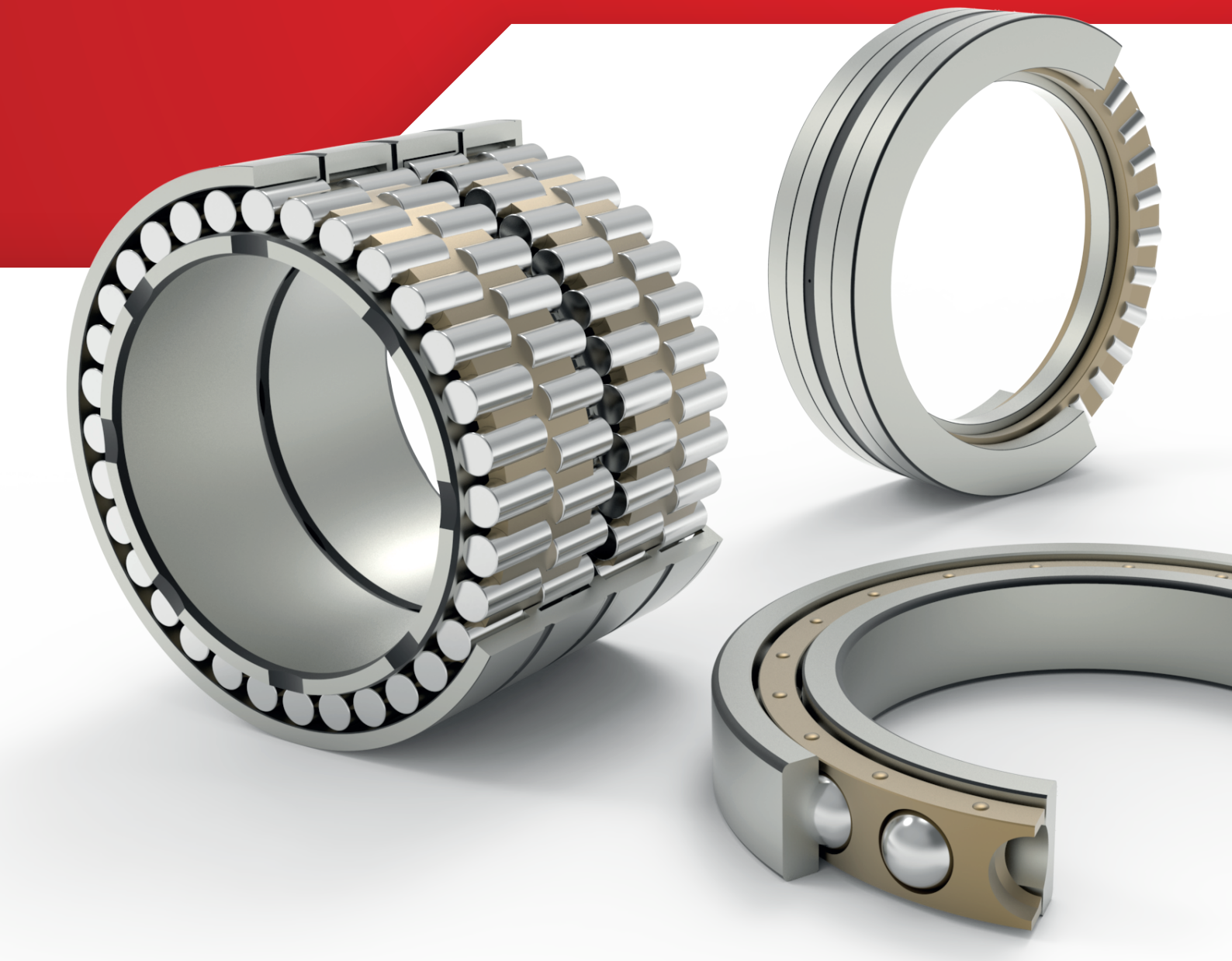
Bearings for rolling mills



EVOLMEC®
EVOLUZIONE MECCANICA

EVOLMEC ® S.r.l.

Evoluzione Meccanica

EVMW-03/2018, «Bearings for rolling mills» catalogue, March 2018

Description

Four-row cylindrical roller 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 roller 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 of cylindrical rollers and equipped cages are mostly used for big cold rolling mills for plane products, where lamination efforts are considerable and the speed very high. Bearings with more than four rows are produced for necks of the cylinders with diameters over about 220 mm. The outer ring is equipped with two not integral edges, while the rollers are self-guided.

Dimensions

The encumbrance sizes of radial cylindrical roller bearings with several rows listed in the tables comply with the norm ISO 15:2017.

Tolerances

Excluding specific customer requests, four-row radial cylindrical roller bearings are normally manufactured with dimensional precision class P6 and form precision class P5, and those with six rows according to the normal precision. Tolerances values, conform to ISO 492:2014, will be found in the tables from page 24 to page 25.

Radial internal clearance

Four-row cylindrical roller 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 one. All bearings of this type, that have an helical groove in the hole of the inner ring, are manufactured with radial inner clearance C2. The values of the clearance limits conform to ISO 5753-1:2009 for the size range covered by this standard. Radial clearance values will be found in the table on the opposite page.

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 100CrMn6 (WNr.1.3520) according to the sizes. On request and for special applications they can be manufactured in case-hardening steel.

Heat treatment: Annealing (annealing of workability), hardening and tempering. These treatments will be always performed ensuring a stabilization S0 (for use of bearings without deformations of the rings up to temperatures of 150°C). On request these treatments can be performed ensuring a final stabilization S1 & S2.

S1- for functioning without deformations of the rings up to 200°C (suffix S1)

S2- for functioning without deformations of the rings up to 250°C (suffix S2).

Hardness: 58/62 HRc

To improve the working of the cage (see the following paragraph) all the outer rings produced by EVOLMEC have the **internal central flange** (see paragraph relating to available executions) **grinded**.

Cage

Material: Generic brass

Multi-row cylindrical roller bearings are generally provided according to the execution with two double pronged machined brass cages **guided on rollers**, steel pin-type cage (and pierced rollers) or with two double row window-type massive brass cages.

Two double pronged machined brass cages produced by EVOLMEC are manufactured with important changes compared to the execution available on the market. These changes ensure an optimal functioning of the cage which is an important and essential component for the good working of rolling bearings. A cage that is quickly manufactured with non-appropriate machining can cause the early death of the rolling system and consequently of the bearing itself.

The two double pronged machined brass cages we had studied have the following changes:

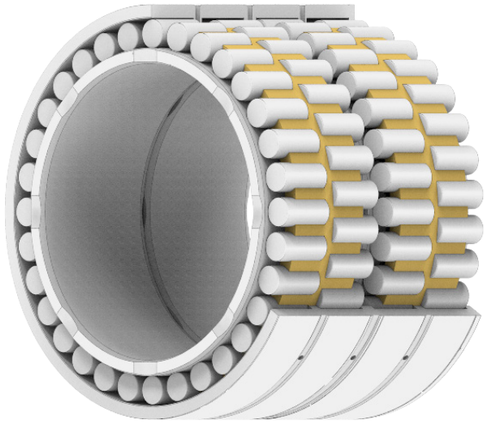
- Production process in several stages in order to minimize to the minimum the internal tensions of the cage.
- Outer central flanges are grinded: it ensures the **cage will be guided correctly on the inner central flange in the outer ring** (which is grinded as well). It ensures the minimization of the power lost by sliding friction, reducing the working temperature of bearing.

Rollers

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

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

Hardness: 60/64 HRc



Designations

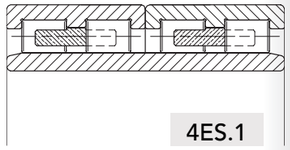
Supplementary designations (prefixes and suffixes) will be found at page 27.

Radial internal clearance of cylindrical roller bearings with cylindrical bore

d		C2		Normal		C3		C4		C5	
>	≤	min	max	min	max	min	max	min	max	min	max
mm		µm		µm		µm		µm		µm	
80	**100**	15	50	50	85	75	110	105	140	155	190
100	**120**	15	55	50	90	85	125	125	165	180	220
120	**140**	15	60	60	105	100	145	140	190	200	245
140	**160**	20	70	70	120	115	165	165	215	228	275
160	**180**	25	75	75	125	120	170	170	220	280	300
180	**200**	35	90	90	145	140	195	195	250	275	330
200	**225**	45	105	105	165	160	220	220	280	305	365
225	**250**	45	110	110	175	170	235	235	300	330	396
250	**280**	55	125	125	195	190	260	260	330	370	440
280	**315**	55	130	130	205	200	275	275	350	410	485
315	**355**	65	145	145	225	225	305	305	385	455	535
355	**400**	100	190	190	280	280	370	370	460	510	600
400	**450**	110	210	210	310	310	410	410	510	565	665
450	**500**	110	220	220	330	330	440	440	550	625	735
500	**560**	120	240	240	360	360	480	480	600	690	810
560	**630**	140	260	260	380	380	500	500	620	780	900
630	**710**	145	285	285	425	425	560	560	705	865	1.005
710	**800**	150	310	310	470	470	630	630	790	975	1.135
800	**900**	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

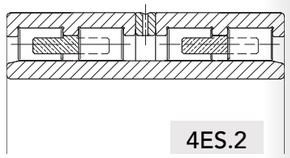
EXECUTION 4ES.1

Two outer rings each with three integral flanges. One inner ring. Two roller guided double pronged machined brass cages. With or without annular groove and/or lubricating holes in the outer rings (see dimensional tables of bearings, dimensions b and k).



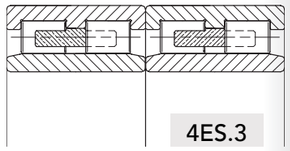
EXECUTION 4ES.2

Two outer rings each with three integral flanges, and with an intermediate ring between the two outer rings. One inner ring. Two roller guided double pronged machined brass cages. With or without annular groove and/or lubricating holes in the outer rings (see dimensional tables of bearings, dimensions b and k).



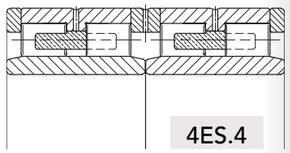
EXECUTION 4ES.3

Two outer rings each with three integral flanges. Two inner rings. Two roller guided double pronged cages of brass. With or without annular groove and/or lubricating holes in the outer rings (see dimensional tables of bearings, dimensions b and k).



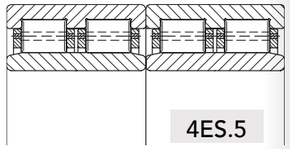
EXECUTION 4ES.4

Two outer rings each with an integral central flange and two loose flange rings; one intermediate ring. Two inner rings. Two roller guided double pronged machined brass cages. With or without annular groove and/or lubricating holes in the outer rings (see dimensional tables of the bearings, dimensions b and k).



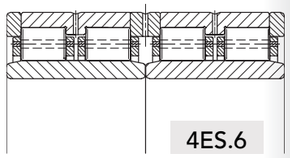
EXECUTION 4ES.5

Two outer rings each with an integral central flange and two loose flange rings; one intermediate ring. Two inner rings. Pierced rollers and four pin-type cages of steel or brass. With or without annular groove and/or lubricating holes in the outer rings (see dimensional tables of the bearings, dimensions b and k).



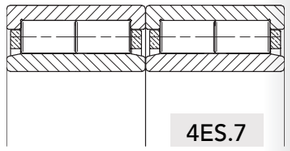
EXECUTION 4ES.6

Two outer rings each with an integral central flange and two loose flange rings; one intermediate ring. Two inner rings. Pierced rollers and four pin-type cages of steel or brass. With or without annular groove and/or lubricating holes in the outer rings (see dimensional tables of the bearing, dimensions b and k).



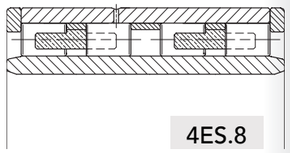
EXECUTION 4ES.7

Two outer rings each with two integral flanges. Two inner rings. Two double row window-type machined brass cages (two rollers per cage pocket)



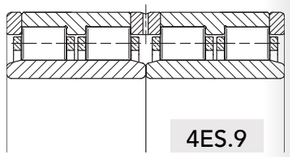
EXECUTION 4ES.8

One outer ring with three loose guide rings and two loose flange rings. One inner ring. Two double pronged machined brass cages. With or without annular groove and/or lubricating holes in the outer ring (see dimensional tables of bearings, dimensions b and k).



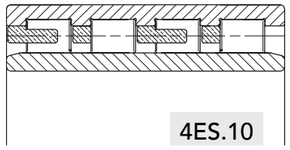
EXECUTION 4ES.9

Two outer rings each with an integral central flange and two loose flange rings; one intermediate ring. Two inner rings. Four pressed steel cages. With or without annular groove and/or lubricating holes in the outer rings (see dimensional tables of bearings, dimensions b and k).



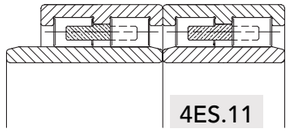
EXECUTION 4ES.10

One outer ring with five integral flanges. One inner ring. Four roller guided pronged cages of brass. With annular groove and lubricating holes in the outer ring (see dimensional tables of bearings, dimensions b and k).



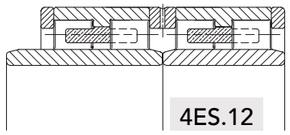
EXECUTION 4ES.11

Two outer rings each with three integral flanges. Two inner rings, one of which is extended. Two roller guided double pronged machined brass cages. With or without annular groove and/or lubrication holes in the outer rings (see dimensional tables of bearings, dimensions b and k).



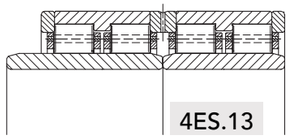
EXECUTION 4ES.12

Two outer rings each with an integral central flange and two loose flange rings; one intermediate ring. Two inner rings, one of which is extended. Two roller guided double pronged machined brass cages. With or without annular groove and/or lubrication holes in the outer rings (see dimensional tables of bearings, dimensions b and k).



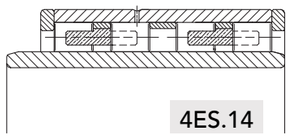
EXECUTION 4ES.13

Two outer rings each with an integral central flange and two loose flange rings; one intermediate ring. Two inner rings, one of which is extended. Pierced rollers and four steel pin-type cages. With or without annular groove and/or lubrication holes in the outer rings (see dimensional tables of bearings, dimensions b and k).



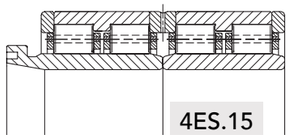
EXECUTION 4ES.14

One outer ring with three loose guide rings and two loose flange rings. One extended inner ring. Two roller guided double pronged machined brass cages. With or without annular groove and/or lubrication holes in the outer ring (see dimensional tables of bearings, dimensions b and k).



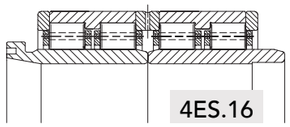
EXECUTION 4ES.15

Two outer rings each with an integral central flange and two loose flange rings; one intermediate ring. Two inner rings, one of which is extended and has a concentric shoulder. Pierced rollers and four steel pin-type cages. With annular groove and lubrication holes in the outer rings (see dimensional tables of bearings, dimensions b and k).



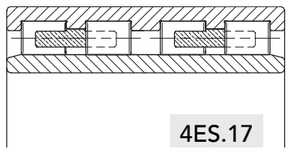
EXECUTION 4ES.16

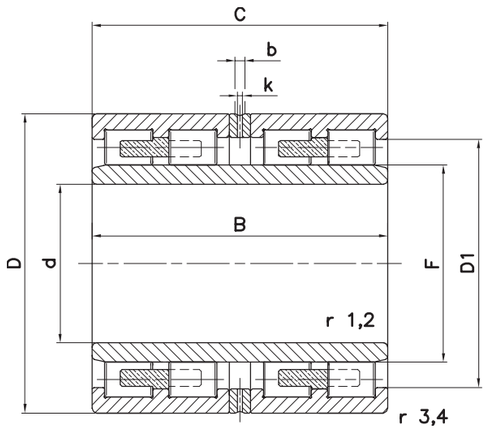
Two outer rings each with an integral central flange and two loose flange rings; one intermediate ring. Two extended inner rings, one of which has a concentric shoulder. Pierced rollers and four steel pin-type cages. With annular groove and lubrication holes in the outer rings (see dimensional tables of bearings, dimensions b and k).



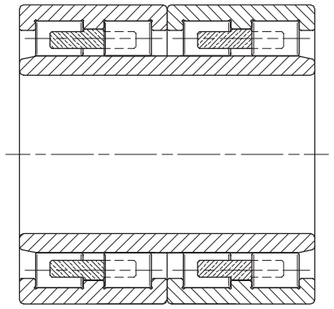
EXECUTION 4ES.17

An outer ring with five integral flanges. An inner ring. Two side-to-side massive brass cage guided on flanges in the outer ring. With or without annular groove and/or lubricating holes in the outer ring (see dimensional tables of bearings, dimensions b and k).

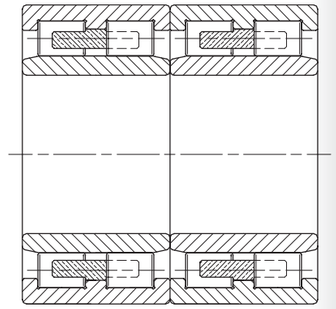




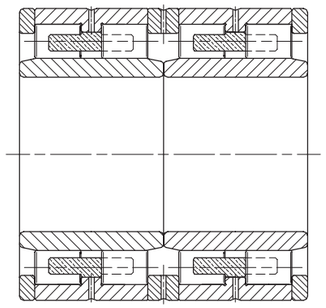
4ES.2



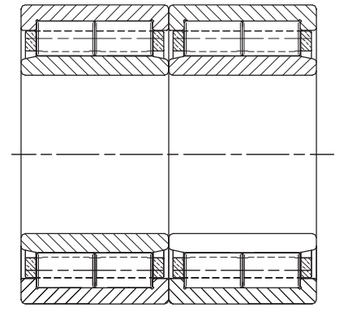
4ES.1



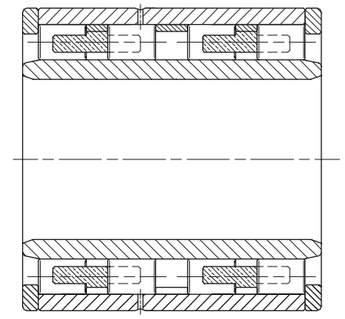
4ES.3



4ES.4



4ES.7

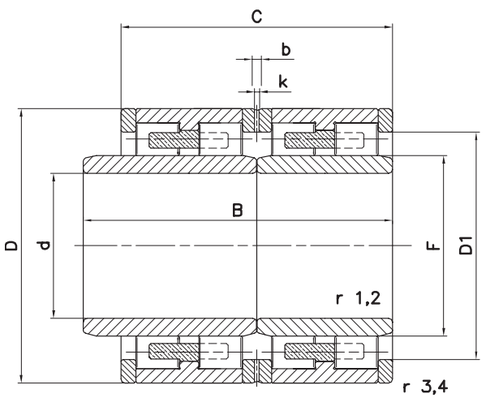


4ES.8

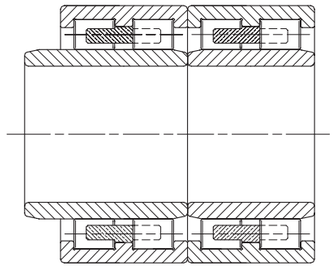
Dimension table

EVOLMEC													SKF			FAG			
										Load rating		CODE	Execution	CODE	Execution	Load rating		CODE	Load rating		Mass
d	D	B	C	F	D_1	b	k	$r_{1,2}$ min	$r_{3,4}$ min	dyn. C	stat. C_0					dyn. C	stat. C_0		dyn. C	stat. C_0	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	-	-	-	-	kN	kN	-	kN	kN	kg
115	165	107,5	90	132,5	151	-	-	1,1	1,1	485	830	**EVNMW.23.11**	**4ES.11**	**BC4B 319738 A**	E.11	402	765	**-**	-	-	8,5
127	174,625	150,812	150,812	139,5	159	-	-	1,1	1,5	810	1.550	**EVNMW.25,4.12**	**4ES.3**	**315643/VJ202**	E.3	627	1.320	**529469.N12BA**	800	1.430	10,5
139,7	215	195	187	156,285	188	-	-	3	0,4	1.440	2.530	**EVNMW.27,9.13**	**4ES.14**	**BC4B 466971 B**	E.14	1.010	2.280	**-**	-	-	25
	215	195	187	159,285	188	-	-	3	0,4	1.450	2.680	**EVNMW.27,9.14**	**4ES.14**	**BC4B 459696**	E.14	1.210	2.550	**-**	-	-	24
145	210	155	155	166	190	-	-	1,1	1,1	935	1.790	**EVNMW.29.15**	**4ES.1/SCFE**	**314625**	E.1/WO	792	1.560	**511605**	1.080	1.930	18
	225	156	156	169	197	-	-	2	2	1.130	2.010	**EVNMW.29.16**	**4ES.1/SCFE**	**313924 A**	E.1/WO	897	1.660	**512764**	1.250	1.960	23
150	230	156	156	174	202	-	-	2	2	1.130	2.010	**EVNMW.30.17**	**4ES.1/SCFE**	**313891 A**	E.1/WO	897	1.660	**506962**	1.140	1.860	24
160	230	130	130	180	210	-	-	1,5	1,5	915	1.600	**EVNMW.32.18**	**4ES.1/SCFE**	**314190**	E.1/WO	781	1.340	**502894B**	830	1.340	17
	230	168	168	179	204	-	-	2	2	1.180	2.210	**EVNMW.32.19**	**4ES.1/SCFE**	**315189 A**	E.1/WO	897	2.200	**510150B**	1.160	2.080	23,5
	233	180	180	178,515	206	8,9	6	2,5	1,8	1.465	2.750	**EVNMW.32.20**	**4ES.8/SVSCFI**	**BC4B 457627 VCA**	E.8/GWI	1.140	2.800	**-**	-	-	26,5
165,1	225,425	168,275	168,275	181	205	-	-	1,5	1,5	1.200	2.250	**EVNMW.33,02.21**	**4ES.3**	**315642/VJ202**	E.3	1.010	2.240	**529468.N12BA**	1.100	2.000	20
170	230	130	130	188,5	211	-	-	2	2	860	1.650	**EVNMW.34.22**	**4ES.2**	**313673**	E.2	671	1.400	**508370**	780	1.400	15
	230	160	160	185,5	212	-	3	2	2	1.150	2.270	**EVNMW.34.23**	**4ES.3**	**BC2B 322340/HB1VJ202**	E.3	1.100	2.360	**567622**	1.200	2.200	19
	240	130	130	190	218	-	-	2	2	1.000	1.840	**EVNMW.34.24**	**4ES.1/SCFE**	**BC4B 635122**	E.1/WO	913	1.830	**510440B**	1.000	1.630	19
	260	225	225	196	230	8,3	4,5	2,1	2,1	1.950	3.720	**EVNMW.34.25**	**4ES.1**	**313587 B**	E.1	1.650	3.350	**505470**	1.930	3.350	43,5
180	260	168	168	202	233	-	-	2,1	2,1	1.400	2.600	**EVNMW.36.26**	**4ES.1/SCFE**	**313812**	E.1/WO	1.280	2.500	**507536**	1.200	2.000	29,5
190	260	168	168	212	237	-	-	2	2	1.300	2.630	**EVNMW.38.27**	**4ES.1/SCFE**	**313651**	E.1/WO	1.140	2.600	**507735**	1.340	2.000	27
	270	200	200	212	242	-	-	2,1	2,1	1.690	3.400	**EVNMW.38.28**	**4ES.1/SCFE**	**314199 B**	E.1/WO	1.510	3.350	**508657**	1.660	3.000	37,5
	280	200	200	214	251	-	-	2,1	2,1	1.910	3.610	**EVNMW.38.29**	**4ES.1/SCFE**	**314049 A**	E.1/WO	1.720	3.350	**510199**	1.830	3.150	41,5
200	270	170	170	222	349	-	-	2,1	2,1	1.340	2.810	**EVNMW.40.30**	**4ES.1/SCFE**	**314553**	E.1/WO	1.170	2.700	**522742B**	1.290	2.600	28,5
	280	170	170	222	252	-	-	2,1	2,1	1.500	2.850	**EVNMW.40.31**	**4ES.1/SCFE**	**314385**	E.1/WO	1.380	3.000	**507344**	1.630	3.200	33,5
	280	170	170	222	253	-	-	2,1	2,1	1.580	3.050	**EVNMW.40.32**	**4ES.3/SCFE**	**BC4B 319659**	E.7/WO	1.450	3.200	**-**	-	-	35
	280	180	170	222	252	-	-	2,1	2,1	1.580	3.050	**EVNMW.40.33**	**4ES.11/SVSCF**	**319019**	E.11/GW	1.380	3.000	**-**	-	-	35
	280	200	200	222	252	-	-	0,6	2,1	1.820	3.650	**EVNMW.40.34**	**4ES.1/SCFE**	**313893**	E.1/WO	1.510	3.350	**508726**	1.630	3.200	39
	285	200	200	222,5	236	10	6	2,1	2	2.000	3.930	**EVNMW.40.35**	**4ES.8/SVSCFI**	**BC4B 457628**	E.8/GWI	1.470	3.900	**-**	-	-	44
	290	192	192	226	260	-	-	2,1	2,1	1.750	3.350	**EVNMW.40.36**	**4ES.1/SCFE**	**313811**	E.1/WO	1.540	3.200	**512580B**	1.800	3.150	42,5
	290	192	192	226	260	-	4,5	2,1	2,1	1.800	3.350	**EVNMW.40.37**	**4ES.1/SCFE**	**313811 A**	E.1/WO	1.540	3.200	**-**	-	-	42,5
	310	230	230	229	273	-	-	2,1	2,1	2.310	4.300	**EVNMW.40.38**	**4ES.3**	**313639/VJ202**	E.3	2.010	3.750	**514958**	2.700	4.250	63
210	290	192	192	236	264	-	-	2,1	2,1	1.690	3.600	**EVNMW.42.39**	**4ES.1/SCFE**	**313646**	E.1/WO	1.450	3.400	**507628**	1.700	3.400	41
220	300	200	200	240	276	-	4,5	2,1	2,1	1.950	4.000	**EVNMW.44.40**	**4ES.3/SCFE**	**BC2B 322341/HB1VJ202**	E.3/WO	1.790	3.900	**567623**	1.830	3.350	41
	310	192	192	246	280	-	-	2,1	2,1	1.940	3.680	**EVNMW.44.41**	**4ES.1/SCFE**	**313839**	E.1/WO	1.680	3.650	**507333**	1.830	3.200	46
	310	225	225	244	278	-	-	0,6	2,1	2.280	4.500	**EVNMW.44.42**	**4ES.1/SCFE**	**313894 B**	E.1/WO	1.940	4.300	**514461**	2.200	41.500	54,5
	330	230	230	249	294	-	-	2,1	2,1	2.450	4.680	**EVNMW.44.43**	**4ES.3/SCFE**	**314889/VJ202**	E.3/WO	2.050	4.000	**541452**	2.360	3.900	68,5
230	330	206	206	260	297	-	-	2,1	2,1	2.260	4.430	**EVNMW.46.44**	**4ES.1/SCFE**	**313824**	E.1/WO	1.870	4.000	**508727B**	2.160	3.900	58
	365	250	250	266	321	11,1	6	3	3	2.920	5.700	**EVNMW.46.45**	**4ES.4**	**313581 A**	E.4	2.640	4.900	**529113**	3.150	-	100

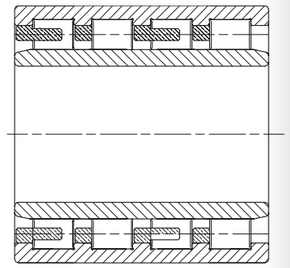
Four-row cylindrical roller bearings
Dimensional tables



4ES.12



4ES.11



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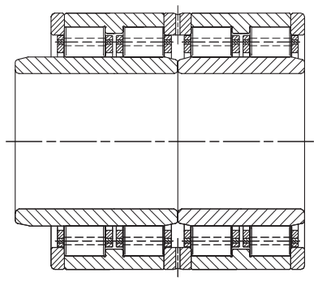
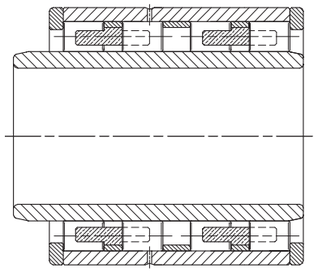
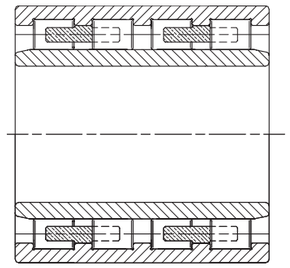


4ES.13



4ES.14



4ES.17

Dimension table

EVOLMEC													SKF				FAG			Mass
										Load rating		CODE	Execution	CODE	Execution	Load rating	CODE	Load rating		
d	D	B	C	F	D_1	b	k	$r_{1,2}$ min	$r_{3,4}$ min	dyn. C	stat. C_0					dyn. C	stat. C_0		dyn. C	stat. C_0	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	-	-	-	-	kN	kN	-	kN	kN	kg
240	330	180	180	265	299	-	-	2,1	2,1	1.950	3.830	**EVNMW.48.46**	**4ES.3/SCFE**	**635194**	E.7/WO	1.720	3.800	**504547**	2.040	3.900	49,5
	330	220	220	265	300	-	-	2,1	2,1	2.230	4.550	**EVNMW.48.47**	**4ES.1/SCFE**	**313921**	E.1/WO	1.720	4.300	**-**	-	-	58
	330	240	220	270	300	-	-	2,1	2,1	2.000	4.420	**EVNMW.48.48**	**4ES.17/SCFI**	**BC4B 320415**	E.10/WI	1.720	4.300	**-**	-	-	60
	360	290	290	270	327	8,3	4,5	8x20°	2	3.660	7.170	**EVNMW.48.49**	**4ES.4/SCFI**	**BC4B 322292 A/HB3**	E.4/WI	3.300	6.550	**514959**	3.350	5.700	130
250	340	230	230	310	276	9	8	3	2,3x45°	2.670	5.500	**EVNMW.50.50**	**4ES.8/SVSCFI**	**BC4B 457629 VCA**	E.8/GWI	1.870	5.000	**-**	-	-	65
260	360	204	204	287	326	-	-	2,1	2,1	2.340	4.670	**EVNMW.52.51**	**4ES.3/SCFE**	**314997/VJ202**	E.3/WO	1.980	4.400	**-**	-	-	64,5
	360	230	230	292	326	-	-	3	3	2.490	5.340	**EVNMW.52.52**	**4ES.1/SCFE**	**BC4B 320956**	E.1/WO	1.980	4.650	**533880**	2.500	5.000	73,5
	370	220	220	292	332	-	-	3	3	2.600	5.160	**EVNMW.52.53**	**4ES.1/SCFE**	**313823**	E.1/WO	2.160	4.650	**507336**	2.200	4.050	77,5
	370	240	220	292	332	-	-	3	3	2.600	5.160	**EVNMW.52.54**	**4ES.11/SVSCF**	**BC4B 319464/HA3**	E.11/GW	2.160	4.605	**-**	-	-	78,5
	400	290	290	296	352	7	5	4	4	3.950	7.650	**EVNMW.52.55**	**4ES.4/SCFI**	**313427 B**	E.4/WI	3.520	7.100	**518214**	3.900	6.300	135
265	370	234	234	300	336	-	-	2	2	2.600	5.560	**EVNMW.53.56**	**4ES.1/SCFE**	**313922**	E.1/WO	2.240	5.400	**517423**	2.500	5.100	80,5
270	380	295	275	300	345	8,3	4,5	2	1	3.450	7.200	**EVNMW.54.57**	**4ES.12/SVSCFI**	**315605**	E.12/GWI	3.080	7.200	**-**	-	-	100
280	380	290	290	308,5	352	-	6	7x20°	2,1	3.400	7.700	**EVNMW.56.58**	**4ES.4/SCFI**	**BC4-0001**	E.4/WI	2.750	6.950	**-**	-	-	75
	390	220	220	312	352	-	-	3	3	2.600	5.250	**EVNMW.56.59**	**4ES.1/SCFE**	**313822**	E.1/WO	2.240	5.000	**507339B**	2.400	4.550	82,5
	390	250	220	312	352	-	-	3	3	2.750	5.450	**EVNMW.56.60**	**4ES.11/SVSCF**	**319259**	E.11/GW	2.240	5.000	**-**	-	-	84,5
	390	275	275	308	353	11,1	6	7x20°	1,1	3.480	7.330	**EVNMW.56.61**	**4ES.4/SCFI**	**314719 C**	E.4/WI	3.080	7.200	**527104**	3.600	6.800	100
	400	285	285	316	360	-	-	3	3	3.700	7.700	**EVNMW.56.62**	**4ES.3/SCFE**	**314070/VJ202**	E.3/WO	3.140	7.350	**513342.N12BA**	3.400	6.400	120
	410	300	300	313	368	-	-	4	4	4.000	8.000	**EVNMW.56.63**	**4ES.3/SCFE**	**314897/VJ202**	E.3/WO	3.520	7.500	**510350.C4.N12BA**	3.900	6.950	130
	420	300	300	319	372	8,3	4,5	4	4	4.370	8.700	**EVNMW.56.64**	**4ES.4**	**313487**	E.4	3.470	7.350	**-**	-	-	150
290	390	190	190	316	356	-	-	2,1	2,1	2.340	4.560	**EVNMW.58.65**	**4ES.3/SCFE**	**635195**	E.7/WO	2.050	4.550	**-**	-	-	67
300	420	300	300	332	379	11,1	6	7x20°	1,5	4.180	8.800	**EVNMW.60.66**	**4ES.4/SCF**	**314484 D**	E.4/W	3.740	8.800	**524289B**	4.150	8.000	130
	420	320	300	332	379	11,1	6	4	1,5	4.300	9.100	**EVNMW.60.67**	**4ES.12/SCFI**	**319129**	E.12/WI	3.740	8.800	**-**	-	-	135
	420	330	300	332	379	11,1	6	6,4x20°	1,5	4.300	9.100	**EVNMW.60.68**	**4ES.12/SVSCFI**	**BC4-0003**	E.12/GWI	3.740	8.800	**-**	-	-	140
320	460	240	240	364	425	-	-	3	3	3.520	6.900	**EVNMW.64.69**	**4ES.3/SCFE**	**BC4B 322216/VJ202**	E.7/WO	2.920	7.200	**804571**	3.750	7.200	140
	480	350	350	364	426	13,9	7,5	10x20°	1,5	5.780	11.600	**EVNMW.64.70**	**4ES.4/SCFE**	**314274 B**	E.6/WI	4.950	10.800	**513654A**	5.850	10.800	220
330	460	340	340	365	415	11,1	6	10,5x20°	1,5	4.480	10.510	**EVNMW.66.71**	**4ES.4/SCFI**	**313445 C**	E.4/WI	4.180	10.200	**543447**	4.650	9.500	175
340	480	350	350	378	431	11,1	6	8x20°	1,5	5.300	11.500	**EVNMW.68.72**	**4ES.4/SCFI**	**314485 A**	E.4/WI	4.570	11.000	**-**	-	-	205
	480	350	350	378	431	11,1	6	8x20°	1,5	5.400	12.000	**EVNMW.68.72**	**4ES.4/SVSCFI**	**314485 C**	E.4/GWI	4.570	11.000	**527634**	5.300	11.000	205
	480	370	350	378	431	11,1	6	4	1,5	5.400	12.000	**EVNMW.68.73**	**4ES.12/SCFI**	**319040 A**	E.12/WI	4.570	11.000	**-**	-	-	200
	500	370	370	385	452	-	9	13x20°	3	5.950	12.600	**EVNMW.68.74**	**4ES.4/SCFE**	**BC4B 322261/HB1**	E.6/WI	5.230	11.800	**517794**	6.550	13.200	260
	560	380	380	396	486	-	7,5	5	4	7.560	14.000	**EVNMW.68.75**	**4ES.4/SCFE**	**313404 A**	E.6/WI	6.820	12.900	**345171**	7.650	12.200	350
350	500	380	380	389	450	-	7,5	5	5	6.000	12.600	**EVNMW.70.76**	**4ES.3**	**314563/VJ202**	E.3	4.950	11.400	**532381.N12BA**	5.700	11.200	240
	500	410	410	388	455	16,7	9	11,5x20°	3	6.400	13.800	**EVNMW.70.78**	**4ES.4/SCFE**	**BC4B 322777/HB1**	E.6/WI	5.830	13.700	**532001**	7.100	14.300	285
	510	300	300	401	468	-	6	5	5	4.700	9.750	**EVNMW.70.79**	**4ES.3**	**BC2B 319878/VJ202**	E.3	4.290	9.000	**-**	-	-	220
	520	300	300	401	468	-	6	8x20°	5	5.000	9.800	**EVNMW.70.80**	**4ES.1/SVSCFI**	**BC4B 326909/HA3**	E.1/GWI	4.290	9.000	**568450**	5.100	8.800	220
	520	320	300	401	468	-	6	8x20,5°	5	5.160	10.160	**EVNMW.70.81**	**4ES.11/SVSCF**	**BC4B 326858/HB3**	E.11/GW	4.290	9.000	**-**	-	-	240

Description

Single-row deep groove ball bearings are the most common type of rolling bearings. Their range of application is very wide. The raceway grooves in both the inner and outer rings have circular arcs of slightly larger radius than that of the balls. Their straight forward basic design has many advantages:

- good radial load capacity;
- acceptable axial load capacity in both directions;
- have low torque capacity at startup and running speeds;
- can operate with low noise;
- require little maintenance.

When the radial load of a rolling mill is taken by four (or two) rows cylindrical roller bearings, the deep groove ball bearings are used as assistant bearings at the roll's driven end and to withstand a part of axial load.

Dimensions

The boundary dimensions of the bearings listed in the tables conform to **ISO 15:2017.**

Tolerances

Deep groove ball bearings are produced with normal tolerances (**P0**) as standard or with increased accuracy corresponding to tolerance classes **P6** and **P5** (where running tolerance is critical). Please contact our technical department to check the availability of bearings to **P6** and **P5** specifications.

Tolerances values, conform to **ISO 492:2014**, will be found in the tables from page **24** to page **25**.

Radial internal clearance

Generally larger clearance will be adopted when used in rolling mills. The values of the clearance limits conform to **ISO 5753-1:2009** for the size range covered by this standard. Radial internal clearance values will be found in the table on the opposite page.

Inner and outer rings

Material: Core hardened steel 100Cr6 (UNI 3097 – WNr. 1.3505) or 100CrMn6 (WNr.1.3520) according to the sizes. On request and for special applications they can be manufactured in case-hardening steel.

Heat treatment: Annealing (annealing of workability), hardening and tempering. These treatments will be always performed ensuring a stabilization **S0** (for use of bearings without deformations of the rings up to temperatures of 150°C). On request these treatments can be performed ensuring a final stabilization **S1** & **S2**.

S1- for functioning without deformations of the rings up to 200°C (**suffix S1**)

S2- for functioning without deformations of the rings up to 250°C (**suffix S2**).

Hardness: 58/62 HRc

Cage

Single row deep groove ball bearings, which have two pieces riveted steel cage (**Figure 1**) as standard (code with no suffix regarding the cage execution), may be supplied with machined-brass cage (**Figure 2**) for particular applications.

Please refer to the suffixes in the next page to determine the available cages executions.

Figure 1

Two pressed-steel half cages are fixed together with rivets. They are designed to reduce frictional torque and have high rigidity and strength, making it the cage of choice for most applications.

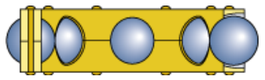


Figure 2

Two identical half cages made from solid brass are fixed together with rivets. Superior strength enables this cage to be used in heavily loaded and high-speed applications. On request this cage can be made in a single piece.

Balls

Material: Core-hardened steel 100Cr6 (UNI 3097)

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

Hardness: 60/64 HRc

Misalignment

Single row deep groove ball bearings have very limited ability to accommodate errors of alignment. The permissible angular misalignment between inner and outer rings, which will not produce inadmissibly high additional stresses in the bearing, depends on the radial internal clearance of the earing during operation, the bearing size, its internal design and the forces and moments acting on it. Exact values for permissible misalignment can't be given.

It should be noted that misalignment of the bearing rings causes an appreciable increase in noise level when the bearing is running.

Designations

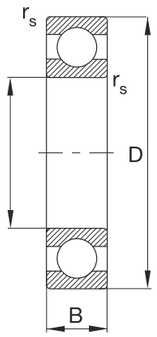
Supplementary designations (prefixes and suffixes) will be found at page **27**.

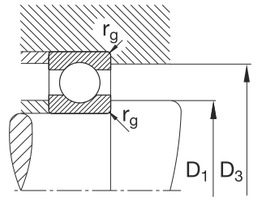
Steel Cage

Brass Cage

Radial internal clearance of deep groove ball bearings

d		C2		Normal		C3		C4		C5	
>	≤	min	max	min	max	min	max	min	max	min	max
mm		µm		µm		µm		µm		µm	
80	**100**	1	18	12	36	30	58	53	84	75	120
100	**120**	2	20	15	41	36	66	61	97	90	140
120	**140**	2	23	18	48	41	81	71	114	105	160
140	**160**	2	23	18	53	46	91	81	130	120	180
160	**180**	2	25	20	61	53	102	91	147	135	200
180	**200**	2	30	25	71	63	117	107	163	150	230
200	**225**	2	35	25	85	75	140	125	195	175	265
225	**250**	2	40	30	95	85	160	145	225	205	300
250	**280**	2	45	35	105	90	170	155	245	225	340
280	**315**	2	55	40	115	100	190	175	270	245	370
315	**355**	3	60	45	125	110	210	195	300	275	410
355	**400**	3	70	55	145	130	240	225	340	315	460
400	**450**	3	80	60	170	150	270	250	380	350	520
450	**500**	3	90	70	190	170	300	280	420	390	570
500	**560**	10	100	80	210	190	330	310	470	440	630
560	**630**	10	110	90	230	210	360	340	520	490	700
630	**710**	20	130	110	260	240	400	380	570	540	780
710	**800**	20	140	120	290	270	450	430	630	600	860
800	**900**	20	160	140	320	300	500	480	700	670	960
900	**1.000**	20	170	150	350	330	550	530	770	740	1.040
1.000	**1.120**	20	180	160	380	360	600	580	850	820	1.150
1.120	**1.250**	20	190	170	410	390	650	630	920	890	1.260
1.250	**1.400**	30	200	190	440	420	700	680	1.000	–	–
1.400	**1.600**	30	210	210	470	450	750	730	1.060	–	–

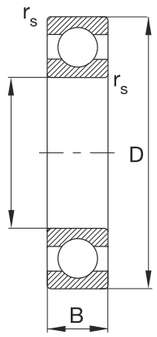


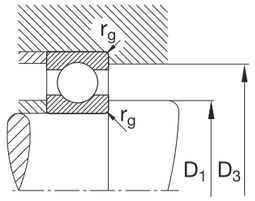


Dimension table

EVOLMEC								FAG	Load rating - Factor			Mass
d	D	B	r_s min	D_1 min	D_3 max	r_g max	CODE	CODE	dyn. C	stat. C_0	f_0	
mm	mm	mm	mm	mm	mm	mm	-	-	kN	kN	kN	kg
150	229,5	35	2,1	160	220	2,1	**EVSR 0100**	**538271**	122	125	16	5,45
	230	35	2,1	160	220	2,1	**EVSR 0101**	**506964**	122	125	16	5,5
160	229,5	33	2	169	221	2	**EVSR 0102**	**567422**	102	114	16,5	4,34
	230	33	2	169	221	2	**EVSR 0103**	**574960**	102	114	16,4	4,38
180	259,5	33	2	189	251	2	**EVSR 0104**	**507540**	122	137	16,4	5,88
190	269,5	33	2	199	261	2	**EVSR 0105**	**502288**	132	146	16,4	6,31
	280	33	2	199	271	2	**EVSR 0106**	**510452**	132	146	16,4	7,45
200	279,5	38	2,1	210	269	2,1	**EVSR 0107**	**508728**	150	166	16,4	7,17
	289,5	38	2,1	210	270	2,1	**EVSR 0108**	**502283**	150	166	16,4	8,46
220	309,5	38	2,1	230	290	2,1	**EVSR 0109**	**800679 HA**	176	204	16,4	9,19
	309,5	38	2,1	230	290	2,1	**EVSR 0110**	**507335**	176	204	16,4	9,19
230	329,5	40	2,1	240	319	2,1	**EVSR 0111**	**508729**	200	240	16,3	11,5
	329,5	40	2,1	240	319	2,1	**EVSR 0112**	**801656 HA**	200	240	16,3	11,5
240	329,5	40	2,1	250	319	2,1	**EVSR 0113**	**578545**	196	240	16,4	10,4
260	369,5	46	2,1	270	360	2,1	**EVSR 0114**	**507338A**	220	280	16,3	16,4
280	389,5	46	2,1	290	380	2,1	**EVSR 0115**	**507341**	236	310	16,4	17,5
290	409,5	60	3	302	397	2,5	**EVSR 0116**	**578599**	310	425	15,9	26,2
300	419,5	56	3	312	407	2,5	**EVSR 0117**	**538205**	285	400	16,2	24,4
330	460	56	3	352	448	2,5	**EVSR 0118**	**509173**	305	455	16,4	29,6
340	479,5	60	3	352	467	2,5	**EVSR 0119**	**538204**	280	415	16,5	35,7
	489,5	65	5	358	472	4	**EVSR 0120**	**576368**	345	510	16,2	40,9
350	500	70	4	365	485	3	**EVSR 0121**	**532002**	355	550	16,3	44,3
360	550	85	5	378	532	4	**EVSR 0122**	**533303**	455	735	15,9	75,4
380	519,5	65	4	397	505	3	**EVSR 0123**	**576367**	365	585	16,4	40,3

HA = retaining groove in the outer ring





Dimension table

EVOLMEC								FAG	Load rating - Factor			Mass
d	D	B	r_s min	D_1 min	D_3 max	r_g max	CODE	CODE	dyn. C	stat. C_0	f_0	
mm	mm	mm	mm	mm	mm	mm	-	-	kN	kN	kN	kg
420	560	65	4	435	545	3	**EVSR 0124**	**576366**	390	655	16,5	45,6
	580	70	4	435	565	3	**EVSR 0125**	**544178**	380	640	16,5	57
500	700	100	6	523	677	5	**EVSR 0126**	**530352**	585	1.120	16,2	116
530	760	100	6	553	737	5	**EVSR 0127**	**508780 HA**	600	1.160	16,3	158
	780	112	6	553	757	5	**EVSR 0128**	**529220 HA**	710	1.400	16	190
640	940	128	7,5	668	912	6	**EVSR 0129**	**508308**	815	1.760	16,2	327
650	920	118	6	673	897	5	**EVSR 0130**	**514645**	750	1.630	16,4	262
670	850	85	6	693	827	5	**EVSR 0131**	**509029**	550	1.180	16,1	118
710	1.000	140	7,5	738	972	6	**EVSR 0132**	**502954**	880	2.000	16,4	361
	1.030	140	7,5	738	1.002	6	**EVSR 0133**	**534196 HA**[1)]	1.020	2.320	16	394
	1.080	160	7,5	785	1.005	7,5	**EVSR 0134**	**528283 HA**[1)]	1.140	2.700	15,8	534
750	1.016	125	6	773	993	5	**EVSR 0135**	**565323 HA**	830	2.000	16,4	312
760	1.080	150	7,5	788	1.052	6	**EVSR 0136**	**500909 HA**	1.100	2.650	16	381
800	1.080	115	6	823	1.057	5	**EVSR 0137**	**526190**	865	2.080	16,4	313
	1.150	155	7,5	828	1.122	6	**EVSR 0138**	**801911 HA**	1.140	2.800	16,1	538
850	1.220	165	7,5	878	1.192	6	**EVSR 0139**	**501657 HA**[2)]	1.220	3.150	16,2	629
860	1.130	120	7,5	888	1.102	6	**EVSR 0140**	**529055 HA**	930	2.360	16,4	337

HA = retaining groove in the outer ring

1) Radial clearance C4; C3 clearance for the other bearings

2) Radial clearance: 200 to 300 µm

Description

Two single row angular contact ball bearings, when duplexed back-to-back so that the inner ring forms one piece, are used to create double row angular contact ball bearings. Alternatively, the bearings may be duplexed face-to-face with the outer ring as one piece.

These bearings support radial and axial loads in either direction: back-to-back duplexed bearings also support moment loads.

Dimensions

The boundary dimensions of the bearings listed in the tables conform to ISO 15:2017.

Tolerances

Double row angular contact ball bearings are produced with normal tolerances (P0) as standard or with increased accuracy corresponding to tolerance classes P6 and P5 (where running tolerance is critical). Please contact our technical department to check the availability of bearings to P6 and P5 specifications.

Tolerances values, conform to ISO 492:2014, will be found in the tables from page 24 to page 25.

Internal clearance

Double row angular contact ball bearings are produced with normal axial internal clearance as standard. Most sizes are however also available with an internal clearance which is greater or smaller than normal.

For axial internal clearance values please contact EVOLMEC technical department.

Misalignment

Angular misalignment of the outer ring relative to the inner ring, particularly in bearings with the ball rows arranged back-to-back, can only be accomodated by force between the balls and raceways. The increased ball loads thus produced can lead to an increased running noise and a shortening of bearing life.

Inner and outer rings

Material: Core hardened steel 100Cr6 (UNI 3097 – WNr. 1.3505) or 100CrMn6 (WNr.1.3520) according to the sizes. On request and for special applications they can be manufactured in case-hardening steel.

Heat treatment: Annealing (annealing of workability), hardening and tempering. These treatments will be always performed ensuring a stabilization S0 (for use of bearings without deformations of the rings up to temperatures of 150°C). On request these treatments can be performed ensuring a final stabilization S1 & S2.

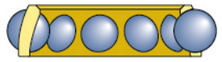
S1- for functioning without deformations of the rings up to 200°C (suffix S1)

S2- for functioning without deformations of the rings up to 250°C (suffix S2).

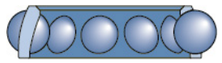
Hardness: 58/62 HRc

Cage

Double row angular contact ball bearings are normally provided with one of the following types of cages according to the range and dimensions:



Machined brass cage



Machined steel cage

Balls

Material: Core-hardened steel 100Cr6 (UNI 3097)

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

Hardness: 60/64 HRc

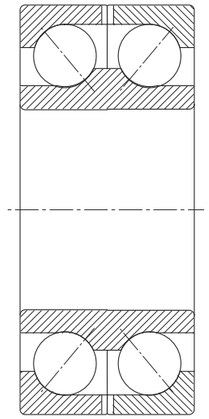
Designations

Supplementary designations (prefixes and suffixes) will be found at page 27.

Executions

Execution 1

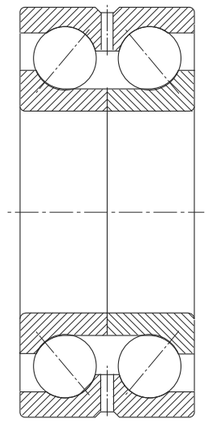
BACK-TO-BACK



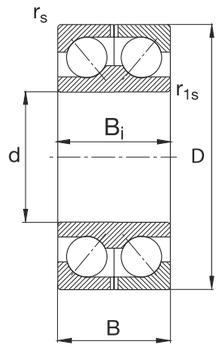
Execution 1

Execution 2

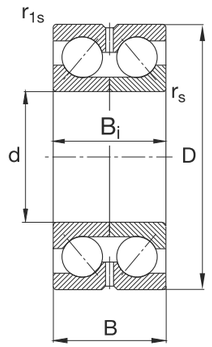
FACE-TO-FACE



Execution 2

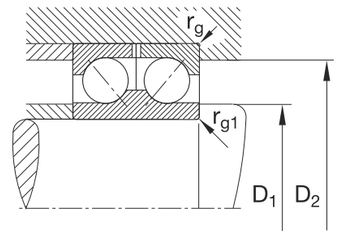


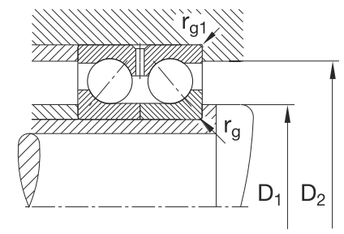
Execution 1



Execution 2

Double-row angular contact ball bearings
Dimensional tables





Dimension table

EVOLMEC												FAG		Load rating		Mass
d	D	B	B_i	r_s min	r_{1s} min	D_1 min	D_2 max	r_g max	r_{g1} max	CODE	Execution	CODE	Execution	dyn. C	stat. C_0	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	-	-	-	-	kN	kN	kg
100	170	60,3	60,3	2	2	111	159	2	2	**EVSAD 0100**	**2**	**511044A**	**2**	140	170	5,57
120	180	56	56	2	1	129	175	2	1	**EVSAD 0101**	**2**	**541983**	**2**	146	193	4,75
	190	66	66	2	2	131	179	2	2	**EVSAD 0102**	**2**	**540889**	**2 Z**	186	236	6,74
	190	66	66	2	2	131	179	2	2	**EVSAD 0103**	**2**	**517458A**	**2**	186	236	6,74
140	209,5	66	66	2	2	149	201	2	2	**EVSAD 0104**	**2**	**538854**	**2**	173	236	7,52
150	225	70	70	2,1	2,1	160	215	2	2	**EVSAD 0105**	**2**	**577243**	**2 HA**	180	255	9,47
	225	73	73	2,1	2,1	160	215	2,1	2,1	**EVSAD 0106**	**2**	**568819**	**2 HA**	180	255	8,89
	225	73	73	2,1	2,1	160	215	2,1	2,1	**EVSAD 0107**	**2**	**510776A**	**2**	180	255	9,89
	230	70	70	2,1	2,1	160	220	2,1	2,1	**EVSAD 0108**	**2**	**506963**	**2**	212	290	9,63
	230	70	70	2,1	2,1	160	220	2,1	2,1	**EVSAD 0109**	**2**	**567620**	**2 HA**	236	325	10,7
	240	84	84	1,5	1	155	233	1,5	1	**EVSAD 0110**	**1**	**504083**	**1**	240	335	15,8
160	215	50	56	1,8	1,8	167	208	1,8	1,8	**EVSAD 0111**	**2**	**514478**	**2**	132	204	5,27
	239,5	76	76	2,1	2	170	231	2,1	2	**EVSAD 0112**	**2**	**537406**	**2**	232	325	11,4
	240	76	76	2	2	169	231	2	2	**EVSAD 0113**	**1**	**507511**	**1**	232	325	12,3
170	260	84	84	2,1	2,1	180	250	2,1	2,1	**EVSAD 0114**	**1**	**503288**	**1**	280	405	16,5
175	280	92	92	2,1	2,1	185	270	2,1	2,1	**EVSAD 0115**	**1**	**506872**	**1**	315	475	23,4
180	250	66	66	2	2	189	241	2	2	**EVSAD 0116**	**1**	**528711A**	**1**	190	285	9,93
	250	70	70	2	2	189	241	2	2	**EVSAD 0117**	**1**	**508893A**	**1**	190	285	10,4
	259,5	66	66	2	2	189	251	2	2	**EVSAD 0118**	**2**	**509059A**	**2**	196	305	11,9
	280	92	92	2	2	189	271	2	2	**EVSAD 0119**	**2**	**566013**	**2 HA**	290	430	20,1
	280	92	92	2,1	1,1	186	270	2,1	1,1	**EVSAD 0120**	**1**	**503739**	**1**	290	440	21,6

Dimension table

EVOLMEC												FAG		Load rating		Mass
d	D	B	B_i	r_s min	r_{1s} min	D_1 min	D_2 max	r_g max	r_{g1} max	CODE	Execution	CODE	Execution	dyn. C	stat. C_0	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	-	-	-	-	kN	kN	kg
190	255	58	58	1,1	1,1	196	249	1,1	1,1	**EVSAD 0121**	**2**	**514479**	**2**	180	285	8,73
	269,5	66	66	2	2	199	261	2	2	**EVSAD 0122**	**2**	**508658A**	**2**	224	345	10,4
	290	92	92	2,1	1,1	196	280	2,1	1,1	**EVSAD 0123**	**1**	**507510A**	**1**	325	500	23,4
200	279,5	76	76	2,1	2,1	210	270	2,1	2,1	**EVSAD 0124**	**2**	**508733A**	**2**	245	380	14,3
	280	80	80	2,1	1,1	206	270	2,1	1,1	**EVSAD 0125**	**1**	**507629**	**1**	255	390	15,8
	289,5	76	76	2,1	2,1	210	280	2,1	2,1	**EVSAD 0126**	**2**	**509590A**	**2**	245	380	16,9
	289,5	76	76	2,1	2,1	210	280	2,1	2,1	**EVSAD 0127**	**2**	**581040**	**2 HA**	245	380	16,9
	289,5	76	76	2,1	1,1	206	280	2,1	1,1	**EVSAD 0128**	**1**	**507448**	**1**	245	380	17,9
	309,5	96	96	2,1	2,1	210	300	2,1	2,1	**EVSAD 0129**	**2**	**538852**	**2**	365	585	26,3
	310	96	96	2,1	2,1	210	300	2,1	2,1	**EVSAD 0130**	**1**	**506871**	**1**	365	585	28,3
220	300	70	76	1,1	1,1	226	294	1,1	1,1	**EVSAD 0131**	**2**	**514480**	**2**	265	430	14,6
	309,5	76	76	2	2	229	301	2	2	**EVSAD 0132**	**2**	**511045A**	**2**	255	405	17,5
	309,5	76	76	2	2	229	301	2	2	**EVSAD 0133**	**2**	**567621**	**2 HA**	285	465	17,6
230	329,5	80	80	2,1	2,1	240	320	2,1	2,1	**EVSAD 0134**	**2**	**508732A**	**2**	320	530	22
	329,5	80	80	2,1	1,1	236	320	2,1	1,1	**EVSAD 0135**	**1**	**573446**	**1**	320	530	23,9
250	340	70	76	2,1	1,5	260	333	2,1	1,5	**EVSAD 0136**	**2**	**514481**	**2**	300	510	18,9
260	369,5	92	92	2,1	2,1	270	360	2,1	2,1	**EVSAD 0137**	**2**	**508731A**	**2**	390	695	30,5
	400	130	130	4	4	277	383	4	4	**EVSAD 0138**	**1**	**505057**	**1**	540	1.020	61,5
280	389,5	92	92	2,1	2,1	290	380	2,1	2,1	**EVSAD 0139**	**2**	**508730A**	**2**	405	750	32,5

HA = retaining groove in the outer ring

Z = Separable bearing

HA = retaining groove in the outer ring

Z = Separable bearing

Description

Double direction tapered roller thrust bearings allow the realization of compact axial systems. The bearings of this type can support extremely heavy axial loads in both direction and they are insensitive to impacts.

They are mainly used to support the axial load on roll neck of rolling mills, in combination with multi-row cylindrical roller radial bearings.

Since double direction tapered roller thrust bearings are normally assembled with free coupling, both on the neck of the cylinder and on the housing of the crankset to prevent the rotation on the housing, the shaft washer is provided with one or two stopping carvings, where a key is inserted, or by similar means.

Dimensions

The boundary dimensions of tapered roller thrust bearings haven't been unified.

Tolerances

Except for some cases, these bearings are produced with normal tolerances (**P0**) as standard for the hole and the inner diameter. These values, conform to **ISO 492:2014**, will be found in the tables at page **26**.

Tolerances on the height and on the rotation precision differ from normal values. On request values relating to a specific bearing can be provided.

Misalignment

Tapered roller thrust bearings with plane washers cannot accept any misalignment of the shaft with respect to the housing nor any errors of angle of the support surfaces in the housing and on the shaft.

Washers

Material: Core hardened steel 100Cr6 (UNI 3097 – WNr. 1.3505) or 100CrMn6 (WNr.1.3520) according to the sizes. On request and for special applications they can be manufactured in case-hardening steel.

Heat treatment: Annealing (annealing of workability), hardening and tempering. These treatments will be always performed ensuring a stabilization **S0** (for use of bearings without deformations of the rings up to temperatures of 150°C). On request these treatments can be performed ensuring a final stabilization **S1** & **S2**.

ST1- for functioning without deformations of the rings up to 200°C (**suffix S1**)

S2- for functioning without deformations of the rings up to 250°C (**suffix S2**).

Hardness: 58/62 HRc

Cage

Double direction tapered roller thrust bearings without full complement of rollers are provided with a massive brass cage or with steel pin-type cage. Bearings of ESB.2 & ESB.3 execution are provided with window-type steel cage.

Tapered rollers

Material: Core-hardened steel 100Cr6 (UNI 3097)

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

Hardness: 60/64 HRc

On request they can be manufactured in case-hardening steel (pierced rollers).

Designations

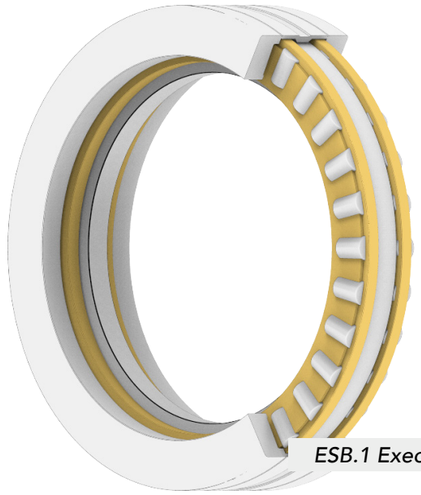
Supplementary designations (prefixes and suffixes) will be found at page **27.**

Executions

Two types of executions exist:

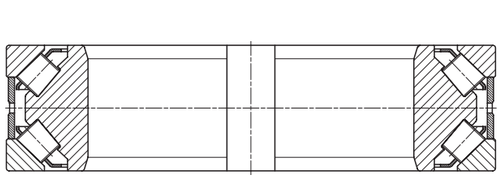
EXECUTION ESB.1

This execution, with plain central shaft washer, is the most common because it is able to withstand slight shaft eccentricity with respect to the housing bore. Between shaft washers for housing there is a spacer, proportioned so that it is possible to tighten fully the screws.



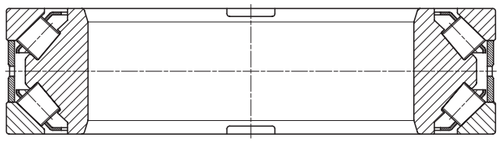
ESB.1 Execution

EXECUTIONS ESB.2 / ESB.3



ESB.2

ONE STOPPING CARVING

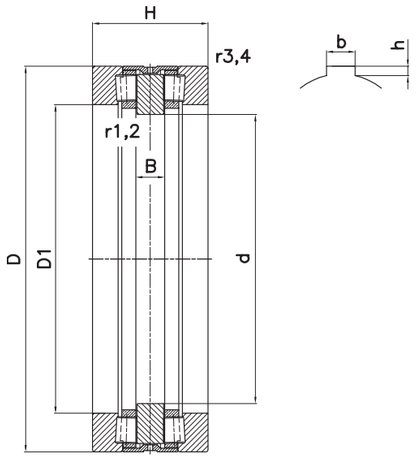


ESB.3

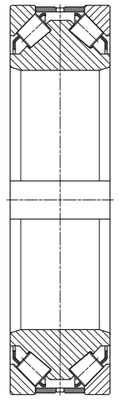
TWO STOPPING CARVINGS

These executions have tapered raceways on the shaft washers. They have a greater load capacity than that with the plain central shaft washer and somehow they also can radially constrain the shaft.

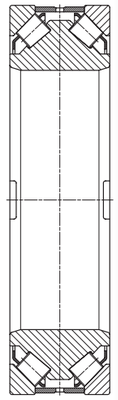
ESB.2 Execution



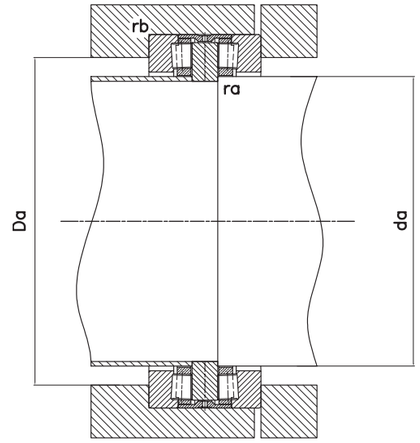
ESB.1



ESB.2



ESB.3



Dimension table

EVOLMEC														EVOLMEC-SKF		SKF		FAG			Mass
									Adjacent dimensions				CODE	Execution	Load rating		CODE	Execution	CODE	Load rating		
d	D	H	D_1	B	b	h	$r_{1,2}$ min	$r_{3,4}$ min	da	Da max	ra max	rb max			dyn. C	stat. C_0				dyn. C	stat. C_0	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	-	-	kN	kN	-	-	-	kN	kN	kg
170	240	84	184	20	-	-	0,6	2	182	190	0,6	2	**EVRC 0100**	**ESB.1**	330	1.290	**350980 C**	BFD.1	**528974**	380	1.430	12,5
180	280	90	196	20	-	-	1	2	192	205	1	2	**EVRC 0101**	**ESB.1**	561	2.400	**353162**	BFD.1	**528294**	720	3.250	22
220	300	96	236	22	-	-	0,6	2	231	245	0,6	2	**EVRC 0102**	**ESB.1**	440	1.660	**351019 C**	BFD.1	**528876**	570	2.240	20
240	320	96	256	22	-	-	0,6	2	251	265	0,6	2	**EVRC 0103**	**ESB.1**	418	1.900	**351182 C**	BFD.1	**529086**	610	2.600	21,5
250	380	100	275	22	30	6,7	0,6	2	267	285	0,6	2	**EVRC 0104**	**ESB.1**	897	4.550	**353005**	BFD.1	**522010**	980	5.200	43,5
260	360	92	285	20	-	-	1	2	276	290	1	2	**EVRC 0105**	**ESB.1**	605	2.600	**350981 C**	BFD.1	**509352**	680	3.100	28
270	450	180	310	45	40	10	2	5	300	325	2	4	**EVRC 0106**	**ESB.1**	1.650	6.000	**351164 C**	BFD.1	**527907**	2.000	8.500	120
305,07	530	200	410	200	36,1	30	6,4	6,4	363	410	6	6	**EVRC 0107**	**ESB.2**	2.380	10.600	**BFDB 353194/HB3**	BFD.2	**-**	-	-	185
320	440	108	355	26	-	-	1,1	3	348	360	1	2,5	**EVRC 0108**	**ESB.1**	990	4.650	**353102 C**	BFD.1	**528562**	980	4.900	48,5
	470	130	350	30	-	-	1,1	3	340	360	1	2,5	**EVRC 0109**	**ESB.1**	1.300	5.700	**350982 C**	BFD.1	**509654**	1.340	6.550	80
350	490	130	390	30	-	-	1,1	3	380	400	1	2,5	**EVRC 0110**	**ESB.1**	1.170	5.100	**351100 C**	BFD.1	**530739**	1.320	6.700	73,5
	540	135	400	30	-	-	1,1	4	384	405	1	3	**EVRC 0111**	**ESB.1**	1.720	9.150	**353006**	BFD.1	**522008**	1.800	10.400	115
380	560	130	430	32	45	10	1,5	3	416	435	1,5	2,5	**EVRC 0112**	**ESB.1**	1.790	10.000	**351175 C**	BFD.1	**513125**	1.800	10.800	110
	650	215	450	65	55	10	2	4	446	470	2	3	**EVRC 0113**	**ESB.1**	3.360	16.600	**BFDB 353204**	BFD.1	**545936**	3.750	19.300	275
400	650	200	527	200	50,8	19	4	4	480	527	4	4	**EVRC 0114**	**ESB.2**	2.700	13.700	**353106**	BFD.2	**-**	-	-	235
	650	200	527	200	50,8	19	4	4	480	527	4	4	**EVRC 0115**	**ESB.2**	2.700	13.700	**353106 C**	BFD.2	**-**	-	-	235
	650	200	527	200	50,8	19	4	4	480	527	4	4	**EVRC 0116**	**ESB.3**	2.700	13.700	**353106 D**	BFD.3	**-**	-	-	230
420	620	170	465	35	56	10	1,5	3	455	485	1,5	3	**EVRC 0117**	**ESB.1**	2.420	12.200	**351121 C**	BFD.1	**509392**	2.280	12.000	185
	620	185	465	50	-	-	1,5	3	455	485	1,5	3	**EVRC 0118**	**ESB.1**	2.420	12.200	**BFDB 353200/HA3**	BFD.1	**545991**	2.280	12.000	200
440	645	167	490	50	45	11	3	4	480	510	2,5	3	**EVRC 0119**	**ESB.1**	1.980	10.800	**353152**	BFD.1	**534038**	2.240	12.700	190
450	645	155	490	38	45	11	4	4	480	510	3	3	**EVRC 0120**	**ESB.1**	1.980	10.800	**350916 D**	BFD.1	**513401**	2.240	12.700	170
470	720	200	535	50	55	11	2	4	515	550	2	3	**EVRC 0121**	**ESB.1**	3.410	17.600	**353151**	BFD.1	**509391**	3.400	19.300	285
	720	200	535	40	55	10	2	4	515	550	2	3	**EVRC 0122**	**ESB.1**	3.410	17.600	**351301 B**	BFD.1	**-**	-	-	285
	720	210	535	60	-	-	2	4	515	550	2	3	**EVRC 0123**	**ESB.1**	3.410	17.600	**BFDB 353238/HA3**	BFD.1	**549701**	3.400	19.300	305
530	710	218	575	57	45	10	2	3	560	590	2	2,5	**EVRC 0124**	**ESB.1**	2.200	11.000	**351475 C**	BFD.1	**511746**	2.700	14.000	245
550	760	230	610	50	45	10	2	5	585	585	2	4	**EVRC 0125**	**ESB.1**	2.920	13.200	**350976 C**	BFD.1	**515196**	3.200	16.300	310
600	880	290	680	70	-	-	5	6	670	670	4	5	**EVRC 0126**	**ESB.1**	4.730	21.200	**BFDB 350824 B/HA1**	BFD.1	**-**	-	-	550
	910	290	680	70	45	12	5	6	670	670	4	5	**EVRC 0127**	**ESB.1**	4.730	21.200	**350901 C**	BFD.1	**-**	-	-	655
670	900	230	725	50	45	12	2	5	705	705	2	4	**EVRC 0128**	**ESB.1**	3.580	19.000	**351761 A**	BFD.1	**521823**	3.800	21.200	425

RADIAL BEARINGS
Normal (P0), P6 And P5 Tolerances - **INNER RING**

Class P0 tolerances for radial bearings (except tapered roller bearings)

Inner ring d		Δ_{dmp}		V_{dp} Diametral series			V_{dmp}	Δ_{Bs}		V_{Bs}	K_{ia}
				8, 9	0, 1	2, 3, 4					
>	≤	U	L	max	max	max	max	U	L	max	max
mm		µm		µm	µm	µm	µm	µm		µm	µm
80	**120**	0	-20	25	25	15	15	0	-200	25	25
120	**180**	0	-25	31	31	19	19	0	-250	30	30
180	**250**	0	-30	38	38	23	23	0	-300	30	40
250	**315**	0	-35	44	44	26	26	0	-350	35	50
315	**400**	0	-40	50	50	30	30	0	-400	40	60
400	**500**	0	-45	56	56	34	34	0	-450	50	65
500	**630**	0	-50	63	63	38	38	0	-500	60	70
630	**800**	0	-75	-	-	-	-	0	-750	70	80
800	**1.000**	0	-100	-	-	-	-	0	-1.000	80	90
1.000	**1.250**	0	-125	-	-	-	-	0	-1.250	100	100
1.250	**1.600**	0	-160	-	-	-	-	0	-1.600	120	120
1.600	**2.000**	0	-200	-	-	-	-	0	-2.000	140	140

Class P6 tolerances for radial bearings (except tapered roller bearings)

Inner ring d		Δ_{dmp}		V_{dp} Diametral series			V_{dmp}	Δ_{Bs}		V_{Bs}	K_{ia}
				8, 9	0, 1	2, 3, 4					
>	≤	U	L	max	max	max	max	U	L	max	max
mm		µm		µm	µm	µm	µm	µm		µm	µm
80	**120**	0	-15	19	19	11	11	0	-200	25	13
120	**180**	0	-18	23	23	14	14	0	-250	30	18
180	**250**	0	-22	28	28	17	17	0	-300	30	20
250	**315**	0	-25	31	31	19	19	0	-350	35	25
315	**400**	0	-30	38	38	23	23	0	-400	40	30
400	**500**	0	-35	44	44	26	26	0	-450	45	35
500	**630**	0	-40	50	50	30	30	0	-500	50	40
630	**800**	0	-50	-	-	-	-	0	-750	55	45
800	**1.000**	0	-65	-	-	-	-	0	-1.000	60	50
1.000	**1.250**	0	-80	-	-	-	-	0	-1.250	70	60
1.250	**1.600**	0	-100	-	-	-	-	0	-1.600	70	70
1.600	**2.000**	0	-130	-	-	-	-	0	-2.000	80	80

Class P5 tolerances for radial bearings (except tapered roller bearings)

Inner ring d		Δ_{dmp}		V_{dp} Diametral series		V_{dmp}	Δ_{Bs}		V_{Bs}	K_{ia}	S_d
				8, 9	0, 1, 2, 3, 4						
>	≤	U	L	max	max	max	U	L	max	max	max
mm		µm		µm	µm	µm	µm		µm	µm	µm
80	**120**	0	-10	10	8	5	0	-200	7	6	9
120	**180**	0	-13	13	10	7	0	-250	8	8	10
180	**250**	0	-15	15	12	8	0	-300	10	10	11
250	**315**	0	-18	18	14	9	0	-350	13	13	13
315	**400**	0	-23	23	18	12	0	-400	15	15	15
400	**500**	0	-27	28	21	14	0	-450	18	17	18
500	**630**	0	-33	35	26	18	0	-500	20	19	20
630	**800**	0	-40	-	-	-	0	-750	26	22	26
800	**1.000**	0	-50	-	-	-	0	-1.000	32	26	32
1.000	**1.250**	0	-65	-	-	-	0	-1.250	38	30	38
1.250	**1.600**	0	-80	-	-	-	0	-1.600	45	35	45
1.600	**2.000**	0	-100	-	-	-	0	-2.000	55	40	55

RADIAL BEARINGS
OUTER RING - Normal (P0), P6 And P5 Tolerances

Class P0 tolerances for radial bearings (except tapered roller bearings)

Outer ring D		Δ_{Dmp}		V_{Dp} Diametral series			V_{Dmp}	K_{ea}
				8, 9	0, 1	2, 3, 4		
>	≤	U	L	max	max	max	max	max
mm		µm		µm	µm	µm	µm	µm
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

Class P6 tolerances for radial bearings (except tapered roller bearings)

Outer ring D		Δ_{Dmp}		V_{Dp} Diametral series			V_{Dmp}	K_{ea}
				8, 9	0, 1	2, 3, 4		
>	≤	U	L	max	max	max	max	max
mm		µm		µm	µm	µm	µm	µm
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

Class P5 tolerances for radial bearings (except tapered roller bearings)

Outer ring D		Δ_{Dmp}		V_{Dp} Diametral series		V_{Dmp}	V_{Cs}	K_{ea}	S_D
				8, 9	0, 1, 2, 3, 4				
>	≤	U	L	max	max	max	max	max	max
mm		µm		µm	µm	µm	µm	µm	µm
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	25
1.000	**1.250**	0	-50	-	-	-	30	40	30
1.250	**1.600**	0	-65	-	-	-	35	45	35
1.600	**2.000**	0	-85	-	-	-	38	55	40
2.000	**2.500**	0	-110	-	-	-	45	65	50

TAPERED ROLLER THRUST BEARINGS

Normal (P0), P6 And P5 Tolerances

Class P0, P6, P5 tolerances for tapered roller thrust bearings

Shaft washer d		Δ_{dmp}		V_{dp}	S_i Class P0	S_i Class P6	S_i Class P5
>	≤	U	L	max	max	max	max
mm		µm		µm	µm	µm	µm
80	**120**	0	-20	15	15	8	4
120	**180**	0	-25	19	15	9	5
180	**250**	0	-30	23	20	10	5
250	**315**	0	-35	26	25	13	7
315	**400**	0	-40	30	30	15	7
400	**500**	0	-45	34	30	18	9
500	**630**	0	-50	38	35	21	11
630	**800**	0	-75	-	40	25	13
800	**1.000**	0	-100	-	45	30	15
1.000	**1.250**	0	-125	-	50	35	18
1.250	**1.600**	0	-160	-	60	40	21
1.600	**2.000**	0	-200	-	75	50	25

Class P0, P6, P5 tolerances for tapered roller thrust bearings

Housing washer D		Δ_{Dmp}		V_{Dp}	S_e Class P0	S_e Class P6	S_e Class P5
>	≤	U	L	max	max	max	max
mm		µm		µm	µm	µm	µm
80	**120**	0	-22	17	15	8	4
120	**180**	0	-25	19	15	9	5
180	**250**	0	-30	23	20	10	5
250	**315**	0	-35	26	25	13	7
315	**400**	0	-40	30	30	15	7
400	**500**	0	-45	34	30	18	9
500	**630**	0	-50	38	35	21	11
630	**800**	0	-75	55	40	25	13
800	**1.000**	0	-100	75	45	30	15
1.000	**1.250**	0	-125	-	50	35	18
1.250	**1.600**	0	-160	-	60	40	21
1.600	**2.000**	0	-200	-	75	50	25
2.000	**2.500**	0	-250	-	60	40	21

Class P0, P6, P5 tolerances for tapered roller thrust bearings

Bearing height d		Δ_{Ts}		Δ_{T1s}		Δ_{T2s}		Δ_{T3s}		Δ_{T4s}	
>	≤	U	L	U	L	U	L	U	L	U	L
mm		µm		µm		µm		µm		µm	
80	**120**	+25	-300	+150	-300	+200	-500	+400	-500	+25	-400
120	**180**	+25	-400	+150	-400	+200	-600	+400	-600	+25	-500
180	**250**	+30	-400	+150	-400	+250	-600	+500	-600	+30	-500
250	**315**	+40	-400	+200	-400	+350	-700	+600	-700	+40	-700
315	**400**	+40	-500	+200	-500	+350	-700	+600	-700	+40	-700
400	**500**	+50	-500	+300	-500	+400	-900	+750	-900	+50	-900
500	**630**	+60	-600	+350	-600	+500	-1.100	+900	-1.100	+60	-1.200
630	**800**	+70	-750	+400	-750	+600	-1.300	+1.100	-1.300	+70	-1.400
800	**1.000**	+80	-1.000	+450	-1.000	+700	-1.500	+1.300	-1.500	+80	-1.800
1.000	**1.250**	+100	-1.400	+500	-1.400	+900	-1.800	+1.600	-1.800	+100	-2.400

DESIGNATIONS

Supplementary designations: prefixes & suffixes

Prefixes

L	Removable inner ring of a multi-row cylindrical roller bearing
R	Outer ring, cage and rollers system of a multi-row cylindrical roller bearing

Suffixes

A1,A2,A3,A4	Removable inner ring of a multi-row cylindrical roller bearing
C2	Radial inner clearance lower than normal
C3	Radial inner clearance higher than normal
C4	Radial inner clearance higher than C3
CE	Inner and outer cemented rings
CEE	Outer cemented ring
CEI	Inner cemented ring
CER	Cemented inner and outer ring and cemented rollers
TB	Bainitic hardening for inner rings and outer rings
TBE	Bainitic hardening for outer rings
TBI	Bainitic hardening for inner rings
K	Tapered bore, taper 1:12 on diameter
K30	Tapered bore, taper 1:30 on diameter
P5	Dimensional and running accuracy according to ISO tolerance class 5
P6	Dimensional and running accuracy according to ISO tolerance class 6
2IRC	Group of two double-row bearings
SCA3	Annular groove and three lubrification holes on the outer ring
SCA6	Annular groove and six lubrication holes on the outer ring
SCA8	Annular groove and eight lubrication holes on the outer ring
SCF	Groove on faces
SCFI	Groove on the faces of the inner ring
SCFE	Groove on the faces of the outer ring
SV	Helical groove on the bore
S0	Rings stabilized for functioning without deformations up to +150°C
S1	Rings stabilized for functioning without deformations up to +200°C
S2	Rings stabilized for functioning without deformations up to +250°C
M	Machined brass cage, ball centred
MA	Machined brass cage, outer ring centred
MB	Machined brass cage, inner ring centred

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products to meet the specific needs of each of our clients