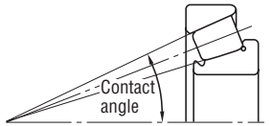
6. TAPERED ROLLER BEARINGS

DESIGN, TYPES, AND FEATURES

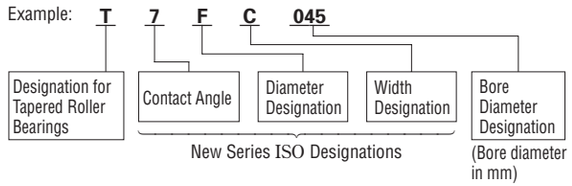


Tapered roller bearings are designed so the apices of the cones formed by the raceways of the inner and outer rings and the inner ring rollers all coincide at one point on the axis of the bearing. When a radial load is imposed, a component axial force occurs; therefore, it is necessary to use two bearings in opposition or some other multiple-bearing arrangement.

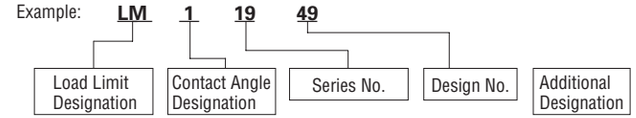
For Metric Series medium-angle or steep-angle tapered roller bearings, the respective contact angle designation C or D is added after the bore number. For normal-angle tapered roller bearings, no contact angle designation is used. Medium-angle tapered roller bearings are primarily used for the pinion shafts of differential gears in automobiles.

Some bearings with high load capacity (HR Series) contain a J suffix that indicates they conform to ISO specifications for outer ring back face raceway diameter, outer ring width, and contact angle. Therefore, the inner ring assembly and outer ring of bearings with a J suffix are internationally interchangeable.

Some Metric Series tapered roller bearings specified by ISO 355 have different dimensions from past Series 3XX bearings. Some of these are listed in the bearing tables. These conform to ISO specifications for the small-end diameter of the inner ring and contact angle. The inner and outer ring assemblies are internationally interchangeable. The bearing designation structure, which has changed from the past, is listed below:



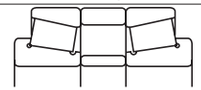
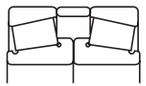
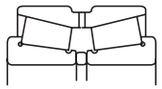
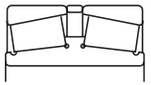
Inch Series bearings also exist. Inner ring assemblies and outer rings are approximately formulated as follows (excluding four-row tapered roller bearings):



Various arrangements of tapered roller bearings (excluding single-row bearings) are available.

The cages of tapered roller bearings are usually made of pressed steel.

Table 1 Design and Features of Tapered Roller Bearing Arrangements

Design	Arrangement	Ex. Bearing Designation	Features
	Back-to-back	HR30210JDB+KLR10	Two standard bearings are combined. The bearing clearances are adjusted by inner ring spacers or outer ring spacers. The inner rings, outer rings, and spacers are marked with serial numbers and mating marks. Components with the same serial number can be assembled by referring to the matching indications.
	Face-to-face	HR30210JDF+KR	
	KBE Type	100KBE31+L	The KBE type is a back-to-back arrangement of bearings with an integrated outer ring spacer. The KH type is a face-to-face arrangement in which the inner rings are integrated. Since the bearing clearance is adjusted using spacers, components must have the same serial number for assembly with reference to the matching indications.
	KH Type	110KH31+K	

TOLERANCES AND RUNNING ACCURACY

METRIC SERIES TAPERED ROLLER BEARINGS ····· Table 7.3 (Pages A132 to A135)

INCH SERIES TAPERED ROLLER BEARINGS ····· Table 7.4 (Pages A136 and A137)

The following precision classes apply to some Inch Series tapered roller bearings. For more details, please consult with NSK.

(1) J line bearings (bearings preceeded by ▲ in the bearing tables)

Table 2 Tolerances for Inner Rings (CLASS K)

Units : m

Nominal Bore Diameter d (mm)		Δ_{dmp}		V_{dp}	V_{dmp}	K_{ia}
over	incl.	high	low	max.	max.	max.
10	18	0	−12	12	9	15
18	30	0	−12	12	9	18
30	50	0	−12	12	9	20
50	80	0	−15	15	11	25
80	120	0	−20	20	15	30
120	180	0	−25	25	19	35
180	250	0	−30	30	23	50
250	315	0	−35	35	26	60
315	400	0	−40	40	30	70

Table 3 Tolerances for Outer Rings (CLASS K)

Units : m

Nominal Outside Diameter D (mm)		Δ_{Dmp}		V_{Dp}	V_{Dmp}	K_{ea}
over	incl.	high	low	max.	max.	max.
18	30	0	−12	12	9	18
30	50	0	−14	14	11	20
50	80	0	−16	16	12	25
80	120	0	−18	18	14	35
120	150	0	−20	20	15	40
150	180	0	−25	25	19	45
180	250	0	−30	30	23	50
250	315	0	−35	35	26	60
315	400	0	−40	40	30	70
400	500	0	−45	45	34	80

Table 4 Deviations of Actual Bearing Width and Actual Effective Widths of Inner Subunit and Outer Ring (CLASS K)

Units : m

Nominal Bore Diameter d (mm)		Deviation of Actual Effective Width of Inner Subunit Δ_{T_1s}		Deviation of Actual Effective Width of Outer Ring Δ_{T_2s}		Deviation of Actual Bearing Width Δ_{Ts}	
over	incl.	high	low	high	low	high	low
10	80	+100	0	+100	0	+200	0
80	120	+100	−100	+100	−100	+200	−200
120	315	+150	−150	+200	−100	+350	−250
315	400	+200	−200	+200	−200	+400	−400

(2) Bearings for Front Axles of Automobiles

(In the bearing tables, these are preceded by "T")

Table 5 Tolerances for Deviations of a Single Bore Diameter and Actual Bearing Width

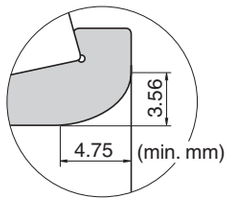
Units : m

Nominal Bore Diameter d				Deviation of a Single Bore Diameter Δ_{ds}		Deviation of Actual Bearing Width Δ_{Ts}	
over		incl.					
(mm)	1/25.4	(mm)	1/25.4	high	low	high	low
—		76.200	3.0000	+20	0	+356	0

The tolerances for outside diameter and those for radial runout of the inner rings and outer rings conform to Table 7.4.2 (Pages A136 and A137).

(3) Special Chamfer Dimensions

For bearings marked “spec.” in the r column of the bearing tables have inner ring back-face side dimensions as shown in the following figure:



RECOMMENDED FITS

INTERNAL CLEARANCE

DIMENSIONS RELATED TO MOUNTING

The dimensions related to mounting tapered roller bearings are listed in the bearing tables. Since the cages protrude from the ring faces of tapered roller bearings, please use care when designing shafts and housings.

When heavy axial loads are imposed, the shaft shoulder dimensions and strength must be sufficient to support the inner ring rib.

PERMISSIBLE MISALIGNMENT

The permissible misalignment angle for tapered roller bearings is approximately 0.0009 radian (3′).

LIMITING SPEEDS (GREASE/OIL)

The limiting speeds (grease) and limiting speeds (oil) listed in the bearing tables should be adjusted depending on bearing load conditions. Furthermore, higher speeds are attainable by making changes in the lubrication method, cage design, etc. Refer to page A098 for more detailed information.

PRECAUTIONS FOR USE OF TAPERED ROLLER BEARINGS

1. If the load on tapered roller bearings becomes too small, or if the ratio of the axial and radial loads for matched bearings during operation exceeds 'e' as listed in the bearing tables, slippage between the rollers and raceways occurs, which may result in smearing. This is especially prevalent with large bearings since the weight of the rollers and cage is high. If such load conditions are expected, please contact NSK for selection of the bearings.

2. Confirm the dimensions of D_a, D_b, S_a, and S_b when adopting HR Series bearings.

TECHNICAL DATA

Free Space of Tapered Roller Bearings

Tapered roller bearings can carry radial loads and unidirectional axial loads and offer high capacity. These bearings are used widely in machines with relatively severe loading conditions, usually in various combinations of opposed or combined single-row bearings.

Tapered roller bearings are usually lubricated with grease to facilitate easier maintenance and inspection. Be sure to select a grease appropriate for operating conditions and use the proper amount of grease in the housing space. The necessary free space for various bearing Series are listed in Table 6.

The free space of a tapered roller bearing is measured as the outer volume of the bearing less the inner ring, outer ring, and cage, as shown in Figure 1. The bearing is filled so that grease reaches the inner ring rib surface and pocket surface sufficiently. Take care regarding the fill amount and state of the grease, especially if grease leakage occurs or if maintaining low running torque is important.

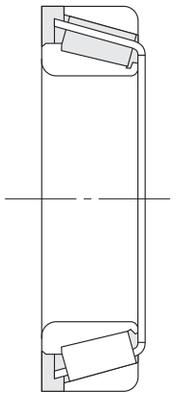


Fig. 1 Free Space in a Tapered Roller Bearing

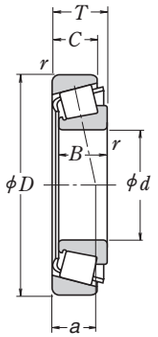
Table 6 Free Space of Tapered Roller Bearings

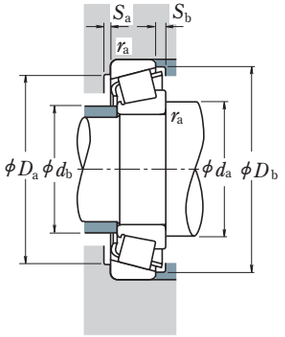
Units: cm^3

Bearing Bore No.	Bearing Free Space									
	Bearing Series									
	HR329-J	HR320-XJ	HR330-J	HR331-J	HR302-J	HR322-J	HR332-J	HR303-J	HR303-DJ	HR323-J
02	—	—	—	—	—	—	—	4.5	—	—
03	—	—	—	—	3.3	4.3	—	5.7	—	—
04	—	3.5	—	—	5.3	6.6	—	7.2	—	9.2
/22	—	3.6	—	—	—	7.3	—	9.1	—	—
05	—	3.7	4.3	—	6.3	7.4	7.5	11	13	15
/28	—	5.3	—	—	8.8	9.8	10	16	—	—
06	—	6.2	6.7	—	9.2	11	12	18	21	23
/32	—	6.6	—	—	11	13	14	20	—	—
07	4.0	7.5	8.9	—	13	17	18	23	26	35
08	5.8	9.1	11	—	18	23	25	31	35	45
09	—	11	—	18	22	24	26	41	48	58
10	—	12	15	20	23	26	29	55	59	77
11	8.8	19	21	29	30	36	40	72	78	99
12	9.0	20	23	—	39	47	53	88	95	130
13	—	21	25	—	45	62	65	110	120	150
14	17	29	33	—	53	67	69	130	150	190
15	—	30	34	—	58	73	74	160	180	230
16	—	40	—	—	75	91	100	200	200	270
17	—	43	49	76	92	120	130	230	250	320
18	28	58	—	110	110	150	—	260	310	370
19	29	60	—	—	140	170	—	310	350	430
20	37	64	—	150	160	210	240	380	460	580

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 15 – 28 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

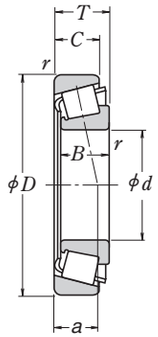
The values of e, Y_1, and Y_0 are given in the table below.

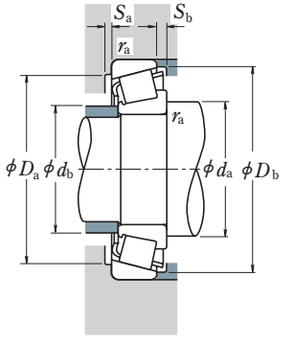
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)									Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer							
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.		a	e	Y_1	Y_0	approx.
15	35	11.75	11	10	0.6	0.6	14 800	13 200	11 000	15 000	**30202**	—	23	19	30	30	33	2	1.5	0.6	0.6	8.2	0.32	1.9	1.0	0.053
	42	14.25	13	11	1	1	23 600	21 100	9 500	13 000	**HR 30302 J**	2FB	24	22	36	36	38.5	2	3	1	1	9.5	0.29	2.1	1.2	0.098
17	40	13.25	12	11	1	1	20 100	19 900	9 500	13 000	**HR 30203 J**	2DB	26	23	34	34	37.5	2	2	1	1	9.7	0.35	1.7	0.96	0.079
	40	17.25	16	14	1	1	27 100	28 000	9 500	13 000	**HR 32203 J**	2DD	26	22	34	34	37	2	3	1	1	11.2	0.31	1.9	1.1	0.103
	47	15.25	14	12	1	1	29 200	26 700	8 500	12 000	**HR 30303 J**	2FB	26	24	41	40	43	2	3	1	1	10.4	0.29	2.1	1.2	0.134
	47	15.25	14	10.5	1	1	22 000	20 300	8 000	11 000	**30303 D**	—	29	23	41	34	44	2	4.5	1	1	15.4	0.81	0.74	0.41	0.129
	47	20.25	19	16	1	1	37 500	36 500	8 500	11 000	**HR 32303 J**	2FD	28	23	41	39	43	2	4	1	1	12.5	0.29	2.1	1.2	0.178
20	42	15	15	12	0.6	0.6	24 600	27 400	9 000	12 000	**HR 32004 XJ**	3CC	28	24	37	35	40	3	3	0.6	0.6	10.6	0.37	1.6	0.88	0.097
	47	15.25	14	12	1	1	27 900	28 500	8 000	11 000	**HR 30204 J**	2DB	29	27	41	40	44	2	3	1	1	11.0	0.35	1.7	0.96	0.127
	47	15.25	14	12	0.3	1	23 900	24 000	8 000	11 000	**HR 30204 C-A-**	—	29	26	41	37	44	2	3	0.3	1	13.0	0.55	1.1	0.60	0.126
	47	19.25	18	15	1	1	35 500	37 500	8 500	11 000	**HR 32204 J**	2DD	29	25	41	38	44.5	3	4	1	1	12.6	0.33	1.8	1.0	0.161
	47	19.25	18	15	1	1	31 500	33 500	8 000	11 000	**HR 32204 CJ**	5DD	29	25	41	36	44	2	4	1	1	14.5	0.52	1.2	0.64	0.166
	52	16.25	15	13	1.5	1.5	35 000	33 500	7 500	10 000	**HR 30304 J**	2FB	31	27	44	44	47.5	2	3	1.5	1.5	11.6	0.30	2.0	1.1	0.172
	52	16.25	15	12	1.5	1.5	25 300	24 500	7 100	10 000	**30304 D**	—	34	26	43	37	49	2	4	1.5	1.5	16.7	0.81	0.74	0.41	0.168
	52	22.25	21	18	1.5	1.5	45 500	47 500	8 000	11 000	**HR 32304 J**	2FD	33	26	43	42	48	3	4	1.5	1.5	13.9	0.30	2.0	1.1	0.241
22	44	15	15	11.5	0.6	0.6	25 600	29 400	8 500	11 000	**HR 320/22 XJ**	3CC	30	27	39	37	42	3	3.5	0.6	0.6	11.1	0.40	1.5	0.83	0.103
	50	15.25	14	12	1	1	29 200	30 500	7 500	10 000	**HR 302/22**	—	31	29	44	42	47	2	3	1	1	11.6	0.37	1.6	0.90	0.139
	50	15.25	14	12	1	1	27 200	29 500	7 500	10 000	**HR 302/22 C**	—	31	29	44	40	47	2	3	1	1	13.0	0.49	1.2	0.67	0.144
	50	19.25	18	15	1	1	36 500	40 500	7 500	11 000	**HR 322/22**	—	31	28	44	41	47	2	4	1	1	13.5	0.37	1.6	0.89	0.18
	50	19.25	18	15	1	1	33 500	39 500	7 500	10 000	**HR 322/22 C**	—	31	29	44	39	48	2	4	1	1	15.2	0.51	1.2	0.65	0.185
	56	17.25	16	14	1.5	1.5	37 000	36 500	7 100	9 500	**HR 303/22**	—	33	30	47	46	50	2	3	1.5	1.5	12.4	0.32	1.9	1.0	0.208
	56	17.25	16	13	1.5	1.5	34 500	34 000	6 700	9 500	**HR 303/22 C**	—	33	30	47	44	52.5	3	4	1.5	1.5	15.9	0.59	1.0	0.56	0.207
25	47	15	15	11.5	0.6	0.6	27 400	33 000	8 000	11 000	**HR 32005 XJ**	4CC	33	30	42	40	45	3	3.5	0.6	0.6	11.8	0.43	1.4	0.77	0.116
	47	17	17	14	0.6	0.6	31 000	38 000	8 000	11 000	**HR 33005 J**	2CE	33	29	42	41	44	3	3	0.6	0.6	11.0	0.29	2.1	1.1	0.131
	52	16.25	15	13	1	1	32 000	35 000	7 100	10 000	**HR 30205 J**	3CC	34	31	46	44	48.5	2	3	1	1	12.7	0.37	1.6	0.88	0.157
	52	16.25	15	12	1	1	28 100	31 500	9 700	9 500	**HR 30205 C**	—	34	32	46	43	49.5	2	4	1	1	14.4	0.53	1.1	0.62	0.155
	52	19.25	18	16	1	1	40 000	45 000	7 100	10 000	**HR 32205 J**	2CD	34	30	46	44	50	2	3	1	1	13.5	0.36	1.7	0.92	0.189
	52	19.25	18	15	1	1	35 000	42 000	7 100	9 500	**HR 32205 C**	—	34	30	46	40	50	2	4	1	1	15.8	0.53	1.1	0.62	0.19
	52	22	22	18	1	1	47 500	56 500	7 500	10 000	**HR 33205 J**	2DE	34	29	46	43	49.5	4	4	1	1	14.1	0.35	1.7	0.94	0.221
	62	18.25	17	15	1.5	1.5	47 500	46 000	6 300	8 500	**HR 30305 J**	2FB	36	34	54	54	57	2	3	1.5	1.5	13.2	0.30	2.0	1.1	0.27
	62	18.25	17	14	1.5	1.5	42 000	45 000	6 000	8 500	**HR 30305 C**	—	36	35	53	49	58.5	3	4	1.5	1.5	16.4	0.55	1.1	0.60	0.276
	62	18.25	17	13	1.5	1.5	38 000	40 500	5 600	8 000	**HR 30305 DJ**	(7FB)	39	34	53	47	59	2	5	1.5	1.5	19.9	0.83	0.73	0.40	0.265
	62	18.25	17	13	1.5	1.5	38 000	40 500	5 600	8 000	**HR 31305 J**	7FB	39	33	53	47	59	3	5	1.5	1.5	19.9	0.83	0.73	0.40	0.265
	62	25.25	24	20	1.5	1.5	62 500	66 000	6 300	8 500	**HR 32305 J**	2FD	38	32	53	51	57	3	5	1.5	1.5	15.6	0.30	2.0	1.1	0.376
28	52	16	16	12	1	1	32 000	39 000	7 100	9 500	**HR 320/28 XJ**	4CC	37	33	46	44	50	3	4	1	1	12.8	0.43	1.4	0.77	0.146
	58	17.25	16	14	1	1	39 500	41 500	6 300	9 000	**HR 302/28**	—	37	34	52	50	55	2	3	1	1	13.2	0.35	1.7	0.93	0.203
	58	17.25	16	12	1	1	34 000	38 500	6 300	8 500	**HR 302/28 C**	—	37	34	52	48	54	2	5	1	1	16.9	0.64	0.94	0.52	0.198
	58	20.25	19	16	1	1	47 500	54 000	6 300	9 000	**HR 322/28**	—	37	34	52	49	55	2	4	1	1	14.6	0.37	1.6	0.89	0.243
	58	20.25	19	16	1	1	42 000	49 500	6 300	9 000	**HR 322/28 CJ**	5DD	37	33	52	45	55	2	4	1	1	16.8	0.56	1.1	0.59	0.251
	68	19.75	18	15	1.5	1.5	55 000	55 500	6 000	8 000	**HR 303/28**	—	39	37	59	58	61	2	4.5	1.5	1.5	14.5	0.31	1.9	1.1	0.341
	68	19.75	18	14	1.5	1.5	49 500	50 500	5 600	7 500	**HR 303/28 C**	—	39	38	59	57	63	3	5.5	1.5	1.5	17.4	0.52	1.2	0.64	0.335

Remark Suffix C represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix C.

■SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 30 – 35 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

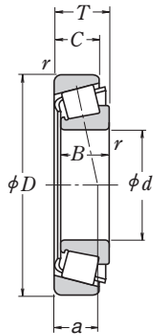
The values of e, Y_1, and Y_0 are given in the table below.

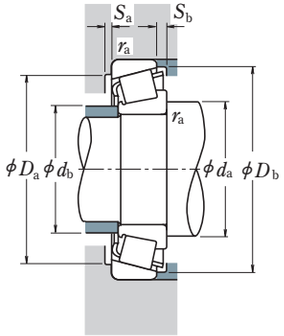
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.	a	e	Y_1	Y_0	approx.
30	47	12	12	9	0.3 0.3	17 600	24 400	7 500	10 000	**HR 32906 J**	2BD	34	34	44	42	44	3	3	0.3 0.3	9.2	0.32	1.9	1.0	0.074
	55	17	17	13	1 1	36 000	44 500	6 700	9 000	**HR 32006 XJ**	4CC	39	35	49	47	53	3	4	1 1	13.5	0.43	1.4	0.77	0.172
	55	20	20	16	1 1	42 000	54 000	6 700	9 000	**HR 33006 J**	2CE	39	35	49	48	52	3	4	1 1	13.1	0.29	2.1	1.1	0.208
	62	17.25	16	14	1 1	43 000	47 500	6 000	8 000	**HR 30206 J**	3DB	39	37	56	52	58	2	3	1 1	13.9	0.37	1.6	0.88	0.238
	62	17.25	16	12	1 1	35 500	37 000	5 600	7 500	**HR 30206 C**	—	39	36	56	49	59	2	5	1 1	17.8	0.68	0.88	0.49	0.221
	62	21.25	20	17	1 1	52 000	60 000	6 000	8 500	**HR 32206 J**	3DC	39	36	56	51	58.5	2	4	1 1	15.4	0.37	1.6	0.88	0.297
	62	21.25	20	16	1 1	48 000	56 000	6 000	8 000	**HR 32206 C**	—	39	35	56	48	59	2	5	1 1	17.8	0.55	1.1	0.60	0.293
	62	25	25	19.5	1 1	66 500	79 500	6 000	8 000	**HR 33206 J**	2DE	39	35	56	52	59.5	5	5.5	1 1	16.1	0.34	1.8	0.97	0.355
	72	20.75	19	16	1.5 1.5	59 500	60 000	5 300	7 500	**HR 30306 J**	2FB	41	40	63	62	66	3	4.5	1.5 1.5	15.1	0.32	1.9	1.1	0.403
	72	20.75	19	14	1.5 1.5	56 500	55 500	5 300	7 100	**HR 30306 C**	—	41	38	63	59	67	3	6.5	1.5 1.5	18.5	0.55	1.1	0.60	0.383
	72	20.75	19	14	1.5 1.5	49 000	52 500	4 800	6 700	**HR 30306 DJ**	(7FB)	44	40	63	55	68	3	6.5	1.5 1.5	23.1	0.83	0.73	0.40	0.393
	72	20.75	19	14	1.5 1.5	49 000	52 500	4 800	6 800	**HR 31306 J**	7FB	44	40	63	55	68	3	6.5	1.5 1.5	23.1	0.83	0.73	0.40	0.393
	72	28.75	27	23	1.5 1.5	80 000	88 500	5 600	7 500	**HR 32306 J**	2FD	43	38	63	59	66	3	5.5	1.5 1.5	18.0	0.32	1.9	1.1	0.57
	72	28.75	27	23	1.5 1.5	76 000	86 500	5 600	7 500	**HR 32306 CJ**	5FD	43	36	63	54	68	3	5.5	1.5 1.5	22.0	0.55	1.1	0.60	0.583
32	58	17	17	13	1 1	37 500	47 000	6 300	8 500	**HR 320/32 XJ**	4CC	41	37	52	49	55	3	4	1 1	14.2	0.45	1.3	0.73	0.191
	58	21	20	16	1 1	41 000	50 000	6 300	8 500	**330/32**	—	41	37	52	50	55	2	4	1 1	13.8	0.31	1.9	1.1	0.225
	65	18.25	17	15	1 1	48 500	54 000	5 600	8 000	**HR 302/32**	—	41	39	59	56	61	3	3	1 1	14.7	0.37	1.6	0.88	0.277
	65	18.25	17	14	1 1	45 500	52 500	5 600	7 500	**HR 302/32 C**	—	41	39	59	54	62	3	4	1 1	16.9	0.55	1.1	0.60	0.273
	65	22.25	21	18	1 1	56 000	65 000	6 000	8 000	**HR 322/32**	—	41	38	59	54	61	3	4	1 1	15.9	0.37	1.6	0.88	0.336
	65	22.25	21	17	1 1	49 500	60 000	5 600	7 500	**HR 322/32 C**	—	41	39	59	51	62	3	5	1 1	20.2	0.59	1.0	0.56	0.335
	65	26	26	20.5	1 1	70 000	86 500	5 600	8 000	**HR 332/32 J**	2DE	41	38	59	55	62	5	5.5	1 1	17.0	0.35	1.7	0.95	0.40
	75	21.75	20	17	1.5 1.5	56 000	56 000	5 300	7 100	**303/32**	—	44	42	66	64	68	3	4.5	1.5 1.5	15.9	0.33	1.8	1.0	0.435
35	55	14	14	11.5	0.6 0.6	27 400	39 000	6 300	8 500	**HR 32907 J**	2BD	43	40	50	50	52.5	3	2.5	0.6 0.6	10.7	0.29	2.1	1.1	0.123
	62	18	18	14	1 1	43 500	55 500	5 600	8 000	**HR 32007 XJ**	4CC	44	40	56	54	60	4	4	1 1	15.0	0.45	1.3	0.73	0.229
	62	21	21	17	1 1	49 000	65 000	5 600	8 000	**HR 33007 J**	2CE	44	40	56	55	59	4	4	1 1	14.1	0.31	2.0	1.1	0.267
	72	18.25	17	15	1.5 1.5	54 000	59 500	5 300	7 100	**HR 30207 J**	3DB	46	43	63	62	67	3	3	1.5 1.5	15.0	0.37	1.6	0.88	0.34
	72	18.25	17	13	1.5 1.5	47 000	54 500	5 000	6 700	**HR 30207 C**	—	46	44	63	59	68	3	5	1.5 1.5	19.6	0.66	0.91	0.50	0.331
	72	24.25	23	19	1.5 1.5	70 500	83 500	5 300	7 100	**HR 32207 J**	3DC	46	42	63	61	67.5	3	5	1.5 1.5	17.9	0.37	1.6	0.88	0.456
	72	24.25	23	18	1.5 1.5	60 500	71 500	5 000	7 100	**HR 32207 C**	—	46	42	63	58	68.5	3	6	1.5 1.5	20.6	0.55	1.1	0.60	0.442
	72	28	28	22	1.5 1.5	86 500	108 000	5 300	7 100	**HR 33207 J**	2DE	46	41	63	61	68	5	6	1.5 1.5	18.3	0.35	1.7	0.93	0.54
	80	22.75	21	18	2 1.5	76 000	79 000	4 800	6 700	**HR 30307 J**	2FB	47	45	71	69	74	3	4.5	2 1.5	16.7	0.32	1.9	1.1	0.538
	80	22.75	21	16	2 1.5	68 000	70 500	4 800	6 300	**HR 30307 C**	—	47	44	71	65	74	3	6.5	2 1.5	20.3	0.55	1.1	0.60	0.518
	80	22.75	21	15	2 1.5	62 000	68 000	4 300	6 000	**HR 30307 DJ**	7FB	51	44	71	62	77	3	7.5	2 1.5	25.2	0.83	0.73	0.40	0.519
	80	22.75	21	15	2 1.5	62 000	68 000	4 300	6 000	**HR 31307 J**	7FB	51	44	71	62	77	3	7.5	2 1.5	25.2	0.83	0.73	0.40	0.52
	80	32.75	31	25	2 1.5	99 000	111 000	5 000	6 700	**HR 32307 J**	2FE	49	43	71	66	74	3	7.5	2 1.5	20.7	0.32	1.9	1.1	0.765

Remark Suffix C represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix C.

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 40 – 50 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

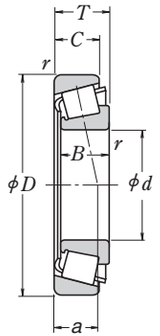
The values of e, Y_1, and Y_0 are given in the table below.

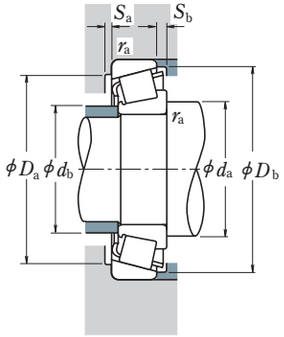
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.		a	e	Y_1	Y_0	approx.
40	62	15	15	12	0.6	0.6	34 000	47 000	5 600	7 500	**HR 32908 J**	2BC	48	44	57	57	59	3	3	0.6	0.6	11.5	0.29	2.1	1.1	0.161
	68	19	19	14.5	1	1	53 000	71 000	5 300	7 100	**HR 32008 XJ**	3CD	49	45	62	60	65.5	4	4.5	1	1	15.0	0.38	1.6	0.87	0.28
	68	22	22	18	1	1	59 000	81 500	5 300	7 100	**HR 33008 J**	2BE	49	45	62	61	65	4	4	1	1	14.6	0.28	2.1	1.2	0.322
	75	26	26	20.5	1.5	1.5	78 500	101 000	4 800	6 700	**HR 33108 J**	2CE	51	46	66	65	71	4	5.5	1.5	1.5	18.0	0.36	1.7	0.93	0.503
	80	19.75	18	16	1.5	1.5	63 500	70 000	4 800	6 300	**HR 30208 J**	3DB	51	48	71	69	75	3	3.5	1.5	1.5	16.6	0.37	1.6	0.88	0.437
	80	24.75	23	19	1.5	1.5	77 000	90 500	4 800	6 300	**HR 32208 J**	3DC	51	48	71	68	75	3	5.5	1.5	1.5	18.9	0.37	1.6	0.88	0.548
	80	24.75	23	19	1.5	1.5	74 000	90 500	4 500	6 300	**HR 32208 CJ**	5DC	51	47	71	65	76	3	5.5	1.5	1.5	21.9	0.55	1.1	0.60	0.558
	80	32	32	25	1.5	1.5	107 000	137 000	4 800	6 300	**HR 33208 J**	2DE	51	46	71	67	76	5	7	1.5	1.5	20.8	0.36	1.7	0.92	0.744
	90	25.25	23	20	2	1.5	90 500	101 000	4 300	5 600	**HR 30308 J**	2FB	52	52	81	76	82	3	5	2	1.5	19.5	0.35	1.7	0.96	0.758
	90	25.25	23	18	2	1.5	84 500	93 500	4 300	5 600	**HR 30308 C**	—	52	50	81	72	84	3	7	2	1.5	22.8	0.53	1.1	0.62	0.735
	90	25.25	23	17	2	1.5	80 000	89 500	3 800	5 300	**HR 30308 DJ**	7FB	56	50	81	70	87	3	8	2	1.5	28.7	0.83	0.73	0.40	0.728
	90	25.25	23	17	2	1.5	80 000	89 500	3 800	5 300	**HR 31308 J**	7FB	56	50	81	70	87	3	8	2	1.5	28.7	0.83	0.73	0.40	0.728
	90	35.25	33	27	2	1.5	120 000	145 000	4 300	6 000	**HR 32308 J**	2FD	54	50	81	73	82	3	8	2	1.5	23.4	0.35	1.7	0.96	1.05
45	68	15	15	12	0.6	0.6	34 500	50 500	5 000	6 700	**HR 32909 J**	2BC	53	50	63	62	64	3	3	0.6	0.6	12.3	0.32	1.9	1.0	0.187
	75	20	20	15.5	1	1	60 000	83 000	4 500	6 300	**HR 32009 XJ**	3CC	54	51	69	67	72	4	4.5	1	1	16.6	0.39	1.5	0.84	0.354
	75	24	24	19	1	1	69 000	99 000	4 800	6 300	**HR 33009 J**	2CE	54	51	69	67	71	4	5	1	1	16.3	0.29	2.0	1.1	0.414
	80	26	26	20.5	1.5	1.5	84 000	113 000	4 500	6 000	**HR 33109 J**	3CE	56	51	71	69	77	4	5.5	1.5	1.5	19.1	0.38	1.6	0.86	0.552
	85	20.75	19	16	1.5	1.5	68 500	79 500	4 300	6 000	**HR 30209 J**	3DB	56	53	76	74	80	3	4.5	1.5	1.5	18.3	0.41	1.5	0.81	0.488
	85	24.75	23	19	1.5	1.5	83 000	102 000	4 300	6 000	**HR 32209 J**	3DC	56	53	76	73	81	3	5.5	1.5	1.5	20.1	0.41	1.5	0.81	0.602
	85	24.75	23	19	1.5	1.5	75 500	95 500	4 300	5 600	**HR 32209 CJ**	5DC	56	52	76	70	82	3	5.5	1.5	1.5	23.6	0.59	1.0	0.56	0.603
	85	32	32	25	1.5	1.5	111 000	147 000	4 300	6 000	**HR 33209 J**	3DE	56	51	76	72	81	5	7	1.5	1.5	22.0	0.39	1.6	0.86	0.817
	95	29	26.5	20	2.5	2.5	88 500	109 000	3 600	5 000	**T 7 FC045**	7FC	60	53	83	71	91	3	9	2	2	32.1	0.87	0.69	0.38	0.918
	95	36	35	30	2.5	2.5	139 000	174 000	4 000	5 300	**T 2 ED045**	2ED	60	54	83	79	89	5	6	2	2	23.5	0.32	1.9	1.02	1.22
	100	27.25	25	22	2	1.5	112 000	127 000	3 800	5 300	**HR 30309 J**	2FB	57	58	91	86	93	3	5	2	1.5	21.1	0.35	1.7	0.96	1.01
	100	27.25	25	18	2	1.5	95 500	109 000	3 400	4 800	**HR 30309 DJ**	7FB	61	57	91	79	96	3	9	2	1.5	31.5	0.83	0.73	0.40	0.957
	100	27.25	25	18	2	1.5	95 500	109 000	3 400	4 800	**HR 31309 J**	7FB	61	57	91	79	96	3	9	2	1.5	31.5	0.83	0.73	0.40	0.947
	100	38.25	36	30	2	1.5	144 000	177 000	3 800	5 300	**HR 32309 J**	2FD	59	56	91	82	93	3	8	2	1.5	25.0	0.35	1.7	0.96	1.42
50	100	36	35	30	2.5	2.5	144 000	185 000	3 800	5 000	**T 2 ED050**	2ED	65	59	88	83	94	6	6	2	2	24.2	0.34	1.8	0.96	1.3
	72	15	15	12	0.6	0.6	36 000	54 000	4 500	6 300	**HR 32910 J**	2BC	58	54	67	66	69	3	3	0.6	0.6	13.5	0.34	1.8	0.97	0.193
	80	20	20	15.5	1	1	61 000	87 000	4 300	6 000	**HR 32010 XJ**	3CC	59	56	74	71	77	4	4.5	1	1	17.9	0.42	1.4	0.78	0.38
	80	24	24	19	1	1	70 500	104 000	4 300	6 000	**HR 33010 J**	2CE	59	55	74	71	76	4	5	1	1	17.4	0.32	1.9	1.0	0.452
	85	26	26	20	1.5	1.5	89 000	126 000	4 300	5 600	**HR 33110 J**	3CE	61	56	76	74	82	4	6	1.5	1.5	20.3	0.41	1.5	0.8	0.597
	90	21.75	20	17	1.5	1.5	76 000	91 500	4 000	5 300	**HR 30210 J**	3DB	61	58	81	79	85	3	4.5	1.5	1.5	19.6	0.42	1.4	0.79	0.557
	90	24.75	23	19	1.5	1.5	87 500	109 000	4 000	5 300	**HR 32210 J**	3DC	61	57	81	78	86	3	5.5	1.5	1.5	21.0	0.42	1.4	0.79	0.642
	90	24.75	23	18	1.5	1.5	77 500	102 000	3 800	5 300	**HR 32210 CJ**	5DC	61	58	81	76	87	3	6.5	1.5	1.5	24.6	0.59	1.0	0.56	0.655
	90	32	32	24.5	1.5	1.5	118 000	165 000	4 000	5 300	**HR 33210 J**	3DE	61	56	81	76	87	5	7.5	1.5	1.5	23.2	0.41	1.5	0.80	0.867
	105	32	29	22	3	3	109 000	133 000	3 200	4 500	**T 7 FC050**	7FC	74	59	91	78	100	5	10	2.5	2.5	36.4	0.87	0.69	0.38	1.22
	110	29.25	27	23	2.5	2	130 000	148 000	3 400	4 800	**HR 30310 J**	2FB	65	65	100	95	102	3	6	2	2	23.1	0.35	1.7	0.96	1.28
	110	29.25	27	19	2.5	2	114 000	132 000	3 200	4 300	**HR 30310 DJ**	7FB	70	62	100	87	105	3	10	2	2	34.3	0.83	0.73	0.40	1.26
	110	29.25	27	19	2.5	2	114 000	132 000	3 200	4 300	**HR 31310 J**	7FB	70	62	100	87	105	3	10	2	2	34.3	0.83	0.73	0.40	1.26
	110	42.25	40	33	2.5	2	176 000	220 000	3 600	4 800	**HR 32310 J**	2FD	68	62	100	91	102	3	9	2	2	28.0	0.35	1.7	0.96	1.88
	110	42.25	40	33	2.5	2	164 000	218 000	3 400	4 800	**HR 32310 CJ**	5FD	68	59	100	82	103	3	9	2	2	32.8	0.55	1.1	0.60	1.93

Remark Suffix C represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix C.

■SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 55 – 65 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

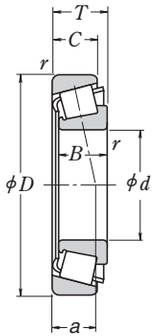
The values of e, Y_1, and Y_0 are given in the table below.

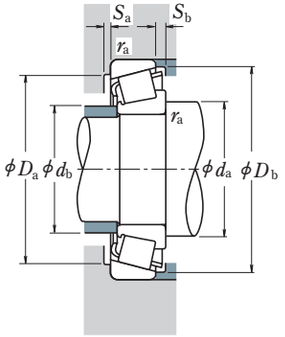
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.	a	e	Y_1	Y_0	approx.
55	80	17	17	14	1 1	45 500	74 500	4 300	5 600	**HR 32911 J**	2BC	64	60	74	73	76	4	3	1 1	14.6	0.31	1.9	1.1	0.282
	90	23	23	17.5	1.5 1.5	81 500	117 000	3 800	5 300	**HR 32011 XJ**	3CC	66	62	81	80	86	4	5.5	1.5 1.5	19.7	0.41	1.5	0.81	0.568
	90	27	27	21	1.5 1.5	91 500	138 000	3 800	5 300	**HR 33011 J**	2CE	66	62	81	80	86	5	6	1.5 1.5	19.2	0.31	1.9	1.1	0.657
	95	30	30	23	1.5 1.5	112 000	158 000	3 800	5 000	**HR 33111 J**	3CE	66	62	86	82	91	5	7	1.5 1.5	22.4	0.37	1.6	0.88	0.877
	100	22.75	21	18	2 1.5	94 500	113 000	3 600	5 000	**HR 30211 J**	3DB	67	64	91	89	94	4	4.5	2 1.5	20.9	0.41	1.5	0.81	0.736
	100	26.75	25	21	2 1.5	110 000	137 000	3 600	5 000	**HR 32211 J**	3DC	67	63	91	87	95	4	5.5	2 1.5	22.7	0.41	1.5	0.81	0.859
	100	35	35	27	2 1.5	141 000	193 000	3 600	5 000	**HR 33211 J**	3DE	67	62	91	86	96	6	8	2 1.5	25.2	0.40	1.5	0.83	1.18
	115	34	31	23.5	3 3	126 000	164 000	3 000	4 300	**T 7 FC055**	7FC	73	66	101	86	109	4	10.5	2.5 2.5	39.0	0.87	0.69	0.38	1.58
	120	31.5	29	25	2.5 2	150 000	171 000	3 200	4 300	**HR 30311 J**	2FB	70	71	110	104	111	4	6.5	2 2	24.6	0.35	1.7	0.96	1.63
	120	31.5	29	21	2.5 2	131 000	153 000	2 800	4 000	**HR 30311 DJ**	7FB	75	67	110	94	114	4	10.5	2 2	37.0	0.83	0.73	0.40	1.58
	120	31.5	29	21	2.5 2	131 000	153 000	2 800	4 000	**HR 31311 J**	7FB	75	67	110	94	114	4	10.5	2 2	37.0	0.83	0.73	0.40	1.58
	120	45.5	43	35	2.5 2	204 000	258 000	3 200	4 300	**HR 32311 J**	2FD	73	67	110	99	111	4	10.5	2 2	29.9	0.35	1.7	0.96	2.39
	120	45.5	43	35	2.5 2	195 000	262 000	3 200	4 300	**HR 32311 CJ**	5FD	73	65	110	91	112	4	10.5	2 2	35.8	0.55	1.1	0.60	2.47
60	85	17	17	14	1 1	49 000	84 500	3 800	5 300	**HR 32912 J**	2BC	69	65	79	78	81	4	3	1 1	15.5	0.33	1.8	1.0	0.306
	95	23	23	17.5	1.5 1.5	85 500	127 000	3 600	5 000	**HR 32012 XJ**	4CC	71	66	86	85	91	4	5.5	1.5 1.5	20.9	0.43	1.4	0.77	0.608
	95	27	27	21	1.5 1.5	96 000	150 000	3 600	5 000	**HR 33012 J**	2CE	71	66	86	85	90	5	6	1.5 1.5	20.0	0.33	1.8	1.0	0.713
	100	30	30	23	1.5 1.5	115 000	166 000	3 400	4 800	**HR 33112 J**	3CE	71	68	91	88	96	5	7	1.5 1.5	23.6	0.40	1.5	0.83	0.91
	110	23.75	22	19	2 1.5	104 000	123 000	3 400	4 500	**HR 30212 J**	3EB	72	69	101	96	103	4	4.5	2 1.5	22.0	0.41	1.5	0.81	0.930
	110	29.75	28	24	2 1.5	131 000	167 000	3 400	4 500	**HR 32212 J**	3EC	72	68	101	95	104	4	5.5	2 1.5	24.1	0.41	1.5	0.81	1.18
	110	38	38	29	2 1.5	166 000	231 000	3 400	4 500	**HR 33212 J**	3EE	72	68	101	94	105	6	9	2 1.5	27.6	0.40	1.5	0.82	1.56
	125	37	33.5	26	3 3	151 000	197 000	2 800	3 800	**T 7 FC060**	7FC	78	72	111	94	119	4	11	2.5 2.5	41.4	0.82	0.73	0.40	2.03
	130	33.5	31	26	3 2.5	174 000	201 000	3 000	4 000	**HR 30312 J**	2FB	78	77	118	112	120	4	7.5	2.5 2	26.0	0.35	1.7	0.96	2.03
	130	33.5	31	22	3 2.5	151 000	177 000	2 600	3 800	**HR 30312 DJ**	7FB	84	74	118	103	125	4	11.5	2.5 2	40.3	0.83	0.73	0.40	1.98
	130	33.5	31	22	3 2.5	151 000	177 000	2 600	3 800	**HR 31312 J**	7FB	84	74	118	103	125	4	11.5	2.5 2	40.3	0.83	0.73	0.40	1.98
	130	48.5	46	37	3 2.5	233 000	295 000	3 000	4 000	**HR 32312 J**	2FD	81	74	118	107	120	4	11.5	2.5 2	31.4	0.35	1.7	0.96	2.96
	130	48.5	46	35	3 2.5	196 000	249 000	2 800	3 800	**32312 C**	—	81	74	116	102	125	4	13.5	2.5 2	39.9	0.58	1.0	0.57	2.86
65	90	17	17	14	1 1	49 000	86 500	3 600	5 000	**HR 32913 J**	2BC	74	70	84	82	86	4	3	1 1	16.8	0.35	1.7	0.93	0.323
	100	23	23	17.5	1.5 1.5	86 500	132 000	3 400	4 500	**HR 32013 XJ**	4CC	76	71	91	90	97	4	5.5	1.5 1.5	22.4	0.46	1.3	0.72	0.646
	100	27	27	21	1.5 1.5	97 500	156 000	3 400	4 500	**HR 33013 J**	2CE	76	71	91	90	96	5	6	1.5 1.5	21.1	0.35	1.7	0.95	0.76
	110	34	34	26.5	1.5 1.5	148 000	218 000	3 200	4 300	**HR 33113 J**	3DE	76	73	101	96	106	6	7.5	1.5 1.5	26.0	0.39	1.5	0.85	1.32
	120	24.75	23	20	2 1.5	122 000	151 000	3 000	4 000	**HR 30213 J**	3EB	77	78	111	106	113	4	4.5	2 1.5	23.8	0.41	1.5	0.81	1.18
	120	32.75	31	27	2 1.5	157 000	202 000	3 000	4 000	**HR 32213 J**	3EC	77	75	111	104	115	4	5.5	2 1.5	27.1	0.41	1.5	0.81	1.55
	120	41	41	32	2 1.5	202 000	282 000	3 000	4 000	**HR 33213 J**	3EE	77	74	111	102	115	6	9	2 1.5	29.2	0.39	1.5	0.85	2.04
	140	36	33	28	3 2.5	200 000	233 000	2 600	3 600	**HR 30313 J**	2GB	83	83	128	121	130	4	8	2.5 2	27.9	0.35	1.7	0.96	2.51
	140	36	33	23	3 2.5	173 000	205 000	2 400	3 400	**HR 30313 DJ**	7GB	89	80	128	111	133	4	13	2.5 2	43.2	0.83	0.73	0.40	2.43
	140	36	33	23	3 2.5	173 000	205 000	2 400	3 400	**HR 31313 J**	7GB	89	80	128	111	133	4	13	2.5 2	43.2	0.83	0.73	0.40	2.43
	140	51	48	39	3 2.5	267 000	340 000	2 800	3 800	**HR 32313 J**	2GD	86	80	128	116	130	4	12	2.5 2	34.0	0.35	1.7	0.96	3.6

Remark Suffix C represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix C.

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 70 – 80 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

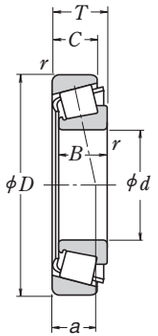
The values of e, Y_1, and Y_0 are given in the table below.

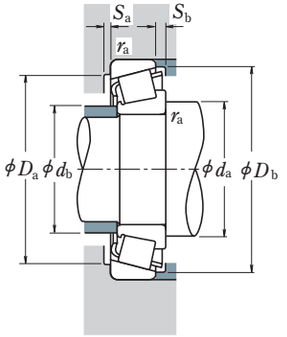
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.	a	e	Y_1	Y_0	approx.
70	100	20	20	16	1 1	70 000	113 000	3 200	4 500	**HR 32914 J**	2BC	79	76	94	93	96	4	4	1 1	17.6	0.32	1.9	1.1	0.494
	110	25	25	19	1.5 1.5	104 000	158 000	3 200	4 300	**HR 32014 XJ**	4CC	81	77	101	98	105	5	6	1.5 1.5	23.7	0.43	1.4	0.76	0.869
	110	31	31	25.5	1.5 1.5	127 000	204 000	3 000	4 300	**HR 33014 J**	2CE	81	78	101	100	105	5	5.5	1.5 1.5	22.2	0.28	2.1	1.2	1.11
	120	37	37	29	2 1.5	177 000	262 000	3 000	4 000	**HR 33114 J**	3DE	82	79	111	104	115	6	8	2 1.5	27.9	0.38	1.6	0.87	1.71
	125	26.25	24	21	2 1.5	132 000	163 000	2 800	4 000	**HR 30214 J**	3EB	82	81	116	110	118	4	5	2 1.5	25.6	0.42	1.4	0.79	1.3
	125	33.25	31	27	2 1.5	157 000	205 000	2 800	4 000	**HR 32214 J**	3EC	82	80	116	108	119	4	6	2 1.5	28.6	0.42	1.4	0.79	1.66
	125	41	41	32	2 1.5	209 000	299 000	2 800	4 000	**HR 33214 J**	3EE	82	78	116	107	120	7	9	2 1.5	30.4	0.41	1.5	0.81	2.15
	140	39	35.5	27	3 3	178 000	235 000	2 400	3 400	**T 7 FC070**	7FC	88	81	126	106	133	5	12	2.5 2.5	46.4	0.87	0.69	0.38	2.58
	150	38	35	30	3 2.5	227 000	268 000	2 400	3 400	**HR 30314 J**	2GB	88	89	138	132	140	4	8	2.5 2	29.7	0.35	1.7	0.96	3.03
	150	38	35	25	3 2.5	192 000	229 000	2 200	3 200	**HR 30314 DJ**	7GB	94	85	138	118	142	4	13	2.5 2	45.8	0.83	0.73	0.40	2.94
	150	38	35	25	3 2.5	192 000	229 000	2 200	3 200	**HR 31314 J**	7GB	94	85	138	118	142	4	13	2.5 2	45.8	0.83	0.73	0.40	2.94
	150	54	51	42	3 2.5	300 000	390 000	2 600	3 400	**HR 32314 J**	2GD	91	86	138	124	140	4	12	2.5 2	36.1	0.35	1.7	0.96	4.35
	150	54	51	42	3 2.5	280 000	390 000	2 400	3 400	**HR 32314 CJ**	5GD	91	84	138	115	141	4	12	2.5 2	43.3	0.55	1.1	0.60	4.47
75	105	20	20	16	1 1	72 500	120 000	3 200	4 300	**HR 32915 J**	2BC	84	81	99	98	101	4	4	1 1	18.7	0.33	1.8	0.99	0.53
	115	25	25	19	1.5 1.5	109 000	171 000	3 000	4 000	**HR 32015 XJ**	4CC	86	82	106	103	110	5	6	1.5 1.5	25.1	0.46	1.3	0.72	0.925
	115	31	31	25.5	1.5 1.5	133 000	220 000	3 000	4 000	**HR 33015 J**	2CE	86	83	106	104	110	6	5.5	1.5 1.5	23.0	0.30	2.0	1.1	1.18
	125	37	37	29	2 2	182 000	275 000	2 800	3 800	**HR 33115 J**	3DE	87	83	115	109	120	6	8	2 2	29.2	0.40	1.5	0.83	1.8
	130	27.25	25	22	2 1.5	143 000	182 000	2 800	3 800	**HR 30215 J**	4DB	87	85	121	115	124	4	5	2 1.5	27.0	0.44	1.4	0.76	1.43
	130	33.25	31	27	2 1.5	165 000	219 000	2 800	3 800	**HR 32215 J**	4DC	87	84	121	113	125	4	6	2 1.5	29.8	0.44	1.4	0.76	1.72
	130	41	41	31	2 1.5	215 000	315 000	2 800	3 800	**HR 33215 J**	3EE	87	83	121	111	125	7	10	2 1.5	31.6	0.43	1.4	0.77	2.25
	160	40	37	31	3 2.5	253 000	300 000	2 400	3 200	**HR 30315 J**	2GB	93	95	148	141	149	4	9	2.5 2	31.8	0.35	1.7	0.96	3.63
	160	40	37	26	3 2.5	211 000	251 000	2 200	3 000	**HR 30315 DJ**	7GB	99	91	148	129	152	6	14	2.5 2	48.8	0.83	0.73	0.40	3.47
	160	40	37	26	3 2.5	211 000	251 000	2 200	3 000	**HR 31315 J**	7GB	99	91	148	129	152	6	14	2.5 2	48.8	0.83	0.73	0.40	3.47
	160	58	55	45	3 2.5	340 000	445 000	2 400	3 200	**HR 32315 J**	2GD	96	91	148	134	149	4	13	2.5 2	38.9	0.35	1.7	0.96	5.31
	160	58	55	43	3 2.5	310 000	420 000	2 200	3 200	**32315 CA**	—	96	90	148	124	153	4	15	2.5 2	47.7	0.58	1.0	0.57	5.3
80	110	20	20	16	1 1	75 000	128 000	3 000	4 000	**HR 32916 J**	2BC	89	85	104	102	106	4	4	1 1	19.8	0.35	1.7	0.94	0.56
	125	29	29	22	1.5 1.5	140 000	222 000	2 800	3 600	**HR 32016 XJ**	3CC	91	89	116	112	120	6	7	1.5 1.5	26.9	0.42	1.4	0.78	1.32
	125	36	36	29.5	1.5 1.5	172 000	282 000	2 800	3 600	**HR 33016 J**	2CE	91	88	116	112	119	6	6.5	1.5 1.5	25.5	0.28	2.2	1.2	1.66
	130	37	37	29	2 1.5	186 000	289 000	2 600	3 600	**HR 33116 J**	3DE	82	88	121	113	126	6	8	2 1.5	30.4	0.42	1.4	0.79	1.88
	140	28.25	26	22	2.5 2	157 000	195 000	2 600	3 400	**HR 30216 J**	3EB	95	91	130	124	132	4	6	2 2	28.1	0.42	1.4	0.79	1.68
	140	28.25	26	20	2.5 2	147 000	190 000	2 400	3 400	**30216 CA**	—	95	92	130	122	133	4	8	2 2	33.8	0.58	1.0	0.57	1.66
	140	35.25	33	28	2.5 2	192 000	254 000	2 600	3 400	**HR 32216 J**	3EC	95	90	130	122	134	4	7	2 2	30.6	0.42	1.4	0.79	2.13
	140	46	46	35	2.5 2	256 000	385 000	2 600	3 400	**HR 33216 J**	3EE	95	89	130	119	135	7	11	2 2	34.8	0.43	1.4	0.78	2.93
	170	42.5	39	33	3 2.5	276 000	330 000	2 200	3 000	**HR 30316 J**	2GB	98	102	158	150	159	4	9.5	2.5 2	34.0	0.35	1.7	0.96	4.27
	170	42.5	39	27	3 2.5	235 000	283 000	2 000	2 800	**HR 30316 DJ**	7GB	104	97	158	136	159	6	15.5	2.5 2	51.8	0.83	0.73	0.40	4.07
	170	42.5	39	27	3 2.5	235 000	283 000	2 000	2 800	**HR 31316 J**	7GB	104	97	158	136	159	6	15.5	2.5 2	51.8	0.83	0.73	0.40	4.07
	170	61.5	58	48	3 2.5	385 000	505 000	2 200	3 000	**HR 32316 J**	2GD	101	98	158	143	159	4	13.5	2.5 2	41.4	0.35	1.7	0.96	6.35
	170	61.5	58	48	3 2.5	365 000	530 000	2 200	3 000	**HR 32316 CJ**	5GD	101	95	158	132	160	4	13.5	2.5 2	49.3	0.55	1.1	0.60	6.59

Remark Suffix CA represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix CA.

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 85 – 100 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

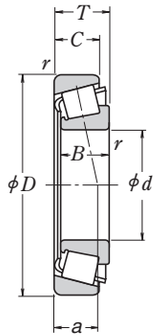
The values of e, Y_1, and Y_0 are given in the table below.

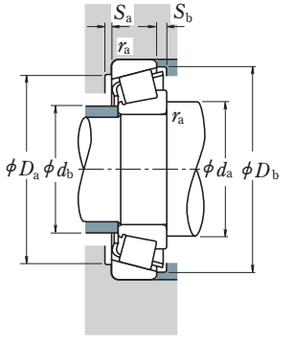
Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.		C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.		a	e	Y_1	Y_0	approx.
85	120	23	23	18	1.5	1.5	93 500	157 000	2 800	3 800	**HR 32917 J**	2BC	96	92	111	111	115	5	5	1.5	1.5	20.9	0.33	1.8	1.0	0.8
	130	29	29	22	1.5	1.5	143 000	231 000	2 600	3 600	**HR 32017 XJ**	4CC	96	94	121	116	125	6	7	1.5	1.5	28.2	0.44	1.4	0.75	1.38
	130	36	36	29.5	1.5	1.5	180 000	305 000	2 600	3 600	**HR 33017 J**	2CE	96	94	121	117	125	6	6.5	1.5	1.5	26.5	0.29	2.1	1.1	1.75
	140	41	41	32	2.5	2	230 000	365 000	2 400	3 400	**HR 33117 J**	3DE	100	94	130	122	135	7	9	2	2	32.7	0.41	1.5	0.81	2.51
	150	30.5	28	24	2.5	2	184 000	233 000	2 400	3 200	**HR 30217 J**	3EB	100	97	140	133	141	5	6.5	2	2	30.3	0.42	1.4	0.79	2.12
	150	30.5	28	22	2.5	2	171 000	226 000	2 200	3 200	**30217 CA**	—	100	98	140	131	142	5	8.5	2	2	36.2	0.58	1.0	0.57	2.07
	150	38.5	36	30	2.5	2	210 000	277 000	2 200	3 200	**HR 32217 J**	3EC	100	96	140	131	142	5	8.5	2	2	33.9	0.42	1.4	0.79	2.64
	150	49	49	37	2.5	2	281 000	415 000	2 400	3 200	**HR 33217 J**	3EE	100	95	140	129	144	7	12	2	2	37.3	0.42	1.4	0.79	3.57
	180	44.5	41	34	4	3	310 000	375 000	2 000	2 800	**HR 30317 J**	2GB	106	108	166	157	167	5	10.5	3	2.5	35.8	0.35	1.7	0.96	5.08
	180	44.5	41	28	4	3	261 000	315 000	1 900	2 600	**HR 30317 DJ**	7GB	113	103	166	144	169	6	16.5	3	2.5	55.4	0.83	0.73	0.40	4.88
	180	44.5	41	28	4	3	261 000	315 000	1 900	2 600	**HR 31317 J**	7GB	113	103	166	144	169	6	16.5	3	2.5	55.4	0.83	0.73	0.40	4.88
	180	63.5	60	49	4	3	410 000	535 000	2 000	2 800	**HR 32317 J**	2GD	110	104	166	151	167	5	14.5	3	2.5	43.6	0.35	1.7	0.96	7.31
90	125	23	23	18	1.5	1.5	97 000	167 000	2 600	3 600	**HR 32918 J**	2BC	101	97	116	116	120	5	5	1.5	1.5	22.0	0.34	1.8	0.96	0.838
	140	32	32	24	2	1.5	170 000	273 000	2 400	3 200	**HR 32018 XJ**	3CC	102	99	131	124	134	6	8	2	1.5	29.7	0.42	1.4	0.78	1.78
	140	39	39	32.5	2	1.5	220 000	360 000	2 400	3 200	**HR 33018 J**	2CE	102	99	131	129	135	7	6.5	2	1.5	27.9	0.27	2.2	1.2	2.21
	150	45	45	35	2.5	2	259 000	405 000	2 400	3 200	**HR 33118 J**	3DE	105	100	140	132	144	7	10	2	2	35.2	0.40	1.5	0.83	3.14
	160	32.5	30	26	2.5	2	201 000	256 000	2 200	3 000	**HR 30218 J**	3FB	105	103	150	141	150	5	6.5	2	2	31.7	0.42	1.4	0.79	2.6
	160	42.5	40	34	2.5	2	256 000	350 000	2 200	3 000	**HR 32218 J**	3FC	105	102	150	139	152	5	8.5	2	2	36.2	0.42	1.4	0.79	3.41
	190	46.5	43	36	4	3	345 000	425 000	1 900	2 600	**HR 30318 J**	2GB	111	114	176	176	176	5	10.5	3	2.5	37.3	0.35	1.7	0.96	5.91
	190	46.5	43	30	4	3	264 000	315 000	1 800	2 400	**HR 30318 DJ**	7GB	118	110	176	152	179	6	16.5	3	2.5	58.7	0.83	0.73	0.40	5.52
	190	46.5	43	30	4	3	264 000	315 000	1 800	2 400	**HR 31318 J**	7GB	118	110	176	152	179	6	16.5	3	2.5	58.7	0.83	0.73	0.40	5.52
	190	67.5	64	53	4	3	450 000	590 000	2 000	2 600	**HR 32318 J**	2GD	115	109	176	158	177	5	14.5	3	2.5	46.5	0.35	1.7	0.96	8.6
95	130	23	23	18	1.5	1.5	98 000	172 000	2 400	3 400	**HR 32919 J**	2BC	106	102	121	121	125	5	5	1.5	1.5	23.2	0.36	1.7	0.92	0.877
	145	32	32	24	2	1.5	173 000	283 000	2 400	3 200	**HR 32019 XJ**	4CC	107	104	136	131	140	6	8	2	1.5	31.2	0.44	1.4	0.75	1.88
	145	39	39	32.5	2	1.5	231 000	390 000	2 400	3 200	**HR 33019 J**	2CE	107	103	136	133	139	7	6.5	2	1.5	28.6	0.28	2.2	1.2	2.3
	160	46	46	38	3	3	283 000	445 000	2 200	3 000	**T 2 ED095**	2ED	113	108	146	141	152	6	8	2.5	2.5	34.5	0.34	1.8	0.97	3.74
	170	34.5	32	27	3	2.5	223 000	286 000	2 200	2 800	**HR 30219 J**	3FB	113	110	158	150	159	5	7.5	2.5	2	33.7	0.42	1.4	0.79	3.13
	170	45.5	43	37	3	2.5	289 000	400 000	2 200	2 800	**HR 32219 J**	3FC	113	108	158	147	161	5	8.5	2.5	2	39.3	0.42	1.4	0.79	4.22
	200	49.5	45	38	4	3	370 000	455 000	1 900	2 600	**HR 30319 J**	2GB	116	119	186	172	184	5	11.5	3	2.5	38.6	0.35	1.7	0.96	6.92
	200	49.5	45	36	4	3	350 000	435 000	1 800	2 400	**30319 CA**	—	116	119	186	168	188	5	13.5	3	2.5	48.6	0.54	1.1	0.61	6.71
	200	49.5	45	32	4	3	310 000	375 000	1 700	2 400	**HR 30319 DJ**	7GB	123	115	186	158	187	6	17.5	3	2.5	61.9	0.83	0.73	0.40	6.64
	200	49.5	45	32	4	3	310 000	375 000	1 700	2 400	**HR 31319 J**	7GB	123	115	186	158	187	6	17.5	3	2.5	61.9	0.83	0.73	0.40	6.64
	200	71.5	67	55	4	3	525 000	710 000	1 900	2 600	**HR 32319 J**	2GD	120	115	186	167	186	5	16.5	3	2.5	48.6	0.35	1.7	0.96	10.4
100	140	25	25	20	1.5	1.5	117 000	205 000	2 200	3 200	**HR 32920 J**	2CC	111	109	132	132	134	5	5	1.5	1.5	24.2	0.33	1.8	1.0	1.18
	145	24	22.5	17.5	3	3	113 000	163 000	2 200	3 000	**T 4 CB100**	4CB	118	108	135	135	142	6	6.5	2.5	2.5	30.1	0.47	1.3	0.70	1.18
	150	32	32	24	2	1.5	176 000	294 000	2 200	3 000	**HR 32020 XJ**	4CC	112	109	141	136	144	6	8	2	1.5	32.5	0.46	1.3	0.72	1.95
	150	39	39	32.5	2	1.5	235 000	405 000	2 200	3 000	**HR 33020 J**	2CE	112	107	141	137	143	7	6.5	2	1.5	29.3	0.29	2.1	1.2	2.38
	165	52	52	40	2.5	2	315 000	515 000	2 000	2 800	**HR 33120 J**	3EE	115	110	155	144	159	8	12	2	2	40.5	0.41	1.5	0.81	4.32
	180	37	34	29	3	2.5	255 000	330 000	2 000	2 600	**HR 30220 J**	3FB	118	116	168	158	168	5	8	2.5	2	36.1	0.42	1.4	0.79	3.78
	180	49	46	39	3	2.5	325 000	450 000	2 000	2 600	**HR 32220 J**	3FC	118	115	168	155	171	5	10	2.5	2	41.5	0.42	1.4	0.79	5.05
	180	63	63	48	3	2.5	410 000	635 000	2 000	2 600	**HR 33220 J**	3FE	118	113	168	152	172	10	15	2.5	2	46.0	0.40	1.5	0.82	6.76
	215	51.5	47	39	4	3	425 000	525 000	1 700	2 400	**HR 30320 J**	2GB	121	128	201	185	197	5	12.5	3	2.5	41.4	0.35	1.7	0.96	8.41
	215	56.5	51	35	4	3	385 000	505 000	1 500	2 200	**HR 31320 J**	7GB	136	125	201	169	202	7	21.5	3	2.5	67.7	0.83	0.73	0.40	9.02
	215	77.5	73	60	4	3	565 000	755 000	1 700	2 400	**HR 32320 J**	2GD	125	125	201	178	200	5	17.5	3	2.5	53.2	0.35	1.7	0.96	12.7

Remark Suffix CA represents medium-angle tapered roller bearings. Since they are designed for specific applications, please consult NSK when using bearings with suffix CA.

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 105 – 130 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

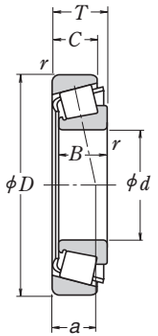
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

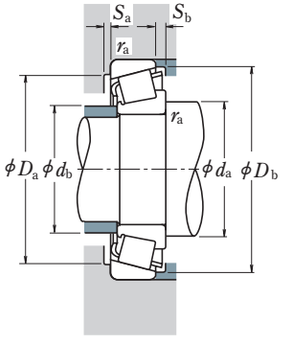
The values of e, Y_1, and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring:													Ring:						
d	D	T	B	C	Inner r min.	Outer r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	Inner r_a max.	Outer r_a max.	a	e	Y_1	Y_0	approx.
105	145	25	25	20	1.5	1.5	119 000	212 000	2 200	3 000	**HR 32921 J**	2CC	116	114	137	137	140	5	5	1.5	1.5	25.3	0.34	1.8	0.96	1.23
	160	35	35	26	2.5	2	204 000	340 000	2 000	2 800	**HR 32021 XJ**	4DC	120	115	150	144	154	6	9	2	2	34.3	0.44	1.4	0.74	2.48
	160	43	43	34	2.5	2	256 000	435 000	2 000	2 800	**HR 33021 J**	2DE	120	115	150	146	153	7	9	2	2	30.9	0.28	2.1	1.2	3.03
	190	39	36	30	3	2.5	280 000	365 000	1 900	2 600	**HR 30221 J**	3FB	123	123	178	166	177	6	9	2.5	2	38.1	0.42	1.4	0.79	4.51
	190	53	50	43	3	2.5	360 000	510 000	1 900	2 600	**HR 32221 J**	3FC	123	120	178	162	180	5	10	2.5	2	44.8	0.42	1.4	0.79	6.25
	225	53.5	49	41	4	3	455 000	565 000	1 600	2 200	**HR 30321 J**	2GB	126	133	211	195	206	6	12.5	3	2.5	43.3	0.35	1.7	0.96	9.52
	225	58	53	36	4	3	415 000	540 000	1 500	2 000	**HR 31321 J**	7GB	141	130	211	177	211	7	22	3	2.5	70.2	0.83	0.73	0.40	10
	225	81.5	77	63	4	3	670 000	925 000	1 700	2 200	**HR 32321 J**	2GD	130	129	211	186	209	6	18.5	3	2.5	55.2	0.35	1.7	0.96	14.9
110	150	25	25	20	1.5	1.5	123 000	224 000	2 200	2 800	**HR 32922 J**	2CC	121	119	142	142	145	5	5	1.5	1.5	26.5	0.36	1.7	0.93	1.29
	170	38	38	29	2.5	2	236 000	390 000	2 000	2 600	**HR 32022 XJ**	4DC	125	121	160	153	163	7	9	2	2	35.9	0.43	1.4	0.77	3.09
	170	47	47	37	2.5	2	294 000	515 000	2 000	2 600	**HR 33022 J**	2DE	125	121	160	153	161	7	10	2	2	33.7	0.29	2.1	1.2	3.84
	180	56	56	43	2.5	2	365 000	610 000	1 900	2 600	**HR 33122 J**	3EE	125	121	170	156	174	9	13	2	2	44.1	0.42	1.4	0.79	5.54
	200	41	38	32	3	2.5	315 000	420 000	1 800	2 400	**HR 30222 J**	3FB	128	129	188	175	187	6	9	2.5	2	40.2	0.42	1.4	0.79	5.28
	200	56	53	46	3	2.5	400 000	565 000	1 800	2 400	**HR 32222 J**	3FC	128	127	188	171	190	5	10	2.5	2	47.2	0.42	1.4	0.79	7.35
	240	54.5	50	42	4	3	485 000	595 000	1 500	2 000	**HR 30322 J**	2GB	131	143	226	208	220	6	12.5	3	2.5	45.1	0.35	1.7	0.96	11
	240	63	57	38	4	3	470 000	605 000	1 400	1 900	**HR 31322 J**	7GB	146	136	226	191	224	7	25	3	2.5	74.8	0.83	0.73	0.40	12.3
	240	84.5	80	65	4	3	675 000	910 000	1 500	2 000	**HR 32322 J**	2GD	135	139	226	201	222	6	19.5	3	2.5	58.6	0.35	1.7	0.96	17.1
120	165	29	29	23	1.5	1.5	161 000	291 000	1 900	2 600	**HR 32924 J**	2CC	131	129	156	155	160	6	6	1.5	1.5	29.2	0.35	1.7	0.95	1.8
	170	27	25	19.5	3	3	153 000	243 000	1 800	2 600	**T 4 CB120**	4CB	138	129	158	158	164	7	7.5	2.5	2.5	35.0	0.47	1.3	0.70	1.78
	180	38	38	29	2.5	2	242 000	405 000	1 800	2 400	**HR 32024 XJ**	4DC	135	131	170	162	173	7	9	2	2	39.7	0.46	1.3	0.72	3.27
	180	48	48	38	2.5	2	300 000	540 000	1 800	2 600	**HR 33024 J**	2DE	135	130	168	161	171	6	10	2	2	36.0	0.31	2.0	1.1	4.2
	200	62	62	48	2.5	2	460 000	755 000	1 700	2 400	**HR 33124 J**	3FE	135	133	190	173	192	9	14	2	2	47.9	0.40	1.5	0.83	7.67
	215	43.5	40	34	3	2.5	335 000	450 000	1 600	2 200	**HR 30224 J**	4FB	138	141	203	190	201	6	9.5	2.5	2	44.4	0.44	1.4	0.76	6.28
	215	61.5	58	50	3	2.5	440 000	635 000	1 600	2 200	**HR 32224 J**	4FD	138	137	203	181	204	6	11.5	2.5	2	52.1	0.44	1.4	0.76	9.0
	260	59.5	55	46	4	3	535 000	655 000	1 400	1 900	**HR 30324 J**	2GB	141	154	246	223	237	6	13.5	3	2.5	50.0	0.35	1.7	0.96	13.9
	260	68	62	42	4	3	560 000	730 000	1 300	1 800	**HR 31324 J**	7GB	156	148	246	206	244	9	26	3	2.5	81.7	0.83	0.73	0.40	15.6
	260	90.5	86	69	4	3	770 000	1 060 000	1 400	1 900	**HR 32324 J**	2GD	145	149	246	216	239	6	21.5	3	2.5	62.5	0.35	1.7	0.96	21.8
130	180	32	30	26	2	1.5	167 000	281 000	1 800	2 400	**32926**	—	142	141	171	168	175	6	6	2	1.5	34.7	0.36	1.7	0.92	2.25
	180	32	32	25	2	1.5	200 000	365 000	1 800	2 400	**HR 32926 J**	2CC	142	140	170	168	173	6	7	2	1.5	31.4	0.34	1.8	0.97	2.46
	185	29	27	21	3	3	183 000	296 000	1 700	2 400	**T 4 CB130**	4CB	148	141	171	171	179	8	8	2.5	2.5	37.5	0.47	1.3	0.70	2.32
	200	45	45	34	2.5	2	320 000	535 000	1 600	2 200	**HR 32026 XJ**	4EC	145	144	190	179	192	8	11	2	2	43.9	0.43	1.4	0.76	5.06
	200	55	55	43	2.5	2	395 000	715 000	1 700	2 200	**HR 33026 J**	2EE	145	144	188	179	192	8	12	2	2	42.4	0.34	1.8	0.97	6.25
	230	43.75	40	34	4	3	375 000	505 000	1 500	2 000	**HR 30226 J**	4FB	151	151	216	205	217	7	9.5	3	2.5	45.9	0.44	1.4	0.76	7.25
	230	67.75	64	54	4	3	530 000	790 000	1 500	2 000	**HR 32226 J**	4FD	151	147	216	196	219	7	13.5	3	2.5	57.0	0.44	1.4	0.76	11.3
	280	63.75	58	49	5	4	545 000	675 000	1 300	1 800	**30326**	—	157	168	262	239	255	8	14.5	4	3	53.9	0.36	1.7	0.92	16.6
	280	63.75	58	49	5	4	650 000	820 000	1 300	1 800	**HR 30326 J**	2GB	157	166	262	241	255	8	14.5	4	3	52.8	0.35	1.7	0.96	17.2
	280	72	66	44	5	4	625 000	820 000	1 200	1 700	**HR 31326 J**	7GB	174	159	262	220	261	9	28	4	3	87.1	0.83	0.73	0.40	18.8
	280	98.75	93	78	5	4	830 000	1 150 000	1 300	1 800	**32326**	—	162	165	262	233	263	8	20.5	4	3	69.2	0.36	1.7	0.92	26.6

SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 140 – 170 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

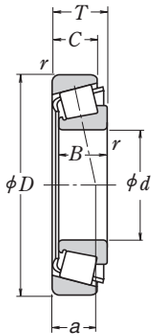
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

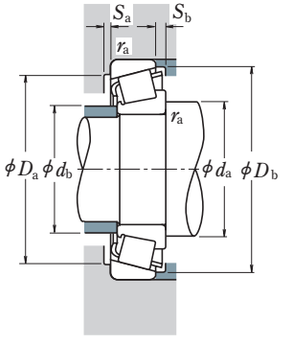
The values of e, Y_1, and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner / Outer r min.							d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	Ring: Inner / Outer r_a max.		a	e	Y_1	Y_0	
d	D	T	B	C		C_r	C_{0r}	Grease	Oil		approx.														approx.
140	190	32	32	25	2	1.5	206 000	390 000	1 700	2 200	**HR 32928 J**	2CC	152	150	180	178	184	6	7	2	1.5	33.6	0.36	1.7	0.92	2.64
	210	45	45	34	2.5	2	325 000	555 000	1 600	2 200	**HR 32028 XJ**	4DC	155	152	200	189	202	8	11	2	2	46.6	0.46	1.3	0.72	5.32
	210	56	56	44	2.5	2	410 000	770 000	1 600	2 200	**HR 33028 J**	2DE	155	153	198	189	202	7	12	2	2	45.5	0.36	1.7	0.92	6.74
	250	45.75	42	36	4	3	390 000	515 000	1 400	1 900	**HR 30228 J**	4FB	161	164	236	221	234	7	9.5	3	2.5	48.9	0.44	1.4	0.76	8.74
	250	71.75	68	58	4	3	610 000	915 000	1 400	1 900	**HR 32228 J**	4FD	161	159	236	213	238	9	13.5	3	2.5	60.5	0.44	1.4	0.76	14.3
	300	67.75	62	53	5	4	740 000	945 000	1 200	1 700	**HR 30328 J**	2GB	167	177	282	256	273	9	14.5	4	3	55.7	0.35	1.7	0.96	21.1
	300	77	70	47	5	4	695 000	955 000	1 100	1 500	**HR 31328 J**	7GB	184	174	282	236	280	9	30	4	3	92.9	0.83	0.73	0.40	28.5
	300	107.75	102	85	5	4	985 000	1 440 000	1 200	1 600	**32328**	—	172	177	282	246	281	9	22.5	4	3	76.4	0.37	1.6	0.88	33.9
150	210	38	36	31	2.5	2	247 000	440 000	1 500	2 000	**32930**	—	165	162	200	195	201	7	7	2	2	36.7	0.33	1.8	1.0	3.8
	210	38	38	30	2.5	2	281 000	520 000	1 500	2 000	**HR 32930 J**	2DC	165	163	198	196	202	7	8	2	2	36.5	0.33	1.8	1.0	4.05
	225	48	48	36	3	2.5	375 000	650 000	1 400	2 000	**HR 32030 XJ**	4EC	168	164	213	202	216	8	12	2.5	2	49.8	0.46	1.3	0.72	6.6
	225	59	59	46	3	2.5	435 000	805 000	1 400	2 000	**HR 33030 J**	2EE	168	165	213	203	217	8	13	2.5	2	48.7	0.36	1.7	0.90	8.07
	270	49	45	38	4	3	485 000	665 000	1 300	1 800	**HR 30230 J**	2GB	171	175	256	236	250	7	11	3	2.5	51.3	0.44	1.4	0.76	11.2
	270	77	73	60	4	3	705 000	1 080 000	1 300	1 800	**HR 32230 J**	4GD	171	171	256	228	254	8	17	3	2.5	64.7	0.44	1.4	0.76	17.8
	320	72	65	55	5	4	690 000	860 000	1 100	1 500	**30330**	—	177	193	302	275	292	8	17	4	3	61.4	0.36	1.7	0.92	24.2
	320	72	65	55	5	4	825 000	1 060 000	1 100	1 600	**HR 30330 J**	2GB	177	190	302	276	292	8	17	4	3	60.0	0.35	1.7	0.96	25
	320	82	75	50	5	4	790 000	1 100 000	1 000	1 400	**HR 31330 J**	7GB	194	187	302	253	300	9	32	4	3	99.3	0.83	0.73	0.40	28.5
	320	114	108	90	5	4	1 120 000	1 700 000	1 100	1 500	**32330**	—	182	191	302	262	297	8	24	4	3	81.5	0.37	1.6	0.88	41.4
160	220	38	38	30	2.5	2	296 000	570 000	1 400	1 900	**HR 32932 J**	2DC	175	173	208	206	212	7	8	2	2	38.7	0.35	1.7	0.95	4.32
	240	51	51	38	3	2.5	425 000	750 000	1 300	1 800	**HR 32032 XJ**	4EC	178	175	228	216	231	8	13	2.5	2	53.0	0.46	1.3	0.72	7.93
	290	52	48	40	4	3	530 000	730 000	1 200	1 600	**HR 30232 J**	4GB	181	189	276	253	269	8	12	3	2.5	55.0	0.44	1.4	0.76	13.7
	290	84	80	67	4	3	795 000	1 220 000	1 200	1 600	**HR 32232 J**	4GD	181	184	276	243	274	10	17	3	2.5	70.5	0.44	1.4	0.76	22.5
	340	75	68	58	5	4	765 000	960 000	1 000	1 400	**30332**	—	187	205	322	293	311	10	17	4	3	64.6	0.36	1.7	0.92	28.4
	340	75	68	58	5	4	915 000	1 180 000	1 100	1 400	**HR 30332 J**	2GB	187	201	322	293	310	10	17	4	3	62.9	0.35	1.7	0.96	29.7
	340	75	68	48	5	4	675 000	875 000	950	1 300	**30332 D**	—	196	198	322	270	313	9	27	4	3	99.4	0.81	0.74	0.41	27.5
	340	121	114	95	5	4	1 210 000	1 770 000	1 000	1 400	**32332**	—	192	202	322	281	319	10	26	4	3	87.1	0.37	1.6	0.88	48.3
170	230	38	36	31	2.5	2.5	258 000	485 000	1 300	1 800	**32934**	—	185	183	220	216	223	7	7	2	2	41.6	0.36	1.7	0.90	4.3
	230	38	38	30	2.5	2	294 000	560 000	1 400	1 800	**HR 32934 J**	3DC	185	180	218	215	222	7	8	2	2	41.7	0.38	1.6	0.86	4.44
	260	57	57	43	3	2.5	505 000	890 000	1 200	1 700	**HR 32034 XJ**	4EC	188	187	248	232	249	10	14	2.5	2	56.6	0.44	1.4	0.74	10.6
	310	57	52	43	5	4	630 000	885 000	1 100	1 500	**HR 30234 J**	4GB	197	202	292	273	288	8	14	4	3	59.4	0.44	1.4	0.76	17.1
	310	91	86	71	5	4	930 000	1 450 000	1 100	1 500	**HR 32234 J**	4GD	197	197	292	262	294	10	20	4	3	76.4	0.44	1.4	0.76	28
	360	80	72	62	5	4	845 000	1 080 000	950	1 300	**30334**	—	197	221	342	312	332	10	18	4	3	70.1	0.37	1.6	0.90	33.5
	360	80	72	62	5	4	960 000	1 230 000	1 000	1 300	**HR 30334 J**	2GB	197	214	342	310	329	10	18	4	3	67.3	0.35	1.7	0.96	34.5
	360	80	72	50	5	4	760 000	1 040 000	900	1 200	**30334 D**	—	206	215	342	288	332	10	30	4	3	107.3	0.81	0.74	0.41	33.4
	360	127	120	100	5	4	1 370 000	2 050 000	1 000	1 300	**32334**	—	202	213	342	297	337	10	27	4	3	91.3	0.37	1.6	0.88	57

■SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 180 – 240 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

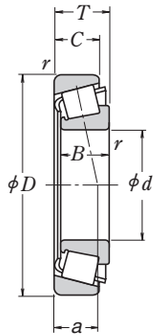
When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

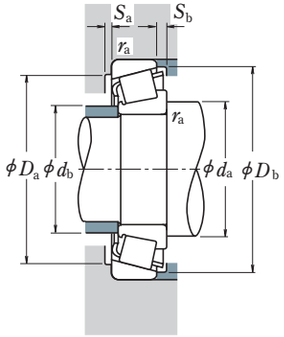
The values of e, Y_1, and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.	a	e	Y_1	Y_0	approx.
180	250	45	45	34	2.5 2	350 000	685 000	1 300	1 700	**HR 32936 J**	4DC	195	192	240	227	241	8	11	2 2	53.9	0.48	1.3	0.69	6.56
	280	64	64	48	3 2.5	640 000	1 130 000	1 200	1 600	**HR 32036 XJ**	3FD	198	199	268	248	267	10	16	2.5 2	60.4	0.42	1.4	0.78	14.3
	320	57	52	43	5 4	650 000	930 000	1 100	1 400	**HR 30236 J**	4GB	207	210	302	281	297	9	14	4 3	61.8	0.45	1.3	0.73	17.8
	320	91	86	71	5 4	960 000	1 540 000	1 100	1 400	**HR 32236 J**	4GD	207	205	302	270	303	10	20	4 3	78.9	0.45	1.3	0.73	29.8
	380	83	75	64	5 4	935 000	1 230 000	900	1 300	**30336**	—	207	233	362	324	345	10	19	4 3	72.5	0.36	1.7	0.92	39.3
	380	83	75	53	5 4	820 000	1 120 000	850	1 200	**30336 D**	—	216	229	362	304	352	10	30	4 3	113.1	0.81	0.74	0.41	38.5
	380	134	126	106	5 4	1 520 000	2 290 000	950	1 300	**32336**	—	212	225	362	310	353	10	28	4 3	96.6	0.37	1.6	0.88	66.8
190	260	45	45	34	2.5 2	365 000	715 000	1 200	1 600	**HR 32938 J**	4DC	205	201	250	237	251	8	11	2 2	55.3	0.48	1.3	0.69	6.83
	290	64	64	48	3 2.5	650 000	1 170 000	1 100	1 500	**HR 32038 XJ**	4FD	208	209	278	258	279	10	16	2.5 2	63.4	0.44	1.4	0.75	14.9
	340	60	55	46	5 4	715 000	1 020 000	1 000	1 300	**HR 30238 J**	4GB	217	223	322	302	318	9	14	4 3	65.6	0.44	1.4	0.76	21.4
	340	97	92	75	5 4	1 110 000	1 770 000	1 000	1 400	**HR 32238 J**	4GD	217	216	322	290	323	10	22	4 3	80.5	0.44	1.4	0.76	35.2
	400	86	78	65	6 5	1 010 000	1 340 000	850	1 200	**30338**	—	223	248	378	346	366	11	21	5 4	76.1	0.36	1.7	0.92	46
	400	140	132	109	6 5	1 660 000	2 580 000	850	1 200	**32338**	—	229	243	378	332	375	11	31	5 4	102.7	0.37	1.6	0.88	78.9
200	280	51	48	41	3 2.5	410 000	780 000	1 100	1 500	**32940**	—	218	217	268	256	269	9	10	2.5 2	53.4	0.37	1.6	0.88	9.26
	280	51	51	39	3 2.5	480 000	935 000	1 100	1 500	**HR 32940 J**	3EC	218	216	268	258	271	9	12	2.5 2	54.2	0.39	1.5	0.84	9.65
	310	70	70	53	3 2.5	760 000	1 370 000	1 000	1 400	**HR 32040 XJ**	4FD	218	221	298	277	297	11	17	2.5 2	67.4	0.43	1.4	0.77	18.9
	360	64	58	48	5 4	795 000	1 120 000	950	1 300	**HR 30240 J**	4GB	227	236	342	318	336	10	16	4 3	69.1	0.44	1.4	0.76	25.5
	360	104	98	82	5 4	1 210 000	1 920 000	950	1 300	**HR 32240 J**	3GD	227	230	342	305	340	11	22	4 3	85.1	0.41	1.5	0.81	42.6
	420	89	80	67	6 5	1 030 000	1 390 000	850	1 200	**30340**	—	233	253	398	346	368	11	22	5 4	81.4	0.37	1.6	0.88	52.3
	420	89	80	56	6 5	965 000	1 330 000	750	1 000	**30340 D**	—	244	253	398	336	385	11	33	5 4	122.9	0.81	0.74	0.41	49.6
	420	146	138	115	6 5	1 820 000	2 870 000	800	1 100	**32340**	—	239	253	398	346	392	11	31	5 4	106.7	0.37	1.6	0.88	90.9
220	300	51	51	39	3 2.5	490 000	990 000	1 000	1 400	**HR 32944 J**	3EC	238	235	288	278	293	9	12	2.5 2	59.2	0.43	1.4	0.78	10.3
	340	76	76	57	4 3	885 000	1 610 000	950	1 300	**HR 32044 XJ**	4FD	241	244	326	303	326	12	19	3 2.5	73.6	0.43	1.4	0.77	24.4
	400	72	65	54	5 4	810 000	1 150 000	850	1 100	**30244**	—	247	267	382	350	367	11	18	4 3	74.7	0.40	1.5	0.82	33.6
	400	114	108	90	5 4	1 340 000	2 210 000	850	1 100	**32244**	—	247	260	382	340	377	12	24	4 3	93.0	0.40	1.5	0.82	57.4
	460	97	88	73	6 5	1 430 000	1 990 000	750	1 000	**30344**	—	253	283	438	390	414	12	24	5 4	85.4	0.36	1.7	0.92	72.4
	460	154	145	122	6 5	2 020 000	3 200 000	750	1 000	**32344**	—	259	274	438	372	421	12	32	5 4	114.9	0.37	1.6	0.88	114
240	320	51	51	39	3 2.5	500 000	1 040 000	950	1 300	**HR 32948 J**	4EC	258	255	308	297	314	9	12	2.5 2	65.1	0.46	1.3	0.72	11.1
	360	76	76	57	4 3	920 000	1 730 000	850	1 200	**HR 32048 XJ**	4FD	261	262	346	321	346	12	19	3 2.5	79.1	0.46	1.3	0.72	26.2
	440	79	72	60	5 4	990 000	1 400 000	750	1 000	**30248**	—	267	288	422	384	408	11	19	4 3	85.1	0.44	1.4	0.74	45.2
	440	127	120	100	5 4	1 630 000	2 730 000	750	1 000	**32248**	—	267	285	422	374	416	12	27	4 3	102.5	0.40	1.5	0.82	78
	500	105	95	80	6 5	1 660 000	2 340 000	670	950	**30348**	—	273	308	478	422	447	12	25	5 4	92.8	0.36	1.7	0.92	92.6
	500	165	155	132	6 5	2 520 000	4 100 000	670	900	**32348**	—	279	301	478	410	464	12	33	5 4	123.2	0.37	1.6	0.88	145

■SINGLE-ROW TAPERED ROLLER BEARINGS

Bore Diameter 260 – 440 mm





Dynamic Equivalent Load

$P = XF_r + YF_a$

$F_a/F_r \leqq e$		$F_a/F_r > e$	
X	Y	X	Y
1	0	0.4	Y_1

Static Equivalent Load

$P_0 = 0.5F_r + Y_0F_a$

When $F_r > 0.5F_r + Y_0F_a$, use $P_0 = F_r$

The values of e, Y_1, and Y_0 are given in the table below.

Boundary Dimensions (mm)						Basic Load Ratings (N)		Limiting Speeds (min^{-1})		Bearing Designation	ISO355 Dimension Series	Abutment and Fillet Dimensions (mm)								Eff. Load Center (mm)	Constant	Axial Load Factors		Mass (kg)
					Ring: Inner Outer													Ring: Inner Outer						
d	D	T	B	C	r min.	C_r	C_{0r}	Grease	Oil		approx.	d_a min.	d_b max.	D_a max.	D_a min.	D_b min.	S_a min.	S_b min.	r_a max.	a	e	Y_1	Y_0	approx.
260	360	63.5	63.5	48	3 2.5	730 000	1 450 000	850	1 100	**HR 32952 J**	3EC	278	278	348	333	347	11	15.5	2.5 2	69.8	0.41	1.5	0.81	18.6
	400	87	87	65	5 4	1 160 000	2 160 000	800	1 100	**HR 32052 XJ**	4FC	287	287	382	357	383	14	22	4 3	86.3	0.43	1.4	0.76	38.5
	480	89	80	67	6 5	1 190 000	1 700 000	670	900	**30252**	—	293	316	458	421	447	12	22	5 4	94.6	0.44	1.4	0.74	60.7
	480	137	130	106	6 5	1 900 000	3 300 000	670	950	**32252**	—	293	305	458	394	446	14	31	5 4	116.0	0.45	1.3	0.73	103
	540	113	102	85	6 6	1 870 000	2 640 000	630	850	**30352**	—	293	336	512	460	487	16	28	5 5	101.6	0.36	1.7	0.92	114
	540	176	165	136	6 6	2 910 000	4 800 000	630	850	**32352**	—	293	328	512	441	495	13	40	5 5	130.5	0.37	1.6	0.88	188
280	380	63.5	63.5	48	3 2.5	765 000	1 580 000	800	1 100	**HR 32956 J**	4EC	298	297	368	352	368	12	15.5	2.5 2	75.3	0.43	1.4	0.76	20
	420	87	87	65	5 4	1 180 000	2 240 000	710	1 000	**HR 32056 XJ**	4FC	307	305	402	374	402	14	22	4 3	91.6	0.46	1.3	0.72	40.6
	500	89	80	67	6 5	1 240 000	1 900 000	630	850	**30256**	—	313	339	478	436	462	12	22	5 4	98.5	0.44	1.4	0.74	66.3
	500	137	130	106	6 5	1 950 000	3 450 000	630	850	**32256**	—	313	325	478	412	467	14	31	5 4	123.1	0.47	1.3	0.70	109
	580	187	175	145	6 6	3 300 000	5 400 000	560	800	**32356**	—	319	353	552	475	532	14	42	5 5	139.6	0.37	1.6	0.89	224
300	420	76	72	62	4 3	895 000	1 820 000	710	950	**32960**	—	321	326	406	386	405	13	14	3 2.5	79.3	0.37	1.6	0.88	30.5
	420	76	76	57	4 3	1 010 000	2 100 000	710	950	**HR 32960 J**	3FD	321	324	406	387	405	13	19	3 2.5	79.9	0.39	1.5	0.84	31.4
	460	100	100	74	5 4	1 440 000	2 700 000	670	900	**HR 32060 XJ**	4GD	327	330	442	408	439	15	26	4 3	98.4	0.43	1.4	0.76	56.6
	540	96	85	71	6 5	1 440 000	2 100 000	600	800	**30260**	—	333	355	518	470	499	14	25	5 4	105.1	0.44	1.4	0.74	80.6
	540	149	140	115	6 5	2 220 000	3 700 000	600	800	**32260**	—	333	352	518	458	514	15	34	5 4	131.7	0.46	1.3	0.72	132
320	440	76	72	63	4 3	900 000	1 880 000	970	900	**32964**	—	341	345	426	404	425	13	13	3 2.5	84.3	0.39	1.5	0.84	32
	440	76	76	57	4 3	1 040 000	2 220 000	670	900	**HR 32964 J**	3FD	341	344	426	406	426	13	19	3 2.5	85.0	0.42	1.4	0.79	33.3
	480	100	100	74	5 4	1 510 000	2 910 000	630	850	**HR 32064 XJ**	4GD	347	350	462	430	461	15	26	4 3	104.5	0.46	1.3	0.72	60
	580	104	92	75	6 5	1 640 000	2 420 000	530	750	**30264**	—	353	381	558	503	533	14	29	5 4	113.7	0.44	1.4	0.74	99.3
	580	159	150	125	6 5	2 860 000	5 050 000	530	750	**32264**	—	353	383	558	487	550	15	34	5 4	141.7	0.46	1.3	0.72	175
	670	210	200	170	7.5 7.5	4 200 000	7 100 000	480	670	**32364**	—	383	412	634	547	616	14	42	6 6	157.5	0.37	1.6	0.88	343
340	460	76	72	63	4 3	910 000	1 940 000	630	850	**32968**	—	361	364	446	426	446	13	13	3 2.5	89.2	0.41	1.5	0.80	33.6
	460	76	76	57	4 3	1 050 000	2 220 000	630	850	**HR 32968 J**	4FD	361	362	446	427	446	13	19	3 2.5	91.0	0.44	1.4	0.75	34.3
	520	112	106	92	6 5	1 650 000	3 400 000	560	750	**32068**	—	373	386	498	464	496	3.5	22	5 4	104.5	0.37	1.6	0.89	83.7
360	480	76	72	62	4 3	945 000	2 100 000	600	800	**32972**	—	381	386	466	445	465	14	14	3 2.5	91.4	0.40	1.5	0.82	35.8
	480	76	76	57	4 3	1 080 000	2 340 000	560	800	**HR 32972 J**	4FD	381	381	466	445	466	13	19	3 2.5	96.8	0.46	1.3	0.72	36.1
	540	112	106	92	6 5	1 680 000	3 500 000	530	750	**32072**	—	393	402	518	480	514	5.5	22	5 4	108.6	0.38	1.6	0.86	86.5
380	520	87	82	71	5 4	1 210 000	2 550 000	560	750	**32976**	—	407	406	502	478	501	16	16	4 3	95.2	0.39	1.6	0.86	49.5
400	540	87	82	71	5 4	1 250 000	2 700 000	530	710	**32980**	—	427	428	522	499	524	16	16	4 3	100.8	0.40	1.5	0.82	52.7
	600	125	118	100	6 5	1 960 000	4 050 000	480	670	**32080**	—	433	443	578	533	565	5	25	5 4	115.3	0.36	1.7	0.92	116
420	560	87	82	72	5 4	1 300 000	2 810 000	500	670	**32984**	—	447	448	542	521	544	3.5	15	4 3	106.1	0.41	1.5	0.81	54.8
	620	125	118	100	6 5	2 000 000	4 200 000	450	630	**32084**	—	453	463	598	552	586	6.5	25	5 4	120.0	0.37	1.6	0.88	121
440	650	130	122	104	6 6	2 230 000	4 600 000	430	600	**32088**	—	473	487	622	582	616	5	26	5 5	126.3	0.36	1.7	0.92	136