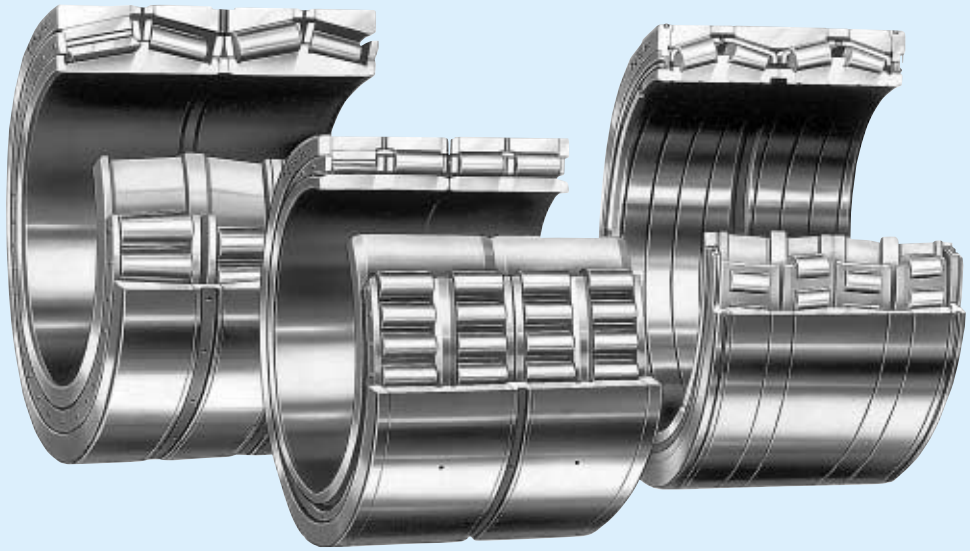
MOTION & CONTROL™
NSK

Rolling Bearings

Roll-Neck and Railway Rolling Stock Bearings



ROLL-NECK BEARINGS

DESIGN, TYPES, AND FEATURES

Four-row tapered roller bearings and four-row cylindrical roller bearings used for rolling-mill roll necks are easy to service and check, and are designed to have the highest load rating possible for the limited space around roll necks. Also, they are designed for high speed to satisfy the demand for fast rolling.

In addition to the open type (KV) four-row tapered roller bearings listed in this catalog, sealed-clean type four-row tapered roller bearings are also available. Please refer to "Large-Size Rolling Bearings" catalog (CAT. No. E125) or "Extra-Capacity Sealed-Clean™ Roll Neck Bearings" catalog (CAT. No. E1225) for more detailed information.

TOLERANCES AND RUNNING ACCURACY

METRIC DESIGN FOUR-ROW TAPERED ROLLER BEARINGS ..... Table 8.3 (Pages A64 to A67)

INCH DESIGN FOUR-ROW TAPERED ROLLER BEARINGS ..... Table 8.4 (Pages A68 to A69)

FOUR-ROW CYLINDRICAL ROLLER BEARINGS ..... Table 8.2 (Pages A60 to A63)
(Not applicable to combined width)

RECOMMENDED FITS

FOUR-ROW TAPERED ROLLER BEARINGS (CYLINDRICAL BORES)

Tables 1 and 2 apply to metric series bearings and Tables 3 and 4 to inch design.

Table 1 Fits of Metric Design Four-Row Tapered Roller Bearings with Roll Necks

Units : μm

Nominal Bore Diameter d (mm)		Single Plane Mean Bore Dia. Deviation Δ_{dmp}		Tolerance		Clearance		Wear Limits
over	incl	high	low	high	low	min	max	Ref.
80	120	0	−20	−120	−150	100	150	300
120	180	0	−25	−150	−175	125	175	350
180	250	0	−30	−175	−200	145	200	400
250	315	0	−35	−210	−250	175	250	500
315	400	0	−40	−240	−300	200	300	600
400	500	0	−45	−245	−300	200	300	600
500	630	0	−50	−250	−300	200	300	600
630	800	0	−75	−325	−400	250	400	800

Table 2 Fits of Metric Design Four-Row Tapered Roller Bearings with Chock

Units : μm

Nominal Outside Diameter D (mm)		Single Plane Mean Outside Dia. Deviation $\Delta_{D_{mp}}$		Tolerance for Chock Bore Diameter		Clearance		Wear Limits of Chock
over	incl	high	low	high	low	min	max	Ref.
120	150	0	− 18	+ 57	+25	25	75	150
150	180	0	− 25	+100	+50	50	125	250
180	250	0	− 30	+120	+50	50	150	300
250	315	0	− 35	+115	+50	50	150	300
315	400	0	− 40	+110	+50	50	150	300
400	500	0	− 45	+105	+50	50	150	300
500	630	0	− 50	+100	+50	50	150	300
630	800	0	− 75	+150	+75	75	225	450
800	1 000	0	−100	+150	+75	75	250	500

Table 3 Fits of Inch Design Four-Row Tapered Roller Bearings with Roll Necks

Units : μm

Nominal Bore Diameter d				Bore Diameter Deviation Δ_{d_s}		Tolerance for Roll Neck Diameter		Clearance		Wear Limits of Roll Neck
over		incl								
(mm)	1/25.4	(mm)	1/25.4	high	low	high	low	min	max	Ref.
152.400	6.0000	203.200	8.0000	+ 25	0	−150	−175	150	200	400
203.200	8.0000	304.800	12.0000	+ 25	0	−175	−200	175	225	450
304.800	12.0000	609.600	24.0000	+ 51	0	−200	−250	200	301	600
609.600	24.0000	914.400	36.0000	+ 76	0	−250	−325	250	401	800
914.400	36.0000	—	—	+102	0	−300	−400	300	502	1 000

Table 4 Fits of Inch Design Four-Row Tapered Roller Bearings with Chocks

Units : μm

Nominal Outside Diameter D				Outside Dia. Deviation Δ_{D_s}		Tolerance for Chock Bore Diameter		Clearance		Wear Limits of Chock
over		incl								
(mm)	1/25.4	(mm)	1/25.4	high	low	high	low	min	max	Ref.
—	—	304.800	12.0000	+ 25	0	+ 75	+ 50	25	75	150
304.800	12.0000	609.600	24.0000	+ 51	0	+150	+100	49	150	300
609.600	24.0000	914.400	36.0000	+ 76	0	+225	+150	74	225	450
914.400	36.0000	1 219.200	48.0000	+102	0	+300	+200	98	300	600
1 219.200	48.0000	1 524.000	60.0000	+127	0	+375	+250	123	375	750

FOUR-ROW CYLINDRICAL ROLLER BEARINGS (CYLINDRICAL BORES)

When they are used on backup rolls of four stage rolling mills, the tolerances for roll neck diameters are shown in Table 5. For the fitting between the bearing and chock bore, we recommend G7.

For the fitting of four-row cylindrical roller bearings on the roll necks of other rolling mills, Table 9.2 (Page A84) and Table 9.4 (Page A85) usually apply.

Table 5 Recommended Backup Roll Neck Tolerances

Units : μm

Nominal Bore Diameter d		Tolerances for Roll Neck Diameter	
over	incl	high	low
280	355	+0.165	+0.13
355	400	+0.19	+0.15
400	450	+0.22	+0.17
450	500	+0.25	+0.19
500	560	+0.28	+0.21
560	630	+0.32	+0.25
630	710	+0.35	+0.27
710	800	+0.39	+0.31
800	900	+0.44	+0.35
900	1 000	+0.48	+0.39

INTERNAL CLEARANCES

FOUR-ROW TAPERED ROLLER BEARINGS

The radial internal clearances in four-row tapered roller bearings (cylindrical bores) used on rolling mill roll necks with a loose fit are C2 or often smaller than C2. The NSK standard clearances for four-row tapered roller bearings for roll necks are shown in Table 6. Depending on the operating conditions, special radial clearance selection may become necessary, please contact NSK in such a case.

The internal clearance in four-row tapered roller bearings is peadjusted for individual bearing sets, therefore it is necessary to use each part of a given set by observing mating marks when assembling them.

FOUR-ROW CYLINDRICAL ROLLER BEARINGS

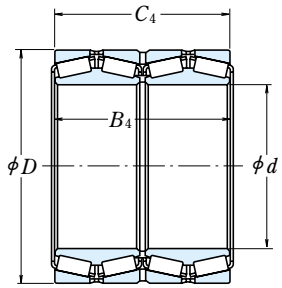
Please contact NSK regarding internal clearance.

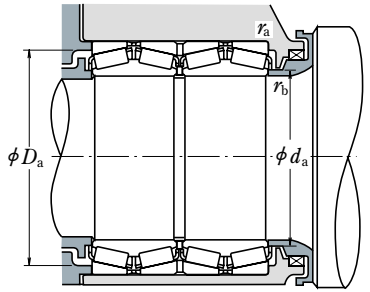
Table 6 Standard Radial Internal Clearances in Four-Row Tapered Roller Bearings (Cylindrical Bores)

Units : μm

Nominal Bore Diameter d (mm)		Radial Internal Clearance	
over	incl	min	max
80	120	25	45
120	180	30	50
180	250	40	60
250	315	50	70
315	400	60	80
400	500	70	90
500	630	80	100
630	800	100	120
800	1 000	120	140

Bore Diameter 100 – 939.800 mm





Bearing Numbers	Boundary Dimensions (mm)			Basic Load Ratings (N)		Basic Load Ratings {kgf}		Abutment and Fillet Dimensions (mm)				Mass (kg)	Reference Numbers
	d	D	B_4	C_4	C_r	C_{0r}	C_r	C_{0r}	d_a	D_a	r_a max	r_b max	approx	
100	140	104	104	320 000	765 000	32 500	78 000						—
120	170	124	124	475 000	1 080 000	48 000	110 000						—
135	180	160	160	455 000	1 280 000	46 500	130 000						—
150	212	155	155	750 000	1 880 000	76 500	192 000						—
165.100	225.425	165.100	168.275	705 000	2 160 000	72 000	220 000						46791D -720-721D
177.800	247.650	192.088	192.088	950 000	2 570 000	97 000	262 000						67791D -720-721D
190.500	266.700	187.325	188.912	1 010 000	2 870 000	103 000	293 000						67885D -820-820D
206.375	282.575	190.500	190.500	995 000	2 870 000	101 000	292 000						67986D -920-921D
228.600	400.050	296.875	296.875	2 570 000	5 450 000	262 000	555 000						EE 529091D -157-158XD
240	338	248	248	1 960 000	5 300 000	199 000	540 000						—
244.475	327.025	193.675	193.675	1 300 000	3 700 000	132 000	375 000						LM 247748D -710-710D
254.000	358.775	269.875	269.875	2 230 000	6 150 000	227 000	630 000						M 249748DW -710-710D
266.700	355.600	230.188	228.600	1 810 000	5 050 000	185 000	515 000						LM 451349D -310-310D
279.400	393.700	269.875	269.875	2 010 000	5 450 000	205 000	555 000						EE 135111D -155-156XD
304.648	438.048	280.990	279.400	2 600 000	6 750 000	265 000	685 000						M 757448DW -410-410D
343.052	457.098	254.000	254.000	2 520 000	7 250 000	256 000	740 000						LM 761649DW -610-610D
368.300	523.875	382.588	382.588	5 050 000	14 900 000	515 000	1 520 000						HM 265049D -010-010D
384.175	546.100	400.050	400.050	5 750 000	16 600 000	585 000	1 700 000						HM 266449D -410-410D
406.400	546.100	288.925	288.925	2 960 000	8 550 000	300 000	875 000						LM 767749DW -710-710D
415.925	590.550	434.975	434.975	6 450 000	19 500 000	655 000	1 990 000						M 268749D -710-710D
457.200	596.900	276.225	279.400	3 300 000	10 000 000	335 000	1 020 000						L 770849DW -810-810D
479.425	679.450	495.300	495.300	8 200 000	25 500 000	840 000	2 600 000						M 272749DW -710-710D
482.600	615.950	330.200	330.200	4 100 000	13 800 000	415 000	1 410 000						LM 272249DW -210-210D
500	705	515	515	8 350 000	26 600 000	850 000	2 710 000						—
509.948	654.924	377.000	379.000	4 700 000	16 100 000	480 000	1 640 000						—
558.800	736.600	409.575	409.575	6 050 000	19 400 000	620 000	1 980 000						LM 377449DW -410-410D
571.500	812.800	593.725	593.725	11 700 000	37 000 000	1 200 000	3 800 000						M 278749DW -710-710D
609.600	787.400	361.950	361.950	5 750 000	18 700 000	585 000	1 910 000						EE 649241DW -310-311D
635	900	660	660	13 300 000	43 500 000	1 350 000	4 400 000						—
685.800	876.300	352.425	355.600	6 350 000	22 200 000	645 000	2 270 000						EE 655271DW -345-346D
711.200	914.400	317.500	317.500	5 500 000	19 300 000	560 000	1 970 000						EE 755281DW -360-361D
749.300	990.600	605.000	605.000	13 000 000	47 000 000	1 330 000	4 800 000						LM 283649DW -610-610D
762.000	1 066.800	723.900	736.600	18 000 000	59 500 000	1 840 000	6 050 000						—
840.000	1 170.000	840.000	840.000	22 200 000	76 000 000	2 260 000	7 750 000						—
939.800	1 333.500	952.500	952.500	26 900 000	92 000 000	2 740 000	9 400 000						—
∗100 KV 895								109	130	2	1.5	4.9	—
∗120 KV 895								131	158	2	2	8.5	—
∗135 KV 1802								145	169	1.5	2	11.1	—
∗150 KV 895								162	196	2	2	17	—
∗165 KV 2252								178	209	3.3	0.8	20.2	46791D -720-721D
∗177 KV 2452								192	228	3.3	1.5	27.9	67791D -720-721D
∗190 KV 2651								204	246	3.3	1.5	32.8	67885D -820-820D
∗206 KV 2854								218	261	3.3	0.8	35.2	67986D -920-921D
∗228 KV 4051								264	367	3.3	3.3	152	EE 529091D -157-158XD
240 KV 895								257	315	2.5	2.5	68.5	—
∗244 KV 3251								260	306	3.3	1.5	44.6	LM 247748D -710-710D
∗254 KV 3551								272	335	3.3	1.5	85.6	M 249748DW -710-710D
∗266 KV 3552								281	335	3.3	1.5	60.6	LM 451349D -310-310D
∗279 KV 3951								302	363	6.4	1.5	100	EE 135111D -155-156XD
∗304 KV 4353								329	407	4.8	3.3	133	M 757448DW -410-410D
∗343 KV 4555								362	430	3.3	1.5	114	LM 761649DW -610-610D
∗368 KV 5251								396	487	6.4	3.3	274	HM 265049D -010-010D
∗384 KV 5452								417	510	6.4	3.3	309	HM 266449D -410-410D
∗406 KV 5455								430	512	6.4	1.5	186	LM 767749DW -710-710D
∗415 KV 5951								451	550	6.4	3.3	395	M 268749D -710-710D
∗457 KV 5952								487	566	3.3	1.5	201	L 770849DW -810-810D
∗479 KV 6751								520	635	6.4	3.3	595	M 272749DW -710-710D
∗482 KV 6152								508	582	6.4	3.3	242	LM 272249DW -210-210D
500 KV 895								544	657	5	5	654	—
∗509 KV 6551								536	619	6.4	1.5	312	—
∗558 KV 7352								588	697	6.4	3.3	457	LM 377449DW -410-410D
∗571 KV 8151								622	755	6.4	3.3	1 020	M 278749DW -710-710D
∗609 KV 7851 A								644	745	6.4	3.3	454	EE 649241DW -310-311D
635 KV 9001								695	840	5	4	1 380	—
∗685 KV 8751								730	833	6.4	3.3	543	EE 655271DW -345-346D
∗711 KV 9151								770	870	6.4	3.3	549	EE 755281DW -360-361D
∗749 KV 9951								804	940	6.4	3.3	1 310	LM 283649DW -610-610D
∗762 KV 1051								828	996	12.7	5	2 100	—
∗840 KV 1151								910	1 095	7	7	2 900	—
∗939 KV 1351								1 035	1 245	12.7	4.8	4 380	LM 287849DW -810-810D

Note (∗) Bearings marked ∗ are inch design.

Remarks 1. For four-row tapered roller bearings not listed above, please contact NSK.
2. Four-row tapered roller bearings are designed for specific applications, when using them, please contact NSK.

Bore Diameter 100 – 330 mm

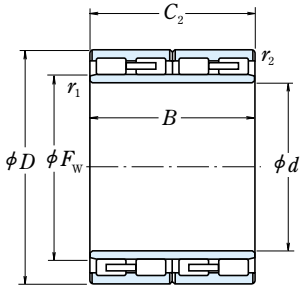


Figure 1

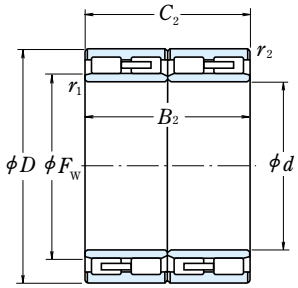


Figure 2

Boundary Dimensions (mm)							Basic Load Ratings (N)		{kgf}		Bearing Numbers	Mass (kg) approx	Figures	Reference Bearing Numbers
d	D	B, B_2	C_2	F_w	r_1 min	r_2 min	C_r	C_{0r}	C_r	C_{0r}				
100	140	104	104	111	1.5	1.1	345 000	820 000	35 000	84 000	**100 RV 1401**	4	2	—
145	225	156	156	169	2	2	835 000	1 820 000	85 000	185 000	**145 RV 2201**	23	1	313924A
150	220	150	150	168	2	2	770 000	1 700 000	78 500	174 000	**150 RV 2201**	20	1	—
	230	156	156	174	2	2	825 000	1 810 000	84 500	185 000	**150 RV 2302**	23	1	313891A
160	230	130	130	178	2	2	665 000	1 340 000	68 000	136 000	**160 RV 2301**	16	1	—
	230	168	168	180	2	2	895 000	2 200 000	91 500	225 000	**160 RV 2302**	22	1	—
170	250	168	168	192	2.1	2.1	1 040 000	2 320 000	106 000	237 000	**170 RV 2501**	27	1	—
	255	180	180	193	2.1	2.1	1 130 000	2 500 000	115 000	255 000	**170 RV 2503**	31	1	—
180	250	156	156	200	2	2	880 000	2 230 000	89 500	227 000	**180 RV 2501**	23	1	—
	260	168	168	202	2.1	2.1	990 000	2 300 000	101 000	235 000	**180 RV 2601**	29	1	313812
190	260	168	168	212	2	2	980 000	2 600 000	100 000	265 000	**190 RV 2601**	26	1	—
	270	200	200	212	2.1	2.1	1 260 000	3 100 000	128 000	315 000	**190 RV 2701**	36	1	314199B
200	280	200	200	224	2.1	2.1	1 210 000	3 200 000	123 000	325 000	**200 RV 2801**	38	1	—
	290	192	192	226	2.1	2.1	1 220 000	3 000 000	124 000	305 000	**200 RV 2901**	42	1	313811
220	310	192	192	247	2.1	2.1	1 320 000	3 450 000	134 000	350 000	**220 RV 3101**	46	1	—
	310	225	225	245	2.1	2.1	1 500 000	3 900 000	153 000	395 000	**220 RV 3102**	52	1	—
	320	210	210	248	2.1	2.1	1 530 000	3 650 000	156 000	375 000	**220 RV 3201**	56	1	—
230	330	206	206	260	2.1	2.1	1 510 000	3 900 000	154 000	395 000	**230 RV 3301**	58	1	313824
	340	260	260	261	3	3	2 050 000	5 100 000	209 000	520 000	**230 RV 3401**	81	1	—
240	330	220	220	270	3	3	1 520 000	4 400 000	155 000	445 000	**240 RV 3301**	57	1	313921
250	350	220	220	278	3	3	1 660 000	4 200 000	169 000	430 000	**250 RV 3501**	64	1	—
260	370	220	220	292	3	3	1 760 000	4 450 000	179 000	455 000	**260 RV 3701**	76	1	313823
	380	280	280	294	3	3	2 420 000	6 250 000	247 000	635 000	**260 RV 3801**	107	1	—
270	380	230	230	298	2.1	2.1	2 000 000	5 050 000	204 000	515 000	**270 RV 3801**	83	1	—
280	390	220	220	312	3	3	1 820 000	4 800 000	186 000	490 000	**280 RV 3901**	80	1	313822
300	400	300	300	328	2	2	2 330 000	6 900 000	238 000	700 000	**300 RV 4021**	103	2	—
	420	240	240	332	3	3	2 280 000	5 750 000	233 000	585 000	**300 RV 4201**	101	1	—
310	430	240	240	344.5	3	3	2 240 000	5 950 000	228 000	605 000	**310 RV 4301**	107	1	—
320	450	240	240	355	3	3	2 320 000	5 750 000	237 000	585 000	**320 RV 4502**	116	1	—
330	460	340	340	365	4	4	3 050 000	8 650 000	310 000	880 000	**330 RV 4601**	174	1	—

Remarks 1. For four-row cylindrical roller bearings not listed above, please contact NSK.
2. Four-row cylindrical roller bearings are designed for specific applications, when using them, please contact NSK.

Bore Diameter 370 – 920 mm

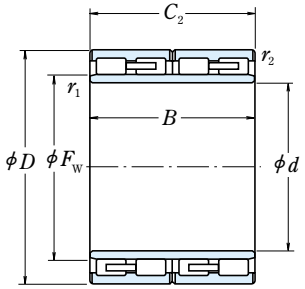


Figure 1

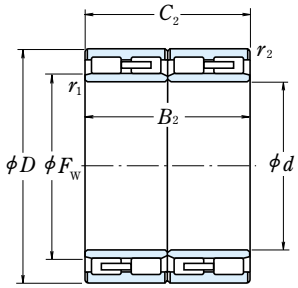


Figure 2

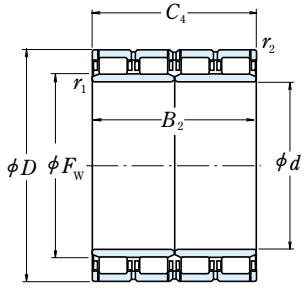


Figure 3

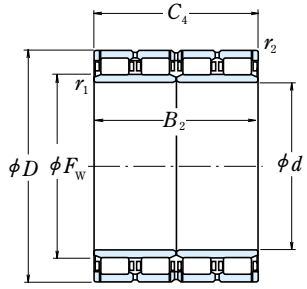


Figure 4

Boundary Dimensions (mm)							Basic Load Ratings (N)		Basic Load Ratings {kgf}		Bearing Numbers	Mass (kg) approx	Figures	Reference Bearing Numbers
d	D	B, B_2	C_2	F_w	r_1 min	r_2 min	C_r	C_{0r}	C_r	C_{0r}				
370	540	400	400	415	4	4	4 500 000	12 000 000	460 000	1 230 000	**370 RV 5401**	311	1	—
380	540	400	400	424	5	5	4 300 000	12 000 000	440 000	1 220 000	**380 RV 5401**	280	1(1)	—
390	550	400	400	434	5	5	4 400 000	12 400 000	450 000	1 260 000	**390 RV 5521**	303	2(1)	—
400	560	410	410	445	5	2	5 600 000	16 500 000	575 000	1 680 000	**400 RV 5611**	315	3	313015
430	591	420	420	476	4	4	4 450 000	13 400 000	455 000	1 370 000	**430 RV 5921**	347	2	—
440	620	450	450	490	4	4	6 350 000	19 000 000	650 000	1 940 000	**440 RV 6221**	430	2	—
450	630	450	450	500	4	4	5 950 000	17 500 000	605 000	1 780 000	**450 RV 6321**	440	2	—
460	670	500	500	522	6	6	7 650 000	22 700 000	780 000	2 320 000	**460 RV 6721**	596	2(1)	—
480	680	500	500	534	5	5	7 700 000	23 100 000	785 000	2 360 000	**480 RV 6811**	610	3	—
500	690	510	510	552	5	5	7 750 000	24 600 000	790 000	2 500 000	**500 RV 6921**	580	2(1)	—
	700	515	515	554	5	5	7 800 000	23 800 000	800 000	2 430 000	**500 RV 7021**	622	2(1)	—
	720	530	530	560	6	6	8 550 000	25 300 000	870 000	2 580 000	**500 RV 7211**	782	3	—
520	735	535	535	574.5	5	5	8 900 000	26 300 000	910 000	2 680 000	**520 RV 7331**	750	4	—
530	780	570	570	601	6	6	10 100 000	29 200 000	1 030 000	2 980 000	**530 RV 7811**	960	3	—
570	815	594	594	628	6	6	11 700 000	33 500 000	1 190 000	3 450 000	**570 RV 8111**	960	3	—
610	870	660	660	680	6	6	13 200 000	41 500 000	1 340 000	4 250 000	**610 RV 8711**	1 330	3	—
650	920	690	690	723	7.5	7.5	14 200 000	45 000 000	1 450 000	4 600 000	**650 RV 9211**	1 520	3	—
690	980	715	715	767.5	7.5	7.5	15 300 000	48 000 000	1 560 000	4 900 000	**690 RV 9831**	1 790	4	—
700	930	620	620	763	6	6	11 100 000	38 000 000	1 130 000	3 900 000	**700 RV 9311**	1 200	3	—
	980	700	700	774	6	6	15 300 000	49 000 000	1 560 000	5 000 000	**700 RV 9821**	1 720	2(1)	—
725	1 000	700	700	796	6	6	15 600 000	51 000 000	1 590 000	5 200 000	**725 RV 1011**	1 670	3	—
760	1 080	805	790	845	6	6	19 000 000	61 000 000	1 940 000	6 200 000	**760 RV 1032**	2 430	4	—
800	1 080	750	750	880	6	6	16 000 000	56 500 000	1 630 000	5 750 000	**800 RV 1032**	2 050	4	—
820	1 160	840	840	911	7.5	7.5	21 900 000	71 500 000	2 230 000	7 300 000	**820 RV 1121**	2 900	2(1)	—
	1 100	745	720	892	6	3	16 900 000	58 500 000	1 720 000	6 000 000	**820 RV 1132**	2 000	4	—
850	1 180	850	850	940	7.5	7.5	21 100 000	72 000 000	2 150 000	7 350 000	**850 RV 1111**	2 850	3	—
860	1 130	670	670	934	6	6	15 700 000	56 500 000	1 600 000	5 800 000	**860 RV 1132**	1 780	4	—
	1 160	735	710	940	7.5	4	17 500 000	60 000 000	1 780 000	6 100 000	**860 RV 1133**	2 200	4	—
900	1 230	895	870	985	7.5	7.5	22 100 000	76 000 000	2 250 000	7 750 000	**900 RV 1211**	3 200	3	—
920	1 280	865	850	1 015	7.5	7.5	24 000 000	80 000 000	2 450 000	8 150 000	**920 RV 1211**	3 510	3	—

Remarks 1. For four-row cylindrical roller bearings not listed above, please contact NSK.
2. Four-row cylindrical roller bearings are designed for specific applications, when using them, please contact NSK.

Note (1) Oil holes and oil grooves are provided at the center of outer rings.

Railway Rolling Stock Bearings

Railway rolling stock bearings are important components of rolling stocks that require high reliability.
The main bearings consist of axle bearings that are mounted at both ends of axle and support the entire weight of the rolling stock. Additionally, there are railway traction motor bearings that are used for the motor that drives the axle; and gear unit bearings that transfer the power from the motor to the axle. NSK has designed and manufactured specific bearings for these very applications.

Types and Features

Axle Bearings

- Axle bearings consist of the following types of bearings to meet operator demands for high-speed capability of rolling stock, weight reductions, and minimal maintenance and inspection requirements:
  - ➢ Cylindrical roller bearings with a thrust collar (oil bath lubrication, grease lubrication)
  - ➢ Tapered roller bearings (oil bath lubrication)
  - ➢ RCC Bearings (sealed-clean rotating end cap cylindrical roller bearings) (grease lubrication)
  - ➢ RCT bearings (sealed-clean rotating end cap tapered roller bearings) (grease lubrication)
- NSK has been approved by AAR (Association of American Railroads).

Traction Motor Bearings

- Bearings for inverter controlled AC motors are speciality designed to meet high-speed specifications and requirements for ensuring dimensional stability. NSK recommends long-life grease for these bearings.
- NSK offers the following bearings as a measure against electric erosion, which occurs when electric current is allowed to flow through the motor bearings:
  - ➢ Ceramic-insulated bearings (ceramic-coated bearings) and PPS-insulated bearings
- High capacity bearings also available for locomotive-type large traction motors

Gear Unit Bearings

- These bearings are designed to meet high-speed specifications and offer excellent seizure resistance.
- A reinforced cage has been adopted for these bearings.

Specified catalogs

- Bearings for Railway Rolling Stock CAT. No. E1156
- Axle Bearings for Railway Rolling Stock (Cylindrical Roller Bearings) CAT. No. E1239
- Axle Bearings for Railway Rolling Stock (Spherical Roller Bearings) CAT. No. E1240
- Bearings for Traction Motors CAT. No. E1241