN 1850 part 5	240.17	240.242	B__D08240270001
240	270	290	250	15.00	4.00	2x45°	DIN 1850 part 5	240.17	240.242	B__D08240270002
240	270	290	300	15.00	4.00	2x45°	DIN 1850 part 5	240.17	240.242	B__D08240270003
250	280	300	200	15.00	4.00	2x45°	DIN 1850 part 5	250.17	250.242	B__D08250280001
250	280	300	250	15.00	4.00	2x45°	DIN 1850 part 5	250.17	250.242	B__D08250280002
250	280	300	300	15.00	4.00	2x45°	DIN 1850 part 5	250.17	250.242	B__D08250280003

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