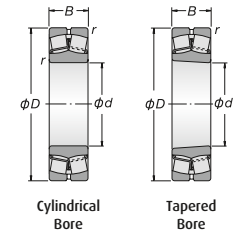


# Spherical Roller Bearings

## Features compared with conventional bearings

- › Bearing Life 2 times
- › Limiting Speed 20% higher\*
- › Working Temperature up to 200 °C

\*Limiting speeds of the CA-design bearings are equal to those of conventional bearings



**Nomenclature**

**Example:** 232 36 CA M K E4 C3 S11 \*H\*

**Bearing**  
239, 230, 240, 231, 241, 222, 232, 213, 223: Spherical Roller Bearings

**Bore**  
Bore number indicates bore diameter.  
Bore Number x 5 (mm)

**Internal Design**  
EA, CA: High Load Capacity

**Cage**  
M: Machined Brass Cage (for CA Design)  
Omitted: Pressed Steel Cage (for EA Design)

**Design of Rings**  
K: Tapered Bore of inner ring (Taper 1:12)  
K30: Tapered Bore of inner ring (Taper 1:30)  
E4: Lubricating Groove in outside surface and holes in outer ring

**NSKHPS**  
\*H\*: NSKHPS Bearings

**Special Specification**  
S11: Dimensional Stabilizing Treatment  
Working Temperature Lower than 200 °C (Although S11 symbol is omitted in the EA design, special heat treatment of S11 is done)

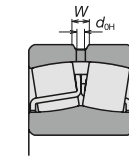
**Internal Clearance**  
C2: Clearance less than CN  
Omitted: CN Clearance  
C3: Clearance greater than CN  
C4: Clearance greater than C3  
C5: Clearance greater than C4

Table 1: Dimensions of Oil Groove and Holes

Nominal Width B		Oil Groove Width W	Hole Diameter $d_{OH}$
Over	Incl.		
18	30	5.0	2.5
30	40	6.0	3.0
40	50	7.0	4.0
50	65	8.0	5.0
65	80	10.0	6.0
80	100	12.0	8.0
100	120	15.0	10.0
120	160	20.0	12.0
160	200	25.0	15.0
200	250	30.0	20.0
250	315	35.0	20.0
315	400	40.0	25.0
400	-	40.0	25.0

Unit: mm

Table 2: Number of Oil Holes

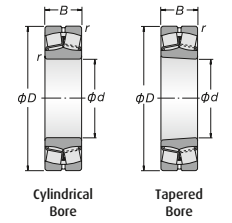


Nominal Outer Ring Diameter D (mm)		Number of Holes
Over	Incl.	
-	180	4
180	250	6
250	315	6
315	400	6
400	500	6
500	630	8
630	800	8
800	1,000	8
1,000	1,250	8
1,250	1,600	8
1,600	2,000	8

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speed (rpm)		Max. Speed Rating* (rpm)	Bearing Numbers	
d	D	B	r (min.)	$C_i$	$C_{or}$	Grease	Oil	Oil	Cylindrical Bore	Tapered Bore
40	80	23	1.1	113,000	99,500	6,700	8,500	11,000	22208EA4	22208EA4E4
	90	23	1.5	118,000	111,000	6,000	7,500	9,500	21308EA4	21308EA4E4
	90	33	1.5	170,000	153,000	5,300	6,700	8,000	22308EA4	22308EA4E4
45	85	23	1.1	118,000	111,000	6,000	7,500	10,000	22209EA4	22209EA4E4
	100	25	1.5	149,000	144,000	5,000	6,300	8,500	21309EA4	21309EA4E4
	100	36	1.5	207,000	195,000	4,500	5,600	7,000	22309EA4	22309EA4E4
50	90	23	1.1	124,000	119,000	5,600	7,100	9,500	22210EA4	22210EA4E4
	110	27	2.0	178,000	175,000	4,500	5,600	7,500	21310EA4	21310EA4E4
	110	40	2.0	246,000	234,000	4,300	5,300	6,300	22310EA4	22310EA4E4
55	100	25	1.5	149,000	144,000	5,300	6,700	8,000	22211EA4	22211EA4E4
	120	29	2.0	178,000	174,000	4,500	5,600	7,500	21311EA4	21311EA4E4
	120	43	2.0	292,000	292,000	3,800	4,800	5,600	22311EA4	22311EA4E4
60	110	28	1.5	178,000	174,000	4,800	6,000	7,500	22212EA4	22212EA4E4
	130	31	2.1	238,000	244,000	3,800	4,800	6,300	21312EA4	21312EA4E4
	130	46	2.1	340,000	340,000	3,600	4,500	5,300	22312EA4	22312EA4E4
65	120	31	1.5	221,000	230,000	4,300	5,300	7,000	22213EA4	22213EA4E4
	140	33	2.1	264,000	275,000	3,600	4,500	6,000	21313EA4	21313EA4E4
	140	48	2.1	375,000	380,000	3,200	4,000	5,000	22313EA4	22313EA4E4
70	125	31	1.5	225,000	232,000	4,000	5,300	6,700	22214EA4	22214EA4E4
	150	35	2.1	310,000	325,000	3,200	4,000	5,600	21314EA4	21314EA4E4
	150	51	2.1	425,000	435,000	3,000	3,800	4,500	22314EA4	22314EA4E4
75	130	31	1.5	238,000	244,000	4,000	5,000	6,300	22215EA4	22215EA4E4
	160	37	2.1	310,000	325,000	3,200	4,000	5,600	21315EA4	21315EA4E4
	160	55	2.1	485,000	505,000	2,800	3,600	4,300	22315EA4	22315EA4E4
80	140	33	2.0	264,000	275,000	3,600	4,500	6,000	22216EA4	22216EA4E4
	170	39	2.1	355,000	375,000	3,000	3,800	5,300	21316EA4	21316EA4E4
	170	58	2.1	540,000	565,000	2,600	3,400	4,000	22316EA4	22316EA4E4
85	150	36	2.0	310,000	325,000	3,400	4,300	5,600	22217EA4	22217EA4E4
	180	41	3.0	360,000	395,000	3,000	4,000	5,300	21317EA4	21317EA4E4
	180	60	3.0	600,000	630,000	2,400	3,200	3,800	22317EA4	22317EA4E4
90	160	40	2.0	360,000	395,000	3,200	4,000	5,300	22218EA4	22218EA4E4
	190	43	3.0	415,000	450,000	2,800	3,600	4,800	21318EA4	21318EA4E4
	190	64	3.0	665,000	705,000	2,400	3,000	3,600	22318EA4	22318EA4E4
95	170	43	2.1	415,000	450,000	3,000	3,800	4,800	22219EA4	22219EA4E4
	200	45	3.0	430,000	435,000	1,500	2,000	4,500	21319CAM4	21319CAM4E4
	200	67	3.0	735,000	780,000	2,200	2,800	3,400	22319EA4	22319EA4E4

\*Note: Limiting speed is applicable for general use. Please see Rolling Bearing Catalogue, Chapter: Limiting Speed. If max. speed rating is applied, please consult NSK.

# Spherical Roller Bearings



Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speed (rpm)		Max. Speed Rating* (rpm)	Bearing Numbers	
d	D	B	r (min.)	C <sub>r</sub>	C <sub>0r</sub>	Grease	Oil	Oil	Cylindrical Bore	Tapered Bore
100	180	46.0	2.1	455,000	490,000	2,800	3,600	4,500	22220EAE4	22220EAKE4
	180	60.3	2.1	525,000	605,000	1,600	2,200	3,400	23220CAME4	23220CAMKE4
	215	47.0	3.0	495,000	485,000	1,400	1,900	4,500	21320CAM4	21320CAMKE4
	215	73.0	3.0	860,000	930,000	2,000	2,600	3,000	22320EAE4	22320EAKE4
	180	56.0	2.0	480,000	630,000	1,600	2,000	3,600	23122CAM4	23122CAMKE4
110	180	69.0	2.0	575,000	750,000	1,600	2,000	3,000	24122CAM4	24122CAMKE4
	200	53.0	2.1	605,000	645,000	2,600	3,200	4,000	22222EAE4	22222EAKE4
	200	69.8	2.1	645,000	760,000	1,500	1,900	3,000	23222CAM4	23222CAMKE4
	240	50.0	3.0	565,000	545,000	1,300	1,700	3,600	21322CAM4	21322CAMKE4
	240	80.0	3.0	1,030,000	1,120,000	1,900	2,400	2,800	22322EAE4	22322EAKE4
120	180	46.0	2.0	395,000	525,000	1,800	2,200	4,000	23024CAM4	23024CAMKE4
	180	60.0	2.0	480,000	680,000	1,500	2,000	3,400	24024CAM4	24024CAMKE4
	200	62.0	2.0	580,000	720,000	1,400	1,800	3,400	23124CAM4	23124CAMKE4
	200	80.0	2.0	695,000	905,000	1,400	1,800	2,600	24124CAM4	24124CAMKE4
	215	58.0	2.1	685,000	765,000	2,400	3,000	3,800	22224EAE4	22224EAKE4
130	215	76.0	2.1	790,000	970,000	1,300	1,700	2,800	23224CAM4	23224CAMKE4
	260	86.0	3.0	1,190,000	1,320,000	1,700	2,200	2,600	22324EAE4	22324EAKE4
	200	52.0	2.0	500,000	655,000	1,700	2,000	3,600	23026CAM4	23026CAMKE4
	200	69.0	2.0	620,000	865,000	1,400	1,800	3,000	24026CAM4	24026CAMKE4
	210	64.0	2.0	630,000	825,000	1,300	1,700	3,200	23126CAM4	23126CAMKE4
140	210	80.0	2.0	735,000	1,010,000	1,300	1,700	2,400	24126CAM4	24126CAMKE4
	230	64.0	3.0	820,000	940,000	2,200	2,600	3,600	22226EAE4	22226EAKE4
	230	80.0	3.0	875,000	1,080,000	1,200	1,600	2,600	23226CAM4	23226CAMKE4
	280	93.0	4.0	1,240,000	1,350,000	1,300	1,600	2,400	23226CAM4	23226CAMKE4
	210	53.0	2.0	525,000	715,000	1,600	1,900	3,400	23028CAM4	23028CAMKE4
150	210	69.0	2.0	635,000	905,000	1,300	1,700	2,800	24028CAM4	24028CAMKE4
	225	68.0	2.1	725,000	945,000	1,200	1,600	2,800	23128CAM4	23128CAMKE4
	225	85.0	2.1	835,000	1,160,000	1,200	1,600	2,400	24128CAM4	24128CAMKE4
	250	68.0	3.0	835,000	945,000	1,400	1,700	3,200	22228EAE4	22228EAKE4
	250	88.0	3.0	1,040,000	1,300,000	1,100	1,500	2,400	23228CAM4	23228CAMKE4
160	300	102.0	4.0	1,450,000	1,590,000	1,200	1,500	2,200	23228CAM4	23228CAMKE4
	225	56.0	2.1	590,000	815,000	1,400	1,800	3,200	23030CAM4	23030CAMKE4
	225	75.0	2.1	740,000	1,090,000	1,200	1,500	2,600	24030CAM4	24030CAMKE4
	250	80.0	2.1	905,000	1,180,000	1,100	1,400	2,600	23130CAM4	23130CAMKE4
	250	100.0	2.1	1,070,000	1,450,000	1,100	1,400	2,200	24130CAM4	24130CAMKE4
170	270	73.0	3.0	955,000	1,120,000	1,300	1,600	3,000	22230CAM4	22230CAMKE4
	270	96.0	3.0	1,220,000	1,560,000	1,100	1,400	2,200	23230CAM4	23230CAMKE4
	320	108.0	4.0	1,530,000	1,690,000	1,100	1,400	2,000	22330CAM4	22330CAMKE4
	220	45.0	2.0	450,000	675,000	1,400	1,800	3,000	23932CAM4	23932CAMKE4
	240	60.0	2.1	675,000	955,000	1,300	1,700	3,000	23032CAM4	23032CAMKE4

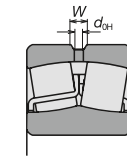
\*Note: Limiting speed is applicable for general use. Please see Rolling Bearing Catalogue, Chapter: Limiting Speed. If max. speed rating is applied, please consult NSK.

Table 1: Dimensions of Oil Groove and Holes

Nominal Width B		Oil Groove Width W	Hole Diameter d <sub>OH</sub>
Over	Incl.		
18	30	5.0	2.5
30	40	6.0	3.0
40	50	7.0	4.0
50	65	8.0	5.0
65	80	10.0	6.0
80	100	12.0	8.0
100	120	15.0	10.0
120	160	20.0	12.0
160	200	25.0	15.0
200	250	30.0	20.0
250	315	35.0	20.0
315	400	40.0	25.0
400	-	40.0	25.0

Unit: mm

Table 2: Number of Oil Holes



Nominal Outer Ring Diameter D (mm)		Number of Holes
Over	Incl.	
-	180	4
180	250	6
250	315	6
315	400	6
400	500	6
500	630	8
630	800	8
800	1,000	8
1,000	1,250	8
1,250	1,600	8
1,600	2,000	8

Boundary Dimensions (mm)				Basic Load Ratings (N)		Limiting Speed (rpm)		Max. Speed Rating* (rpm)	Bearing Numbers	
d	D	B	r (min.)	C <sub>r</sub>	C <sub>0r</sub>	Grease	Oil	Oil	Cylindrical Bore	Tapered Bore
180	250	52	2.0	590,000	890,000	1,200	1,600	2,800	23936CAME4	23936CAMKE4
	280	74	2.1	935,000	1,270,000	1,200	1,400	2,600	23036CAM4	23036CAMKE4
	280	100	2.1	1,210,000	1,750,000	950	1,200	2,200	24036CAM4	24036CAMKE4
	300	96	3.0	1,320,000	1,760,000	900	1,200	2,200	23136CAM4	23136CAMKE4
	300	118	3.0	1,490,000	2,040,000	900	1,200	1,700	24136CAM4	24136CAMKE4
	320	86	4.0	1,280,000	1,540,000	1,100	1,300	2,600	22236CAM4	22236CAMKE4
	320	112	4.0	1,620,000	2,110,000	850	1,100	1,900	23236CAM4	23236CAMKE4
	380	126	4.0	2,170,000	2,340,000	950	1,200	1,700	23336CAM4	23336CAMKE4
	260	52	2.0	575,000	875,000	1,200	1,500	2,600	23938CAM4	23938CAMKE4
	290	75	2.1	970,000	1,350,000	1,100	1,400	2,400	23038CAM4	23038CAMKE4
	290	100	2.1	1,220,000	1,840,000	900	1,200	2,000	24038CAM4	24038CAMKE4
	320	104	3.0	1,480,000	2,020,000	850	1,100	2,000	23138CAM4	23138CAMKE4
190	320	128	3.0	1,710,000	2,330,000	850	1,100	1,600	24138CAM4	24138CAMKE4
	340	92	4.0	1,420,000	1,730,000	1,000	1,200	2,400	22238CAM4	22238CAMKE4
	340	120	4.0	1,800,000	2,350,000	800	1,100	1,800	23238CAM4	23238CAMKE4
	400	132	5.0	2,370,000	2,590,000	900	1,100	1,800	22338CAM4	22338CAMKE4
	280	60	2.1	710,000	1,060,000	1,100	1,400	2,400	23940CAM4	23940CAMKE4
	310	82	2.1	1,180,000	1,700,000	1,000	1,300	2,200	23040CAM4	23040CAMKE4
	310	109	2.1	1,420,000	2,120,000	850	1,100	1,900	24040CAM4	24040CAMKE4
	340	112	3.0	1,700,000	2,330,000	800	1,000	1,900	23140CAM4	23140CAMKE4
200	340	140	3.0	1,960,000	2,660,000	800	1,000	1,500	24140CAM4	24140CAMKE4
	360	98	4.0	1,620,000	2,010,000	950	1,200	2,200	22240CAM4	22240CAMKE4
	360	128	4.0	2,070,000	2,750,000	750	1,000	1,700	23240CAM4	23240CAMKE4
	300	60	2.1	785,000	1,240,000	1,000	1,300	2,200	23944CAM4	23944CAMKE4
	340	90	3.0	1,360,000	1,980,000	950	1,200	2,000	23044CAM4	23044CAMKE4
	340	118	3.0	1,640,000	2,490,000	750	1,000	1,700	24044CAM4	24044CAMKE4
	370	120	4.0	1,960,000	2,710,000	710	950	1,700	23144CAM4	23144CAMKE4
	370	150	4.0	2,250,000	3,200,000	710	950	1,400	24144CAM4	24144CAMKE4
220	400	108	4.0	1,960,000	2,430,000	850	1,000	2,000	22244CAM4	22244CAMKE4
	400	144	4.0	2,520,000	3,400,000	670	900	1,500	23244CAM4	23244CAMKE4
	320	60	2.1	795,000	1,300,000	950	1,200	2,000	23948CAM4	23948CAMKE4
	360	92	3.0	1,450,000	2,140,000	850	1,100	1,900	23048CAM4	23048CAMKE4
	360	118	3.0	1,730,000	2,730,000	710	950	1,600	24048CAM4	24048CAMKE4
	400	128	4.0	2,230,000	3,100,000	670	850	1,600	23148CAM4	23148CAMKE4
	400	160	4.0	2,660,000	3,800,000	670	850	1,300	24148CAM4	24148CAMKE4
	260	360	75	2.1	1,170,000	1,870,000	850	1,000	1,900	23952CAM4

\*Note: Limiting speed is applicable for general use. Please see Rolling Bearing Catalogue, Chapter: Limiting Speed. If max. speed rating is applied, please consult NSK.