DISTITEC®

BEARING CATALOGUE FOR NECKS OF CYLINDERS OF ROLLING MILLS

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INTRODUCTION

This catalogue provides an overview of the products made – partly in outsourcing – by DISTITEC S.R.L. and used in the steel and mechanical industry.
The bearings described in this catalogue are mainly used in the flattening and straightening lines of steel sheet, stainless steel sheet and aluminum sheet, but also in rolling mills on the rolling cylinder necks, in overhead conveyors and in many applications of the mechanical industry such as LIFTING VEHICLES, NAVAL CRANES, PALLETIZES, SOLAR PANELS, WIND TURBINES, WOOD PROCESSING MACHINES, RADARS, BOTTLING MACHINES, REVOLVING LIFTING CLAMPS, WELDING ROBOTS, REVOLVING TABLES and OTHERS.

DISTITEC relies on qualified and certified technicians with a long experience in this field and equipped with advanced machine tools to produce high precision mechanical parts.
DISTITEC performs the design, assembling and testing of its products and provides an efficient technical assistance to the customer. After sizing the bearings and executing the construction drawings we follow the order progress: the components are worked, checked, tested and assembled. Finally, we carry out the final testing. If the assembled bearing is in accordance with the technical requests and the roller bearing standards, it is ready to be packed and shipped. Our stock can meet customers' requests with a short delivery time.

INDEX

Four-row cylindrical rollers radial bearings are used almost exclusively in the rolling stands.
They have a lower friction than the other roller bearings and they are suitable for applications where high speeds are required.
The reduced radial encumbrance of these bearings lets the adoption of big diameter necks compared to lamination roll. In the four-row cylindrical rollers bearings, rollers are driven on the outer ring between integrals edges or not integrals.
The inner ring is devoid of edges.
The bearing can cope, within certain limits, to axial displacement of the tree compared to the lodging.
Depending on the application, bearings like this can be provided with cylindrical bore or conic.
The rings, inner and outer, can be just in one piece or into several pieces.
Bearings with more than four rows cylindrical rollers and equipped cages are mostly used for big cold rolling mills for plane products, where lamination efforts are considerable and speed is very high.
Bearings with more than four rows are produced for cylinders' neck with diameters over about 220 mm.
The outer ring is equipped with two not integral edges, while the rollers are self-guided.
The inner ring is devoid of edges, so bearings can face an axial displacement of the tree compared to the casing.

DIMENSIONS
The encumbrance sizes of radial cylindrical roller bearings with several rows listed in the tables comply with the regulation **ISO- 15-1981.**

TOLERANCES
Excluding specific customer requests, four row radial cylindrical rollers bearings are normally manufactured with dimensional precision class P6 and form precision classP5, and those with six rows according to the normal precision.
To consult the tolerances values please consult the tables on pages **24-25-26**.

CLEARANCES
Four row cylindrical rollers radial bearings are manufactured with a radial inner clearance **C3** or **C4**, while those with six rows have variable clearances according to the use. On customer request, however, we can provide bearings with different clearances to these ones. All bearings of this type, that have an helical groove in the hole of the inner ring, are manufactured with radial inner clearance C2.
To consult radial clearance values please consult the tables on page 27.

MISALIGNMENT
For this kind of bearings it is not expected any kind of misalignment.

INNER AND OUTER RINGS

Material: core hardened steel 100Cr6 (UNI 3097 – WNr. 1.3505) or 100CrMo7 (WNr.1.3507) according to sizes.
On request and for special applications they can be manufactured in hardening steel.

Heat treatment: stress relieving (annealing of workability), hardening and tempering.
These treatments will be always performed ensuring a stabilization SZ0 (for use of bearings without dilatation of the rings until temperatures of 150°).
On request these treatments can be performed ensuring a final stabilization SZ1 & SZ2.
SZ1- for functioning without dilatation of the rings until 200° (suffix SZ1)
SZ2- for functioning without dilatation of the rings until 250° (suffix SZ2). Hardness : 58/62 HRc

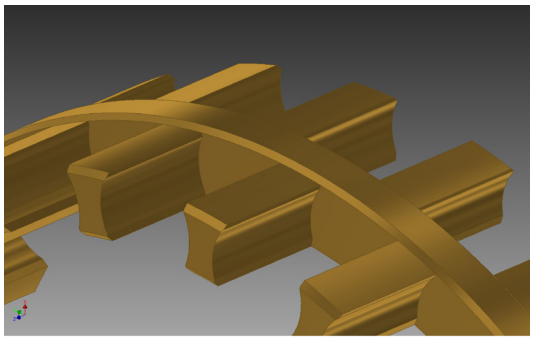
To improve the functioning of the cage (see the following paragraph) all outer rings produced by DISTITEC have the central edge (see paragraph related to available executions) rectified.

CAGE

Material: generic brass ZnZCu40Pb2
Roller bearings with several rows, that are available at the moment on the market ,are provided according to the execution with two massive side-to-side brass cages guided on rolls, with pivot steel cages (and related drilled rollers) or with massive brass cages with alveolus for two row.

DISTITEC NEW EXECUTION

Massive side-to-side cages (fig. 1) produced by DISTITEC are manufactured with important changes according to the execution available at the moment on the market.
These changes ensure an optimal functioning of the cage that is an important and essential component for the good functioning of rolling bearings.
A cage that is quickly manufactured can cause the early death of the rolling system and consequently of the bearing itself.
Massive cages we had studied and patented, regarding the procedure of the manufacturing, they have the following changes according to the executions currently in use:



Production process in several stages in order to minimize to the minimum the internal tensions of the cage.
Outer central edge retified : it ensures the cage will be guided correctly on the inner central edge in the outer ring(it is retified as well). It ensures the cages to minimize to the minimum the power lost by sliding friction reducing the temperature of bearing operation.

The superficial treatment of silvering electrolytic that improves the superficial finishing of the cage and also of alveolus that will guide rollers will reduce considerably the friction generated between them during the operation.

These changes introduced by us make, in our opinion, the production of Distitec massive cages a technologically advanced product compared to the versions currently in use.

ROLLER LOGARITHMIC PROFILE

Material: core-hardened steel 100Cr6 (UNI 3097)
On request they can be manufactured in hardening steel (drilled rollers).

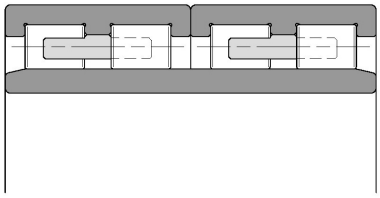
Heat treatment: stress relieving (annealing of workability), hardening and tempering.

Hardness: 60/64 HRc

Rollers used in these bearings will have a possible minimum outer logarithmic profile suitable to absorb a possible misalignment of housings and the neck of the cylinder where bearings will be housed and keyed. Moreover these rollers will be manufactured ensuring form tolerances of the outer profile including in a micron. It will ensure a better work charge distribution reducing the specific pressure.

SUFFIXES

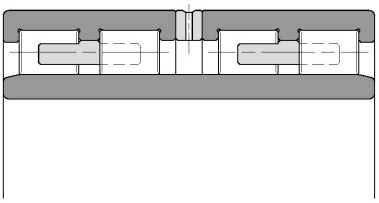
A1,A2,A3,A4	inner execution changes
C2	radial inner clearance lower than normal
C3	radial inner clearance higher than normal
C4	radial inner clearance higher than C3
CH	case hardened inner and outer rings
CHO	case hardened outer ring
CHI	case hardened inner ring
CHA	case hardened inner rings, outer rings and rollers
BH	bainitic hardening for inner and outer rings
BHO	bainitic hardening for outer rings
BHI	bainitic hardening for inner rings
K	tapered hole, taper 1:12
K30	tapered hole, taper 1:30
P5	dimensional and shape precision according to 5 ISO class
P6	dimensional and shape precision according to 6 ISO class
2IR	group of two double row bearings
CA3	annular groove and three lubrification holes on the outer ring
CA6	annular groove and six lubrification holes on the outer ring
CA8	annular groove and eight lubrification holes on the outer ring
SC	groove on lateral faces
SCI	groove on inner ring's lateral faces
SCO	groove on outer ring's lateral faces
V	helical groove in the hole
SZ0	stabilized rings for uses until +150°C
SZ1	stabilized rings for uses until +200°C
SZ2	stabilized rings for uses until +250°C



4EZ.1

EXECUTION 4EZ.1

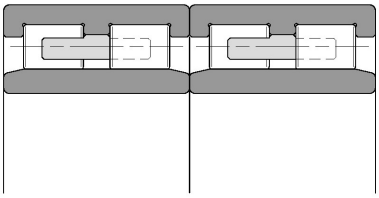
Two outer rings with three integral hems each. One inner ring. Two massive double prong-type brass cages guided on the outer ring. With or without annular groove and/or lubrification holes on the outer ring (see bearings' dimensional tables, dimensions b and k).



4EZ.2

EXECUTION 4EZ.2

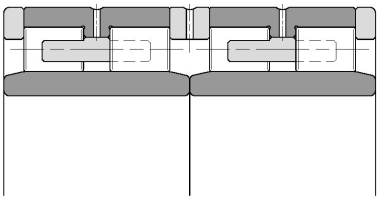
as 4EZ.1 but with an intermediate spacer among the outer rings



4EZ.3

EXECUTION 4EZ.3

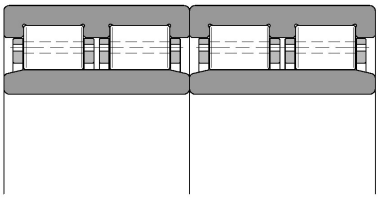
Two outer rings with three integral hems each. Two inner rings. Two massive double prong-type brass cages guided on the outer ring. With or without annular groove and/or lubrification holes on the outer ring (see bearings' dimensional tables, dimensions b and k)



4EZ.4

EXECUTION 4EZ.4

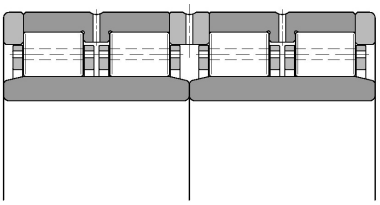
Two outer rings, each of them with a central integral hem and a reported hem; one intermediate spacer. Two inner rings. Two massive double prong-type brass cages guided on the outer ring. With or without annular groove and/or lubrification holes on the outer ring (see bearings' dimensional tables, dimensions b and k).



4EZ.5

EXECUTION 4EZ.5

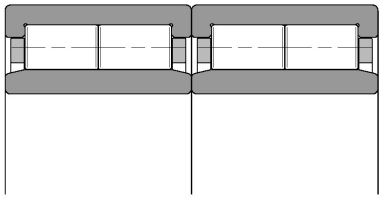
Two outer rings, each of them with three integral hems ;
Two inner rings. Drilled rollers and four steel pin cages
With or without annular groove and/or lubrification holes on the outer ring (see bearings' dimensional tables, dimensions b and k).



4EZ.6

EXECUTION 4EZ.6

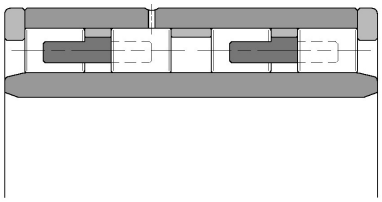
Two outer rings, each of them with a central integral hem and a reported hem ; an intermediate spacer ; Two inner rings. Drilled rollers and four steel pin cages.
With or without annular groove and/or lubrification holes on the outer ring (see bearings' dimensional tables, dimensions b and k).



4EZ.7

EXECUTION 4EZ.7

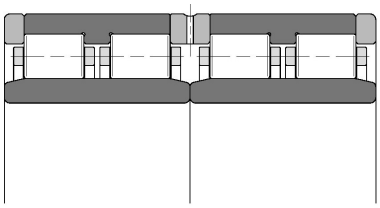
Two outer rings, each of them with two integral hems ; Two inner rings. Two massive brass cages with slits, for row ring



4EZ.8

EXECUTION 4EZ.8

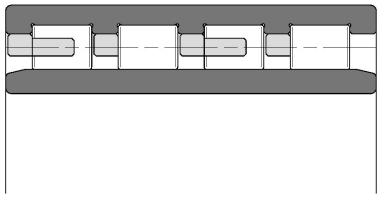
One outer ring with three reported guide rings. One inner ring.
Two massive double prong-type brass cages guided on the reported rings. With or without annular groove and/or lubrification holes on the outer ring (see bearings' dimensional tables, dimensions b and k).



4EZ.9

EXECUTION 4EZ.9

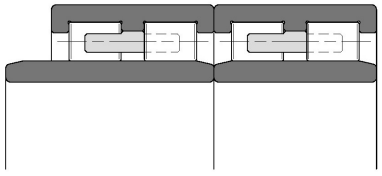
Two outer rings, each of them with a central integral hem and a reported hem; one intermediate spacer. Two inner rings. Four pressed sheet steel cages.
With or without annular groove and/or lubrification holes on the outer ring (see bearings' dimensional tables, dimensions b and k).



4EZ.10

EXECUTION 4EZ.10

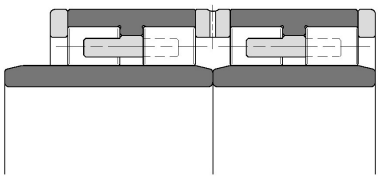
One outer ring with fiveintegral hems. One inner ring.
Four massive single prong-type brass cages guided on the hems of the outer ring.
With or without annular groove and/or lubrification holes on the outer ring (see bearings' dimensional tables, dimensions b and k).



4EZ.11

EXECUTION 4EZ.11

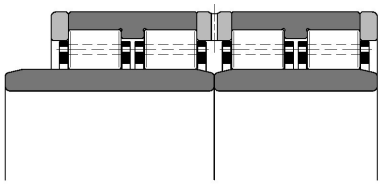
As EZ.3 with a wider inner ring



4EZ.12

EXECUTION 4EZ.12

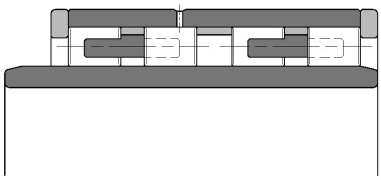
As EZ.4 with a wider inner ring



4EZ.13

EXECUTION 4EZ.13

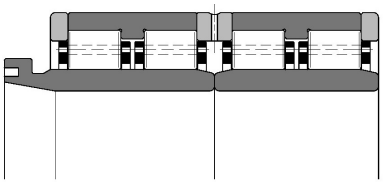
As EZ.6 with a wider inner ring.



4EZ.14

EXECUTION 4EZ.14

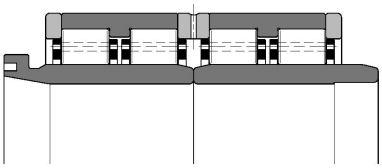
As EZ.8 with a wider inner ring.



4EZ.15

EXECUTION 4EZ.15

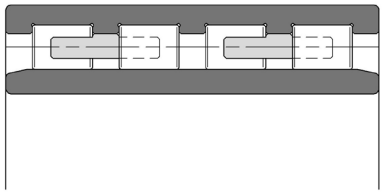
As EZ.6 with a wider inner ring, equipped with a concentric shoulder.



4EZ.16

EXECUTION 4EZ.16

As EZ.6 with two wider inner rings, one of them equipped with a concentric shoulder

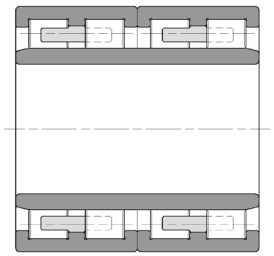


4EZ.17

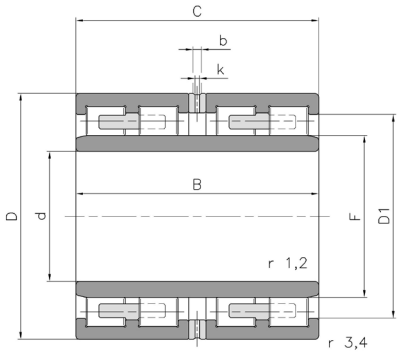
EXECUTION 4EZ.17

One outer ring with five integral hems. One inner ring.
Two massive double prong-type brass cages guided on the hems of the outer ring.
With or without annular groove and/or lubrification holes on the outer ring (see bearings' dimensional tables, dimensions b and k).

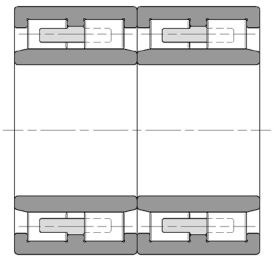
RADIAL CYLINDRICAL ROLLER BEARINGS - DIMENSIONAL TABLES



4EZ.1

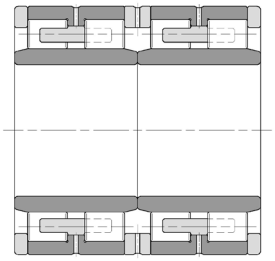


4EZ.2

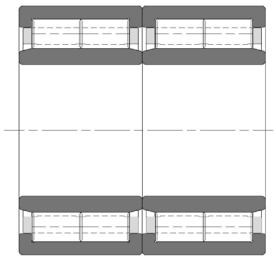


4EZ.3

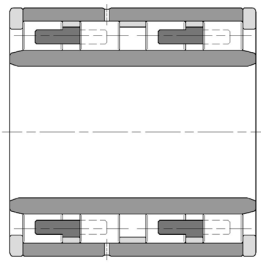
DISTITEC										load coefficients		CODE	Excecution
d	D	B	C	F	D_1	b	k	$r_{1,2}$	$r_{3,4}$	dyn. C KN	stat. C0 KN		
115	165	107,5	90	132,5	151	-	-	1,1	1,1	485	830	PZW.23.11	4EZ.11
127	174,625	150,812	150,812	139,5	159	-	-	1,1	1,5	810	1.550	PZW.25,4.12	4EZ.3
139,700	215	195	187	156,285	188	-	-	3	0,4	1.440	2.530	PZW.27,9.13	4EZ.14
	215	195	187	159,285	188	-	-	3	0,4	1.450	2.680	PZW.27,9.14	4EZ.14
145	210	155	155	166	190	-	-	1,1	1,1	935	1.790	PZW.29.15	4EZ.1SCO
	225	156	156	169	197	-	-	2	2	1.130	2.010	PZW.29.16	4EZ.1/SCO
150	230	156	156	174	202	-	-	2	2	1.130	2.010	PZW.30.17	4EZ.1/SCO
160	230	130	130	180	210	-	-	1,5	1,5	915	1.600	PZW.32.18	4EZ.1/SCO
	230	168	168	179	204	-	-	2	2	1.180	2.210	PZW.32.19	4EZ.1/SCO
	233	180	180	178,515	206	8,9	6	2,5	1,8	1.465	2.750	PZW.32.20	4EZ.8/VSCI
165,100	225,425	168,275	168,275	181	205	-	-	1,5	1,5	1.200	2.250	PZW.33,02.21	4EZ.3
170	230	130	130	188,5	211	-	-	2	2	860	1.650	PZW.34.22	4EZ.2
	230	160	160	185,5	212	-	3	2	2	1.150	2.270	PZW.34.23	4EZ.3
	240	130	130	190	218	-	-	2	2	1.000	1.840	PZW.34.24	4EZ.1/SCO
	260	225	225	196	230	8,3	4,5	2,1	2,1	1.950	3.720	PZW.34.25	4EZ.1
180	260	168	168	202	233	-	-	2,1	2,1	1.400	2.600	PZW.36.26	4EZ.1/SCO
190	260	168	168	212	237	-	-	2	2	1.300	2.630	PZW.38.27	4EZ.1/SCO
	270	200	200	212	242	-	-	2,1	2,1	1.690	3.400	PZW.38.28	4EZ.1/SCO
	280	200	200	214	251	-	-	2,1	2,1	1.910	3.610	PZW.38.29	4EZ.1/SCO
200	270	170	170	222	349	-	-	2,1	2,1	1.340	2.810	PZW.40.30	4EZ.1/SCO
	280	170	170	222	252	-	-	2,1	2,1	1.500	2.850	PZW.40.31	4EZ.1/SCO
	280	170	170	222	253	-	-	2,1	2,1	1.580	3.050	PZW.40.32	4EZ.3/SCO
	280	180	170	222	252	-	-	2,1	2,1	1.580	3.050	PZW.40.33	4EZ.11/VSC
	280	200	200	222	252	-	-	0,6	2,1	1.820	3.650	PZW.40.34	4EZ.1/SCO
	285	200	200	222,5	236	10	6	2,1	2	2.000	3.930	PZW.40.35	4EZ.8/VSCI
	290	192	192	226	260	-	-	2,1	2,1	1.750	3.350	PZW.40.36	4EZ.1/SCO
	290	192	192	226	260	-	4,5	2,1	2,1	1.800	3.350	PZW.40.37	4EZ.1/SCO
	310	230	230	229	273	-	-	2,1	2,1	2.310	4.300	PZW.40.38	4EZ.3
210	290	192	192	236	264	-	-	2,1	2,1	1.690	3.600	PZW.42.39	4EZ.1/SCO
220	300	20	20	240	276	-	4,5	2,1	2,1	1.950	4.000	PZW.44.40	4EZ.3/SCO
	310	192	192	246	280	-	-	2,1	2,1	1.940	3.680	PZW.44.41	4EZ.1/SCO
	310	225	225	244	278	-	-	0,6	2,1	2.280	4.500	PZW.44.42	4EZ.1/SCO
	330	230	230	249	294	-	-	2,1	2,1	2.450	4.680	PZW.44.43	4EZ.3/SCO
230	330	206	206	260	297	-	-	2,1	2,1	2.260	4.430	PZW.46.44	4EZ.1/SCO
	365	250	250	266	321	11,1	6	3	3	2.920	5.700	PZW.46.45	4EZ.4



4EZ.4



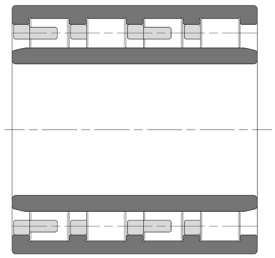
4EZ.7



4EZ.8

SKF				FAG			XLB			
CODE	Excecution	load coefficients		CODE	load coefficients		CODE	load coefficients		Weight
		dyn. C KN	stat. C0 KN		dyn. C KN	stat. C0 KN		dyn. C KN	stat. C0 KN	Kg
BC4B 319738 A	E.11	402	765	-	-	-	-	-	-	8,5
315643/VJ202	E.3	627	1.320	529469.N12BA	800	1.430	-	-	-	10,5
BC4B 466971 B	E.14	1.010	2.280	-	-	-	-	-	-	25
BC4B 459696	E.14	1.210	2.550	-	-	-	-	-	-	24
314625	E.1/WO	792	1.560	511605	1.080	1.930	FC2942155	735	1.560	18
313924 A	E.1/WO	897	1.660	512764	1.250	1.960	FC2945156	835	1.820	23
313891 A	E.1/WO	897	1.660	506962	1.140	1.860	FC3046156	825	1.810	24
314190	E.1/WO	781	1.340	502894B	830	1.340	FC3246130	781	1.340	17
315189 A	E.1/WO	897	2.200	510150B	1.160	2.080	FC3246168	1.050	2.170	23,5
BC4B 457627 VCA	E.8/GWI	1.140	2.800	-	-	-	-	-	-	26,5
315642/VJ202	E.3	1.010	2.240	529468.N12BA	1.100	2.000	-	-	-	20
313673	E.2	671	1.400	508370	780	1.400	FC3446130	670	1.400	15
BC2B 322340/HB1VJ202	E.3	1.100	2.360	567622	1.200	2.200	-	-	-	19
BC4B 635122	E.1/WO	913	1.830	510440B	1.000	1.630	FC3448130	913	1.830	19
313587 B	E.1	1.650	3.350	505470	1.930	3.350	FC3452225	1.650	3.310	43,5
313812	E.1/WO	1.280	2.500	507536	1.200	2.000	FC3652168	990	2.300	29,5
313651	E.1/WO	1.140	2.600	507735	1.340	2.000	FC3852168	1.140	2.600	27
314199 B	E.1/WO	1.510	3.350	508657	1.660	3.000	FC3854200	1.510	3.310	37,5
314049 A	E.1/WO	1.720	3.350	510199	1.830	3.150	FC3856200	1.720	3.370	41,5
314553	E.1/WO	1.170	2.700	522742B	1.290	2.600	FC4054170	1.170	2.500	28,5
314385	E.1/WO	1.380	3.000	507344	1.630	3.200	FC4056170	1.380	2.870	33,5
BC4B 319659	E.7/WO	1.450	3.200	-	-	-	-	-	-	35
319019	E.11/GW	1.380	3.000	-	-	-	-	-	-	35
313893	E.1/WO	1.510	3.350	508726	1.630	3.200	FC4056200	1.510	3.310	39
BC4B 457628	E.8/GWI	1.470	3.900	-	-	-	-	-	-	44
313811	E.1/WO	1.540	3.200	512580B	1.800	3.150	FC4058192	1.540	3.750	42,5
313811 A	E.1/WO	1.540	3.200	-	-	-	-	-	-	42,5
313639/VJ202	E.3	2.010	3.750	514958	2.700	4.250	FC4062230	2.010	3.750	63
313646	E.1/WO	1.450	3.400	507628	1.700	3.400	FC4258192	1.450	3.400	41
BC2B 322341/HB1VJ202	E.3/WO	1.790	3.900	567623	1.830	3.350	FCD4460200	1.790	3.900	41
313839	E.1/WO	1.680	3.650	507333	1.830	3.200	FC4462192	1.680	3.650	46
313894 B	E.1/WO	1.940	4.300	514461	2.200	41.500	FC4462225	1.940	4.300	54,5
314889/VJ202	E.3/WO	2.050	4.000	541452	2.360	3.900	FCD4466230	2.050	4.000	68,5
313824	E.1/WO	1.870	4.000	508727B	2.160	3.900	FC4666206	1.870	4.000	58
313581 A	E.4	2.640	4.900	529113	3.150	-	FCD4673250	2.640	4.900	100

RADIAL CYLINDRICAL ROLLER BEARINGS - DIMENSIONAL TABLES



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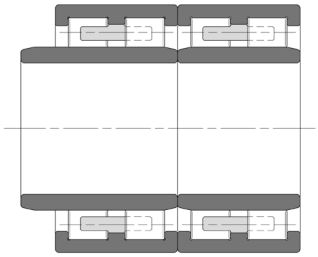

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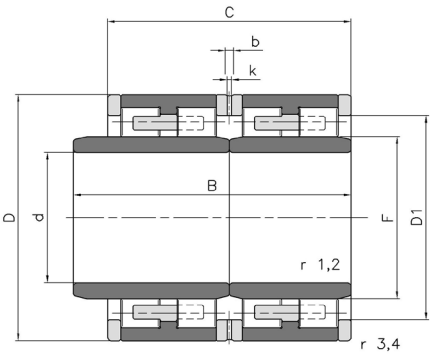

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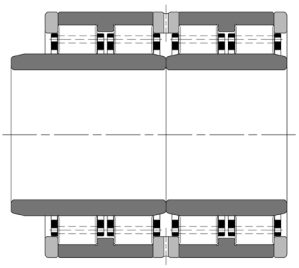
DISTITEC													
d	D	B	C	F	D_1	b	k	$r_{1,2}$	$r_{3,4}$	load coefficients dyn. C KN	load coefficients stat. C0 KN	CODE	Excecution
240	330	180	180	265	299	-	-	2,1	2,1	1.950	3.830	PZW.48.46	4EZ.3/SCO
	330	220	220	265	300	-	-	2,1	2,1	2.230	4.550	PZW.48.47	4EZ.1/SCO
	330	240	220	270	300	-	-	2,1	2,1	2.000	4.420	PZW.48.48	4EZ.17/SCI
	360	290	290	270	327	8,3	4,5	8x20°	2	3.660	7.170	PZW.48.49	4EZ.4/SCI
250	340	230	230	310	276	9	8	3	2,3x45°	2.670	5.500	PZW.50.50	4EZ.8/VSCI
260	360	204	204	287	326	-	-	2,1	2,1	2.340	4.670	PZW.52.51	4EZ.3/SCO
	360	230	230	292	326	-	-	3	3	2.490	5.340	PZW.52.52	4EZ.1/SCO
	370	220	220	292	332	-	-	3	3	2.600	5.160	PZW.52.53	4EZ.1/SCO
	370	240	220	292	332	-	-	3	3	2.600	5.160	PZW.52.54	4EZ.11/VSC
	400	290	290	296	352	7	5	4	4	3.950	7.650	PZW.52.55	4EZ.4/SCI
265	370	234	234	300	336	-	-	2	2	2.600	5.560	PZW.53.56	4EZ.1/SCO
270	380	295	275	300	345	8,3	4,5	2	1	3.450	7.200	PZW.54.57	4EZ.12/VSCI
280	380	290	290	308,5	352	-	6	7x20°	2,1	3.400	7.700	PZW.56.58	4EZ.4/SCI
	390	220	220	312	352	-	-	3	3	2.600	5.250	PZW.56.59	4EZ.1/SCO
	390	250	220	312	352	-	-	3	3	2.750	5.450	PZW.56.60	4EZ.11/VSC
	390	275	275	308	353	11,1	6	7x20°	1,1	3.480	7.330	PZW.56.61	4EZ.4/SCI
	400	285	285	316	360	-	-	3	3	3.700	7.700	PZW.56.62	4EZ.3/SCO
	410	300	300	313	368	-	-	4	4	4.000	8.000	PZW.56.63	4EZ.3/SCO
	420	300	300	319	372	8,3	4,5	4	4	4.370	8.700	PZW.56.64	4EZ.4
290	390	190	190	316	356	-	-	2,1	2,1	2.340	4.560	PZW.58.65	4EZ.3/SCO
300	420	300	300	332	379	11,1	6	7x20°	1,5	4.180	8.800	PZW.60.66	4EZ.4/SC
	420	320	300	332	379	11,1	6	4	1,5	4.300	9.100	PZW.60.67	4EZ.12/SCI
	420	330	300	332	379	11,1	6	6,4x20°	1,5	4.300	9.100	PZW.60.68	4EZ.12/VSCI
320	460	240	240	364	425	-	-	3	3	3.520	6.900	PZW.64.69	4EZ.3/SCO
	480	350	350	364	426	13,9	7,5	10x20°	1,5	5.780	11.600	PZW.64.70	4EZ.4/SCO
330	460	340	340	365	415	11,1	6	10,5x20°	1,5	4.480	10.510	PZW.66.71	4EZ.4/SCI
340	480	350	350	378	431	11,1	6	8x20°	1,5	5.300	11.500	PZW.68.72	4EZ.4/SCI
	480	350	350	378	431	11,1	6	8x20°	1,5	5.400	12.000	PZW.68.72	4EZ.4/VSCI
	480	370	350	378	431	11,1	6	4	1,5	5.400	12.000	PZW.68.73	4EZ.12/SCI
	500	370	370	385	452	-	9	13x20°	3	5.950	12.600	PZW.68.74	4EZ.4/SCO
	560	380	380	396	486	-	7,5	5	4	7.560	14.000	PZW.68.75	4EZ.4/SCO
350	500	380	380	389	450	-	7,5	5	5	6.000	12.600	PZW.70.76	4EZ.3
	500	410	410	388	455	16,7	9	11,5x20°	3	6.400	13.800	PZW.70.78	4EZ.4/SCO
	510	300	300	401	468	-	6	5	5	4.700	9.750	PZW.70.79	4EZ.3
	520	300	300	401	468	-	6	8x20°	5	5.000	9.800	PZW.70.80	4EZ.1/VSCI
	520	320	300	401	468	-	6	8x20,5°	5	5.160	10.160	PZW.70.81	4EZ.11/VSC

DIMENSIONAL TABLES



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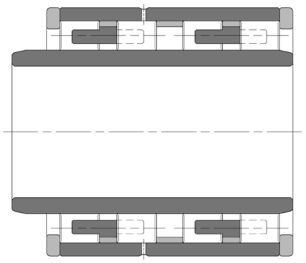

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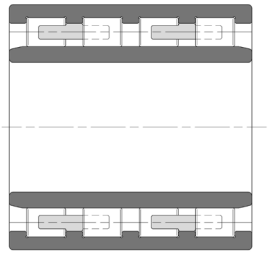

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SKF				FAG			XLB			
CODE	Excecution	load coefficients dyn. C KN	load coefficients stat. C0 KN	CODE	load coefficients dyn. C KN	load coefficients stat. C0 KN	CODE	load coefficients dyn. C KN	load coefficients stat. C0 KN	Weight Kg
635194	E.7/WO	1.720	3.800	504547	2.040	3.900	FC4886180	1.720	3.800	49,5
313921	E.1/WO	1.720	4.300	-	-	-	-	-	-	58
BC4B 320415	E.10/WI	1.720	4.300	-	-	-	-	-	-	60
BC4B 322292 A/HB3	E.4/WI	3.300	6.550	514959	3.350	5.700	-	-	-	130
BC4B 457629 VCA	E.8/GWI	1.870	5.000	-	-	-	-	-	-	65
314997/VJ202	E.3/WO	1.980	4.400	-	-	-	FC5272204	1.980	4.400	64,5
BC4B 320956	E.1/WO	1.980	4.650	533880	2.500	5.000	FC5272230	1.980	4.650	73,5
313823	E.1/WO	2.160	4.650	507336	2.200	4.050	FC5274220	2.160	4.650	77,5
BC4B 319464/HA3	E.11/GW	2.160	4.605	-	-	-	-	-	-	78,5
313427 B	E.4/WI	3.520	7.100	518214	3.900	6.300	FCD5280290	3.520	7.100	135
313922	E.1/WO	2.240	5.400	517423	2.500	5.100	FC5374234	2.240	5.400	80,5
315605	E.12/GWI	3.080	7.200	-	-	-	-	-	-	100
BC4-0001	E.4/WI	2.750	6.950	-	-	-	FCD5678290	2.750	6.950	75
313822	E.1/WO	2.240	5.000	507339B	2.400	4.550	FC5678220	2.240	5.000	82,5
319259	E.11/GW	2.240	5.000	-	-	-	-	-	-	84,5
314719 C	E.4/WI	3.080	7.200	527104	3.600	6.800	FCD5678275	2.424	6.350	100
314070/VJ202	E.3/WO	3.140	7.350	513342.N12BA	3.400	6.400	FCD5680285	3.140	7.350	120
314897/VJ202	E.3/WO	3.520	7.500	510350.C4.N12BA	3.900	6.950	FCD5682300	3.520	7.450	130
313487	E.4	3.470	7.350	-	-	-	FCD5684300	3.470	7.350	150
635195	E.7/WO	2.050	4.550	-	-	-	FC5878190	2.050	4.550	67
314484 D	E.4/W	3.740	8.800	524289B	4.150	8.000	FCD6084300	2.270	3.820	130
319129	E.12/WI	3.740	8.800	-	-	-	-	-	-	135
BC4-0003	E.12/GWI	3.740	8.800	-	-	-	-	-	-	140
BC4B 322216/VJ202	E.7/WO	2.920	7.200	804571	3.750	7.200	-	-	-	140
314274 B	E.6/WI	4.950	10.800	513654A	5.850	10.800	-	-	-	220
313445 C	E.4/WI	4.180	10.200	543447	4.650	9.500	-	-	-	175
314485 A	E.4/WI	4.570	11.000	-	-	-	-	-	-	205
314485 C	E.4/GWI	4.570	11.000	527634	5.300	11.000	-	-	-	205
319040 A	E.12/WI	4.570	11.000	-	-	-	-	-	-	200
BC4B 322261/HB1	E.6/WI	5.230	11.800	517794	6.550	13.200	-	-	-	260
313404 A	E.6/WI	6.820	12.900	345171	7.650	12.200	-	-	-	350
314563/VJ202	E.3	4.950	11.400	532381.N12BA	5.700	11.200	-	-	-	240
BC4B 322777/HB1	E.6/WI	5.830	13.700	532001	7.100	14.300	-	-	-	285
BC2B 319878/VJ202	E.3	4.290	9.000	-	-	-	-	-	-	220
BC4B 326909/HA3	E.1/GWI	4.290	9.000	568450	5.100	8.800	-	-	-	220
BC4B 326858/HB3	E.11/GW	4.290	9.000	-	-	-	-	-	-	240

ANGULAR CONTACT BALL BEARINGS

Angular bearings with one row of balls can hold axial loads operating in only one direction.
Under the effect of a radial load, an axial force is generated in each of them, which has to be balanced: therefore they are usually mounted in opposition.

In the tandem arrangement, load's lines are parallel and radial and axial loads are distributed equally among bearings.

Load lines of the bearings "O" distributed diverge towards the axis and axial loads can be hold in both ways, but obviously with just one bearing.
With this disposition, a relatively rigid arrangement is obtained, able to hold also tilting moments.

Load lines of the bearings "X" distributed diverge towards the axis and, also in this case, axial loads can be hold in both ways, but with just one bearing.
With this disposition, a less rigid arrangement than the previous one is obtained and less suitable for holding tilting moment.

Usually, angular bearings with one row of balls have a high shoulder and a low shoulder, on a same ring.
Low shoulders allow to introduce a big number of balls, which brings with it the advantage of a relatively high load capacity

DIMENSIONS

The overall dimensions of standard bearings (identified by a standard appellation and not a drawing number) are according to ISO 15-1981..

TOLERANCES

Angular bearings with one row of balls of normal execution for single assembly are usually made with normal tolerances.
Some of them are also available with higher precision according to classes P6 and P5.
Normal classes tolerances values, P6 and P5 are according to ISO 492-1986 and they are indicated in the tables on pages 24/25/26.

CLEARANCES

we can speak about clearance in the case of an angular bearing with one row of balls only after its assembly in opposition with another one and the value of this clearance depends on the registration made.

MISALIGNMENT

angular bearings with one row of balls have a limited attitude to tolerate alignment errors of the inner ring as compared to the outer and related problems are as complicated as those of radial bearings with one row of balls.
In case of paired bearings, especially with the "O" disposition, the angular misalignment involves additional efforts between the balls and grooves and on the cages and so, a reduction in duration.
The misalignment brings also a significant reduction in silence.

1 – Outer ring
2 – Inner ring
3 – Cage
4 – Balls
5 – Protection ring

INNER AND OUTER RING

Material: full hardened steel 100Cr6 (UNI 3097 - WNr. 1.3505) or 100CrMo7(WNr. 1.3507) depending on dimensions.
On request, they can be made in case hardening steel for particular applications.

Heat treatment: Stress relieving (annealing workability), hardening & tempering.
These treatmets will always be done ensuring a SZ0 stabilization (for bearings use without dilatation of the rings untill a temperature of 150°C).
On request, the treatments can be done ensuring a SZ1 & SZ2 final stabilization:
SZ1 - for functioning without dilatation of the rings at 200°C (suffix SZ1)
SZ2 - for functioning without dilatation of the rings at 250°C (suffiz SZ2)
Hardness: 58/62 HRc

CAGE

Angular bearings with one row of balls are usually equipped with one of the following types of cages, depending on the series and dimensions:

massive brass cage

massive steel cage

polyamide cage

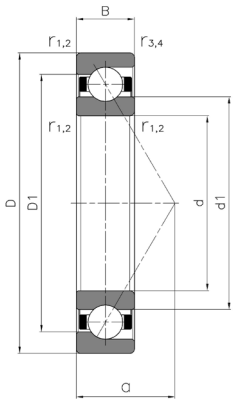
bearings equipped with polyamide cage 6.6 reinforced with glass fibres can be used at working temperatures untill +120°C.
In applications in which the temperature remains consistently above 120° C or below -40°C, it is necessary to resort to bearings with metal cage.
If you have a cooling system that uses ammonia, bearings with massive steel cage are recommended

BALLS

Material: full hardened steel 100Cr6 (UNI 3097)
Heat treatment: Stress relieving (annealing workability), hardening & tempering.
Hardness: 60/64 HRc

ANGULAR CONTACT BALL BEARINGS - POSSIBLE ARRANGEMENTS

Distitec's angular contact ball bearings can be arranged in different positions that vary according to the level of stiffness and load requirements imposed by the application. Possible dispositions are shown in the following pictures, in which the used suffixes are specified in names of matched bearing groups

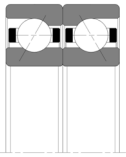


Excecution

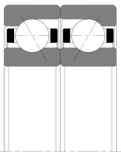
With a high shoulder and a low shoulder for the outer ring and with two high shoulders for the inner ring

- **Bearings' "O" disposition (back to back)**

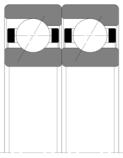
In "O" dispositions, load lines diverge towards the axis of the bearing.
Axial loads are allowed in both directions but only one bearing or a group of bearings in each direction.
Bearings "O" assembled guarantee a relatively rigid arrangement which is able to hold also overturning moments



"O" disposition
Suffix: DB (DD)



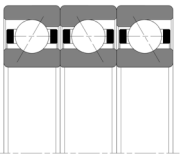
"X" disposition
Suffix: DF (FF)



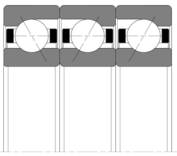
Tandem disposition
Suffix: DT (T)

- **Bearings' "X" disposition (face to face)**

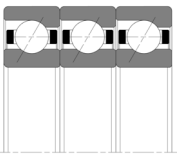
In "X" dispositions (face to face) load lines diverge towards the axis of the bearing.
Axial loads are allowed in both directions but only one bearing or a group of bearings in each direction.
"X" dispositions can support small deflections



"O" disposition
Suff: TBT (TD)



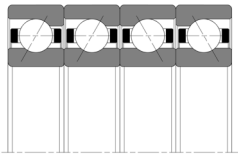
"X" disposition
Suff: TFT (TF)



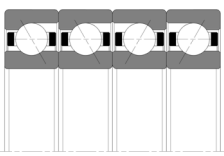
Tandem disposition
Suff: TT (3T)

- **Bearings' disposition in tandem**

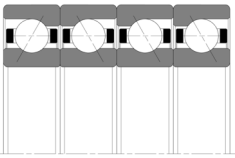
Bearings' disposition axial load capacity can be increased by integrating bearings in tandem disposition.
In bearings' tandem arrangements, load's lines are parallel so radial and axial loads are distributed equally among the bearings of the group.
These groups of bearings are able to support axial loads that operate in just one direction.
If axial loads operate in an opposite direction or in presence of combined loads, additional bearings should be integrated, combined with a tandem disposition.



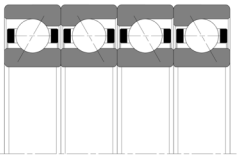
"O" disposition
Suff: QBC (TDT)



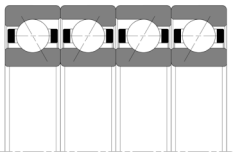
"X" disposition
Suff: TFT (TF)



Tandem disposition
Suff: TT (3T)



"O" disposition
Suff: QBT (3TD)

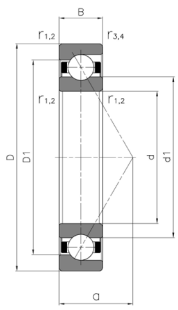


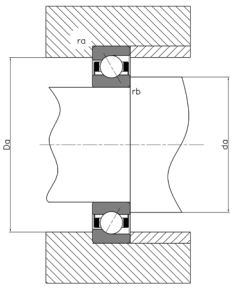
"X" disposition
Suff: QFT (3FT)

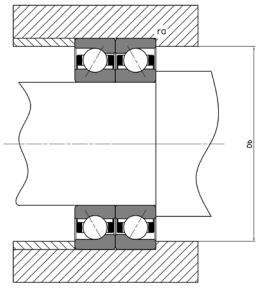
SUFFIXES

A	30° contact angle
AC	25° contact angle
B	40° contact angle
CA	Bearing for universal mounting with “O” or “X” arrangement, inner axial clearance is lower than the normal CB
CB	Bearing for universal mounting with “O” or “X” arrangement, inner axial clearance is the nominal one
CC	Bearing for universal mounting with “O” or “X” arrangement, inner axial clearance is higher than the normal CB
DB	Two "O" paired bearings
DBA	Two "O" paired bearings with light preload
DBB	Two "O" paired bearings with medium preload
DF	Two "X" paired bearings
DFA	Two "X" paired bearings with light preload
DT	Two paired bearings in tandem
E	Optimized internal geometry
F	Massive steel cage
G	Bearing for universal mounting with “O” or “X” arrangement, inner axial clearance exists
GA	Bearing for universal mounting with “O” or “X” arrangement, a light preload exists
GB	Bearing for universal mounting with “O” or “X” arrangement, a medium preload exists
GC	Bearing for universal mounting with “O” or “X” arrangement, a high preload exists
M	Massive brass cage centered on balls
MB	Massive brass cage centered on the inner ring
P	Molded cage of polyamide 6,6 reinforced with glass fibres
SZ0	stabilized rings for uses until +150°C
SZ1	stabilized rings for uses until +200°C
SZ2	stabilized rings for uses until +250°C

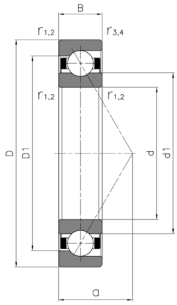
ANGULAR CONTACT BALL BEARINGS - DIMENSIONAL TABLES

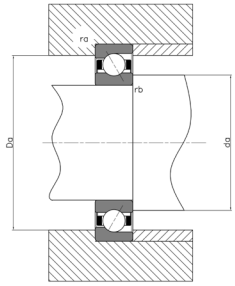


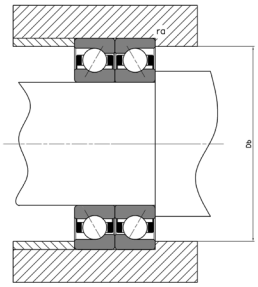




DISTITEC								Adjacent dimensions					load coefficients		CODE	SKF CODE	Weight
d	D	B	d_1 ≈	D_1 ≈	$r_{1,2}$ min	$r_{3,4}$ min	a	d_a min	D_a max	D_b max	r_a max	r_b max	dyn. C KN	stat. C0 KN			Kg
100	140	20	112	128	1,1	0,6	26	107	133	135	1	0,6	60,5	65,5	DSCB 0500	71920 CD/P4A	0,80
	140	20	122	128	1,1	0,6	38	107	133	135	1	0,6	57,2	63	DSCB 0501	71920 ACD/P4A	0,80
	150	24	116	134	1,5	0,6	29	109	141	145	1,5	0,6	83,2	85	DSCB 0502	7020 CD/P4A	1,25
	150	24	116	134	1,5	0,6	41	109	141	145	1,5	0,6	79,3	80	DSCB 0503	7020 ACD/P4A	1,25
	180	34	124	155	2,1	1	36	112	168	173	2	1	156	137	DSCB 0504	7220 CD/P4A	3,25
	180	34	124	155	2,1	1	50	112	168	173	2	1	148	129	DSCB 0505	7220 ACD/P4A	3,25
105	145	20	117	133	1,1	0,6	37	112	138	140	1	0,6	61,8	69,5	DSCB 0506	71921 CD/P4A	0,82
	145	20	117	133	1,1	0,6	39	112	138	140	1	0,6	57,2	65,5	DSCB 0507	71921 ACD/P4A	0,82
	160	26	122	143	2	1	31	115	150	154	2	1	95,6	96,5	DSCB 0508	7021 CD/P4A	1,60
	160	26	122	143	2	1	44	115	150	154	2	1	90,4	93	DSCB 0509	7021 ACD/P4A	1,60
	190	36	131	164	2,1	1,1	38	117	178	183	2	1	172	153	DSCB 0510	7221 CD/P4A	3,85
	190	36	131	164	2,1	1,1	53	117	178	183	2	1	163	146	DSCB 0511	7221 CD/P4A	3,85
110	150	20	122	138	1,1	0,6	27	117	143	145	1	0,6	62,4	72	DSCB 0512	71922 CD/P4A	0,86
	150	20	122	138	1,1	0,6	40	117	143	145	1	0,6	58,5	68	DSCB 0513	71922 ACD/P4A	0,86
	170	28	129	151	2	1	33	120	160	164	2	1	111	108	DSCB 0514	7022 CD/P4A	1,95
	170	28	129	151	2	1	47	120	160	164	2	1	104	104	DSCB 0515	7022 ACD/P4A	1,95
	200	38	138	172	2,1	1,1	40	122	188	193	2	1	178	166	DSCB 0516	7222 CD/P4A	4,55
	200	38	138	172	2,1	1,1	55	122	188	193	2	1	168	160	DSCB 0517	7222 ACD/P4A	4,55
120	165	22	133	152	1,1	0,6	30	127	158	160	1	0,6	78	91	DSCB 0518	71924 CD/P4A	1,15
	165	22	133	152	1,1	0,6	44	127	158	160	1	0,6	72,8	86,5	DSCB 0519	71924 CD/P4A	1,15
	180	28	139	161	2	1	34	130	170	174	2	1	114	122	DSCB 0520	7024 CD/P4A	2,10
	180	28	139	161	2	1	49	130	170	174	2	1	111	116	DSCB 0521	7024 ACD/P4A	2,10
	215	40	150	187	2,1	1,1	43	132	203	208	2	1	199	193	DSCB 0522	7224 CD/P4A	5,40
	215	40	150	187	2,1	1,1	60	132	203	208	2	1	190	183	DSCB 0523	7224 ACD/P4A	5,40
	215	40	157	180	2,1	1,1	90	132	203	208	2	1	165	163	DSCB 0524	7224 BCBM/P5	6,10
	215	40	157	180	2,1	1,1	90	132	203	208	2	1	165	163	DSCB 0525	7224 BGAM/P5	6,10
130	180	24	145	165	1,5	0,6	33	139	171	175	1,5	0,6	92,3	108	DSCB 0526	71926 CD/P4A	1,55
	180	24	145	165	1,5	0,6	48	139	171	175	1,5	0,6	87,1	102	DSCB 0527	71926 ACD/P4A	1,55
	200	33	152	178	2	1	39	140	190	194	2	1	148	156	DSCB 0528	7026 CD/P4A	3,20
	200	33	152	178	2	1	55	140	190	194	2	1	140	150	DSCB 0529	7026 ACD/P4A	3,20
	230	40	162	200	3	1,1	44	144	216	223	2,5	1	216	224	DSCB 0530	7226 CD/P4A	6,30
	230	40	162	200	3	1,1	62	144	216	223	2,5	1	203	212	DSCB 0531	7226 ACD/P4A	6,30
	230	40	169	193	3	1,1	96	144	216	223	2,5	1	186	193	DSCB 0532	7226 BM/P5	6,95
140	190	24	155	175	1,5	0,6	34	149	181	185	1,5	0,6	95,6	116	DSCB 0533	71928 CD/P4A	1,65
	190	24	155	175	1,5	0,6	51	149	181	185	1,5	0,6	90,4	110	DSCB 0534	71928 ACD/P4A	1,65
	210	33	162	188	2	1	40	150	200	204	2	1	153	166	DSCB 0535	7028 CD/P4A	3,40
	210	33	162	188	2	1	58	150	200	204	2	1	146	156	DSCB 0536	7028 ACD/P4A	3,40
	250	42	169	208	3	1,1	103	154	236	243	2,5	1	182	196	DSCB 0537	7228 BM/P5	8,85







DISTITEC																	SKF	
d	D	B	d_1 ≈	D_1 ≈	$r_{1,2}$ min	$r_{3,4}$ min	a	Adjacent dimensions d_a min	D_a max	D_b max	r_a max	r_b max	load coefficients dyn. C KN	stat. C0 KN	CODE	CODE	Weight Kg
150	210	28	168	192	2	1	38	160	200	204	2	1	125	146	DSCB 0538	71930 CD/P4A	2,55
	210	28	168	192	2	1	56	160	200	204	2	1	119	140	DSCB 0539	71930 ACD/P4A	2,55
	225	35	174	201	2,1	1	43	162	213	219	2	1	172	190	DSCB 0540	7030 CD/P4A	4,15
	225	35	174	201	2,1	1	62	162	213	219	2	1	163	180	DSCB 0541	7030 ACD/P4A	4,15
160	220	28	178	202	2	1	40	170	210	214	2	1	130	160	DSCB 0542	71932 CD/P4A	2,70
	220	28	178	202	2	1	58	170	210	214	2	1	124	153	DSCB 0543	71932 ACD/P4A	2,70
	240	38	185	215	2,1	1	46	172	228	234	2	1	195	216	DSCB 0544	7032 CD/P4A	5,10
	240	38	185	215	2,1	1	66	172	228	234	2	1	182	204	DSCB 0545	7032 ACD/P4A	5,10
170	230	28	188	212	2	1	41	180	220	224	2	1	133	166	DSCB 0546	71934 CD/P4A	2,85
	230	28	188	212	2	1	61	180	220	224	2	1	124	160	DSCB 0547	71934 ACD/P4A	2,85
	260	42	199	231	2,1	1,1	50	182	248	253	2	1	212	245	DSCB 0548	7034 CD/P4A	6,85
	260	42	199	231	2,1	1,1	71	182	248	253	2	1	199	232	DSCB 0549	7034 ACD/P4A	6,85
180	250	33	201	229	2	1	54	190	240	244	2	1	168	212	DSCB 0550	71936 CD/P4A	4,20
	250	33	201	229	2	1	67	190	240	244	2	1	159	200	DSCB 0551	71936 ACD/P4A	4,20
	280	46	212	248	2,1	1,1	54	192	268	273	2	1	242	290	DSCB 0552	7036 CD/P4A	8,90
	280	46	212	248	2,1	1,1	77	192	268	273	2	1	229	275	DSCB 0553	7036 ACD/P4A	8,90
190	260	33	211	239	2	1	47	200	250	254	2	1	172	220	DSCB 0554	71938 CD/P4A	4,35
	260	33	211	239	2	1	69	200	250	254	2	1	163	208	DSCB 0555	71938 ACD/P4A	4,35
	290	46	222	258	2,1	1,1	55	202	278	283	2	1	247	300	DSCB 0556	7038 CD/P4A	9,35
	290	46	222	258	2,1	1,1	79	202	278	283	2	1	234	290	DSCB 0557	7038 ACD/P4A	9,35
200	280	38	224	256	2,1	1	51	212	268	274	2	1	208	265	DSCB 0558	71940 CD/P4A	6,10
	280	38	224	256	2,1	1	75	212	268	274	2	1	199	250	DSCB 0559	71940 ACD/P4A	6,10
	310	51	234	276	2,1	1,1	60	212	298	303	2	1	296	390	DSCB 0560	7040 CD/P4A	12,00
	310	51	234	276	2,1	1,1	85	212	298	303	2	1	281	365	DSCB 0561	7040 ACD/P4A	12,00
220	300	38	244	276	2,1	1	54	232	288	294	2	1	221	300	DSCB 0562	71944 CD/P4A	6,60
	300	38	244	276	2,1	1	80	232	288	294	2	1	208	285	DSCB 0563	71944 ACD/P4A	6,60
	340	56	258	302	3	1,1	66	234	326	333	2,5	1	338	455	DSCB 0564	7044 CD/P4A	16,00
	340	56	258	302	3	1,1	94	234	326	333	2,5	1	319	440	DSCB 0565	7044 ACD/P4A	16,00
240	320	38	267	295	2,1	1,1	84	252	308	313	2	1	212	300	DSCB 0566	71948 ACD	8,50
	360	56	278	322	3	1,1	68	254	346	353	2,5	1	345	490	DSCB 0567	7048 CD/P4A	17,00
	360	56	278	322	3	1,1	98	254	346	353	2,5	1	325	465	DSCB 0568	7048 ACD/P4A	17,00
280	380	46	313	349	2,1	1,1	119	292	368	373	2	1	255	380	DSCB 0569	71965 ACD/P5	15,00
	420	65	335	367	4	1,5	74	298	402	411	3	1,5	390	610	DSCB 0570	7056 CGAM/P5	30,00
	420	65	335	367	4	1,5	134	298	402	411	3	1,5	351	550	DSCB 0571	7056 AM/P5	30,00
300	460	74	363	400	4	1,5	147	318	442	451	3	1,5	423	695	DSCB 0572	7060 AM/P5	42,50
360	540	82	431	474	5	2	171	382	518	530	4	2	520	950	DSCB 0573	7072 AM/P5	62,50
380	480	46	413	448	2,1	1,1	123	392	468	473	2	1	291	500	DSCB 0574	71876 ACGAMB/P5	18,00
	520	65	427	475	4	1,5	137	398	502	511	3	1,5	410	735	DSCB 0575	71976 ACGAMB/P5	41,50
	560	82	451	495	5	2	177	402	538	550	4	2	507	950	DSCB 0576	7076 AMB/P5	65,50
460	580	56	498	540	3	3	178	474	566	566	2,5	2,5	371	765	DSCB 0577	71892 AMB/P5	34,50
	680	100	547	599	6	3	215	488	652	666	5	2,5	689	1.460	DSCB 0578	7092 AM/P5	120,00
530	650	56	570	612	3	1,1	198	544	636	643	2,5	1	390	900	DSCB 0579	718/530 AMB/P4	39,50
670	820	69	720	772	4	1,5	250	688	802	811	3	1,5	527	1.250	DSCB 0580	718/670 AMB/P5	80,00
710	870	74	763	818	4	1,5	221	728	852	861	3	1,5	605	1.630	DSCB 0581	718/710 ACMB/P5	93,50

TAPERED ROLLER AXIAL BEARINGS

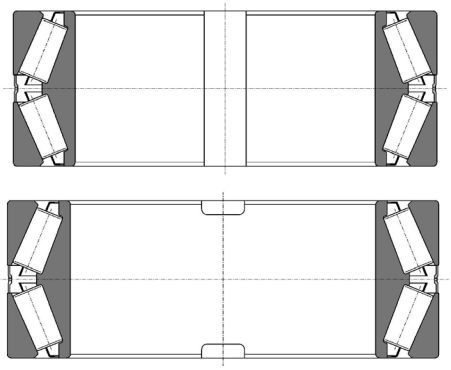
Tapered roller axial bearings allow the creation of compact axial systems, they are able to support very high axial loads, they are insensitive to shocks and they are very rigid.
Being removable, the caged types can be implemented by easily and separately mounting the two washers and the roller cage assembly.
Double effect axial bearings are mainly used in rolling mills, in combination with radial types with more cylindrical rollers crowns
Given that double effect tapered roller axial bearings are usually mounted with free coupling, both on the neck of the cylinder and the housing of the packing (guarnizione), in order to prevent the rotation on the site (non sono sicura di site), shaft's washer is equipped with one or two stop notches, into which a key or something similar has to be inserted.

There are two types of execution:

EXECUTION EZB.1

This execution, with flat central washer, is the most common one, because it tolerates a slight eccentricity of the shaft compared to the housing hole, radial bearing's inner radial clearance order that accompanies them.
A spacer is placed among the housing washers, proportioned so that the packing (guarnizione) cover screws can be fully tightened; for the bearing, it isn't necessary a special registration with springs (molle)

EXECUTIONS EZB.2 / EZB.3



These executions have tapered raceways on the washers. Thanks to this, they have a higher load capacity compared to that one with the flat central washer and, to some extent, they can also constrain the shaft radially
EXECUTION 2: one stop notch
EXECUTION 3: two stop notches

DIMENSIONS

Tapered roller axial bearings' dimensions haven't been unified.

TOLLERANCES

With some exceptions, hole's and double effect tapered roller axial bearings inner diameter's tolerances are the normal ones according to ISO 199-1979
Tolerances on height and on rotation precision instead are different from normal values. On request, an indication on values related to a specific bearing is given.

MISALIGNMENT

Tapered roller axial bearings with flat washers don't allow any shaft misalignment compared to the housing, not even a quadrature error of the support surfaces.

1 – Housing Washer
2 – Shaft Washer
3 – Cage
4 – Spacer
5 – Tapered Roller

INNER AND OUTER WASHERS

Material: full hardened steel 100Cr6 (UNI 3097 - WNr. 1.3505) or 100CrMo7(WNr. 1.3507) depending on dimensions.

On request, they can be made in case hardening steel for particular applications

Heat Treatment: stress relieving (annealing workability), hardening & tempering. These treatmets will always be done ensuring a SZ0 stabilization (for bearings use without dilatation of the rings untill a temperature of 150°C).
On request, the treatments can be done ensuring a SZ1 & SZ2 final stabilization:
SZ1 - for functioning without dilatation of the rings at 200°C (suffix SZ1)
SZ2 - for functioning without dilatation of the rings at 250°C (suffiz SZ2)

Hardness: 59/62 HRc

CAGE

Tapered roller axial bearings not full complement have a massive brass cage or a steel one of the pin type

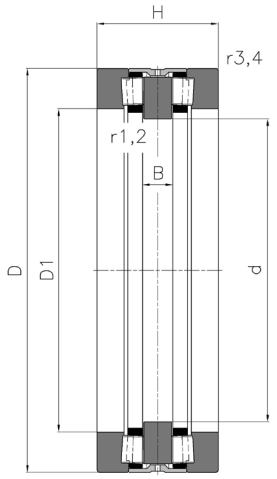
TAPERED ROLLERS

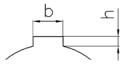
Tapered roller axial bearings have a "logarithmic" profile in the contact between the raceways and the rollers, in order to ensure an optimal distribution of stresses within them and increase the duration

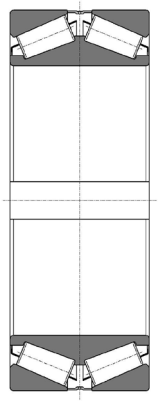
Material: full hardened steel 100Cr6 (UNI 3097
Heat Treatment:stress relieving (annealing workability), hardening & tempering.
Hardness: 60/64 HRc

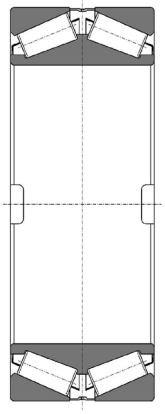
On request, they can be made in case hardening steel for particular applications

TAPERED ROLLER AXIAL BEARINGS - DIMENSIONAL TABLES





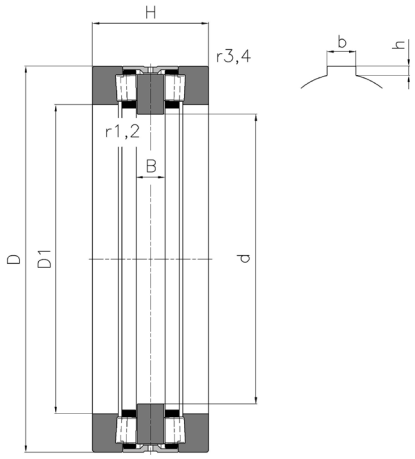


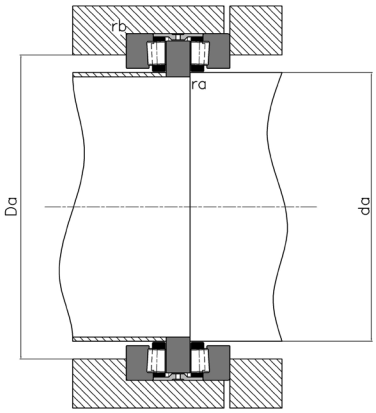


DISTITEC

d	D	H	D_1	B	b	h	$r_{1,2}$ min	$r_{3,4}$ min	Adjacent dimensions d_a	D_a max	r_a max	r_b max	CODE	Excecution
170	240	84	184	20	-	-	0,6	2	182	190	0,6	2	DSTB 0500	EZB.1
180	280	90	196	20	-	-	1	2	192	205	1	2	DSTB 0501	EZB.1
220	300	96	236	22	-	-	0,6	2	231	245	0,6	2	DSTB 0502	EZB.1
240	320	96	256	22	-	-	0,6	2	251	265	0,6	2	DSTB 0503	EZB.1
250	380	100	275	22	30	6,7	0,6	2	267	285	0,6	2	DSTB 0504	EZB.1
260	360	92	285	20	-	-	1	2	276	290	1	2	DSTB 0505	EZB.1
305,07	530	200	410	200	36,1	30	6,4	6,4	363	410	6	6	DSTB 0507	EZB.2
320	440	108	355	26	-	-	1,1	3	348	360	1	2,5	DSTB 0508	EZB.1
	470	130	350	30	-	-	1,1	3	340	360	1	2,5	DSTB 0509	EZB.1
350	490	130	390	30	-	-	1,1	3	380	400	1	2,5	DSTB 0510	EZB.1
	540	135	400	30	-	-	1,1	4	384	405	1	3	DSTB 0511	EZB.1
380	560	130	430	32	45	10	1,5	3	416	435	1,5	2,5	DSTB 0512	EZB.1
	650	215	450	65	55	10	2	4	446	470	2	3	DSTB 0513	EZB.1
400	650	200	527	200	50,8	19	4	4	480	527	4	4	DSTB 0514	EZB.2
	650	200	527	200	50,8	19	4	4	480	527	4	4	DSTB 0515	EZB.2
	650	200	527	200	50,8	19	4	4	480	527	4	4	DSTB 0516	EZB.3
420	620	170	465	35	56	10	1,5	3	455	485	1,5	3	DSTB 0517	EZB.1
	620	185	465	50	-	-	1,5	3	455	485	1,5	3	DSTB 0518	EZB.1
440	645	167	490	50	45	11	3	4	480	510	2,5	3	DSTB 0519	EZB.1
450	645	155	490	38	45	11	4	4	480	510	3	3	DSTB 0520	EZB.1
470	720	200	535	50	55	11	2	4	515	550	2	3	DSTB 0521	EZB.1
	720	200	535	40	55	10	2	4	515	550	2	3	DSTB 0522	EZB.1
	720	210	535	60	-	-	2	4	515	550	2	3	DSTB 0523	EZB.1
530	710	218	575	57	45	10	2	3	560	590	2	2,5	DSTB 0524	EZB.1
550	760	230	610	50	45	10	2	5	585	585	2	4	DSTB 0525	EZB.1
600	880	290	680	70	-	-	5	6	670	670	4	5	DSTB 0526	EZB.1
	910	290	680	70	45	12	5	6	670	670	4	5	DSTB 0527	EZB.1
670	900	230	725	50	45	12	2	5	705	705	2	4	DSTB 0528	EZB.1
270	450	180	310	45	40	10	2	5	300	325	2	4	DSTR 0506	EZB.1

DIMENSIONAL TABLES





	DISTITEC-SKF		SKF		FAG			
	load coefficients		CODE	Excecution	CODE	load coefficients		Weight
	din. C KN	stat. C0 KN				din. C KN	stat. C0 KN	Kg
	330	1290	350980 C	BFD.1	528974	380	1430	12,5
	561	2400	353162	BFD.1	528294	720	3250	22
	440	1660	351019 C	BFD.1	528876	570	2240	20
	418	1900	351182 C	BFD.1	529086	610	2600	21,5
	897	4550	353005	BFD.1	522010	980	5200	43,5
	605	2600	350981 C	BFD.1	509352	680	3100	28
	2380	10600	BFDB 353194/HB3	BFD.2	-	-	-	185
	990	4650	353102 C	BFD.1	528562	980	4900	48,5
	1300	5700	350982 C	BFD.1	509654	1340	6550	80
	1170	5100	351100 C	BFD.1	530739	1320	6700	73,5
	1720	9150	353006	BFD.1	522008	1800	10400	115
	1790	10000	351175 C	BFD.1	513125	1800	10800	110
	3360	16600	BFDB 353204	BFD.1	545936	3750	19300	275
	2700	13700	353106	BFD.2	-	-	-	235
	2700	13700	353106 C	BFD.2	-	-	-	235
	2700	13700	353106 D	BFD.3	-	-	-	230
	2420	12200	351121 C	BFD.1	509392	2280	12000	185
	2420	12200	BFDB 353200/HA3	BFD.1	545991	2280	12000	200
	1980	10800	353152	BFD.1	534038	2240	12700	190
	1980	10800	350916 D	BFD.1	513401	2240	12700	170
	3410	17600	353151	BFD.1	509391	3400	19300	285
	3410	17600	351301 B	BFD.1	-	-	-	285
	3410	17600	BFDB 353238/HA3	BFD.1	549701	3400	19300	305
	2200	11000	351475 C	BFD.1	511746	2700	14000	245
	2920	13200	350976 C	BFD.1	515196	3200	16300	310
	4730	21200	BFDB 350824 B/HA1	BFD.1	-	-	-	550
	4730	21200	350901 C	BFD.1	-	-	-	655
	3580	19000	351761 A	BFD.1	521823	3800	21200	425
	1650	6000	351164 C	BFD.1	527907	2000	8500	120

TOLERANCES (P0/P6) - DIN 620 - RADIAL BEARINGS

Tolerances for radial bearings (excluded tapered rollers) of precision class P0 (µm)

Inner ring d (mm)		Δdmp		VDp diametric series			VDmp	ΔCs		VCs	Kea
				8,9	0,1	2,3,4					
more then	up to	sup.	inf.	max	max	max	max	min	max	max	max
80	120	0	-20	25	25	15	15	-200	0	25	25
120	180	0	-25	31	31	19	19	-250	0	30	30
180	250	0	-30	38	38	23	23	-300	0	30	40
250	315	0	-35	44	44	26	26	-350	0	35	50
315	400	0	-40	50	50	30	30	-400	0	40	60
400	500	0	-45	56	56	34	34	-450	0	50	65
500	630	0	-50	63	63	38	38	-500	0	60	70
630	800	0	-75	-	-	-	-	-750	0	70	80
800	1.000	0	-100	-	-	-	-	-1000	0	80	90
1.000	1.250	0	-125	-	-	-	-	-1250	0	100	100
1.250	1.600	0	-160	-	-	-	-	-1600	0	120	120
1.600	2.000	0	-200	-	-	-	-	-2000	0	140	140

Tolerances for radial bearings (excluded tapered rollers) of precision class P0 (µm)

Outer ring d (mm)		Δdmp		VDp diametric series			VDmp	Kea
				8,9	0,1	2,3,4		
more then	up to	sup.	inf.	max	max	max	max	max
80	120	0	-15	19	19	11	11	35
120	150	0	-18	23	23	14	14	40
150	180	0	-25	31	31	19	19	45
180	250	0	-30	38	38	23	23	50
250	315	0	-35	44	44	26	26	60
315	400	0	-40	50	50	30	30	70
400	500	0	-45	56	56	34	34	80
500	630	0	-50	63	63	38	38	100
630	800	0	-75	94	94	55	55	120
800	1.000	0	-100	125	125	75	75	140
1,000	1.250	0	-125	-	-	-	-	160
1.250	1.600	0	-160	-	-	-	-	190
1.600	2.000	0	-200	-	-	-	-	220
2.000	2.500	0	-250	-	-	-	-	250

Tolerances for radial bearings (excluded tapered rollers) of precision class P6 (µm)

Inner ring d (mm)		Δdmp		VDp diametric series			VDmp	ΔCs		VCs	Kea
				8,9	0,1	2,3,4					
more then	up to	sup.	inf.	max	max	max	max	min	max	max	max
80	120	0	-15	19	19	11	11	-200	0	25	13
120	180	0	-18	23	23	14	14	-250	0	30	18
180	250	0	-22	28	28	17	17	-300	0	30	20
250	315	0	-25	31	31	19	19	-350	0	35	25
315	400	0	-30	38	38	23	23	-400	0	40	30
400	500	0	-35	44	44	26	26	-450	0	45	35
500	630	0	-40	50	50	30	30	-500	0	50	40
630	800	0	-50	-	-	-	-	-750	0	55	45
800	1.000	0	-65	-	-	-	-	-1000	0	60	50
1.000	1.250	0	-80	-	-	-	-	-1250	0	70	60
1.250	1.600	0	-100	-	-	-	-	-1600	0	70	70
1.600	2.000	0	-130	-	-	-	-	-2000	0	80	80

Tolerances for radial bearings (excluded tapered rollers) of precision class P6 (µm)

Outer ring D (mm)		Δdmp		VDp diametric series			VDmp	Kea
				8,9	0,1	2,3,4		
more then	up to	sup.	inf.	max	max	max	max	max
80	120	0	-13	16	16	10	10	18
120	150	0	-15	19	19	11	11	20
150	180	0	-18	23	23	14	14	23
180	250	0	-20	25	25	15	15	25
250	315	0	-25	31	31	19	19	30
315	400	0	-28	35	35	21	21	35
400	500	0	-33	41	41	25	25	40
500	630	0	-38	48	48	29	29	50
630	800	0	-45	56	56	34	34	60
800	1.000	0	-60	75	75	45	45	75
1,000	1.250	0	-80	-	-	-	-	85
1.250	1.600	0	-100	-	-	-	-	100
1.600	2.000	0	-130	-	-	-	-	100
2.000	2.500	0	-160	-	-	-		120

TOLERANCES (P5/P4) – DIN 620 - RADIAL BEARINGS

Tolerances for radial bearings (excluded tapered rollers) of precision class P5 (µm)

Inner ring d (mm)		Δdmp		VDp diametric series 8,9	VDp diametric series 0,1,2,3,4	VDmp	ΔCs		VCs	Kea	Sd
more then	up to	sup.	inf.	max	max	max	min	max	max	max	max
80	120	0	-10	10	8	5	-200	0	7	6	9
120	180	0	-13	13	10	7	-250	0	8	8	10
180	250	0	-15	15	12	8	-300	0	10	10	11
250	315	0	-18	18	14	9	-350	0	13	13	13
315	400	0	-23	23	18	12	-400	0	15	15	15
400	500	0	-27	28	21	14	-450	0	18	17	18
500	630	0	-33	35	26	18	-500	0	20	19	20
630	800	0	-40	-	-	-	-750	0	26	22	26
800	1.000	0	-50	-	-	-	-1000	0	32	26	32
1.000	1.250	0	-65	-	-	-	-1250	0	38	30	38
1.250	1.600	0	-80	-	-	-	-1600	0	45	35	45
1.600	2.000	0	-100	-	-	-	-2000	0	55	40	55

Tolerances for radial bearings (excluded tapered rollers) of precision class P5 (µm)

Outer ring D (mm)		Δdmp		VDp diametric series 8,9	VDp diametric series 0,1,2,3,4	VDmp	VCs	Kea	Sd
more then	up to	sup.	inf.	max	max	max	max	max	max
80	120	0	-10	10	8	5	8	10	9
120	150	0	-11	11	8	6	8	11	10
150	180	0	-13	13	10	7	8	13	10
180	250	0	-15	15	11	8	10	15	11
250	315	0	-18	18	14	9	11	18	13
315	400	0	-20	20	15	10	13	20	13
400	500	0	-23	23	17	12	15	23	15
500	630	0	-28	28	21	14	18	25	18
630	800	0	-35	35	26	18	20	30	20
800	1.000	0	-40	50	29	25	25	35	30
1.000	1.250	0	-50	-	-	-	30	50	40
1.250	1.600	0	-65	-	-	-	40	65	50

Tolerances for radial bearings (excluded tapered rollers) of precision class P4 (µm)

Inner ring d (mm)		Δdmp		VDp diametric series 8,9	VDp diametric series 0,1,2,3,4	VDmp	ΔCs		VCs	Kea	Sd
more then	up to	sup.	inf.	max	max	max	min	max	max	max	max
80	120	0	-8	8	6	4	-200	0	4	5	5
120	180	0	-10	10	8	5	-250	0	5	6	6
180	250	0	-12	12	9	6	-300	0	6	8	7
250	315	0	-15	-	-	-	-350	0	7	8	7
315	400	0	-19	-	-	-	-400	0	8	10	8
400	500	0	-23	-	-	-	-450	0	9	10	9
500	630	0	-26	-	-	-	-500	0	10	12	10
630	800	0	-34	-	-	-	-750	0	15	15	15

Tolerances for radial bearings (excluded tapered rollers) of precision class P4 (µm)

Outer ring D (mm)		Δdmp		VDp diametric series 8,9	VDp diametric series 0,1,2,3,4	VDmp	VCs	Kea	Sd
more then	up to	sup.	inf.	max	max	max	max	max	max
80	120	0	-8	8	6	4	4	6	5
120	150	0	-9	9	7	5	5	7	5
150	180	0	-10	10	8	5	5	8	5
180	250	0	-11	11	8	6	7	10	7
250	315	0	-13	13	10	7	7	11	8
315	400	0	-15	15	11	8	8	13	10
400	500	0	-20	-	-	-	9	14	10
500	630	0	-25	-	-	-	10	17	12
630	800	0	-28	-	-	-	12	20	14
800	1.000	0	-35	-	-	-	15	25	20
1.000	1.250	0	-40	-	-	-	20	30	25
1.250	1.600	0	-55	-	-	-	25	40	30

TOLERANCES (P0/P6) - DIN 620 - TAPERED ROLLERS

Tapered roller bearings' tolerances precision class P0 (µm)

Inner ring d (mm)		Δdmp		VDp	VDmp	ΔCs		Kea	ΔTs	
more then	up to	sup.	inf.	max	max	min	max	max	min	max
80	120	0	-20	20	15	-200	0	30	-200	+200
120	180	0	-25	25	19	-250	0	35	-250	+350
180	250	0	-30	30	23	-300	0	50	-250	+350
250	315	0	-35	35	26	-350	0	60	-250	+350
315	400	0	-40	40	30	-400	0	70	-400	+400
400	500	0	-45	45	-	-450	0	70	-400	+400
500	630	0	-50	50	-	-500	0	85	-500	+500
630	800	0	-75	75	-	-750	0	100	-600	+600
800	1.000	0	-100	100	-	-1000	0	120	-750	+750

Tapered roller bearings' tolerances precision class P0 (µm)

Outer ring D (mm)		Δdmp		VDp	VDmp	Kea
more then	up to	sup.	inf.	max	max	max
80	120	0	-18	18	14	35
120	150	0	-20	20	15	40
150	180	0	-25	25	19	45
180	250	0	-30	30	23	50
250	315	0	-35	35	26	60
315	400	0	-40	40	30	70
400	500	0	-45	45	34	80
500	630	0	-50	50	38	100
630	800	0	-75	75	-	120
800	1.000	0	-100	100	-	120
1,000	1.250	0	-125	125	-	120
1.250	1.600	0	-160	160	-	120

Tapered roller bearings' tolerances precision class P6X (µm)

Inner ring d (mm)		Δdmp		VDp	VDmp	ΔCs		Kea	Δ Ts	
more then	up to	sup.	inf.	max	max	min	max	max	min	max
80	120	0	-20	20	15	-50	0	30	0	+100
120	180	0	-25	25	19	-50	0	35	0	+150
180	250	0	-30	30	23	-50	0	50	0	+150
250	315	0	-35	35	26	-50	0	60	0	+200
315	400	0	-40	40	30	-50	0	70	0	+200

Tapered roller bearings' tolerances precision class P6X (µm)

Outer ring D (mm)		Δdmp		VDp	VDmp	ΔCs		Kea
more then	up to	sup.	inf.	max	max	min	max	max
80	120	0	-18	18	14	-100	0	35
120	150	0	-20	20	15	-100	0	40
150	180	0	-25	25	19	-100	0	45
180	250	0	-30	30	23	-100	0	50
250	315	0	-35	35	26	-100	0	60
315	400	0	-40	40	30	-100	0	70
400	500	0	-45	45	34	-100	0	80
500	630	0	-50	50	38	-100	0	100

Tapered roller bearings' tolerances precision class P4 (µm)

Inner ring d (mm)		Δdmp		VDp	VDmp	ΔCs		Kea	Sd	ΔTs	
more then	up to	sup.	inf.	max	max	min	max	max	max	min	max
80	120	0	-10	8	5	-400	0	5	5	-200	+200
120	180	0	-13	10	7	-500	0	6	6	-250	+350
180	250	0	-15	11	8	-600	0	8	7	-250	+350

Tapered roller bearings' tolerances precision class P4 (µm)

Outer ring D (mm)		Δdmp		VDp	VDmp	Kea	SD	Sea
more then	up to	sup.	inf.	max	max	max	max	max
80	120	0	-10	8	5	6	5	6
120	150	0	-11	8	6	7	5	7
150	180	0	-13	10	7	8	5	8
180	250	0	-15	11	8	10	7	10
250	315	0	-18	14	9	11	8	10
315	400	0	-20	15	10	13	10	13

Tapered roller bearings' tolerances precision class P5 (µm)

Inner ring d (mm)		Δdmp		VDp	VDmp	ΔCs		Kea	Sd	ΔTs	
more then	up to	sup.	inf.	max	max	min	max	max	max	min	max
80	120	0	-15	11	8	-400	0	8	9	-200	+200
120	180	0	-18	14	9	-500	0	11	10	-250	+350
180	250	0	-22	17	11	-600	0	13	11	-300	+350
250	315	0	-25	-	-	-	0	-	13	-350	+350
315	400	0	-30	-	-	-	0	-	15	-400	+400
400	500	0	-35	-	-	-	0	-	17	-450	+400
500	630	0	-40	-	-	-	0	-	20	-500	+500
630	800	0	-75	-	-	-	0	-	30	-750	+600

Tapered roller bearings' tolerances precision class P5 (µm)

Outer ring D (mm)		Δdmp		VDp	VDmp	Kea	SD
more then	up to	sup.	inf.	max	max	max	max
80	120	0	-13	10	7	10	9
120	150	0	-15	11	8	11	10
150	180	0	-18	14	9	13	10
180	250	0	-20	15	10	15	11
250	315	0	-25	19	13	18	13
315	400	0	-28	22	14	20	13
400	500	0	-33	-	-	23	15
500	630	0	-38	-	-	25	18
630	800	0	-45	-	-	30	20
800	1.000	0	-60	-	-	35	30

HEIGHT'S TOLERANCE - RADIAL CLEARANCE

BEARING'S HEIGHT - Axial roller bearings' tolerances (precision classes P0,P6,P5)

bearing's height d (mm)		ΔTS		ΔT1S		ΔT2S		ΔT3S		ΔT4S - ISO	
more then	up to	sup.	inf.	sup.	inf.	supe.	inf.	supe.	inf.	sup.	inf.
-	30	+20	-250	+100	-250	+150	-400	+300	-400	+20	-300
30	50	+20	-250	+100	-250	+150	-400	+300	-400	+20	-300
50	80	+20	-300	+100	-300	+150	-500	+300	-500	+20	-300
80	120	+25	-300	+150	-300	+200	-500	+400	-500	+25	-300
120	180	+25	-400	+150	-400	+200	-600	+400	-600	+25	-400
180	250	+30	-400	+150	-400	+250	-600	+500	-600	+30	-400
250	315	+40	-400	-	-	-	-	-	-	+40	-400
315	400	+40	-500	-	-	-	-	-	-	+40	-500
400	500	+50	-500	-	-	-	-	-	-	+50	-500
500	630	+60	-600	-	-	-	-	-	-	+60	-600
630	800	+70	-750	-	-	-	-	-	-	+70	-750
800	1000	+80	-1000	-	-	-	-	-	-	+80	-1000
1000	1250	+100	-1400	-	-	-	-	-	-	+100	-1400
1250	1600	+120	-1600	-	-	-	-	-	-	+120	-1600

Inner radial clearance of cylindrical roller bearings with tapered hole

hole's diameter (mm)		Inner radial clearance (µm)													
		C1		SPC2		C2		Normal		C3		C4		C5	
more then	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
80	100	10	30	25	45	15	50	50	85	75	110	105	140	155	190
100	120	10	30	25	50	15	55	50	90	85	125	125	165	180	220
120	140	10	35	30	60	15	60	60	105	100	145	140	190	200	245
140	160	10	35	35	65	20	70	70	120	115	165	165	215	228	275
160	180	10	40	35	75	25	75	75	125	120	170	170	220	280	300
180	200	15	45	40	80	35	90	90	145	140	195	195	250	275	330
200	225	15	50	45	90	45	105	105	165	160	220	220	280	305	365
225	250	15	50	50	100	45	110	110	175	170	235	235	300	330	396
250	280	20	55	55	110	55	125	125	195	190	260	260	330	370	440
280	315	20	60	60	120	55	130	130	205	200	275	275	350	410	485
315	355	20	65	65	135	65	145	145	225	225	305	305	385	455	535
355	400	25	75	75	150	100	190	190	280	280	370	370	460	510	600
400	450	25	85	85	170	110	210	210	310	310	410	410	510	565	665
450	500	25	95	95	190	110	220	220	330	330	440	440	550	625	735
500	560	25	105	105	210	120	240	240	360	360	480	480	600	690	810
560	630	25	115	115	230	140	260	260	380	380	500	500	620	780	900
630	710	30	130	130	260	145	285	285	425	425	560	560	705	865	1.005
710	800	35	145	145	290	150	310	310	470	470	630	630	790	975	1.135
800	900	40	160	160	320	180	350	350	520	520	690	690	860	1.095	1.265
900	1.000	-	-	-	-	200	390	390	580	580	770	770	960	1.215	1.405
1.000	1.120	-	-	-	-	220	430	430	640	640	850	850	1.060	1.355	1.565
1.120	1.250	-	-	-	-	230	470	470	710	710	950	950	1.190	1.510	1.750
1.250	1.400	-	-	-	-	270	530	530	790	790	1.050	1.050	1.310	1.680	1.940
1.400	1.600	-	-	-	-	330	610	610	890	890	1.170	1.170	1.450	1.920	2.200
1.600	1.800	-	-	-	-	380	700	700	1.020	1.020	1.340	1.340	1.660	2.160	2.480
1.800	2.000	-	-	-	-	400	760	760	1.120	1.120	1.480	1.480	1.840	2.390	2.760

Inner radial clearance of cylindrical roller bearings with tapered hole

hole's diameter (mm)		Inner radial clearance (µm)													
		C1		SPC2		C2		Normal		C3		C4		C5	
more then	up to	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
80	100	35	55	45	70	40	75	70	105	95	130	120	155	175	210
100	120	40	60	50	80	50	90	90	130	115	155	140	180	200	240
120	140	45	70	60	90	55	100	100	145	130	175	160	205	225	270
140	160	50	75	65	100	60	110	110	160	145	195	180	230	255	305
160	180	55	85	75	110	75	125	125	175	160	210	195	245	280	330
180	200	60	90	80	120	85	140	140	195	180	235	220	275	305	360
200	225	60	95	90	135	95	155	155	215	200	260	245	305	340	400
225	250	65	100	100	150	105	170	170	235	220	285	270	335	375	440
250	280	75	11	110	165	115	185	185	255	240	310	295	365	415	485
280	315	80	120	120	180	130	205	205	280	265	340	325	400	465	560
315	355	90	135	135	200	145	225	225	305	290	370	355	435	515	595
355	400	100	150	150	225	165	255	255	345	330	420	405	495	580	670
400	450	110	170	170	255	185	285	285	385	370	470	455	555	650	750
450	500	120	190	190	285	205	315	315	425	410	520	505	615	720	830
500	560	130	210	210	315	230	350	350	470	455	575	560	680	800	920
560	630	140	230	230	345	260	380	380	500	500	620	620	740	900	1.020
630	710	160	260	260	390	290	435	435	575	565	705	695	835	1.005	1.145
710	800	180	290	290	435	325	480	485	645	630	790	775	935	1.125	1.285
800	900	200	320	320	480	370	540	540	710	700	870	860	1.030	1.265	1.435
900	1.000	-	-	355	540	410	600	600	790	780	970	960	1.150	-	-
1.000	1.120	-	-	395	600	455	665	665	875	865	1.075	1.065	1.275	-	-
1.120	1.250	-	-	400	670	490	730	730	970	960	1.200	1.200	1.440	-	-
1.250	1.400	-	-	490	740	550	810	810	1.070	1.070	1.330	1.330	1.590	-	-
1.400	1.600	-	-	560	840	640	920	920	1.200	1.200	1.480	1.480	1.760	-	-
1.600	1.800	-	-	630	950	700	1.020	1.020	1.340	1.340	1.660	1.660	1.980	-	-
1.800	2.000	-	-	700	1.060	760	1.120	1.120	1.480	1.480	1.840	1.840	2.220	-	-