

# Double Row Angular Contact Ball Bearings



Double row angular contact ball bearings principally correspond to a matched pair of single row angular contact ball bearings in an "O" arrangement. At the same size ( $d$  and  $D$ ) the matched pair has a smaller width.

The bearing has a filling slot on one side. If axial forces, which act in one direction, prevail, the bearing should be mounted so that the forces should not act against the filling slot. They can also be supplied equipped with plastic cage PA6 or PA66, designation TNG.

Bearing design enables the contact angle  $\alpha = 32^\circ$ . That is why they can carry tilting moments in the axial plane. If there is lack of space only one bearing is sufficient for arranging a rotating part.

## Boundary Dimensions

Boundary dimensions comply with the standard ISO 15 and are shown in the dimension tables of this publication.

## Designation

Bearing designation in standard design is a part of data in the dimension tables. The difference from standard design is designated by additional symbols (section 2.2).

## Cage

Double row angular contact ball bearings have cages pressed of steel sheet. They are not indicated. This is not valid for bearings with plastic cage (TNG) because they are not equipped with filling slot.

## Tolerance

Bearings are commonly produced in normal tolerance class P0, it is not indicated. For more demanding arrangements bearings in higher tolerance class P6 are produced.

Limiting values of dimension and running accuracy are in tables 10 and 11 and comply with standards ISO 199 and ISO 492.

## Axial Clearance

Bearings are commonly produced with normal axial clearance, it is not indicated. For special arrangements bearings with smaller C2 and greater C3 and C4 axial clearance are delivered.

## Misalignment

Bearings form a very rigid arrangement especially sensitive to rings misalignment caused by mounting inaccuracies.

### Radial Equivalent Dynamic Load

$$\begin{aligned} P_r &= F_r + 0.73F_a && \text{for } F_a / F_r \leq 0.86 \\ P_r &= 0.62F_r + 1.17F_a && \text{for } F_a / F_r > 0.86 \end{aligned}$$

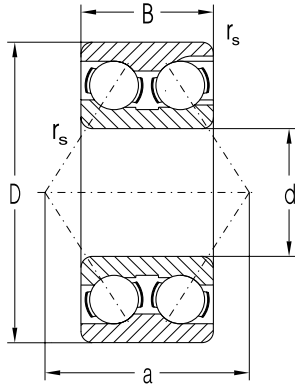
### Radial Equivalent Static Load

$$P_{or} = F_r + 0.63F_a$$



## Double Row Angular Contact Ball Bearings

d = 10 to 75 mm



Dimensions					Basic Load Rating		Fatigue load limit		Limiting Speed for Lubrication with		Bearing Designation
d	D	B	r <sub>s</sub>	a	C <sub>r</sub>	C <sub>or</sub>	P <sub>u</sub>	Grease	Oil		
mm					kN		kN	kN	min <sup>-1</sup>		
10	30	14,0	0,6	20	9,253	5,840	0,265	16000	19000	<b>3200X**</b>	
	30	14,3	0,6	20	9,253	5,840	0,265	16000	19000	<b>3200**</b>	
12	32	15,9	0,6	22	11,050	7,080	0,322	14000	17000	<b>3201**</b>	
15	35	15,9	0,6	23	10,381	7,500	0,341	13000	16000	<b>3202**</b>	
	42	19,0	1,0	27	17,369	11,900	0,541	10600	12600	<b>3302**</b>	
17	40	17,5	0,6	27	14,418	10,600	0,482	11000	13000	<b>3203**</b>	
	47	22,2	1,0	31	23,649	16,200	0,736	9400	11000	<b>3303**</b>	
20	47	20,6	1,0	31	19,905	15,000	0,682	9400	11000	<b>3204**</b>	
	52	22,2	1,1	34	23,656	18,500	0,841	8400	10000	<b>3304**</b>	
25	52	20,6	1,0	35	21,539	18,100	0,823	8400	10000	<b>3205**</b>	
	62	25,4	1,1	40	32,881	26,600	1,209	7100	8400	<b>3305**</b>	
30	62	23,8	1,0	41	30,998	27,100	1,232	7100	8400	<b>3206**</b>	
	72	30,2	1,1	47	43,688	36,200	1,645	6000	7100	<b>3306**</b>	
35	72	27,0	1,1	47	42,125	37,600	1,709	6000	7100	<b>3207**</b>	
	80	34,9	1,5	54	56,219	47,300	2,150	5300	6300	<b>3307**</b>	
40	80	30,2	1,1	52	48,186	43,800	1,991	5300	6300	<b>3208**</b>	
	90	36,5	1,5	58	59,431	59,600	2,709	4700	5600	<b>3308**</b>	
45	85	30,2	1,1	56	51,994	51,100	2,323	5000	6000	<b>3209**</b>	
	100	39,7	1,5	64	82,479	73,600	3,345	4200	5000	<b>3309**</b>	
50	90	30,2	1,1	59	59,553	58,400	2,655	4500	5300	<b>3210**</b>	
	110	44,4	2,0	73	99,898	96,200	4,373	3800	4500	<b>3310**</b>	
55	100	33,3	1,5	64	74,481	66,800	3,036	4200	5000	<b>3211**</b>	
	120	49,2	2,0	80	110,379	108,000	4,909	3300	4000	<b>3311**</b>	
60	110	36,5	1,5	71	82,491	85,800	3,900	3800	4500	<b>3212**</b>	
	130	54,0	2,1	86	128,709	128,000	5,818	3200	3800	<b>3312**</b>	
65	120	38,1	1,5	76	90,746	94,400	4,291	3500	4200	<b>3213**</b>	
	140	58,7	2,1	94	146,328	147,000	6,600	3000	3500	<b>3313**</b>	
70	125	39,7	1,5	81	87,349	98,100	4,459	3200	3800	<b>3214**</b>	
75	130	41,3	1,5	84	96,151	110,000	4,939	3200	3800	<b>3215**</b>	
** Bearings in the new standard NEW FORCE (see the catalogue NEW FORCE)											



# Double Row Self-Aligning Ball Bearings



These bearings are designed with two rows of balls and a spherical raceway in the outer ring. This allows certain misalignment of the inner ring against outer ring around bearing centre without the bearing function being threatened. Bearings are produced with cylindrical and tapered bore and are non-separable. Misalignment ability by not changed functionality determine this bearings to utilize where some bore misalignment in housings or deflection and shaft oscillation are presumed. With respect to a small contact angle and imperfect conformity of balls to raceways they are not suitable for accommodating larger axial forces.

## Boundary Dimensions

Boundary dimensions comply with the standard ISO 15 and are shown in the dimension tables of this publication.

## Designation

Bearing designation in standard design and in design with tapered bore is in the dimension tables. Difference from standard design is designated by additional symbols (section 2.2).

## Tapered Bore

Bearings with tapered bore have taper 1:12. Bearings are fixed on cylindrical shafts by means of adapter sleeves. Adapter sleeves designation corresponding to individual bearings is in the dimension tables of this publication.

## Cage

Bearings have the standard design cages according to the following table (material symbol and cage design are mostly not indicated).

Bearings with Pressed Steel or Brass Cage	Bearings with Machined Brass or Steel Cage
d<10mm, 126	-
1200 to 1222	1224 to 1230
2200 to 2222	-
1300 to 1322	1324
2304 to 23201 <sup>1)</sup>	2322

<sup>1)</sup> Bearing 2305 is produced with a solid cage with filling (TNGN)

### Tolerance

Bearings are commonly produced in normal tolerance class P0 which is not indicated. Bearings for more demanding arrangements are delivered in tolerance class P6.

Limiting values of dimension and running accuracy are shown in tables 10 and 11 and comply with the standards ISO 199 and ISO 492.

### Radial Clearance

Bearings commonly produced have a normal clearance which is not indicated. For special arrangements bearings with smaller radial clearance C2 or greater radial clearance C3, C4 and C5 are delivered.

### Misalignment

Values of permissible bearing misalignment for keeping its functionality are shown in the following table.

Bearing Type	Permissible misalignment
d < 10mm	3°
126, 13, 23 12, 22	2°30'

### Radial Equivalent Dynamic Load

$$P_r = F_r + Y_1 F_a \quad \text{pro } F_a / F_r \leq e \quad [\text{kN}]$$

$$P_r = 0.65 F_r + Y_2 F_a \quad \text{pro } F_a / F_r > e \quad [\text{kN}]$$

Factor values e, Y<sub>1</sub> and Y<sub>2</sub> for individual bearings are shown in the dimension tables of this publication.

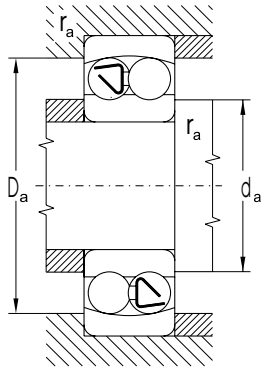
### Radial Equivalent Static Load

$$P_{or} = F_r + Y_0 F_a \quad [\text{kN}]$$

Factor values Y<sub>0</sub> for individual bearings are shown in the dimension tables of this publication.



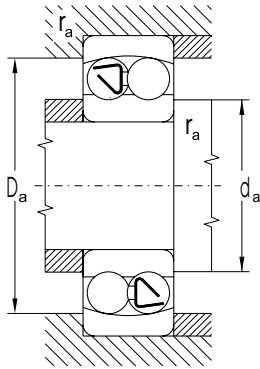




Abutment and Fillet Dimensions				Weight		Corresponding Adapter Sleeve	Factors			
d	d <sub>a min</sub>	D <sub>a max</sub>	r <sub>a max</sub>	K			e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>
mm				kg						
10	14	26	0,6	0,047			0,65	1,0	1,5	1,0
12	16	18	0,6	0,040			0,34	1,9	2,9	2,0
15	19	31	0,6	0,049			0,33	1,9	2,9	2,0
	19	31	0,6	0,060			0,49	1,3	2,0	1,3
17	21	36	0,6	0,073	0,071	H203	0,31	2,1	3,2	2,2
20	25	42	1,0	0,120	0,118	H204	0,27	2,3	3,6	2,4
	25	30	47	1,0	0,141	0,138	H205	0,27	2,3	3,6
30	30	47	1,0	0,163	0,158	H305	0,43	1,5	2,3	1,5
	32	55	1,0	0,264	0,259	H305	0,28	2,3	3,5	2,4
	31	55	1,0	0,335	0,327	H2305	0,47	1,3	2,1	1,4
	35	57	1,0	0,220	0,216	H206	0,25	2,6	4,0	2,7
35	35	57	1,0	0,260	0,254	H306	0,40	1,6	2,5	1,7
	36	65	1,0	0,387	0,381	H306	0,26	2,5	3,8	2,6
	36	65	1,0	0,500	0,489	H2306	0,44	1,4	2,2	1,5
	42	65	1,0	0,323	0,317	H207	0,23	2,7	4,2	2,9
40	42	65	1,0	0,403	0,396	H307	0,37	1,7	2,6	1,8
	47	73	1,0	0,417	0,411	H208	0,22	2,9	4,4	3,0
	47	81	1,5	0,715	0,704	H308	0,24	2,6	4,1	2,7
45	47	81	1,5	0,925	0,903	H2308	0,43	1,5	2,3	1,5
	52	78	1,0	0,465	0,459	H209	0,21	3,0	4,6	3,1
	52	78	1,0	0,545	0,533	H309	0,31	2,1	3,2	2,2
	52	91	1,5	0,957	0,942	H309	0,25	2,5	3,9	2,7
50	52	91	1,5	1,230	1,200	H2309	0,42	1,5	2,3	1,6
	57	83	1,0	0,525	0,515	H210	0,20	3,1	4,9	3,3
	57	83	1,0	0,590	0,577	H310	0,29	2,2	3,4	2,3
	60	100	2,0	1,210	1,190	H310	0,24	2,7	4,1	2,8
55	62	91	1,5	0,705	0,693	H211	0,20	3,2	5,0	3,4
	62	91	1,5	0,810	0,792	H311	0,28	2,3	3,5	2,4
60	67	101	1,5	0,900	0,885	H212	0,19	3,4	5,3	3,6
	67	101	1,5	1,090	1,070	H312	0,28	2,3	3,5	2,4
	72	118	2,0	1,960	1,930	H312	0,23	2,8	4,3	2,9







Abutment and Fillet Dimensions				Weight		Corresponding Adapter Sleeve	Factors			
d	d <sub>a min</sub>	D <sub>a max</sub>	r <sub>a max</sub>	-	K		e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>
mm				kg						
65	72	111	1,5	1,15	1,13	H213	0,17	3,7	5,7	3,9
	72	111	1,5	1,46	1,43	H313	0,28	2,2	3,5	2,3
70	76	128	2,0	3,28	3,20	H2313	0,38	1,6	2,5	1,7
	77	116	1,5	1,52	1,49	H314	0,27	2,4	3,7	2,5
75	81	138	2,0	3,9	3,79	H2314	0,38	1,7	2,6	1,8
	82	121	1,5	1,36	1,34	H215	0,18	3,6	5,6	3,8
	82	121	1,5	1,62	1,58	H315	0,25	2,5	3,9	2,6
	86	148	2,0	3,56	3,51	H315	0,22	2,8	4,4	3,0
80	86	148	2,0	4,72	4,61	H2315	0,38	1,7	2,6	1,7
	90	130	2,0	1,67	1,64	H216	0,16	3,9	6,1	4,1
85	90	130	2,0	2,01	1,97	H316	0,25	2,5	3,9	2,6
	95	140	2,0	2,07	2,04	H217	0,17	3,7	5,7	3,9
	98	166	2,5	4,98	4,91	H317	0,22	2,9	4,5	3,0
90	98	166	2,5	6,71	6,55	H2317	0,37	1,7	2,7	1,8
	100	150	2,0	2,52	2,48	H218	0,17	3,8	5,8	3,9
	100	150	2,0	3,20	3,13	H318	0,27	2,4	3,6	2,5
95	103	176	2,5	7,96	7,77	H2318	0,38	1,7	2,6	1,8
	107	158	2,0	3,10	3,05	H219	0,17	3,7	5,7	3,9
	107	158	2,0	3,95	3,85	H319	0,27	2,4	3,6	2,5
	109	186	2,5	6,69	6,59	H319	0,23	2,8	4,3	2,9
100	109	186	2,5	9,21	8,99	H2319	0,38	1,7	2,6	1,8
	112	168	2,0	3,70	3,64	H220	0,17	3,6	5,6	3,8
	112	168	2,0	4,72	4,61	H320	0,27	2,4	3,6	2,5
	113	201	2,5	8,30	8,19	H320	0,24	2,7	4,1	2,8
110	113	201	2,5	11,70	11,40	H2320	0,38	1,7	2,6	1,7
	122	188	2,0	5,15	5,07	H222	0,17	3,6	5,6	3,8
	122	188	2,0	6,84	6,68	H322	0,28	2,3	3,5	2,4
	124	226	2,5	11,80	11,70	H322	0,22	2,8	4,4	3,0
120	124	226	2,5	17,30	16,90	H2322	0,37	1,7	2,7	1,8
	132	203	2,0	6,75			0,19	3,3	5,1	3,4
	134	246	2,5	15,50			0,24	2,7	4,1	2,8
130	144	216	2,5	8,30	8,10		0,19	3,3	5,0	3,4
140	154	236	2,5	10,90	10,55		0,20	3,1	4,8	3,3
150	164	256	2,5	13,80	13,50		0,19	3,2	5,0	3,4