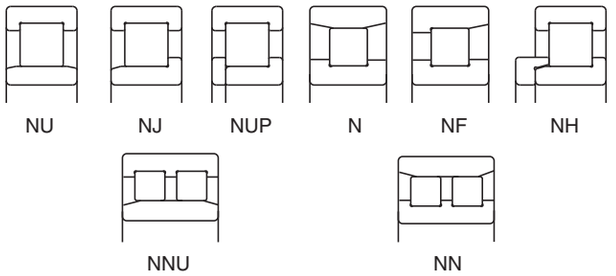
DESIGN, TYPES, AND FEATURES

Cylindrical roller bearings are classified into the following types depending on whether or not they have ribs on their rings:



Types NU, N, NNU, and NN are suitable as free-end bearings. Types NJ and NF can sustain limited axial loads in one direction. Types NH and NUP can be used as fixed-end bearings.

The NH type consists of NJ-type cylindrical roller bearings and HJ-type L-shaped thrust collars (see Pages C156 and C157).

The inner ring loose rib of the NUP type should be mounted so that the marked side is on the outside.

Features of Single-Row Cylindrical Roller Bearings

Cage Spec.		Material	Steel	Steel	Polyamide 66 resin	L-PPS resin	Brass	
		Method	Pressed		Molded		Machined	
		Designation	W	EW	ET	ET7	M	EM
Features		High Load Capacity	○	◎	◎	◎	△	◎
		High-Speed	△	○	○	○	○	◎
		High-Temperature	○	○	△	○	○	○
		Vibration	×	×	×	×	△	○

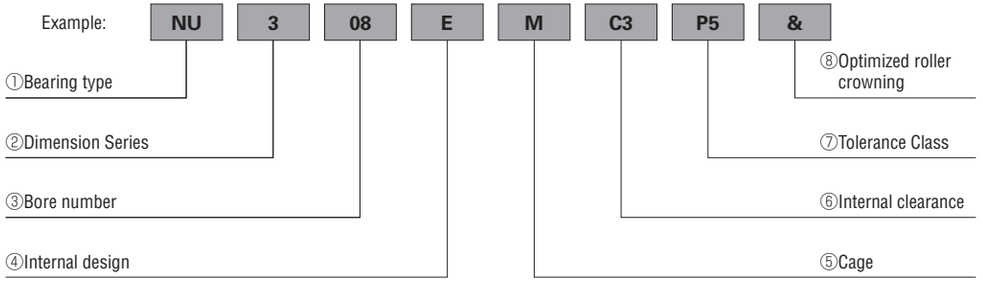
◎ Excellent ○ Good △ Fair × Poor

If a cage is nonstandard for a given designation, the number of rollers may vary; in such a case, the load rating will differ from that listed in the bearing tables.

Many NN double-row bearings have tapered bores, and they are primarily used in the main spindles of machine tools. Cages are made of either molded polyphenylenesulfide (PPS) or machined brass.

Formulation of Bearing Designations

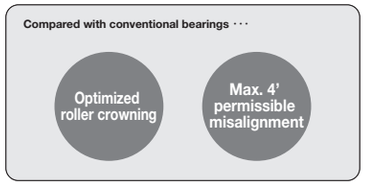
Single-Row Cylindrical Roller Bearing



①Bearing type	NU: Single-row cylindrical roller bearings (Outer ring with both ribs + Inner ring without rib) Please refer to page C126 for detailed information.
②Dimension Series	10: 10 Series, 2: 02 Series, 22: 22 Series, 3: 03 Series, 23: 23 Series, 4: 04 Series,
③Bore number	Bore diameter for 03 and under—01: 12 mm, 02: 15 mm, 03: 17 mm 04 and over—Bore diameter = Bore number × 5 (mm)
④Internal design	E: High load capacity
⑤Cage	W: Pressed-steel Cage, M: Machined Brass Cage, No designation: Machined-brass cage (in Series 10) T: Polyamide 66 resin cage, T7: L-PPS resin cage
⑥Internal clearance	For Interchangeable Cylindrical Roller Bearings— Omitted: CN clearance, C3: Clearance greater than CN, C4: Clearance greater than C3, CG: Special Clearance For Non-Interchangeable Cylindrical Roller Bearings— CC: Normal Clearance, CC3: Clearance greater than CC, CC4: Clearance greater than CC3, CCG: Special Clearance
⑦Tolerance class	Omitted: ISO Normal, P6: ISO Class 6, P5: ISO Class 5, P4: ISO Class 4
⑧Optimized roller crowning	&: Optimized roller crowing (Uses high load capacity machined brass cage and ISO Normal tolerance with clearance CN, C3, or C4)

Cylindrical Roller Bearings with Optimized Roller Crowning

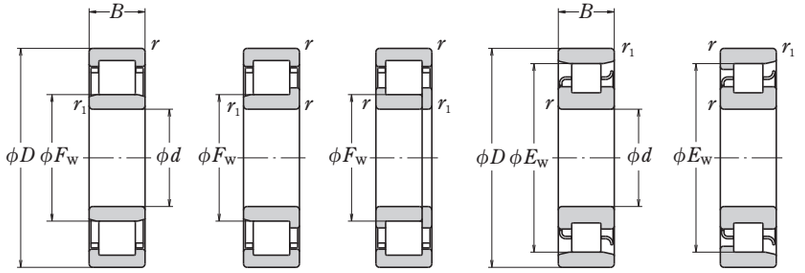
Features

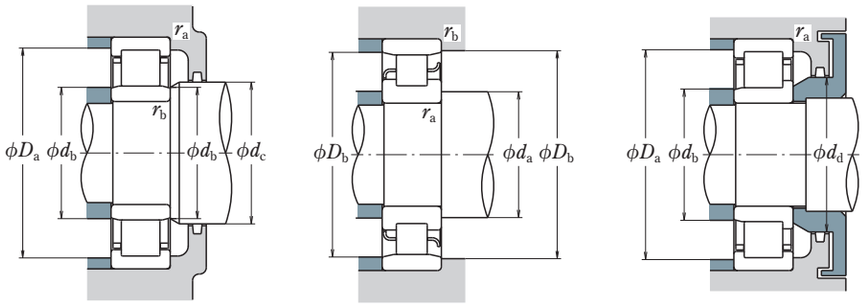


1. Increased reliability
A special crowning applied to the rollers optimizes the distribution of surface pressure at the roller contact area inside the bearing.
2. Improved performance
Accommodate a maximum permissible misalignment of 4'
—twice that of conventional products.

■SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 20 – 30 mm



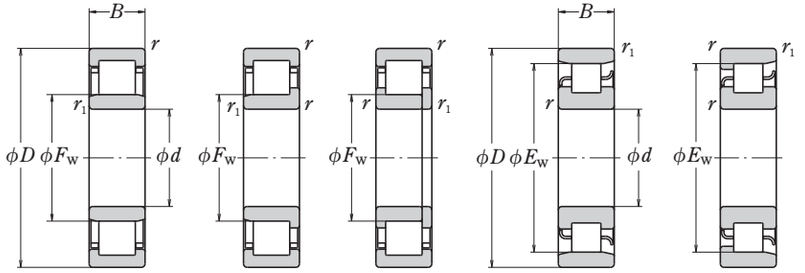


Bearing Designations								Boundary Dimensions (mm)						Basic Load Ratings(6) (N)		Speeds(5) (min−1) Limiting Speeds			Abutment and Fillet Dimensions (mm)								Mass (kg)
	Cage(1) Standard Option		(2) NU	NJ	NUP	N	NF	d	D	B	r min.	r1 min.	FW	EW	Cr	C0r	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	da(3) min.	db min.	db(4) max.	dc min.	dd min.	Da(3) max.	Db max.	Db min.	ra max.	rb max.	approx.
N 204	**W**	—	—	—	—	**N**	**NF**	**20**	47	14	1	0.6	—	40	19 000	12 700	18 000	—	12 000	14 000	25	—	—	—	—	—	43	42	1	0.6	0.107
NU204E	**T**	**T7**	**NU**	**NJ**	**NUP**	—	—		47	14	1	0.6	26.5	—	31 500	22 600	16 000	19 000	13 000	16 000	25	24	25	29	32	42	—	—	1	0.6	0.107
NU2204	**W**	**M**	**NU**	**NJ**	—	—	—		47	18	1	0.6	27	—	25 400	18 400	19 000	—	11 000	13 000	25	24	25	29	32	42	—	—	1	0.6	0.144
N 304	**W**	—	—	—	—	**N**	**NF**		52	15	1.1	0.6	—	44.5	26 300	17 300	14 000	—	10 000	12 000	26.5	—	—	—	—	—	48	46	1	0.6	0.148
NU304E	**T**	**T7**	**NU**	**NJ**	**NUP**	—	—		52	15	1.1	0.6	27.5	—	39 000	26 900	13 000	18 000	12 000	15 000	26.5	24	26	30	33	45.5	—	—	1	0.6	0.145
NU2304	**M**	—	**NU**	**NJ**	**NUP**	—	—		52	21	1.1	0.6	28.5	—	40 500	30 000	14 000	—	11 000	14 000	26.5	24	27	30	33	45.5	—	—	1	0.6	0.217
NU2304E	**T7**	—	**NU**	**NJ**	**NUP**	—	—		52	21	1.1	0.6	27.5	—	51 500	39 000	13 000	—	11 000	14 000	26.5	24	26	30	33	45.5	—	—	1	0.6	0.209
NU1005	**(M)**	—	**NU**	—	—	—	—	**25**	47	12	0.6	0.3	30.5	—	17 600	13 100	15 000	—	15 000	18 000	—	27	30	32	—	43	—	—	0.6	0.3	0.094
N 205	**W**	**M**	—	—	—	**N**	**NF**		52	15	1	0.6	—	45	21 800	15 700	16 000	—	10 000	12 000	30	—	—	—	—	—	48	46	1	0.6	0.135
NU205E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—		52	15	1	0.6	31.5	—	36 000	27 700	14 000	20 000	12 000	14 000	30	29	30	34	37	47	—	—	1	0.6	0.136
NU2205E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—		52	18	1	0.6	31.5	—	43 000	34 500	14 000	17 000	12 000	14 000	30	29	30	34	37	47	—	—	1	0.6	0.16
N 305	**W**	**M**	—	—	—	**N**	**NF**		62	17	1.1	1.1	—	53	36 000	25 200	12 000	—	8 000	10 000	31.5	—	—	—	—	—	55.5	50	1	1	0.233
NU305E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—		62	17	1.1	1.1	34	—	51 000	37 500	11 000	18 000	10 000	12 000	31.5	31.5	32	37	40	55.5	—	—	1	1	0.269
NU2305E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—		62	24	1.1	1.1	34	—	70 000	56 000	11 000	15 000	9 000	11 000	31.5	31.5	32	37	40	55.5	—	—	1	1	0.338
NU1006	**(M)**	—	**NU**	—	—	**N**	—	**30**	55	13	1	0.6	36.5	48.5	24 200	19 600	13 000	—	12 000	15 000	35	34	36	38	—	50	51	49	1	0.6	0.136
N 206	**W**	**M**	—	—	—	**N**	**NF**		62	16	1	0.6	—	53.5	30 500	23 300	13 000	—	8 500	10 000	35	—	—	—	—	—	58	56	1	0.6	0.208
NU206E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—		62	16	1	0.6	37.5	—	48 000	37 500	12 000	17 000	9 500	12 000	35	34	36	40	44	57	—	—	1	0.6	0.205
NU2206E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—		62	20	1	0.6	37.5	—	60 000	50 000	12 000	14 000	9 500	12 000	35	34	36	40	44	57	—	—	1	0.6	0.255
N 306	**W**	**M**	—	—	—	**N**	**NF**		72	19	1.1	1.1	—	62	47 500	35 000	10 000	—	7 100	8 500	36.5	—	—	—	—	—	65.5	64	1	1	0.353
NU306E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—		72	19	1.1	1.1	40.5	—	65 500	50 000	9 500	16 000	8 500	10 000	36.5	36.5	39	44	48	65.5	—	—	1	1	0.409
NU2306E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—		72	27	1.1	1.1	40.5	—	92 000	77 500	9 500	13 000	8 000	9 500	36.5	36.5	39	44	48	65.5	—	—	1	1	0.518

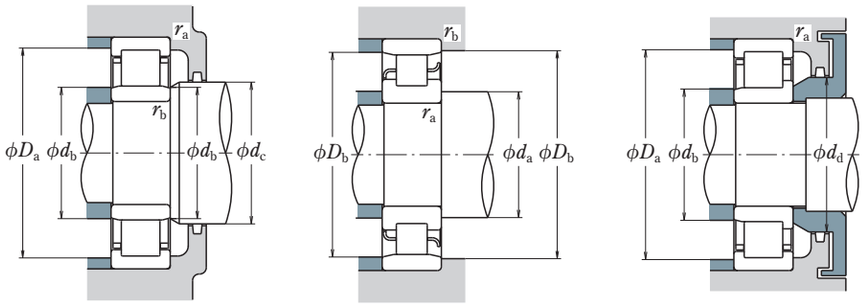
Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 35 – 40 mm



NU NJ NUP N NF

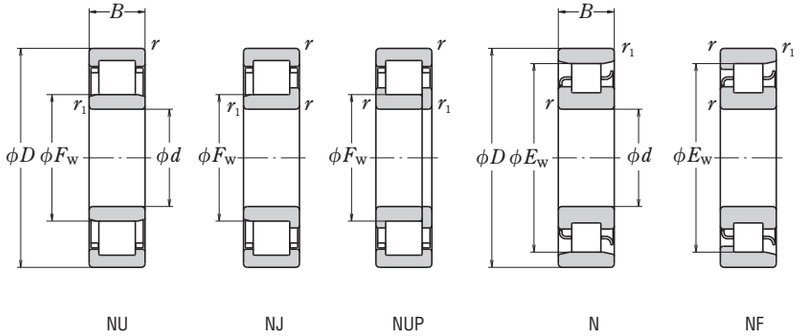


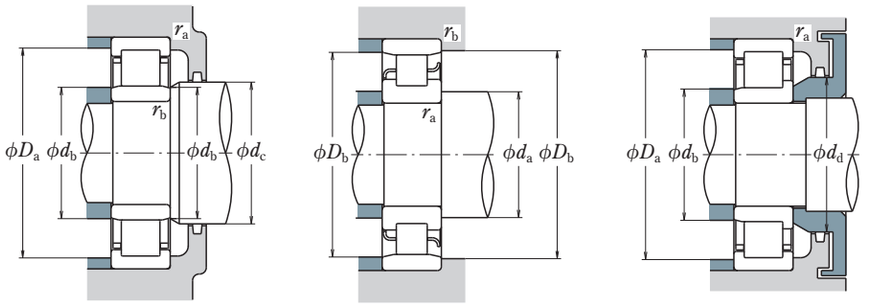
Bearing Designations								Boundary Dimensions (mm)						Basic Load Ratings[6] (N)		Speeds[5] (min⁻¹) Limiting Speeds			Abutment and Fillet Dimensions (mm)										Mass (kg)
	Cage[1] Standard Option		[2] NU	NJ	NUP	N	NF	d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)	d_a[3] min.	d_b min.	d_b[4] max.	d_c min.	d_d min.	D_a[3] max.	D_b max.	D_b min.	r_a max.	r_b max.	approx.
NU1007	(M)	—	**NU**	**NJ**	—	**N**	—	**35**	62	14	1	0.6	42	55	27 800	23 200	11 000	—	11 000	13 000	40	39	41	44	—	57	58	56	1	0.6	0.18
N 207	W	M	—	—	—	**N**	**NF**		72	17	1.1	0.6	—	61.8	44 000	34 000	11 000	—	7 500	9 000	41.5	—	—	—	—	—	68	64	1	0.6	0.301
NU207E	W	M, T, T7	**NU**	**NJ**	**NUP**	—	—		72	17	1.1	0.6	44	—	62 000	50 000	10 000	15 000	8 500	10 000	41.5	39	42	46	50	65.5	—	—	1	0.6	0.304
NU2207E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		72	23	1.1	0.6	44	—	76 000	65 500	11 000	12 000	8 500	10 000	41.5	39	42	46	50	65.5	—	—	1	0.6	0.40
N 307	W	M	—	—	—	**N**	**NF**		80	21	1.5	1.1	—	68.2	61 000	47 000	9 500	—	6 300	7 500	43	—	—	—	—	—	73.5	70	1.5	1	0.476
NU307E	W	M, T, T7	**NU**	**NJ**	**NUP**	—	—		80	21	1.5	1.1	46.2	—	82 000	65 500	8 500	14 000	7 500	9 500	43	41.5	45	48	53	72	—	—	1.5	1	0.545
NU2307E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		80	31	1.5	1.1	46.2	—	115 000	101 000	9 000	11 000	6 700	8 500	43	41.5	45	48	53	72	—	—	1.5	1	0.711
NU1008	(M)	—	**NU**	**NJ**	**NUP**	**N**	—	**40**	68	15	1	0.6	47	61	33 500	29 000	10 000	—	10 000	12 000	45	44	46	49	—	63	64	62	1	0.6	0.223
N 208	W	M	—	—	—	**N**	**NF**		80	18	1.1	1.1	—	70	54 000	43 000	9 500	—	6 700	8 000	46.5	—	—	—	—	—	73.5	72	1	1	0.375
NU208E	W	M, T, T7	**NU**	**NJ**	**NUP**	—	—		80	18	1.1	1.1	49.5	—	68 500	55 500	9 000	13 000	7 500	9 000	46.5	46.5	48	52	56	73.5	—	—	1	1	0.379
NU2208E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		80	23	1.1	1.1	49.5	—	89 000	77 500	9 000	11 000	7 500	9 000	46.5	46.5	48	52	56	73.5	—	—	1	1	0.480
N 308	W	M	—	—	—	**N**	**NF**		90	23	1.5	1.5	—	77.5	72 000	57 000	8 500	—	5 600	6 700	48	—	—	—	—	—	82	79	1.5	1.5	0.649
NU308E	W	M, T, T7	**NU**	**NJ**	**NUP**	—	—		90	23	1.5	1.5	52	—	102 000	81 500	7 500	12 000	6 700	8 000	48	48	50	55	60	82	—	—	1.5	1.5	0.747
NU2308E	T	M, T7	**NU**	**NJ**	**NUP**	—	—		90	33	1.5	1.5	52	—	140 000	122 000	8 000	10 000	6 000	7 500	48	48	50	55	60	82	—	—	1.5	1.5	0.933

Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 45 – 50 mm





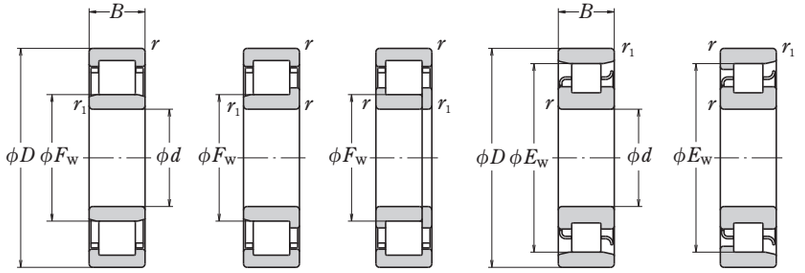
Boundary Dimensions (mm)							Basic Load Ratings[6] (N)		Speeds[5] (min^{-1}) Limiting Speeds			
d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)
45	75	16	1	0.6	52.5	67.5	40 000	35 500	9 500	—	9 000	11 000
	85	19	1.1	1.1	—	75	56 500	47 000	9 000	—	6 300	7 500
	85	19	1.1	1.1	54.5	—	77 500	66 500	8 500	12 000	6 700	8 000
	85	23	1.1	1.1	54.5	—	93 500	84 500	8 500	10 000	6 700	8 500
	100	25	1.5	1.5	—	86.5	97 000	77 500	7 500	—	5 000	6 000
	100	25	1.5	1.5	58.5	—	120 000	98 500	7 100	11 000	6 000	7 500
	100	36	1.5	1.5	58.5	—	169 000	153 000	7 100	9 000	5 300	6 700
50	80	16	1	0.6	57.5	72.5	39 500	36 000	8 500	—	8 000	10 000
	90	20	1.1	1.1	—	80.4	59 500	51 000	8 500	—	5 600	6 700
	90	20	1.1	1.1	59.5	—	85 000	76 500	8 000	11 000	6 300	7 500
	90	23	1.1	1.1	59.5	—	102 000	97 000	7 500	9 000	6 300	8 000
	110	27	2	2	—	95	107 000	86 000	7 100	—	4 500	5 600
	110	27	2	2	65	—	135 000	113 000	6 700	10 000	5 000	6 000
	110	40	2	2	65	—	200 000	187 000	6 700	8 000	5 000	6 300

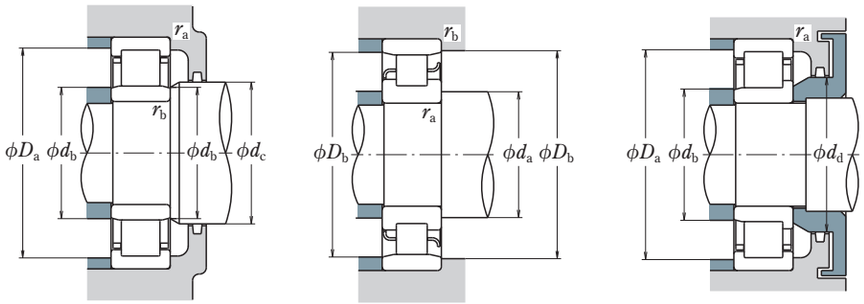
Bearing Designations							Abutment and Fillet Dimensions (mm)										Mass (kg)
	Cage[1] Standard Option		(2) NU	NJ	NUP	N	NF	d_a[3] min.	d_b min.	d_b[4] max.	d_c min.	d_d min.	D_a[3] max.	D_b max.	D_b min.	r_a max.	r_b max.	approx.
NU1009	(M)	—	**NU**	—	—	**N**	**NF**	50	49	51	54	—	70	71	68	1	0.6	0.279
N 209	**W**	**M**	—	—	—	**N**	**NF**	51.5	—	—	—	—	—	78.5	77	1	1	0.429
NU209E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—	51.5	51.5	52	57	61	78.5	—	—	1	1	0.438
NU2209E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	51.5	51.5	52	57	61	78.5	—	—	1	1	0.521
N 309	**W**	**M**	—	—	—	**N**	**NF**	53	—	—	—	—	—	92	77	1.5	1.5	0.869
NU309E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—	53	53	56	60	66	92	—	—	1.5	1.5	1.01
NU2309E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	53	53	56	60	66	92	—	—	1.5	1.5	1.28
NU1010	(M)	—	**NU**	**NJ**	**NUP**	**N**	—	55	54	56	59	—	75	76	73	1	0.6	0.301
N 210	**W**	**M**	—	—	—	**N**	**NF**	56.5	—	—	—	—	—	83.5	82	1	1	0.483
NU210E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—	56.5	56.5	57	62	67	83.5	—	—	1	1	0.50
NU2210E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	56.5	56.5	57	62	67	83.5	—	—	1	1	0.562
N 310	**W**	**M**	—	—	—	**N**	**NF**	59	—	—	—	—	—	101	97	2	2	1.11
NU310E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—	59	59	63	67	73	101	—	—	2	2	1.3
NU2310E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	59	59	63	67	73	101	—	—	2	2	1.7

Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.

SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

Bore Diameter 55 – 60 mm





Boundary Dimensions (mm)							Basic Load Ratings[6] (N)		Speeds[5] (min^{-1}) Limiting Speeds			
d	D	B	r min.	r_1 min.	F_W	E_W	C_r	C_{0r}	Thermal Speed Rating (Oil Bath)	Mechanical (Forced Oil Circulation)	Grease	Oil (Oil Bath)
55	90	18	1.1	1	64.5	80.5	46 500	44 000	8 000	—	7 500	9 000
	100	21	1.5	1.1	—	88.5	71 500	62 500	7 500	—	5 300	6 300
	100	21	1.5	1.1	66	—	106 000	98 500	6 700	10 000	5 600	7 100
	100	25	1.5	1.1	66	—	125 000	122 000	6 700	8 500	5 600	7 100
	120	29	2	2	—	104.5	136 000	111 000	6 300	—	4 000	5 000
	120	29	2	2	70.5	—	169 000	143 000	6 000	9 000	4 500	5 600
	120	43	2	2	70.5	—	247 000	233 000	6 000	7 500	4 500	5 600
60	95	18	1.1	1	69.5	85.5	49 500	48 500	7 500	—	6 700	8 500
	110	22	1.5	1.5	—	97.5	84 500	75 000	7 100	—	4 800	5 600
	110	22	1.5	1.5	72	—	120 000	107 000	6 300	9 500	5 300	6 300
	110	28	1.5	1.5	72	—	161 000	157 000	6 300	7 500	5 300	6 300
	130	31	2.1	2.1	—	113	152 000	126 000	6 000	—	3 800	4 500
	130	31	2.1	2.1	77	—	152 000	126 000	6 000	—	3 800	4 500
	130	31	2.1	2.1	77	—	184 000	157 000	5 600	9 500	4 800	5 600
	130	46	2.1	2.1	77	—	274 000	262 000	5 600	6 700	4 300	5 300

Bearing Designations								Abutment and Fillet Dimensions (mm)									Mass (kg)
	Cage[1] Standard Option		(2) NU	NJ	NUP	N	NF	d_a[3] min.	d_b min.	d_b[4] max.	d_c min.	d_d min.	D_a[3] max.	D_b max.	D_b min.	r_a max.	r_b max.	approx.
NU1011	**(M)**	—	**NU**	**NJ**	—	**N**	—	61.5	60	63	66	—	83.5	85	82	1	1	0.445
N 211	**W**	**M**	—	—	—	**N**	**NF**	63	—	—	—	—	—	93.5	91	1.5	1	0.634
NU211E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—	63	61.5	64	68	73	92	—	—	1.5	1	0.669
NU2211E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	63	61.5	64	68	73	92	—	—	1.5	1	0.783
N 311	**W**	**M**	—	—	—	**N**	**NF**	64	—	—	—	—	—	111	107	2	2	1.42
NU311E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—	64	64	68	72	80	111	—	—	2	2	1.64
NU2311E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	64	64	68	72	80	111	—	—	2	2	2.18
NU1012	**(M)**	—	**NU**	**NJ**	—	**N**	**NF**	66.5	65	68	71	—	88.5	90	87	1	1	0.474
N 212	**W**	**M**	—	—	—	**N**	**NF**	68	—	—	—	—	—	102	100	1.5	1.5	0.823
NU212E	**W**	**M, T, T7**	**NU**	**NJ**	**NUP**	—	—	68	68	70	75	80	102	—	—	1.5	1.5	0.824
NU2212E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	68	68	70	75	80	102	—	—	1.5	1.5	1.06
N 312	**W**	**M**	—	—	—	**N**	**NF**	71	—	—	—	—	—	119	115	2	2	1.78
NU312	**W**	—	**NU**	**NJ**	**NUP**	—	—	71	71	75	79	86	119	—	—	2	2	1.82
NU312E	**M**	**T, T7**	**NU**	**NJ**	**NUP**	—	—	71	71	75	79	86	119	—	—	2	2	2.06
NU2312E	**T**	**M, T7**	**NU**	**NJ**	**NUP**	—	—	71	71	75	79	86	119	—	—	2	2	2.7

Notes (1) Cage designation (M) is usually omitted from the bearing designation.
(2) When L-shaped thrust collars (see Pages C156-C157) are used, the bearings are considered the NH type.
(3) If axial loads are applied, increase d_a and reduce D_a from the values listed above.
(4) d_b (max.) refers to values for adjusting rings for NU and NJ bearings.
(5) The limiting speeds in the bearing tables are for standard cages.
(6) The basic load ratings in the bearing tables are for standard cages.