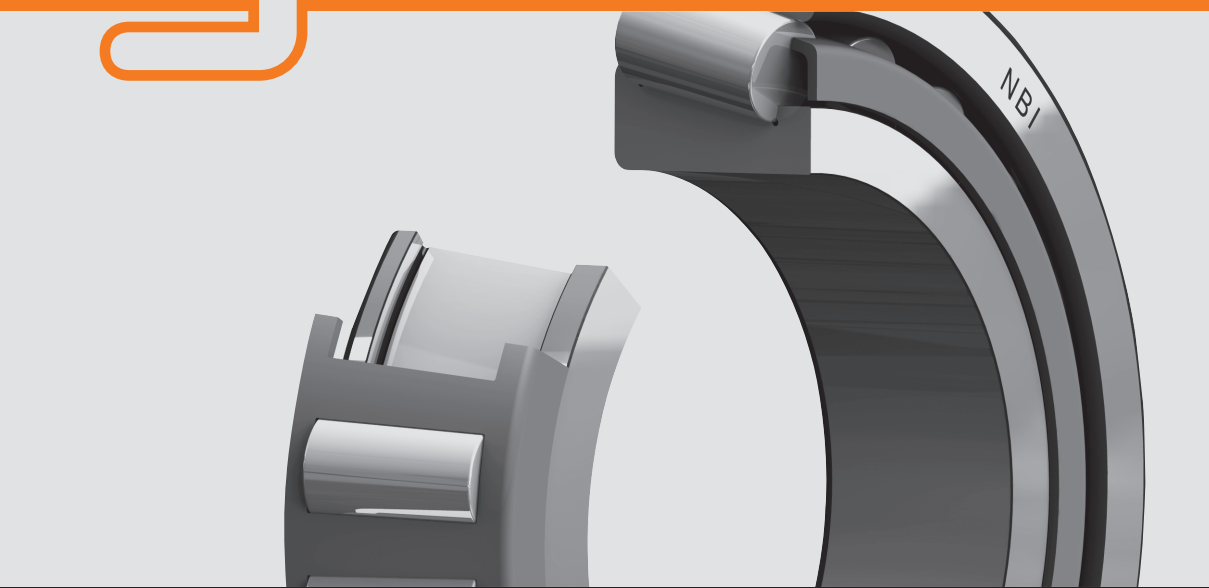


Taper roller bearings

BEARINGS EUROPE NBI®

The data provided in this catalogue is only for information purposes. For more specific information, please contact our engineering department.

Every care has been taken in the making of this catalogue to ensure the accuracy of the publication but no liability can be assumed for any incorrect or incomplete data.

NBI Bearings Europe reserves the right to make any modification without prior notice in the interest of technical progress.

Code: TC-TRB-2015/002

foreword

NBI Bearings Europe was set up as an ambitious project more than a decade ago. The purpose was to become a reliable choice to the most prestigious traditional european manufacturers. Nowadays, we are established in more than 50 countries worldwide, and the number of companies that rely on us increases every day, and we are a solid alternative to the traditional European, USA, or Japanese Premium Class manufacturers.

Our philosophy of continuous improvement has created the optimum choice for customers seeking premium quality products and flexible solutions for standard products and tailor made bearings. In order to provide full technical assistance to our customers, NBI offers an outstanding support by our Engineering Department. We design and produce a wide range of products in accordance with the highest european quality standards.

Our extensive experience, in-depth knowledge in a wide range of applications, and cooperation with prestigious R&D Centers has positioned NBI as the optimum solution for many leading machinery manufacturers.

This catalogue compiles all the information related to the NBI taper roller bearings, which represent chapter nr. 3 in NBI Bearings Europe General Technical Catalogue.

BEARINGS EUROPE NBI®

Taper roller bearings

3.1

Single row taper roller bearings

index

NBI E+ - SERIES WITH ENHANCED LOAD RATING CHARACTERISTICS

NBI has combined the latest achievements of metallurgy and material research with its expertise in bearing design and manufacturing to create a new line of taper roller bearings with additional benefits.

These improvements in internal design (internal geometry, roughness, flanges design, ...) and steel features (composition, purity and microstructure) have led NBI to increase their load carrying capacity.

For all questions you may have regarding the **NBI** E+ series, please feel free to contact our engineering team.

3...-(X)

3...-R

Single row taper roller bearings

Technical characteristics

Single row taper roller bearings are separable radial bearings.

The main dimensions of the metric sized taper roller bearings are standardized by DIN 720 (Rolling Bearing - Taper roller bearing) and ISO 355 (Rolling bearing - Tapered roller bearing - Boundary dimensions and series designations).

They consist on a inner ring with roller set and cage assembly, (i.e. namely the cone), and a loose outer ring (i.e. namely the cup).

In the single row taper roller Bearings when a pure radial load is placed on the bearing, it is generated a load in axial direction, so they must be mounted against another bearing that supports the axial loads generated. Thus, these bearings are generally mounted in pairs, opposite each other.

Taper roller bearings are suitable for both radial and thrust forces in only one direction but also accept combined loads.

Taper roller bearings transfer the loads acting on the bearing with a certain angle, it is called contact angle (see Fig.1).

The ability of taper roller bearings to accommodate axial loads depends on their contact angle. The higher the angle the better the thrust load capability.

The contact angle of most taper roller bearings lies between 10° and 16°.

Taper roller bearings of the series 313 are particularly adequate due to their comparatively large contact angle (approximate 30°), when high axial forces are to be considered.

NBI inch sizes taper roller bearings include the most common sizes of bearings according to the ANSI / ABMA 19.2-1994.

The technical characteristics of inch sized taper roller bearings equal to those of metric taper roller bearings. However, inch sized taper roller bearings also have different tolerances than metric sizes.

Even when you can have NBI taper roller bearings in metric and inch series, for new designs they will be preferred metric series.

Standard design variants

NBI produces single row taper roller bearings in several design variants, (e.g. with flanges on outer rings) and types of material (e.g. through-hardening steels or case-hardening steels) on customer request or order.

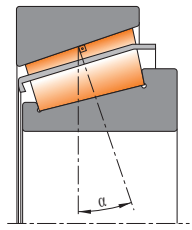


Fig.1 Contact angle

Misalignment

Misalignments not exceeding 1,5 angular minutes (0°,1.5') from their centre position, usually, do not affect negatively the correct operation of single row taper roller bearings.

But it must be considered that taper roller bearings which run misaligned are subjected to considerable additional forces that will shorten their service life and generate high running noise levels.

Tolerances

NBI taper roller bearings are produced to tolerance class PN as standard.

NBI bearings can be produced with closer tolerances according to customer requirements.

NBI inch sized taper roller bearings are produced as standard in normal tolerance as defined by ANSI/ABMA.

Width tolerance and radial run out values of the NBI inch sized taper roller bearings correspond to the values of NBI taper roller bearings in normal tolerance (class PN) according to DIN620-2.

Inch sized taper roller bearings have bigger tolerances for their bore and outer diameter tolerances.

Cages

NBI taper roller bearings are fitted with pressed steel cages as standard.

Because the cages of taper roller bearings usually protrude beyond the bearing faces, special care must be taken to follow the recommended abutment dimensions.

Internal clearance

The axial clearance of taper roller bearings is achieved during mounting by adjusting one bearing against another.

The changes in the shaft length, (e.g. caused by thermal expansion), leads into changes in operating clearance. For this reason the distance between bearing positions should be kept to a minimum.

Minimum load

For effective operation of taper roller bearings a minimum bearing load of approximately 2 per cent of the dynamic load rating Cr is required.

In the case of single row taper rolling bearings of series 320, 302, 303, 322 and 323 their, optimum running behaviour is reached by a ratio of:

$$\frac{F_a}{F_r} \geq 0{,}3$$

For bearings of series 313, having a larger contact angle, this ratio may be up to:

$$\frac{F_a}{F_r} \geq 0{,}7$$

Especially in the case of a thrust loaded taper roller bearing arrangement it must be considered that the unloading of one of the bearings due to high axial loads may cause high sliding friction in the bearings and thus generate high running noise and excessive wear, particularly in the cage pockets.

Equivalent dynamic bearing load

In the case of single row taper roller bearings the following equations should be used:

When $\frac{F_a}{F_r} \leq e$, then: $P = F_r$

or when $\frac{F_a}{F_r} > e$, then: $P = 0{,}4 \cdot F_r + Y \cdot F_a$

Each external radial load applied to taper roller bearings generates an internal thrust force.

For the calculation of axial force, F_a, the information provided in Table 1 (page 8) should be considered.

This formula applies to taper roller bearings operating without axial clearance and without preload.

Equivalent static bearing load

For single row taper roller bearings:

$$P_0 = 0{,}5 \cdot F_r + Y_0 \cdot F_a$$

When P_0 is smaller than F_r, the F_r value must be used for calculating the equivalent static bearing load.

Axial loads of single row taper roller bearings arranged in pairs

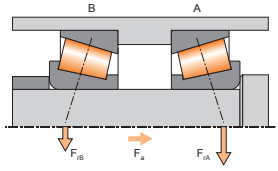
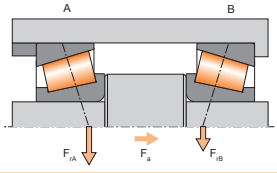
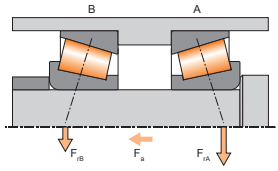
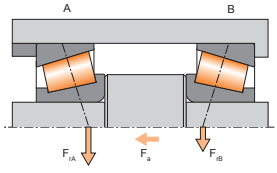
Bearing arrangement		Load case	Axial loads on bearing	
			A	B
O - Arrangement Back to back arrangement  **X - Arrangement** Face to face arrangement 	**1a**	$\frac{F_{rA}}{Y_A} \geq \frac{F_{rB}}{Y_B}$ $F_a \geq 0$	$F_{aA} = \frac{0{,}5 \cdot F_{rA}}{Y_A}$	$F_{aB} = F_{aA} + F_a$
	1b	$\frac{F_{rA}}{Y_A} < \frac{F_{rB}}{Y_B}$ $F_a \geq 0{,}5 \cdot \left(\frac{F_{rB}}{Y_B} - \frac{F_{rA}}{Y_A}\right)$	$F_{aA} = \frac{0{,}5 \cdot F_{rA}}{Y_A}$	$F_{aB} = F_{aA} + F_a$
	1c	$\frac{F_{rA}}{Y_A} < \frac{F_{rB}}{Y_B}$ $F_a < 0{,}5 \cdot \left(\frac{F_{rB}}{Y_B} - \frac{F_{rA}}{Y_A}\right)$	$F_{aA} = F_{aB} - F_a$	$F_{aB} = \frac{0{,}5 \cdot F_{rB}}{Y_B}$
O - Arrangement Back to back arrangement  **X - Arrangement** Face to face arrangement 	**2a**	$\frac{F_{rA}}{Y_A} \leq \frac{F_{rB}}{Y_B}$ $F_a \geq 0$	$F_{aA} = F_{aB} + F_a$	$F_{aB} = \frac{0{,}5 \cdot F_{rB}}{Y_B}$
	2b	$\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$ $F_a \geq 0{,}5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right)$	$F_{aA} = F_{aB} + F_a$	$F_{aB} = \frac{0{,}5 \cdot F_{rB}}{Y_B}$
	2c	$\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$ $F_a < 0{,}5 \cdot \left(\frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B}\right)$	$F_{aA} = \frac{0{,}5 \cdot F_{rA}}{Y_A}$	$F_{aB} = F_{aA} - Fa$

Table 1

Abutment and fillet dimensions

With taper roller bearings, a sufficient support of the bearing rings by the adjacent parts is required.

To gain satisfactory support both the shaft shoulders as well as the housing shoulders must have sufficient height.

The bearing rings, however, must contact adjacent parts with their side faces only.

The bearing chamfers must not contact the shoulder fillet radii of shaft or housing shoulders.

Therefore, the largest fillet radius (r_g or r_{g1}, respectively) must be kept smaller than the minimum fillet dimension of the bearing rings (r_s) as listed in the bearing tables.

Recommendations for the dimensions of adjacent parts are given in DIN 5418 (*Mounting dimensions of rolling bearings*), as well as in the bearing tables.

Supplementary designations

The product tables show the standardized bearing configurations updated on the edition of this catalogue. These standardized configurations correspond to suffix or suffixes of each bearing.

In any case, NBI can offer, under requirement, alternative designs, comprising the ones showed in the following table or many others, whose mention exceeds the purpose of the present catalogue, and can be found in specific technical publications of concrete applications or series of specific bearings.

Should you need a special design not existent in these pages, please contact our Sales Department in **NBI Bearings Europe**.

Suffix	Description
(J)	Pressed window-type steel cage. No suffix as standard on NBI tapered roller bearings
TVP	Injection moulded window-type cage of glass fibre reinforced polyamide 6,6, roller centred
X	Boundary dimensions changed conform to ISO
B	Steeper contact angle than standard design
R	Integrated flanged outer ring (Fig. 2)
ENH	E+, Enhanced bearing series (optimized load ratings)

Table 2

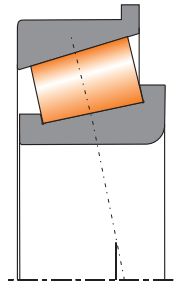
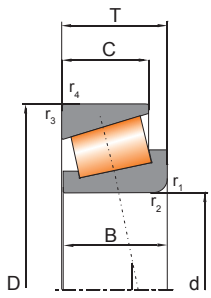
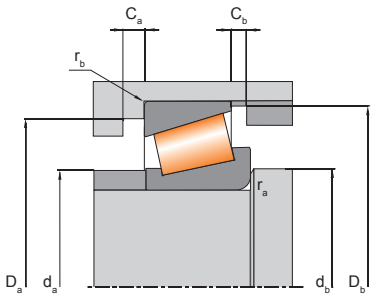


Fig. 2 Suffix R



BOUNDARY DIMENSIONS*			DESIGNATION	DESIGNATION ISO 355	∈+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO 15312
d	D	T				dyn. Cr	stat. Cor	Cu	n_B
15	42	14,25	30302	T2FB015	∈+	22,7	20,1	2,1	12.500
17	40	13,25	30203	T2DB017	∈+	18,9	18,6	1,9	12.300
	47	15,25	30303	T2FB017	∈+	27,8	24,6	2,7	11.300
	47	20,25	32303	T2FD017	∈+	35,0	34,8	3,8	10.500
20	42	15,00	32004-X	T3CC020	∈+	24,1	27,3	2,8	11.100
	47	15,25	30204	T2DB020	∈+	26,8	27,7	2,9	10.500
	52	16,25	30304	T2FB020	∈+	34,0	32,1	3,6	9.900
	52	22,25	32304	T2FD020	∈+	44,7	46,8	5,3	9.300
25	47	15,00	32005-X	T4CC025	∈+	26,0	32,6	3,5	9.300
	52	16,25	30205	T3CC025	∈+	32,0	33,6	3,7	9.200
	52	19,25	32205	T2CD025	∈+	39,4	43,9	4,8	8.100
	52	19,25	32205-B	T5CD025	∈+	35,0	44,0	5,0	8.100
	52	22,00	33205	T2DE025	∈+	53,5	57,9	6,8	8.200
	62	18,25	30305	T2FB025	∈+	45,2	43,7	5,0	8.300
	62	18,25	31305	T7FB025	∈+	37,9	38,3	4,4	7.200
	62	25,25	32305	T2FD025	∈+	61,9	63,7	7,4	7.900
28	52	16,00	320/28-X	T4CC028	∈+	34,2	39,7	4,3	8.400
30	55	17,00	32006-X	T4CC030	∈+	36,5	44,7	4,6	8.000
	62	17,25	30206	T3DB030	∈+	41,1	47,2	5,1	7.500
	62	21,25	32206	T3DC030	∈+	52,0	59,5	6,8	6.800
	62	21,25	32206-B	T5DC030	∈+	48,5	59,2	6,6	6.800
	62	25,00	33206	T2DE030	∈+	64,9	76,7	8,8	7.100
	72	20,75	30306	T2FB030	∈+	59,6	59,3	6,6	7.300
	72	20,75	31306	T7FB030	∈+	46,3	49,4	5,4	6.400
	72	28,75	32306	T2FD030	∈+	79,9	87,3	9,7	6.900
32	58	17,00	320/32-X	T4CC032	∈+	37,2	46,9	5,1	7.700
35	62	18,00	32007-X	T4CC035	∈+	48,1	56,0	6,3	7.000
	72	18,25	30207	F3DB035	∈+	52,4	58,0	6,8	6.400
	72	24,25	32207	F3DC035	∈+	66,7	78,2	10,0	6.100
	72	28,00	33207	T2DE035	∈+	84,6	106,0	11,9	6.100
	80	22,75	30307	T2FB035	∈+	73,0	74,3	8,2	6.500
	80	22,75	31307	T7FB035	∈+	60,7	64,3	7,4	5.800

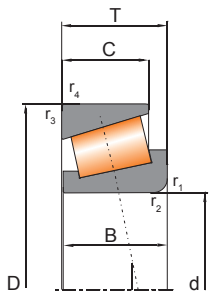
** Dimensions in mm.*



Mounting dimensions

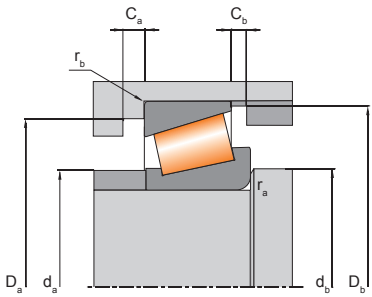
r_1, r_2 (min)	r_3, r_4 (min)	SECONDARY DIMENSIONS B	C	MOUNTING DIMENSIONS d_a max	d_b min	D_a min	D_a max	D_b min	C_a min	C_b min	r_a max	r_b max	CALCULATION FACTORS e	Y	Y0	MASS** ≈
1,0	1,0	13,0	11,0	22	21	36	36	38	2	3,0	1,0	1,0	0,29	2,11	1,16	0,10
1,0	1,0	12,0	11,0	23	23	34	34	37	2	2,0	1,0	1,0	0,35	1,74	0,96	0,06
1,0	1,0	14,0	12,0	25	23	40	41	42	2	3,0	1,0	1,0	0,29	2,11	1,16	0,13
1,0	1,0	19,0	16,0	24	23	39	41	43	3	4,0	1,0	1,0	0,29	2,11	1,16	0,18
0,6	0,6	15,0	12,0	25	25	36	37	39	3	3,0	0,6	0,6	0,37	1,60	0,88	0,11
1,0	1,0	14,0	12,0	27	26	40	41	43	2	3,0	1,0	1,0	0,35	1,74	0,96	0,09
1,5	1,5	15,0	13,0	28	27	44	45	47	2	3,0	1,5	1,5	0,30	2,00	1,10	0,19
1,5	1,5	21,0	18,0	27	27	43	45	47	3	4,0	1,5	1,5	0,30	2,00	1,10	0,24
0,6	0,6	15,0	11,5	30	30	40	42	44	3	3,5	0,6	0,6	0,43	1,39	0,77	0,12
1,0	1,0	15,0	13,0	31	31	44	46	48	2	3,0	1,0	1,0	0,37	1,60	0,88	0,15
1,0	1,0	18,0	16,0	30	31	43	46	50	3	4,0	1,0	1,0	0,36	1,67	0,92	0,19
1,0	1,0	18,0	16,0	30	31	41	46	50	3	4,0	1,0	1,0	0,58	1,03	0,57	0,19
1,0	1,0	22,0	18,0	30	31	43	46	49	4	4,0	1,0	1,0	0,35	1,71	0,94	0,21
1,5	1,5	17,0	15,0	34	32	54	55	57	2	3,0	1,5	1,5	0,30	2,00	1,10	0,29
1.5	1,5	17,0	13,0	34	32	47	55	59	3	5,0	1,5	1,5	0,83	0,73	0,40	0,30
1,5	1,5	24,0	20,0	33	32	52	55	57	3	5,0	1,5	1,5	0,30	2,00	1,10	0,36
1,0	1,0	16,0	12,0	33	34	45	46	49	3	4,0	1,0	1,0	0,43	1,39	0,77	0,16
1,0	1,0	17,0	13,0	35	36	48	49	52	3	4,0	1,0	1,0	0,43	1,39	0,77	0,19
1,0	1,0	16,0	14,0	38	36	53	56	57	2	3,0	1,0	1,0	0,37	1,60	0,88	0,24
1,0	1,0	20,0	17,0	37	36	52	56	59	3	4,0	1,0	1,0	0,37	1,60	0,88	0,27
1,0	1,0	20,0	17,0	36	36	50	56	60	3	4,0	1,0	1,0	0,56	1,07	0,59	0,30
1,0	1,0	25,0	19,5	36	36	53	56	59	5	5,5	1,0	1,0	0,34	1,76	0,97	0,39
1,5	1,5	19,0	16,0	40	37	62	65	66	3	4,5	1,5	1,5	0,31	1,90	1,05	0,44
1,5	1,5	19,0	14,0	40	37	55	65	68	3	6,5	1,5	1,5	0,83	0,73	0,40	0,44
1,5	1,5	27,0	23,0	39	37	59	65	66	3	5,5	1,5	1,5	0,31	1,90	1,05	0,59
1,0	1,0	17,0	13,0	38	38	50	52	55	3	4,0	1,0	1,0	0,45	1,32	0,73	0,19
1,0	1,0	18,0	14,0	40	41	54	56	59	4	4,0	1,0	1,0	0,45	1,32	0,73	0,26
1,5	1,5	17,0	15,0	44	42	62	65	67	3	3,0	1,5	1,5	0,37	1,60	0,88	0,34
1,5	1,5	23,0	19,0	43	42	61	65	67	3	5,0	1,5	1,5	0,37	1,60	0,88	0,48
1,5	1.5	28,0	22,0	42	42	61	65	68	5	6,0	1,5	1,5	0,35	1,70	0,93	0,58
2,0	1.5	21,0	18,0	46	44	70	71	74	3	4,5	2,0	1,5	0,31	1,90	1,05	0,57
2,0	1,5	21,0	15,0	45	44	62	71	76	4	7,5	2,0	1,5	0,83	0,73	0,40	0,58

** Dimensions in mm.*
*** Mass in kg.*



BOUNDARY DIMENSIONS*			DESIGNATION	DESIGNATION ISO 355	∈+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO 15312
d	D	T				dyn. Cr	stat. Cor	Cu	n_B
35	80	32,75	32307	T2FE035	∈+	98,0	113,0	12,3	6.300
	80	32,75	32307-B	T5FE035	∈+	94,5	115,0	12,9	6.300
40	68	19,00	32008-X	T3CD040	∈+	52,2	69,0	8,1	6.200
	68	19,00	32008-X-TVP	T3CD040	∈+	52,2	69,0	8,1	6.200
	75	26,00	33108	T2CE040	∈+	78,3	103,0	12,1	5.500
	80	19,75	30208	T3DB040	∈+	61,1	66,2	7,6	6.000
	80	24,75	32208	T3DC040	∈+	78,7	90,5	9,9	5.400
	80	32,00	33208	T2DE040	∈+	105,0	133,0	15,6	5.700
	85	33,00	T2EE040	T2EE040	∈+	121,0	148,0	16,9	6.000
	90	25,25	30308	T2FB040	∈+	88,5	97,9	11,8	5.900
	90	25,25	31308	T7FB040	∈+	84,7	82,8	9,4	5.200
	90	35,25	32308	T2FD040	∈+	119,0	145,0	17,0	5.600
	90	35,25	32308-B	-	∈+	120,0	149,0	18,2	5.600
45	75	20,00	32009-X	T3CC045	∈+	58,4	80,4	9,0	5.600
	80	26,00	33109	T3CE045	∈+	84,8	114,0	14,1	5.000
	85	20,75	30209	T3DB045	∈+	67,8	78,9	9,1	5.500
	85	24,75	32209	T3DC045	∈+	90,1	98,7	11,5	4.900
	85	32,00	33209	T3DE045	∈+	107,0	144,0	17,5	5.200
	90	24,75	32210	T3DC050	∈+	86,4	105,0	12,8	4.700
	95	29,00	T7FC045	T7FC045	∈+	89,0	112,0	12,9	5.000
	95	36,00	T2ED045	T2ED045	∈+	154,0	184,0	20,7	5.200
	100	27,25	30309	T2FB045	∈+	111,0	127,0	14,5	5.200
	100	27,25	31309	T7FB045	∈+	95,1	104,0	12,6	4.700
	100	38,25	32309	T2FD045	∈+	145,0	185,0	22,3	5.000
	100	38,25	32309-B	T5FD046	∈+	138,0	172,0	19,3	5.100
50	80	20,00	32010-X	T3CC050	∈+	61,4	90,0	9,7	5.100
	80	24,00	33010	T2CE050	∈+	73,1	108,0	13,4	5.400
	85	26,00	33110	T3CE050	∈+	85,6	120,0	14,5	5.500
	90	21,75	30210	T3DB050	∈+	77,4	93,6	11,2	4.600
	90	24,75	32210	T3DC050	∈+	83,0	102,0	11,5	5.000
	90	32,00	33210	T3DE050	∈+	114,0	162,0	18,5	4.600
	100	36,00	T2ED050	T2ED050	∈+	154,0	198,0	22,0	4.600

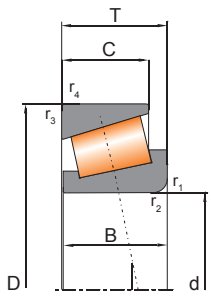
** Dimensions in mm.*



Mounting dimensions

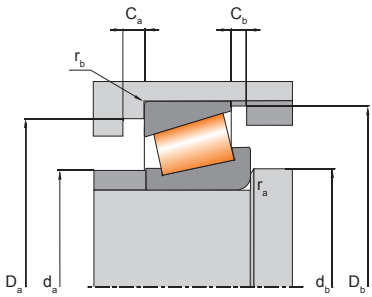
r_1, r_2 (min)	r_3, r_4 (min)	SECONDARY DIMENSIONS B	C	MOUNTING DIMENSIONS d_a max	d_b min	D_a min	D_a max	D_b min	C_a min	C_b min	r_a max	r_b max	CALCULATION FACTORS e	Y	Y0	MASS** ≈
2,0	1,5	31,0	25,0	44	44	65	71	74	4	7,5	2,0	1,5	0,31	1,90	1,05	0,75
2,0	1,5	31,0	25,0	42	44	61	71	76	4	7,5	2,0	1,5	0,55	1,10	0,60	0,80
1,0	1,0	19,0	14,5	46	46	60	62	65	4	4,5	1,0	1,0	0,38	1,58	0,87	0,31
1,0	1,0	19,0	14,5	46	46	60	62	65	4	4,5	1,0	1,0	0,38	1,58	0,87	0,30
1,5	1,5	26,0	20,5	47	47	65	68	71	4	5,5	1,5	1,5	0,36	1,69	0,93	0,54
1,5	1,5	18,0	16,0	49	47	69	73	74	3	3,5	1,5	1,5	0,37	1,60	0,88	0,43
1,5	1,5	23,0	19,0	49	47	68	73	75	3	5,5	1,5	1,5	0,37	1,60	0,88	0,55
1,5	1,5	32,0	25,0	47	47	67	73	76	5	7,0	1,5	1,5	0,36	1,68	0,92	0,74
2,5	2,0	32,1	28,0	48	50	70	75	80	5	5,0	2,0	2,0	0,34	1,74	0,96	0,90
2,0	1,5	23,0	20,0	53	49	77	81	82	3	5,0	2,0	1,5	0,35	1,74	0,96	0,81
2,0	1,5	23,0	17,0	51	49	71	81	86	4	8,0	2,0	1,5	0,83	0,73	0,40	0,73
2,0	1,5	33,0	27,0	50	49	73	81	82	4	8,0	2,0	1,5	0,35	1,74	0,96	1,05
2,0	1,5	33,0	27,0	50	49	69	81	85	4	8,0	2,0	1,5	0,55	1,10	0,60	1,15
1,0	1,0	20,0	15,5	51	51	67	69	72	4	4,5	1,0	1,0	0,39	1,53	0,84	0,33
1,5	1,5	26,0	20,5	52	52	69	73	77	4	5,5	1,5	1,5	0,38	1,57	0,86	0,59
1,5	1,5	19,0	16,0	54	52	74	78	80	3	4,5	1,5	1,5	0,40	1,48	0,81	0,47
1,5	1,5	23,0	19,0	53	52	685	78	80	3	5,5	1,5	1,5	0,40	1,48	0,81	0,57
1,5	1,5	32,0	25,0	52	52	72	78	81	5	7,0	1,5	1,5	0,39	1,56	0,86	0,89
1,5	0,3	23,0	19,0	58	54	78	85	85	3	5,5	1,5	1,5	0,42	1,43	0,79	0,60
2,5	2,5	26,5	20,0	53	58	71	83	91	3	9,0	2,5	2,0	0,87	0,69	0,38	0,93
2,5	2,5	35,0	30,0	55	56	80	83	89	6	6,0	2,0	2,0	0,32	1,86	1,02	1,20
2,0	1,5	25,0	22,0	59	54	86	91	92	3	5,0	2,0	1,5	0,35	1,74	0,96	1,00
2,0	1,5	25,0	18,0	57	53	79	91	95	4	9,0	2,0	1,5	0,83	0,73	0,40	0,99
2,0	1,5	36,0	30,0	56	54	82	91	93	4	8,0	2,0	1,5	0,35	1,74	0,96	1,50
2,0	1,5	36,0	30,0	55	54	76	91	94	5	8,0	2,0	1,5	0,55	1,10	0,60	1,50
1,0	1,0	20,0	15,5	57	56	72	74	77	4	4,5	1,0	1,0	0,42	1,42	0,78	0,38
1,0	1,0	24,0	19,0	56	56	72	74	76	4	5,0	1,0	1,0	0,32	1,90	1,04	0,47
1,5	1,5	26,0	20,0	57	57	74	78	82	4	6,0	1,5	1,5	0,41	1,46	0,80	0,60
1,5	1,5	20,0	17,0	58	57	79	83	85	3	4,5	1,5	1,5	0,42	1,43	0,79	0,60
1,5	1,5	23,0	19,0	58	57	78	83	85	3	5,5	1,5	1,5	0,42	1,43	0,79	0,60
1,5	1,5	32,0	24,5	57	57	77	83	87	5	7,5	1,5	1,5	0,41	1,45	0,80	0,97
2,5	2,5	35,0	30,0	59	60	84	88	94	6	6,0	2,0	2,0	0,34	1,75	0,96	1,30

** Dimensions in mm.*
*** Mass in kg.*



BOUNDARY DIMENSIONS*			DESIGNATION	DESIGNATION ISO 355	∈+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO 15312
d	D	T				dyn. Cr	stat. Cor	Cu	n_B
50	105	32,00	T7FC050	T7FC050	∈+	120,0	133,0	16,0	4.700
	110	29,25	30310	T2FB050	∈+	134,0	143,0	16,7	4.900
	110	29,25	31310	T7FB050	∈+	121,0	120,0	14,6	4.400
	110	42,25	32310	T2FD050	∈+	177,0	230,0	28,0	4.600
	110	42,25	32310-B	T5FD051	∈+	182,0	216,0	27,4	4.700
55	90	23,00	32011-X	T3CC055	∈+	79,7	116,0	13,9	4.700
	90	27,00	33011	T2CE055	∈+	102,0	141,0	17,6	5.000
	95	30,00	33111	T3CE055	∈+	112,0	161,0	18,5	4.300
	100	22,75	30211	T3DB055	∈+	97,2	107,0	12,0	4.600
	100	26,75	32211	T3DC055	∈+	110,0	131,0	15,7	4.100
	100	35,00	33211	T3DE055	∈+	138,0	192,0	22,0	4.400
	110	39,00	T2ED055	T2ED055	∈+	177,0	230,0	25,8	4.400
	115	34,00	T7FC055	T7FC055	∈+	125,0	164,0	19,4	4.200
	120	31,50	30311	T2FB055	∈+	153,0	169,0	19,7	4.500
	120	31,50	31311	T7FB055	∈+	122,0	137,0	16,5	4.100
	120	45,50	32311	T2FD055	∈+	214,0	270,0	31,3	4.300
	120	45,50	32311-B	T5FD056	∈+	194,0	260,0	30,0	4.400
60	95	23,00	32012-X	T4CC060	∈+	80,5	122,0	14,7	4.400
	95	27,00	33012	T2CE060	∈+	104,0	144,0	16,3	4.700
	100	30,00	33112	T3CE060	∈+	116,0	171,0	21,4	4.000
	110	23,75	30212	T3EB060	∈+	108,0	114,0	13,4	4.300
	110	29,75	32212	T3EC060	∈+	130,0	165,0	19,4	3.800
	110	38,00	33212	T3EE060	∈+	168,0	237,0	29,4	4.000
	115	40,00	T2EE060	T2EE060	∈+	192,0	254,0	31,3	4.000
	125	37,00	T7FC060	T7FC060	∈+	152,0	203,0	24,5	3.900
	130	33,50	30312	T2FB060	∈+	172,0	201,0	24,0	4.200
	130	33,50	31312	T7FB060	∈+	147,0	167,0	20,4	3.800
	130	48,50	32312	T2FD060	∈+	229,0	300,0	37,1	4.100
	130	48,50	32312-B	T5FD061	∈+	210,0	295,0	37,4	4.100
65	100	23,00	32013-X	T4CC065	∈+	90,2	126,0	14,4	4.200
	100	27,00	33013	T2CE065	∈+	104,0	153,0	20,0	4.400
	110	31,00	T2DD065	T2DD065	∈+	137,0	190,0	22,1	3.800

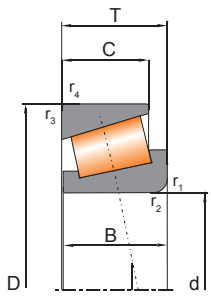
** Dimensions in mm.*



Mounting dimensions

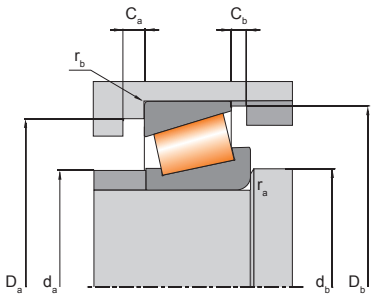
r1, r2 (min)	r3, r4 (min)	SECONDARY DIMENSIONS B	C	MOUNTING DIMENSIONS da max	db min	Da min	Da max	Db min	Ca min	Cb min	ra max	rb max	CALCULATION FACTORS e	Y	Y0	MASS** ≈
3,0	3,0	29,0	22,0	60	63	78	91	100	5	10,0	2,5	3,0	0,87	0,69	0,38	1,40
2,5	2,0	27,0	23,0	65	60	95	100	102	4	6,0	2,5	2,0	0,35	1,74	0,96	1,30
2,5	2,0	27,0	19,0	62	60	87	100	104	4	10,0	2,5	2,0	0,83	0,73	0,40	1,20
2,5	2,0	40,0	33,0	62	60	90	100	102	5	9,0	2,5	2,0	0,35	1,74	0,96	1,90
2,5	2,0	40,0	33,0	62	60	83	100	103	5	9,0	2,0	2,0	0,55	1,10	0,60	1,90
1,5	1,5	23,0	17,5	63	62	81	83	86	4	5,5	1,5	1,5	0,41	1,48	0,81	0,64
1,5	1,5	27,0	21,0	63	62	81	83	86	5	6,0	1,5	1,5	0,31	1,92	1,06	0,67
1,5	1,5	30,0	23,0	63	62	83	88	91	5	7,0	1,5	1,5	0,37	1,60	0,88	0,89
2,0	1,5	21,0	18,0	64	64	88	92	94	4	4,5	2,0	1,5	0,40	1,48	0,81	0,92
2,0	1,5	25,0	21,0	64	64	87	93	95	4	5,5	2,0	1,5	0,40	1,48	0,81	0,87
2,0	1,5	35,0	27,0	63	64	85	92	96	6	8,0	2,0	1,5	0,40	1,50	0,83	1,20
2,5	2,5	39,0	32,0	66	65	93	99	104	7	7,0	2,0	2,0	0,35	1,73	0,95	1,70
3,0	3,0	31,0	23,5	66	67	86	102	109	4	10,5	2,5	3,0	0,87	0,69	0,38	1,80
2,5	2,0	29,0	25,0	71	65	104	111	111	4	6,5	2,5	2,0	0,35	1,74	0,96	1,80
2,5	2,0	29,0	21,0	68	65	94	111	113	4	10,5	2,0	2,0	0,83	0,73	0,40	1,60
2,5	2,0	43,0	35,0	68	65	99	110	111	5	10,5	2,0	2,0	0,35	1,74	0,96	2,40
2,5	2,0	43,0	35,0	67	65	91	112	112	5	10,5	2,0	2,0	0,55	1,10	0,60	2,50
1,5	1,5	23,0	17,5	67	67	85	88	91	4	5,5	1,5	1,5	0,43	1,39	0,77	0,61
1,5	1,5	27,0	21,0	67	67	85	88	90	5	6,0	1,5	1,5	0,33	1,83	1,01	0,71
1,5	1,5	30,0	23,0	67	67	88	93	96	5	7,0	1,5	1,5	0,40	1,51	0,83	1,00
2,0	1,5	22,0	19,0	70	68	96	103	103	4	4,5	2,0	1,5	0,40	1,48	0,81	0,91
2,0	1,5	28,0	24,0	69	68	95	101	104	4	5,5	2,0	1,5	0,40	1,48	0,81	1,20
2,0	1,5	38,0	29,0	69	68	93	101	105	6	9,0	2,0	1,5	0,40	1,48	0,82	1,60
2,5	2,5	39,0	33,0	70	72	98	104	108	7	7,0	2,0	2,5	0,33	1,80	0,99	1,90
3,0	3,0	33,5	26,0	72	75	94	111	119	6	11,0	2,5	2,5	0,82	0,73	0,40	2,10
3,0	2,5	31,0	26,0	77	72	112	118	120	5	7,5	2,5	2,0	0,35	1,74	0,96	2,00
3,0	2,5	31,0	22,0	73	72	103	118	123	5	11,5	3,0	2,5	0,83	0,73	0,40	1,90
3,0	2,5	46,0	37,0	74	72	107	118	122	6	11,5	2,5	2,0	0,35	1,74	0,96	2,90
3,0	2,5	46,0	37,0	73	72	99	118	122	6	11,5	2,5	2,0	0,55	1,10	0,60	3,10
1,5	1,5	23,0	17,5	72	72	90	93	97	4	5,5	1,5	1,5	0,46	1,31	0,72	0,62
1,5	1,5	27,0	21,0	72	72	89	93	96	5	6,0	1,5	1,5	0,35	1,72	0,95	0,77
2,0	2,0	31,0	25,0	74	75	97	100	105	5	6,0	2,0	2,0	0,33	1,81	1,00	1,20

** Dimensions in mm.*
*** Mass in kg.*



BOUNDARY DIMENSIONS*			DESIGNATION	DESIGNATION ISO 355	e+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO 15312
d	D	T				dyn. Cr	stat. Cor	Cu	n_B
65	110	34,00	33113	T3DE065	e+	143,0	211,0	25,8	3.800
	120	24,75	30213	T3EB065	e+	120,0	139,0	16,5	3.900
	120	32,75	32213	T3EC065	e+	154,0	200,0	22,8	3.600
	120	41,00	33213	T3EE065	e+	195,0	280,0	33,4	3.800
	130	37,00	T7FC065	T7FC065	e+	156,0	205,0	26,1	3.800
	140	36,00	30313	T2GB065	e+	201,0	235,0	27,0	3.900
	140	36,00	31313	T7GB065	e+	165,0	193,0	23,3	3.600
	140	51,00	32313	T2GD065	e+	270,0	344,0	43,0	3.800
	140	51,00	32313-B	T5GD066	e+	246,0	339,0	42,0	3.800
70	110	25,00	32014-X	T4CC070	e+	103,0	153,0	18,0	3.900
	110	31,00	33014	T2CE070	e+	131,0	213,0	28,2	4.000
	120	37,00	33114	T3DE070	e+	174,0	258,0	31,4	3.500
	125	26,25	30214	T3EB070	e+	127,0	160,0	18,0	3.700
	125	33,25	32214	T3EC070	e+	162,0	212,0	26,4	3.400
	125	41,00	33214	T3EE070	e+	206,0	298,0	36,5	3.500
	130	43,00	T2ED070	T2ED070	e+	230,0	315,0	37,0	3.700
	140	39,00	T7FC070	T7FC070	e+	177,0	240,0	28,0	3.500
	150	38,00	30314	T2GB070	e+	226,0	266,0	31,0	3.700
	150	38,00	31314	T7GB070	e+	190,0	221,0	26,3	3.400
	150	54,00	32314	T2GD070	e+	300,0	395,0	48,0	3.600
	150	54,00	32314-B	T5GD071	e+	290,0	399,0	47,5	3.600
75	105	20,00	32915	T2BC075	e+	71,0	118,0	13,1	3.550
	115	25,00	32015-X	T4CC075	e+	106,0	163,0	18,8	3.600
	115	31,00	33015	T2CE075	e+	137,0	228,0	27,6	3.700
	125	37,00	33115	T3DE075	e+	177,0	268,0	34,2	3.300
	130	27,25	30215	T4DB075	e+	139,0	176,0	20,3	3.600
	130	33,25	32215	T4DC075	e+	169,0	225,0	25,9	3.200
	130	41,00	33215	T3EE075	e+	209,0	309,0	34,6	3.400
	145	52,00	T3FE075	T3FE075	e+	295,0	430,0	49,0	3.450
	150	42,00	T7FC075	T7FC075	e+	201,0	278,0	31,7	3.300
	160	40,00	30315	T2GB075	e+	254,0	299,0	34,0	3.500
	160	40,00	31315	T7GB075	e+	204,0	241,0	27,6	3.200

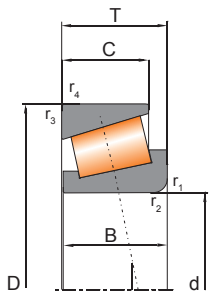
** Dimensions in mm.*



Mounting dimensions

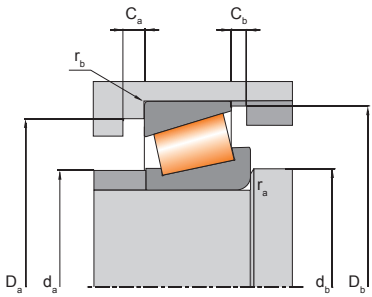
r_1, r_2 (min)	r_3, r_4 (min)	SECONDARY DIMENSIONS B	C	MOUNTING DIMENSIONS d_a max	d_b min	D_a min	D_a max	D_b min	C_a min	C_b min	r_a max	r_b max	CALCULATION FACTORS e	Y	Y0	MASS** ≈
1,5	1,5	34,0	26,5	73	72	96	103	106	6	7,5	1,5	1,5	0,39	1,55	0,85	1,30
2,0	1,5	23,0	20,0	77	74	106	112	113	4	4,5	2,0	1,5	0,40	1,48	0,81	1,30
2,0	1,5	31,0	27,0	76	74	104	113	115	4	5,5	2,0	1,5	0,40	1,48	0,81	1,50
2,0	1,5	41,0	32,0	75	74	102	113	115	6	9,0	2,0	1,5	0,39	1,54	0,85	2,00
3,0	3,0	31,4	25,3	77	77	98	116	124	4	11,0	2,5	2,5	0,87	0,69	0,38	2,20
3,0	2,5	33,0	28,0	83	77	122	128	130	5	8,0	2,5	2,5	0,35	1,74	0,96	2,40
3,0	2,5	33,0	23,0	79	77	111	128	132	5	13,0	2,5	2,0	0,83	0,73	0,40	2,40
3,0	2,5	48,0	39,0	80	77	117	128	130	6	12,0	2,5	2,0	0,35	1,74	0,96	3,60
3,0	2,5	48,0	39,0	77	77	109	128	133	6	12,0	2,5	2,0	0,55	1,10	0,60	3,70
1,5	1,5	25,0	19,0	78	77	98	103	105	5	6,0	1,5	1,5	0,43	1,38	0,76	0,85
1,5	1,5	31,0	25,5	78	77	99	103	105	5	5,5	1,5	1,5	0,28	2,11	1,16	1,10
2,0	1,5	37,0	29,0	79	79	104	112	115	6	8,0	2,0	1,5	0,38	1,58	0,87	1,70
2,0	1,5	24,0	21,0	82	79	110	116	118	4	5,0	2,0	1,5	0,42	1,43	0,79	1,30
2,0	1,5	31,0	27,0	80	79	108	116	119	4	6,0	2,0	1,5	0,42	1,43	0,79	1,80
2,0	1,5	41,0	32,0	79	78	107	115	120	6	9,0	2,0	1,5	0,41	1,47	0,81	2,10
3,0	2,5	42,0	35,0	81	98	111	118	123	7	8,0	7,0	2,0	0,33	1,80	0,99	2,40
3,0	3,0	35,5	27,0	82	88	106	126	133	6	12,0	2,5	2,5	0,87	0,69	0,38	2,70
3,0	2,5	35,0	30,0	90	82	130	138	140	5	8,0	3,0	2,0	0,35	1,74	0,96	3,00
3,0	2,5	35,0	25,0	84	82	118	138	141	5	13,0	3,0	2,5	0,83	0,73	0,40	2,90
3,0	2,5	51,0	42,0	86	82	125	138	140	6	12,0	3,0	2,5	0,35	1,74	0,96	4,30
3,0	2,5	51,0	42,0	83	82	117	138	143	7	12,0	3,0	2,5	0,55	1,10	0,60	4,50
1,0	1,0	20,0	16,0	81	82	98	98	101	4	4,0	1,0	1,0	0,33	1,80	0,99	0,52
1,5	1,5	25,0	19,0	83	82	103	108	110	5	6,0	1,5	1,5	0,46	1,31	0,72	0,92
1,5	1,5	31,0	25,5	84	82	104	108	110	6	5,5	1,5	1,5	0,30	2,01	1,11	1,20
2,0	1,5	37,0	29,0	84	84	109	117	120	6	8,0	2,0	1,5	0,40	1,51	0,83	1,80
2,0	1,5	25,0	22,0	86	84	115	120	124	4	5,0	2,0	1,5	0,44	1,38	0,76	1,60
2,0	1,5	31,0	27,0	85	84	114	121	125	4	6,0	2,0	1,5	0,44	1,38	0,76	1,90
2,0	1,5	41,0	31,0	83	84	111	121	125	7	10,0	2,0	1,5	0,43	1,40	0,77	2,50
5,0	3,0	51,0	43,0	88	95	117	131	138	7	8,0	4,0	2,5	0,43	1,40	0,77	4,00
3,0	3,0	38,0	29,0	87	88	114	136	143	6	13,0	3,0	3,0	0,87	0,69	0,38	3,20
3,0	2,5	37,0	31,0	96	87	139	148	149	5	9,0	2,5	2,0	0,35	1,74	0,96	3,60
3,0	2,5	37,0	26,0	91	87	127	148	151	6	14,0	3,0	2,0	0,83	0,73	0,40	3,80

** Dimensions in mm.*
*** Mass in kg.*



BOUNDARY DIMENSIONS*			DESIGNATION	DESIGNATION ISO 355	e+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO 15312
d	D	T				dyn. Cr	stat. Cor	Cu	n_B
75	160	58,00	32315	T2GD075	e+	360,0	470,0	54,0	3.400
	160	58,00	32315-B	T5GD076	e+	340,0	463,0	54,0	3.400
80	125	29,00	32016-X	T3CC080	e+	138,0	210,0	25,9	3.500
	125	36,00	33016	T2CE080	e+	170,0	285,0	32,3	3.600
	130	37,00	33116	T3DE080	e+	183,0	294,0	33,4	3.100
	140	28,25	30216	T3EB080	e+	153,0	189,0	21,5	3.400
	140	35,25	32216	T3EC080	e+	190,0	250,0	29,1	3.100
	140	46,00	33216	T3EE080	e+	251,0	375,0	42,6	3.200
	160	45,00	T7FC080	T7FC080	e+	229,0	315,0	36,8	3.200
	170	42,50	30316	T2GB080	e+	272,0	322,0	38,2	3.400
	170	42,50	31316	T7GB080	e+	227,0	268,0	31,8	3.100
	170	61,50	32316	T5GD080	e+	373,0	509,0	59,1	3.200
85	130	29,00	32017-X	T4CC085	e+	140,0	224,0	26,3	3.300
	130	36,00	33017	T2CE085	e+	182,0	310,0	36,5	3.400
	140	41,00	33117	T3DE085	e+	220,0	341,0	39,7	3.000
	150	30,50	30217	T3EB085	e+	176,0	220,0	25,5	3.200
	150	38,50	32217	T3EC085	e+	220,0	285,0	35,9	3.000
	150	49,00	33217	T3EE085	e+	293,0	432,0	52,5	3.000
	180	44,50	30317	T2GB085	e+	315,0	369,0	41,9	3.200
	180	44,50	31317	T7GB085	e+	244,0	286,0	33,9	3.000
	180	63,50	32317	T2GD085	e+	420,0	570,0	66,0	3.000
	180	63,50	32317-B	T5GD086	e+	390,0	580,0	68,0	3.000
90	140	32,00	32018-X	T3CC090	e+	167,0	259,0	30,7	3.200
	140	39,00	33018	T2CE090	e+	215,0	358,0	39,9	3.200
	150	45,00	33118	T3DE090	e+	256,0	402,0	46,9	2.900
	160	32,50	30218	T3FB090	e+	195,0	249,0	28,5	3.100
	160	42,50	32218	T3FC090	e+	257,0	343,0	40,5	2.900
	190	46,50	30318	T2GB090	e+	331,0	403,0	43,7	3.100
	190	46,50	31318	T7GB090	e+	275,0	320,0	35,6	2.800
	190	67,50	32318	T2GD090	e+	490,0	650,0	72,9	2.800
95	145	32,00	32019-X	T4CC095	e+	168,0	270,0	30,5	3.000
	145	39,00	33019	T2CE095	e+	220,0	375,0	42,0	3.100

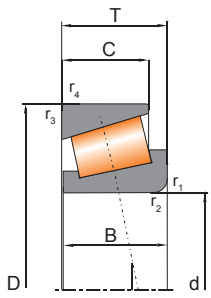
** Dimensions in mm.*



Mounting dimensions

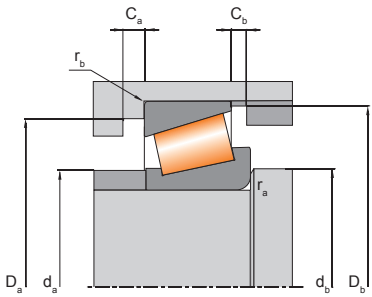
r_1, r_2 (min)	r_3, r_4 (min)	SECONDARY DIMENSIONS B	C	MOUNTING DIMENSIONS d_a max	d_b min	D_a min	D_a max	D_b min	C_a min	C_b min	r_a max	r_b max	CALCULATION FACTORS e	Y	Y0	MASS** ≈
3,0	2,5	55,0	45,0	91	87	133	148	149	7	13,0	3,0	2,5	0,35	1,74	0,96	5,40
3,0	2,5	55,0	45,0	90	87	124	148	151	7	14,0	3,0	2,5	0,55	1,10	0,60	5,60
1,5	1,5	29,0	22,0	89	87	112	117	120	6	7,0	1,5	1,5	0,42	1,42	0,78	1,30
1,5	1,5	36,0	29,5	90	87	112	117	119	6	6,5	1,5	1,5	0,28	2,16	1,19	1,70
2,0	1,5	37,0	29,0	89	89	114	122	126	6	8,0	2,0	1,5	0,42	1,44	0,79	1,90
2,5	2,0	26,0	22,0	91	90	124	130	132	4	6,0	2,5	2,0	0,42	1,43	0,79	1,70
2,5	2,0	33,0	28,0	91	90	122	130	134	5	7,0	2,5	2,0	0,42	1,43	0,79	2,40
2,5	2,0	46,0	35,0	89	90	119	130	135	7	11,0	2,0	2,0	0,43	1,41	0,78	2,90
3,0	3,0	41,0	31,0	94	100	121	146	152	7	14,0	2,5	3,0	0,87	0,69	0,38	4,00
3,0	2,5	39,0	33,0	102	92	148	158	159	5	9,5	3,0	2,5	0,35	1,74	0,96	4,30
3,0	2,5	39,0	27,0	97	92	134	158	159	6	15,5	2,5	2,0	0,83	0,73	0,40	4,20
3,0	2,5	58,0	48,0	98	92	137	158	159	7	13,5	2,5	2,0	0,55	1,10	0,60	6,50
1,5	1,5	29,0	22,0	94	92	117	122	125	6	7,0	1,5	1,5	0,44	1,36	0,75	1,40
1,5	1,5	36,0	29,5	94	92	118	122	125	6	6,5	1,5	1,5	0,29	2,06	1,13	1,80
2,5	2,0	41,0	32,0	95	95	122	130	135	7	9,0	2,5	2,0	0,41	1,48	0,81	2,40
2,5	2,0	28,0	24,0	97	95	132	140	141	5	6,5	2,5	2,0	0,42	1,43	0,79	2,10
2,5	2,0	36,0	30,0	96	95	130	140	142	5	8,5	2,0	2,0	0,42	1,43	0,79	2,70
2,5	2,0	49,0	37,0	95	95	128	140	144	7	12,0	2,0	2,0	0,42	1,43	0,79	3,60
4,0	3,0	41,0	34,0	107	99	156	166	167	6	10,5	3,0	2,5	0,35	1,74	0,96	4,80
4,0	3,0	41,0	28,0	103	99	143	166	169	6	16,5	3,0	3,0	0,83	0,73	0,40	4,90
4,0	3,0	60,0	49,0	103	99	150	166	167	8	14,5	4,0	3,0	0,35	1,74	0,96	7,60
4,0	3,0	60,0	49,0	102	99	138	166	169	7	14,5	4,0	3,0	0,55	1,10	0,60	7,90
2,0	1,5	32,0	24,0	100	98	125	131	134	6	8,0	2,0	1,5	0,42	1,42	0,78	1,80
2,0	1.5	39,0	32,5	100	99	127	131	135	7	6,5	2,0	1,5	0,27	2,23	1,23	2,50
2,5	2,0	45,0	35,0	101	100	130	140	144	7	10,0	2,5	2,0	0,40	1,51	0,83	3,20
2,5	2,0	30,0	26,0	103	101	140	150	150	5	6,5	2,0	2,0	0,42	1,43	0,79	2,60
2,5	2,0	40,0	34,0	102	100	138	150	152	5	8,5	2,5	2,0	0,42	1,43	0,79	3,80
4,0	3,0	43,0	36,0	113	104	165	176	176	6	10,5	3,0	2,5	0,35	1,74	0,96	5,80
4,0	3,0	43,0	30,0	109	105	151	176	179	5	16,5	3,5	3,0	0,83	0,73	0,40	5,50
4,0	3,0	64,0	53,0	108	104	157	176	177	7	14,5	3,5	2,5	0,35	1,74	0,96	8,50
2,0	1,5	32,0	24,0	105	104	130	136	140	6	8,0	2,0	1,5	0,44	1,36	0,75	1,90
2,0	1,5	39,0	32,5	104	104	131	137	139	7	6,5	2,0	1,5	0,28	2,16	1,19	2,30

** Dimensions in mm.*
*** Mass in kg.*



BOUNDARY DIMENSIONS*			DESIGNATION	DESIGNATION ISO 355	∈+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO 15312
d	D	T				dyn. Cr	stat. Cor	Cu	n_B
95	170	34,50	30219	T3FB095	∈+	224,0	276,0	31,7	3.000
	170	45,50	32219	T3FC095	∈+	282,0	403,0	45,2	2.700
	200	49,50	30319	T2GB095	∈+	352,0	431,0	43,0	3.000
	200	49,50	31319	T7GB095	∈+	302,0	356,0	39,4	2.800
	200	71,50	32319	T2GD095	∈+	526,0	686,0	77,2	2.600
100	140	25,00	32920	T2CC100	∈+	114,0	200,0	22,1	3.000
	145	24,00	T4CB100	T4CB100	∈+	120,0	180,0	20,7	3.000
	150	32,00	32020-X	T4CC100	∈+	173,0	280,0	33,1	2.900
	150	39,00	33020	T2CE100	∈+	224,0	390,0	43,8	2.900
	165	47,00	T2EE100	T2EE100	∈+	300,0	460,0	51,0	2.600
	180	37,00	30220	T3FB100	∈+	248,0	321,0	35,7	2.800
	180	49,00	32220	T3FC100	∈+	332,0	469,0	52,8	2.600
	215	51,50	30320	T2GB100	∈+	413,0	507,0	55,9	2.800
	215	56,50	31320-X	T7GB100	∈+	377,0	474,0	51,7	2.600
	215	77,50	32320	T2GD100	∈+	589,0	832,0	84,3	2.400
105	160	35,00	32021-X	T4DC105	∈+	202,0	331,0	37,6	2.800
	160	43,00	33021	T2DE105	∈+	255,0	430,0	52,7	2.900
	190	39,00	30221	T3FB105	∈+	275,0	356,0	40,0	2.700
	190	53,00	32221	T3FC105	∈+	380,0	527,0	59,4	2.500
	225	81,50	32321	T2GD105	∈+	649,0	895,0	115,0	2.300
110	150	25,00	32922-X	T2CC110	∈+	123,0	219,0	23,0	2.500
	170	38,00	32022-X	T4DC110	∈+	235,0	390,0	44,5	2.700
	170	47,00	33022	T2DE110	∈+	288,0	515,0	59,4	2.800
	200	41,00	30222	T3FB110	∈+	309,0	425,0	45,2	2.500
	200	56,00	32222	T3FC110	∈+	412,0	588,0	65,4	2.400
	240	54,50	30322	T2GB110	∈+	474,0	584,0	63,3	2.400
	240	63,00	31322-X	T7GB110	∈+	460,0	589,0	64,4	2.200
	240	84,50	32322	T2GD110	∈+	705,0	876,0	100,0	2.200
120	165	29,00	32924	T2CC120	∈+	170,0	305,0	32,9	2.400
	170	27,00	T4CB120	T4CB120	∈+	155,0	244,0	26,2	2.000
	180	38,00	32024-X	T4DC120	∈+	249,0	416,0	47,3	2.500
	180	48,00	33024	T2DE120	∈+	297,0	552,0	67,7	2.600

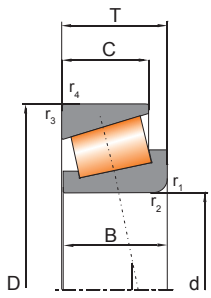
** Dimensions in mm.*



Mounting dimensions

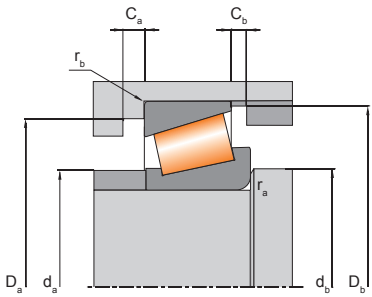
r1, r2 (min)	r3, r4 (min)	SECONDARY DIMENSIONS B	C	MOUNTING DIMENSIONS da max	db min	Da min	Da max	Db min	Ca min	Cb min	ra max	rb max	CALCULATION FACTORS e	Y	Y0	MASS** ≈
3,0	2,5	32,0	27,0	110	107	149	158	159	5	7,5	3,0	2,5	0,42	1,43	0,79	3,10
3,0	2,5	43,0	37,0	108	107	145	158	161	5	8,5	3,0	2,0	0,42	1,43	0,79	4,20
4,0	3,0	45,0	38,0	118	109	172	186	184	6	11,5	3,5	3,0	0,35	1,74	0,96	6,80
4,0	3,0	45,0	32,0	114	109	157	186	187	6	17,5	3,5	2,5	0,83	0,73	0,40	7,10
4,0	3,0	67,0	55,0	115	109	166	186	186	8	16,5	4,0	3,0	0,35	1,74	0,96	10,30
1,5	1,5	25,0	20,0	109	107	131	132	135	5	5,0	1,5	1,5	0,33	1,82	1,00	1,10
3,0	3,0	22,5	17,5	109	112	133	131	140	4	6,5	2,5	2,5	0,47	1,27	0,7	1,20
2,0	1,5	32,0	24,0	109	108	134	142	144	6	8,0	2,0	1,5	0,46	1,31	0,72	1,90
2,0	1,5	39,0	32,5	108	109	135	141	143	7	6,5	2,0	1,5	0,29	2,09	1,15	2,40
3,0	3,0	46,0	39,0	111	112	145	151	157	7	8,0	2,5	2,5	0,32	1,88	1,04	4,00
3,0	2,5	34,0	29,0	116	112	157	168	168	5	8,0	3,0	2,0	0,42	1,43	0,79	3,80
3,0	2,5	46,0	39,0	115	112	154	168	171	5	10,0	2,5	2,5	0,42	1,43	0,79	5,20
4,0	3,0	47,0	39,0	127	115	184	201	197	6	12,5	3,5	2,5	0,35	1,74	0,96	8,30
4,0	3,0	51,0	35,0	121	115	168	201	202	7	21,5	3,5	2,5	0,83	0,73	0,40	8,80
4,0	3,0	73,0	60,0	123	114	177	201	200	8	17,5	3,0	2,5	0,35	1,74	0,96	12,90
2,5	2,0	35,0	26,0	116	115	143	150	154	6	9,0	2,0	2,0	0,44	1,35	0,74	2,30
2,5	2,0	43,0	34,0	116	115	145	150	153	7	9,0	2,0	2,0	0,28	2,12	1,17	3,30
3,0	2,5	36,0	30,0	122	117	165	178	177	6	9,0	3,0	2,0	0,42	1,43	0,79	4,20
3,0	2,5	50,0	43,0	120	117	161	178	180	6	10,0	2,5	2,5	0,42	1,43	0,79	6,10
4,0	3,0	77,0	63,0	128	120	185	211	209	9	18,5	3,5	2,5	0,35	1,74	0,96	15,10
1,5	1,5	25,0	20,0	118	117	140	142	145	5	5,0	1,5	1,5	0,36	1,69	0,93	1,30
2,5	2,0	38,0	29,0	123	121	152	160	163	7	9,0	2,5	2,0	0,43	1,39	0,77	3,40
2,5	2,0	47,0	37,0	123	121	152	160	161	7	10,0	2,0	2,0	0,29	2,09	1,15	4,20
3,0	2,5	38,0	32,0	129	122	174	188	187	6	9,0	2,5	2,0	0,42	1,43	0,79	5,20
3,0	2,5	53,0	46,0	126	122	170	188	190	6	10,0	3,0	2,5	0,42	1,43	0,79	7,40
4,0	3,0	50,0	42,0	142	124	206	226	220	8	12,5	3,5	3,0	0,35	1,74	0,96	11,00
4,0	3,0	57,0	38,0	135	125	188	226	224	7	25,0	3,5	2,5	0,83	0,73	0,40	12,30
4,0	3,0	80,0	65,0	137	125	198	226	222	9	19,5	3,5	3,0	0,35	1,74	0,96	19,00
1,5	1,5	29,0	23,0	129	127	154	158	160	5	6,0	1,5	1,5	0,35	1,72	0,95	1,80
3,0	3,0	25,0	19,5	130	132	157	157	164	4	7,5	2,5	2,5	0,47	1,27	0,70	2,00
2,5	2,0	38,0	29,0	131	130	161	170	173	7	9,0	2,0	2,0	0,46	1,31	0,72	3,30
2,5	2,0	48,0	38,0	132	130	160	170	171	6	10,0	2,0	2,0	0,31	1,97	1,08	4,60

** Dimensions in mm.*
*** Mass in kg.*



BOUNDARY DIMENSIONS*			DESIGNATION	DESIGNATION ISO 355	∈+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO 15312
d	D	T				dyn. Cr	stat. Cor	Cu	n_B
120	215	43,50	30224	T4FB120	∈+	340,0	463,0	53,5	2.400
	215	61,50	32224	T4FD120	∈+	481,0	703,0	72,8	2.200
	260	59,50	30324	T2GB120	∈+	563,0	710,0	77,0	2.100
	260	68,00	31324-X	T7GB120	∈+	539,0	700,0	80,6	2.000
	260	90,50	32324	T2GD120	∈+	714,0	983,0	111,0	2.000
130	180	32,00	32926	T2CC130	∈+	203,0	368,0	39,3	2.200
	200	45,00	32026-X	T4EC130	∈+	314,0	551,0	57,4	2.300
	230	43,75	30226	T4FB130	∈+	360,0	487,0	54,0	2.300
	230	67,75	32226	T4FD130	∈+	558,0	838	92,6	2.000
	280	63,75	30326	T2GB130	∈+	616,0	760,0	84,9	2.000
	280	72,00	31326-X	T7GB130	∈+	608,0	786,0	82,5	1.800
140	190	32,00	32928	T2CC140	∈+	210,0	391,0	41,2	2.100
	195	29,00	T4CB140	T4CB140	∈+	193,0	311,0	33,2	1.800
	210	45,00	32028-X	T4DC140	∈+	333,0	588,0	49,5	2.200
	250	45,75	30228	T4FB140	∈+	419,0	570,0	60,3	2.000
	250	71,75	32228	T4FD140	∈+	649,0	1.000,0	108,0	1.700
	300	77,00	31328-X	T7GB140	∈+	692,0	898,0	91,9	1.700
150	210	32,00	T4DB150	T4DB150	∈+	229,0	374,0	38,5	2.000
	225	48,00	32030-X	T4EC150	∈+	385,0	664,0	67,3	2.000
	225	59,00	33030	T2EE150	∈+	450,0	855,0	85,0	1.950
	270	49,00	30230	T4GB150	∈+	450,0	575,0	66,4	1.900
	270	77,00	32230	T4GD150	∈+	739,0	1.158,0	133,0	1.600
	320	82,00	31330-X	T7GB150	∈+	790,0	1.031,0	100,0	1.500
160	220	32,00	T4DB160	T4DB160	∈+	235,0	403,0	40,0	2.000
	220	38,00	32932	T2DC160	∈+	285,0	525,0	62,0	1.880
	240	51,00	32032-X	T4EC160	∈+	429,0	775,0	87,7	1.800
	290	52,00	30232	T4GB1560	∈+	477,0	607,0	68,8	1.800
	290	84,00	32232	T4GD160	∈+	871,0	1.392,0	156,0	1.400
	340	75,00	30332	T2GB160	∈+	909,0	1.145,0	117,0	1.500
170	230	32,00	T4DB170	T4DB170	∈+	231,0	425,0	45,6	1.480
	230	38,00	32934	T3DC170	∈+	288,0	554,0	62,8	1.790
	260	57,00	32034-X	T4EC170	∈+	512,0	907,0	91,4	1.670

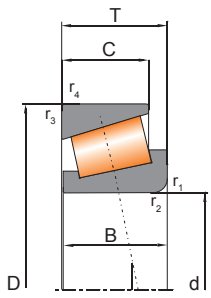
** Dimensions in mm.*



Mounting dimensions

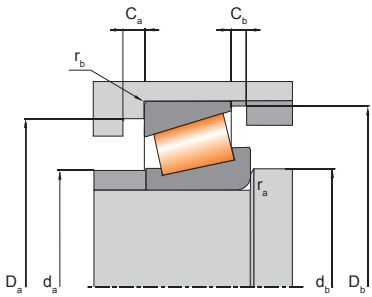
r1, r2 (min)	r3, r4 (min)	SECONDARY DIMENSIONS B	C	MOUNTING DIMENSIONS da max	db min	Da min	Da max	Db min	Ca min	Cb min	ra max	rb max	CALCULATION FACTORS e	Y	Y0	MASS** ≈
3,0	2,5	40,0	34,0	140	132	187	203	201	6	9,5	3,0	2,0	0,44	1,38	0,76	6,30
3,0	2,5	58,0	50,0	137	132	181	203	204	7	11,5	3,0	2,0	0,44	1,38	0,76	9,30
4,0	3,0	55,0	46,0	152	135	221	246	237	8	13,5	4,0	3,0	0,35	1,74	0,96	14,30
4,0	3,0	62,0	42,0	145	135	203	246	244	9	26,0	3,0	3,0	0,83	0,73	0,40	15,40
4,0	3,0	86,0	69,0	148	134	213	245	239	9	21,5	3,0	2,5	0,35	1,74	0,96	21,10
2,0	1,5	32,0	25,0	141	139	167	171	173	6	7,0	2,0	1,5	0,34	1,77	0,97	2,40
2,5	2,0	45,0	34,0	144	141	178	190	192	8	11,0	2,5	2,0	0,43	1,38	0,76	5,00
4,0	3,0	40,0	34,0	152	145	203	216	217	7	9,5	3,5	3,0	0,44	1,38	0,76	7,10
4,0	3,0	64,0	54,0	146	145	193	216	219	7	13,5	3,0	2,5	0,44	1,38	0,76	11,70
5,0	4,0	58,0	49,0	164	149	239	262	255	8	14,5	4,5	4,0	0,35	1,74	0,96	17,20
5,0	4,0	66,0	44,0	157	150	218	263	261	8	28,0	5,0	3,5	0,83	0,73	0,40	19,10
2,0	1,5	32,0	25,0	150	149	177	181	184	6	7,0	2,0	1,5	0,36	1,67	0,92	2,60
3,0	3,0	27,0	21,0	151	154	180	181	189	6	8,0	2,5	3,0	0,50	1,19	0,66	2,40
2,5	2,0	45,0	34,0	153	151	187	200	202	7	11,0	2,5	2,0	0,46	1,31	0,72	5,40
4,0	3,0	42,0	36,0	163	155	219	236	234	7	9,5	3,0	3,0	0,44	1,38	0,76	8,80
4,0	3,0	68,0	58,0	159	156	210	236	238	8	13,5	3,0	3,0	0,44	1,38	0,76	14,00
5,0	4,0	70,0	47,0	169	158	235	283	280	9	30,0	4,5	3,5	0,83	0,73	0,40	23,10
3,0	3,0	30,0	23,0	162	162	194	196	203	5	9,0	2,5	2,5	0,46	1,30	0,72	3,10
3,0	2,5	48,0	36,0	164	163	200	213	216	8	12,0	3,0	2,0	0,46	1,31	0,72	6,50
3,0	2,5	59,0	46,0	164	162	200	213	217	8	13,0	2,5	2,0	0,36	1,65	0,90	8,20
4,0	3,0	45,0	38,0	175	165	234	256	250	9	11,0	3,5	2,5	0,44	1,38	0,76	11,10
4,0	3,0	73,0	60,0	171	166	226	256	254	8	17,0	4,0	2,5	0,44	1,38	0,76	18,50
5,0	4,0	75,0	50,0	181	170	251	302	300	9	32,0	5,0	3,5	0,83	0,73	0,40	28,00
3,0	3,0	30,0	23,0	172	174	204	206	213	5	9,0	2,5	2,4	0,49	1,23	0,68	3,30
2,5	2,0	38,0	30,0	173	170	204	210	212	7	8,0	2,5	2,0	0,35	1,73	0,95	4,10
3,0	2,5	51,0	38,0	175	174	213	228	231	8	13,0	2,5	2,5	0,46	1,31	0,72	7,80
4,0	3,0	48,0	40,0	189	176	252	275	269	9	12,0	3,0	3,0	0,44	1,38	0,76	13,80
4,0	3,0	80,0	67,0	183	175	242	276	274	10	17,0	3,5	3,0	0,44	1,38	0,76	23,40
5,0	4,0	68,0	58,0	201	178	290	322	310	9	17,0	4,5	3,5	0,35	1,74	0,96	29,90
3,0	3,0	30,0	23,0	182	184	214	216	223	6	9,0	3,0	2,5	0,46	1,30	0,72	4,30
2,5	2,0	38,0	30,0	183	181	213	220	222	7	8,0	2,5	2,0	0,38	1,57	0,86	4,40
3,0	2,5	57,0	43,0	187	182	230	246	249	10	14,0	3,0	2,5	0,44	1,35	0,74	11,40

** Dimensions in mm.*
*** Mass in kg.*



BOUNDARY DIMENSIONS*			DESIGNATION	DESIGNATION ISO 355	∈+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO 15312
d	D	T				dyn. Cr	stat. Cor	Cu	n_B
170	310	57,00	30234	T4GB170	∈+	609,0	862,0	89,1	1.550
	310	91,00	32234	T4GD170	∈+	1.000,0	1.600,0	169,0	1.290
180	240	32,00	T4DB180	T4DB180	∈+	250,0	445,0	41,0	1.500
	250	45,00	32936	T4DC180	∈+	355,0	733,0	82,6	1.630
	280	64,00	32036-X	T3FD180	∈+	629,0	1.111,0	117,0	1.500
	320	57,00	30236	T4GB180	∈+	606,0	845,0	87,8	1.500
	320	91,00	32236	T4GD180	∈+	1.010,0	1.650,0	168,0	1.230
190	260	45,00	32938	T4DC190	∈+	368,0	761,0	72,9	1.540
	290	64,00	32038-X	T4FD190	∈+	641,0	1.180,0	116,0	1.410
	340	60,00	30238	T4GB190	∈+	542,0	871,0	88,4	1.440
200	270	37,00	T4DB200	T4DB200	∈+	327,0	556,0	59,7	1.300
	280	51,00	32940	T3EC200	∈+	494,0	944,0	105,0	1.400
	310	70,00	32040-X	T4FD200	∈+	750,0	1.380,0	134,0	1.290
	360	64,00	30240	T4GB200	∈+	789,0	1.090,0	113,0	1.280
	360	104,00	32240	T3GD200	∈+	1.250,0	2.000,0	204,0	1.060
220	285	41,00	T2DC220	T2DC220	∈+	390,0	825,0	75,0	1.300
	300	51,00	32944	T3EC220	∈+	492,0	985,0	99,0	1.320
	340	76,00	32044-X	T4FD220	∈+	894,0	1.655,0	158,0	1.160
	400	72,00	30244	-	∈+	973,0	1.360,0	135,0	1.150
	400	114,00	32244	-	∈+	1.610,0	2.675,0	258,0	910
240	320	42,00	T4EB240	T4EB240	∈+	418,0	805,0	73,0	1.150
	320	51,00	32948	T4EC240	∈+	510,0	1.080,0	111,0	1.150
	360	76,00	32048-X	T4FD240	∈+	905,0	1.736,0	176,0	1.040
	440	127,00	32248	-	∈+	1.820,0	3.280,0	310,0	770
260	400	87,00	32052-X	T4FC260	∈+	1.160,0	2.180,0	209,0	910
	480	137,00	32252	-	∈+	2.210,0	3.730,0	361,0	700
280	380	63,50	32956	T4EC280	∈+	747,0	1.600,0	159,0	910
	420	87,00	32056	T4FC280	∈+	1.210,0	2.330,0	214,0	830
300	420	76,00	32960	T3FD300	∈+	1.050,0	2.140,0	206,0	800
	460	100,00	32060-X	T4GD300	∈+	1.510,0	2.970,0	257,0	730
	540	149,00	32260	-	∈+	2.740,0	4.700,0	354,0	700
320	440	76,00	32964	T3FD320	∈+	1.060,0	2.300,0	189,0	750

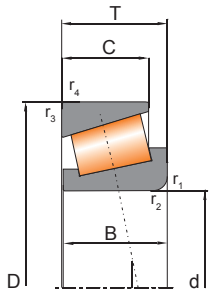
** Dimensions in mm.*



Mounting dimensions

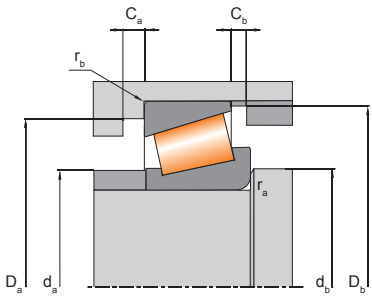
r1, r2 (min)	r3, r4 (min)	SECONDARY DIMENSIONS B	C	MOUNTING DIMENSIONS da max	db min	Da min	Da max	Db min	Ca min	Cb min	ra max	rb max	CALCULATION FACTORS e	Y	Y0	MASS** ≈
5,0	4,0	52,0	43,0	203	188	268	293	288	8	14,0	4,0	3,5	0,44	1,38	0,76	19,20
5,0	4,0	86,0	71,0	196	189	259	292	294	10	20,0	4,0	3,5	0,44	1,38	0,76	28,60
3,0	3,0	30,0	23,0	191	192	224	226	233	6	9,0	2,5	2,5	0,48	1,24	0,68	3,60
2,5	2,0	45,0	34,0	194	192	225	240	241	8	11,0	2,5	2,0	0,48	1,25	0,69	7,10
3,0	2,5	64,0	48,0	199	193	247	267	267	10	16,0	2,5	2,0	0,42	1,42	0,78	14,20
5,0	4,0	52,0	43,0	211	199	278	303	297	9	14,0	4,0	3,0	0,45	1,33	0,73	17,90
5,0	4,0	86,0	71,0	204	199	267	302	303	10	20,0	4,0	4,0	0,45	1,33	0,73	32,50
2,5	2,0	45,0	34,0	204	201	235	249	251	8	11,0	2,0	2,0	0,48	1,26	0,69	7,60
3,0	2,5	64,0	48,0	210	202	257	277	279	10	16,0	3,0	2,5	0,44	1,36	0,75	14,80
5,0	4,0	55,0	46,0	224	208	298	323	318	9	14,0	4,5	3,5	0,44	1,38	0,76	20,80
3,0	3,0	34,0	27,0	214	215	251	255	262	6	10,0	3,0	3,0	0,47	1,27	0,70	5,60
3,0	2,5	51,0	39,0	217	214	257	267	271	9	12,0	2,5	2,0	0,39	1,52	0,84	9,00
3,0	2,5	70,0	53,0	222	212	273	296	297	11	17,0	2,5	2,5	0,43	1,39	0,77	19,00
5,0	4,0	58,0	48,0	237	218	315	342	336	9	16,0	5,0	3,5	0,44	1,38	0,76	25,50
5,0	4,0	98,0	82,0	228	220	302	343	340	11	22,0	4,0	3,5	0,41	1,48	0,81	43,00
4,0	3,0	40,0	33,0	233	236	270	270	277	7	8,0	3,0	2,5	0,32	1,88	1,04	6,50
3,0	2,5	51,0	39,0	234	232	275	287	290	9	12,0	3,0	2,5	0,43	1,41	0,78	10,30
4,0	3,0	76,0	57,0	243	234	300	325	326	12	19,0	3,5	2,5	0,43	1,39	0,77	24,30
5,0	4,0	65,0	54,0	256	237	348	382	371	10	18,0	4,5	3,0	0,42	1,43	0,79	34,60
5,0	4,0	108,0	90,0	255	238	335	383	379	12	24,0	4,5	3,5	0,44	1,38	0,76	59,50
3,0	3,0	39,0	30,0	256	254	299	305	310	7	12,0	2,5	2,5	0,46	1,31	0,72	8,40
3,0	2,5	51,0	39,0	254	253	294	307	311	9	12,0	3,0	2,5	0,46	1,31	0,72	11,00
4,0	3,0	76,0	57,0	262	255	318	345	346	12	19,0	3,0	2,5	0,46	1,31	0,72	28,20
5,0	4,0	120,0	100,0	288	261	371	421	415	13	27,0	5,0	4,0	0,44	1,38	0,76	80,50
5,0	4,0	87,0	65,0	287	280	352	383	383	14	22,0	4,0	3,5	0,43	1,38	0,76	41,10
6,0	5,0	130,0	106,0	306	281	401	458	454	15	31,0	5,5	5,0	0,44	1,38	0,76	102,00
3,0	2,5	63,5	48,0	298	292	348	368	368	11	15,5	3,0	2,0	0,43	1,39	0,76	19,90
5,0	4,0	87,0	65,0	305	299	370	401	402	14	22,0	4,5	3,0	0,46	1,31	0,72	40,50
4,0	3,0	76,0	57,0	324	314	383	406	405	12	19,0	3,5	2,5	0,39	1,52	0,84	31,20
5,0	4,0	100,0	74,0	330	321	404	442	439	15	26,0	4,5	3,0	0,43	1,38	0,76	57,20
6,0	5,0	140,0	115,0	343	326	453	518	511	17	34,0	5,0	4,0	0,44	1,38	0,76	138,00
4,0	3,0	76,0	57,0	343	337	402	424	426	13	19,0	3,0	2,5	0,42	1,44	0,79	33,50

** Dimensions in mm.*
*** Mass in kg.*



BOUNDARY DIMENSIONS*			DESIGNATION	DESIGNATION ISO 355	∈+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO 15312	
d	D	T				dyn. Cr	stat. Cor	Cu	n_B	
320	480	100,00	32064-X	T4GD320	∈+	1.560,0	3.100,0	275,0	680	
340	460	76,00	32968	T4FD340	∈+	1.080,0	2.380,0	210,0	690	
360	480	76,00	32972	T4FD360	∈+	1.085,0	2.400,0	220,0	660	

** Dimensions in mm.*



Mounting dimensions

r_1, r_2 (min)	r_3, r_4 (min)	SECONDARY DIMENSIONS B	C	MOUNTING DIMENSIONS d_a max	d_b min	D_a min	D_a max	D_b min	C_a min	C_b min	r_a max	r_b max	CALCULATION FACTORS e	Y	Y0	MASS** ≈
5,0	4,0	100,0	74,0	350	341	424	461	461	15	26,0	4,0	4,0	0,46	1,31	0,72	60,50
4,0	3,0	76,0	57,0	361	357	421	444	446	14	19,0	3,0	2,5	0,44	1,37	0,75	35,00
4,0	3,0	76,0	57,0	380	377	439	464	466	14	19,0	3,0	2,5	0,46	1,31	0,72	37,10

** Dimensions in mm.*
*** Mass in kg.*

3.2

Paired single row taper roller bearings

index

NBI E+ - SERIES WITH ENHANCED LOAD RATING CHARACTERISTICS

NBI has combined the latest achievements of metallurgy and material research with its expertise in bearing design and manufacturing to create a new line of taper roller bearings with additional benefits.

These improvements in internal design (internal geometry, roughness, flanges design, ...) and steel features (composition, purity and microstructure) have led NBI to increase their load carrying capacity.

For all questions you may have regarding the **NBI** E+ series, please feel free to contact our engineering team.

3....--DB

3....--DF

3....--DT

PAIRED SINGLE ROW TAPER ROLLER BEARINGS

Technical characteristics

Paired taper roller bearings are used where either the load capacity of single bearings does not meet the requirements, or to overcome the time consuming adjustment under the conditions of a mass mounting.

Paired taper roller bearings consist of two matched single row taper roller bearings using spacers for a specific axial clearance or a preload.

Depending on the particular requirements, such pairs may be supplied arranged either in tandem arrangement (suffix DT), in face to face arrangement (suffix DF), or in back to back arrangement (suffix DB) as shown in the sketch below.

Other arrangements are produced upon order request.

Paired bearings

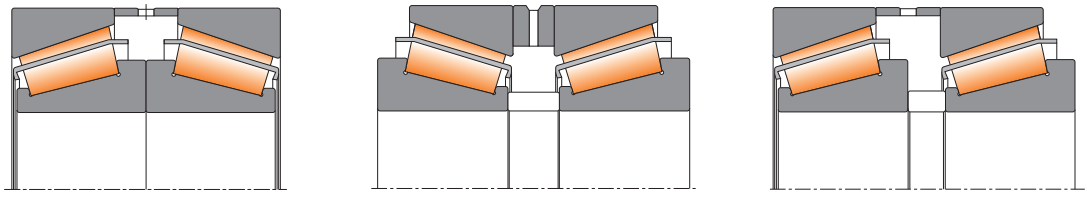
Tandem arrangement, DT suffix

Bearings in tandem arrangements are used where the actual thrust force exceeds the load capacity of a single bearing.

In tandem arrangements the thrust forces are accommodated in one direction only and distributed to both bearings equally.

Taper roller bearings in tandem arrangement can only accommodate axial loads acting in one direction, therefore they should be mounted against other bearing that supports axial loads in the opposite direction.

In tandem arrangement, taper roller bearings require two spacers for matching as a unit, hence the desired total width of the bearing arrangement must be defined when ordering.



Face to face *Back to back* *In tandem*

Fig. 1

Face to face arrangement, DF suffix

Thrust forces are accommodated in both directions and in each direction forces are supported by one of the matched tapered roller bearings.

In taper roller bearings arranged face to face, the load lines converge towards the axis of the bearings, which makes these arrangements less suitable to support tilting moments due to the lower stiffness of the arrangement.

Attention: for bearing pairs arranged face to face the heating of the shaft will cause either a reduction of axial internal clearance or an increase in preloading forces.

Back to back arrangement, DB suffix

Thrust forces are accommodated in both directions and in each direction forces are supported by one of matched the tapered roller bearings.

Bearings arranged back to back provide very rigid bearing arrangements. They also effectively support tilting moments because the load lines diverge towards the bearing axis of the bearings.

Taper roller bearing pairs arranged back to back require two spacers for matching as a unit, the desired total width of bearing arrangement must be defined when ordering.

Misalignment

Generally, taper roller bearings arranged in pairs should not be exposed to misalignments as they may generate considerable additional forces causing high running noise levels. If those misalignments can not be avoided, NBI recommends using the face to face arrangement, due to the lower rigidity of this disposition.

Such additional forces due to misalignment will shorten the service life of taper roller bearings significantly.

Tolerances

Paired NBI taper roller bearings are produced in normal tolerance class (PN) as standard.

These NBI bearings can be produced with closer tolerances according to customer requirements.

The total width tolerance of NBI – taper roller bearing units arranged face to face consist of the internal axial play of the bearing pair and twice the width deviation of the each single bearing, Δ_{TS}.

Cages

NBI taper roller bearings are fitted with pressed steel cages as standard.

Because the cages of taper roller bearings usually protrude beyond the bearing faces, special care must be taken to follow the recommended abutment dimensions.

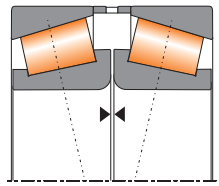
Internal clearance

NBI taper roller bearing pairs arranged face to face (suffix DF) are standard produced with axial internal clearances values, as listed in the table below.

When we indicate the suffix C..(special clearance), the two or three-figure number immediately following the C gives the mean axial internal clearance in µm. This indicates that the clearance is -30/+30 µm of this number, eg., C200 indicates an axial clearance between 170 µm and 230 µm.

NBI also produces other bearing units with alternative internal clearances according to customer's specifications on request.

Axial internal clearance of NBI paired taper roller bearings, arranged face to face (DF suffix)



Axial internal clearance		Bore diameter (mm)								
		-	30	40	50	65	80	100	120	140
	≤	30	40	50	65	80	100	120	140	160
303.. DF 322.. DF	min	100	120	140	160	180	210	220	240	270
	max	140	160	180	200	220	270	280	300	330
313.. DF	min	60	70	80	100	110	110	130	160	180
	max	100	110	120	140	170	170	190	220	240

Table 1

Minimum load

For effective operation of taper roller bearings a minimum bearing load of approximately 2% of the dynamic load rating Cr is required.

Equivalent dynamic bearing load

In the case of single row taper roller bearing pairs arranged face to face the following formula should be used:

when $\frac{F_a}{F_r} \leq e$, then: $P = F_r + Y_1 \cdot F_a$

or when $\frac{F_a}{F_r} > e$, then: $P = 0{,}67 \cdot F_r + Y_2 \cdot F_a$

F_a and F_r indicate the forces acting on the bearing pairs.

Equivalent static bearing load

When single row taper roller bearings are arranged in pairs face to face the equivalent static load on the bearing unit is:

$$P_0 = F_r + Y_0 \cdot F_a$$

Abutment and fillet dimensions

Paired single row taper roller bearings must be supported axially by surrounding machine components in a satisfactory manner.

The bearing rings, however, must contact adjacent parts with their side faces only.

The bearing chamfers must not contact the shoulder fillet radii of shaft or housing shoulders.

Therefore, the largest fillet radius (r_g) must be kept smaller than the minimum fillet dimension of the bearing rings (r_s) as listed in the bearing tables

Recommendations for the dimensions of adjacent parts are given in DIN 5418 (*Mounting dimensions of rolling bearings*), as well as in the bearing tables.

Supplementary designations

The product tables show the standardized bearing configurations updated on the edition of this catalogue. These standardized configurations correspond to suffix or suffixes of each bearing.

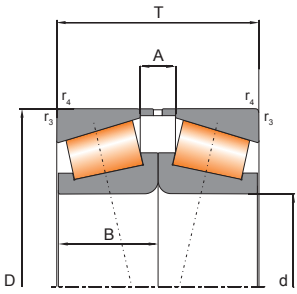
In any case, NBI can offer, under requirement, alternative designs, comprising the ones showed in the following table or many others, whose mention exceeds the purpose of the present catalogue, and can be found in specific technical publications of concrete applications or series of specific bearings.

Should you need a special design not existent in these pages, please contact our Sales Department in **NBI Bearings Europe**.

Suffix	Description
(J)	Pressed window-type steel cage. No suffix as standard on tapered roller bearings NBI
DB	Matched bearing pair arranged back-to-back
DF	Matched bearing pair arranged face-to-face
DT	Matched bearing pair arranged in tandem
C..	Special clearance. The two or three-figure number immediately following the C gives the mean axial internal clearance in µm
T..	The number inmediately following T gives the total width of bearing pairs arranged back-to-back or in tandem

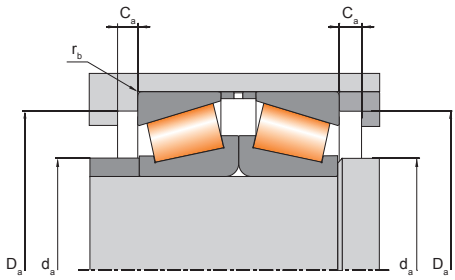
Table 2

NOTES



BOUNDARY DIMENSIONS*			DESIGNATION	∈+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO15312
d	D	T			dyn. Cr	stat. Cor	Cu	n_B
25	62	36,5	31305-DF	∈+	65,0	76,6	8,8	7.625
30	72	41,5	31306-X-DF	∈+	79,4	98,8	10,8	6.625
35	80	45,5	31307-DF	∈+	104,0	129,0	14,9	5.625
40	90	50,5	31308-DF	∈+	145,0	166,0	18,8	5.125
45	100	54,5	31309-DF	∈+	163,0	208,0	25,1	4.625
50	90	43,5	30210-DF	∈+	133,0	187,0	22,4	4.750
	110	58,5	31310-DF	∈+	207,0	241,0	29,2	4.250
60	110	59,5	32212-DF-C290	∈+	223,0	330,0	38,7	4.000
	130	67,0	31312-DF	∈+	252,0	334,0	40,7	3.625
65	120	49,5	30213-DF	∈+	206,0	277,0	32,9	3.563
	140	72,0	31313-DF	∈+	283,0	386,0	46,5	3.440
70	110	50,0	32014-X-DF	∈+	177,0	306,0	35,9	3.500
	150	76,0	31314-DF	∈+	326,0	441,0	52,6	3.190
75	130	66,5	32215-DF	∈+	290,0	450,0	51,8	3.000
80	140	70,5	32216-DF	∈+	325,0	501,0	58,1	2.810
	170	85,0	31316-DF	∈+	389,0	536,0	63,5	2.940
85	130	58,0	32017-DF	∈+	241,0	447,0	52,7	2.850
	150	61,0	30217-DF	∈+	301,0	440,0	51,0	2.875
	180	89,0	31317-DF	∈+	419,0	571,0	67,8	2.875
90	140	64,0	32018-DF	∈+	286,0	517,0	61,5	2.750
	160	65,0	30218-DF	∈+	333,0	498,0	57,0	2.750
	190	93,0	31318-DF	∈+	471,0	640,0	71,0	2.700
95	170	91,0	32219-DF	∈+	483,0	807,0	90,0	2.425
	200	99,0	31319-DF	∈+	518,0	711,0	79,0	2.625
100	150	64,0	32020-DF	∈+	297,0	561,0	66,0	2.550
	180	74,0	30220-DF	∈+	425,0	642,0	71,0	2.500
	215	113,0	31320-X-DF	∈+	646,0	947,0	103,0	2.350
110	170	76,0	32022-X-DF	∈+	403,0	780,0	89,0	2.250
	200	82,0	30222-DF	∈+	530,0	849,0	90,0	2.190
	200	112,0	32222-DF	∈+	706,0	1.175,0	131,0	2.375
	240	126,0	31322 X-DF	∈+	789,0	1.178,0	129,0	2.025
120	180	88,0	32024-X-DF	∈+	427,0	831,0	95,0	2.100

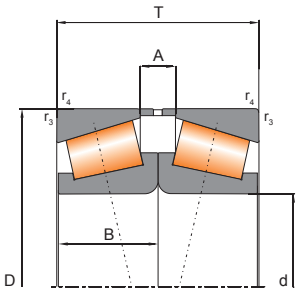
*Dimensions in mm.



Mounting dimensions

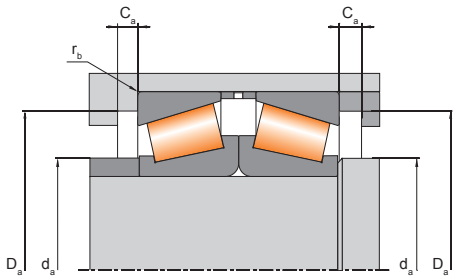
r3, r4 (min)	SECONDARY DIMENSIONS A	B	MOUNTING DIMENSIONS da max	Da min	Da max	Ca min	rb max	CALCULATION FACTORS e	Y1	Y2	Y0	MASS** ≈
1,5	10,5	17	34	47	55	3	1,5	0,83	0,82	1,22	0,80	0,62
1,5	13,5	19	40	55	65	3	1,5	0,83	0,82	1,22	0,80	0,90
1,5	15,5	21	45	62	71	3	1,5	0,83	0,82	1,22	0,80	1,20
1,5	16,5	23	51	71	81	4	1,5	0,83	0,82	1,22	0,80	1,50
1,5	18,5	25	56	79	91	4	1,5	0,83	0,82	1,22	0,80	2,10
1,5	9,5	20	58	79	83	3	1,5	0,42	1,61	2,39	1,57	1,20
2,0	20,5	27	62	87	100	4	2,0	0,83	0,82	1,22	0,80	2,60
1,5	11,5	28	69	95	103	4	1,5	0,40	1,67	2,48	1,63	2,40
2,5	23,0	31	73	103	118	5	2,0	0,83	0,82	1,22	0,80	4,10
1,5	9,5	23	78	106	113	4	1,5	0,40	1,67	2,48	1,63	2,60
2,5	26,0	33	80	111	128	5	2,5	0,83	0,82	1,22	0,80	5,10
1,5	12,0	25	78	98	103	5	1,5	0,43	1,55	2,31	1,52	1,80
2,5	26,0	35	85	118	138	5	2,5	0,83	0,82	1,22	0,80	6,20
1,5	12,5	31	85	114	122	4	1,5	0,44	1,55	2,31	1,52	4,00
2,0	14,5	33	91	122	130	5	2,0	0,42	1,61	2,39	1,57	4,80
2,5	31,0	39	97	134	158	6	2,5	0,83	0,82	1,22	0,80	8,80
1,5	14,0	29	94	117	122	6	1,5	0,44	1,53	2,27	1,49	2,80
2,0	13,0	28	97	132	140	5	2,0	0,42	1,61	2,39	1,57	4,30
3,0	33,0	41	103	143	166	6	3,0	0,83	0,82	1,22	0,80	10,10
1,5	16,0	32	100	125	132	6	1,5	0,42	1,60	2,38	1,56	3,70
2,0	13,0	30	102	140	150	5	2,0	0,42	1,61	2,39	1,57	5,40
3,0	33,0	43	109	151	176	5	3,0	0,83	0,82	1,22	0,80	11,50
2,5	17,0	43	109	145	158	5	2,0	0,42	1,61	2,39	1,57	8,70
3,0	35,0	45	114	157	186	6	3,0	0,83	0,82	1,22	0,80	14,50
1,5	16,0	32	109	134	142	6	1,5	0,46	1,47	2,19	1,44	4,00
2,5	16,0	34	116	157	168	5	2,0	0,42	1,61	2,39	1,57	7,60
3,0	43,0	51	121	168	201	7	2,5	0,83	0,82	1,22	0,80	18,70
2,0	18,0	38	123	152	160	7	2,0	0,43	1,57	2,34	1,53	6,90
2,5	18,0	38	129	174	188	6	2,0	0,42	1,61	2,39	1,57	10,70
2,5	20,0	53	127	170	188	5	2,5	0,42	1,61	2,39	1,57	15,00
3,0	50,0	57	135	188	226	7	2,5	0,83	0,82	1,22	0,80	26,00
2,0	30,0	38	132	161	170	7	2,0	0,46	1,47	2,19	1,44	6,80

* Dimensions in mm.
** Mass in kg.



BOUNDARY DIMENSIONS*			DESIGNATION	∈+	LOAD RATING (kN)		FATIGUE LIMIT LOAD (kN)	REFERENCE SPEED (rpm) ISO15312
d	D	T			dyn. Cr	stat. Cor	Cu	n_B
120	215	87,0	30224-DF	∈+	583,0	925,0	107,0	2.100
	215	123,0	32224-DF	∈+	824,0	1.406,0	146,0	1.850
	260	136,0	31324 X-DF	∈+	925,0	1.400,0	161,0	1.790
130	180	64,0	32926-DF	∈+	348,0	735,0	79,0	1.940
	200	90,0	32026-X-DF	∈+	538,0	1.103,0	115,0	1.940
	230	87,5	30226-DF	∈+	618,0	973,0	108,0	1.800
	280	144,0	31326 X-DF	∈+	1.040,0	1.570,0	165,0	1.625
140	250	91,5	30228 -DF-C100	∈+	719,0	1.140,0	121,0	1.750
	250	143,5	32228-DF	∈+	1.110,0	2.000,0	216,0	1.425
	300	154,0	31328 X-DF	∈+	1.190,0	1.795,0	184,0	1.475
150	225	96,0	32030-X-DF	∈+	660,0	1.330,0	135,0	1.650
	270	98,0	30230-DF-C350	∈+	772,0	1.151,0	133,0	1.560
	270	154,0	32230-DF	∈+	1.270,0	2.315,0	266,0	1.275
	320	164,0	31330-X-DF	∈+	1.355,0	1.065,0	200,0	1.325
160	240	102,0	32032-X-DF	∈+	736,0	1.550,0	175,0	1.475
	290	104,0	30232-DF	∈+	818,0	1.215,0	138,0	1.625
170	260	114,0	32034 -X-DF	∈+	878,0	1.815,0	183,0	1.350
	310	182,0	32234-DF	∈+	1.720,0	3.200,0	338,0	1.020
180	280	128,0	32036 -X-DF	∈+	1.080,0	2.220,0	234,0	1.190
	320	114,0	30236--DF-C300	∈+	1.040,0	1.690,0	176,0	1.280
190	290	128,0	32038-X-DF	∈+	1.100,0	2.360,0	232,0	1.110
	340	120,0	30238-DF-C700	∈+	929,0	1.741,0	177,0	1.240
200	310	140,0	32040 -X-DF	∈+	1.290,0	2.760,0	269,0	1.000
	360	128,0	30240 -DF-C570	∈+	1.350,0	2.180,0	226,0	1.060
220	300	102,0	32944-DF-C300	∈+	844,0	1.971,0	198,0	1.050
	340	152,0	32044 -X-DF	∈+	1.530,0	3.310,0	317,0	860
240	360	152,0	32048-X-DF	∈+	1.550,0	3.470,0	352,0	800
260	400	174,0	32052 -X-DF	∈+	1.990,0	4.3600,	418,0	690
280	420	174,0	32056 -X-DF	∈+	2.075,0	4.660,0	428,0	625
300	420	152,0	32960-DF	∈+	1.800,0	4.280,0	413,0	610

*Dimensions in mm.



Mounting dimensions

r_3, r_4 (min)	SECONDARY DIMENSIONS A	B	MOUNTING DIMENSIONS d_a max	D_a min	D_a max	C_a min	r_b max	CALCULATION FACTORS e	Y_1	Y_2	Y_0	MASS** ≈
2,5	19,0	40	141	187	203	6	2,0	0,44	1,55	2,31	1,52	13,00
2,5	23,0	58	137	181	203	7	2,5	0,44	1,55	2,31	1,52	19,00
3,0	52,0	62	145	203	245	9	3,0	0,83	0,82	1,22	0,80	33,70
1,5	14,0	32	141	167	172	6	1,5	0,34	1,99	2,96	1,94	5,00
2,0	22,0	45	144	178	190	8	2,0	0,43	1,55	2,31	1,52	10,30
3,0	19,5	40	152	203	216	7	2,5	0,44	1,55	2,31	1,52	14,50
4,0	56,0	66	157	218	263	8	4,0	0,83	0,82	1,22	0,80	40,60
3,0	19,5	42	164	219	236	7	2,5	0,44	1,55	2,31	1,52	18,00
3,0	27,5	68	159	210	236	8	3,0	0,44	1,55	2,31	1,52	29,50
4,0	60,0	70	168	238	283	13	3,5	0,83	0,82	1,22	0,80	48,20
2,5	24,0	48	164	200	213	8	2,0	0,46	1,47	2,19	1,44	13,30
3,0	22,0	45	175	234	256	9	2,5	0,44	1,55	2,31	1,52	22,70
3,0	34,0	73	171	226	256	8	2,5	0,44	1,55	2,31	1,52	38,00
4,0	64,0	75	181	255	303	13	3,5	0,83	0,82	1,22	0,80	58,50
2,5	26,0	51	175	213	228	8	2,0	0,46	1,47	2,19	1,44	16,00
3,0	24,0	48	189	252	275	8	2,5	0,44	1,55	2,31	1,52	28,30
2,5	28,0	57	188	230	246	10	2,0	0,44	1,52	2,26	1,49	23,40
4,0	40,0	86	196	259	292	10	3,5	0,44	1,55	2,31	1,52	59,30
2,5	32,0	64	199	247	266	10	2,0	0,42	1,60	2,38	1,56	29,50
4,0	28,0	52	211	278	303	9	3,0	0,45	1,50	2,23	1,47	36,70
2,5	32,0	64	209	257	277	10	2,0	0,44	1,53	2,27	1,49	30,30
4,0	28,0	55	224	298	323	9	3,0	0,44	1,55	2,31	1,52	42,60
2,5	34,0	70	221	273	297	11	2,0	0,43	1,57	2,34	1,53	39,10
4,0	32,0	58	237	315	343	9	3,0	0,44	1,55	2,31	1,52	52,00
2,5	24,0	51	235	275	287	9	2,0	0,43	1,59	2,36	1,55	21,10
3,0	38,0	76	244	300	325	12	2,5	0,43	1,57	2,34	1,53	51,00
3,0	38,0	76	261	318	346	12	3,0	0,46	1,47	2,19	1,44	57,70
4,0	44,0	87	287	352	383	13	3,0	0,43	1,55	2,31	1,52	84,30
4,0	44,0	87	305	370	400	14	3,0	0,46	1,47	2,19	1,44	84,50
3,0	38,0	76	324	383	405	12	2,5	0,39	1,71	2,54	1,67	64,70

* Dimensions in mm.
** Mass in kg.

BEARINGS EUROPE NBI®

NBI Bearings Europe, S.A.
Pol. Industrial Basauri, nave 6-10
01409, Oquendo - Álava (Spain)
Sales phone: +34 945 898 395
Admin. Phone: +34 945 898 397
Fax: +34 945 898 396

gruponbi.com

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