NSKHPS SPHERICAL ROLLER BEARINGS

THE STANDARD IN HIGH PERFORMANCE

STAY IN MOTION. STAY IN CONTROL.






FIELD-PROVEN TO OUTPERFORM AND OUTLAST

Extreme heavy and impact loads in steelmaking, mining and construction. Extreme speeds and high heat in papermaking. Extreme reliability where and when unexpected machine and equipment downtime is intolerable.

For the spherical roller bearings employed in industry's most challenging applications, the expectations are invariably demanding: to run harder, to run faster, to run longer. And to transcend being mere load bearing components to being performance enhancers - mitigating maintenance and operating costs, improving throughput and profitability.

Decisively.

That distinction is achieved by better manufacturing processes, better material technology, better design fundamentals.

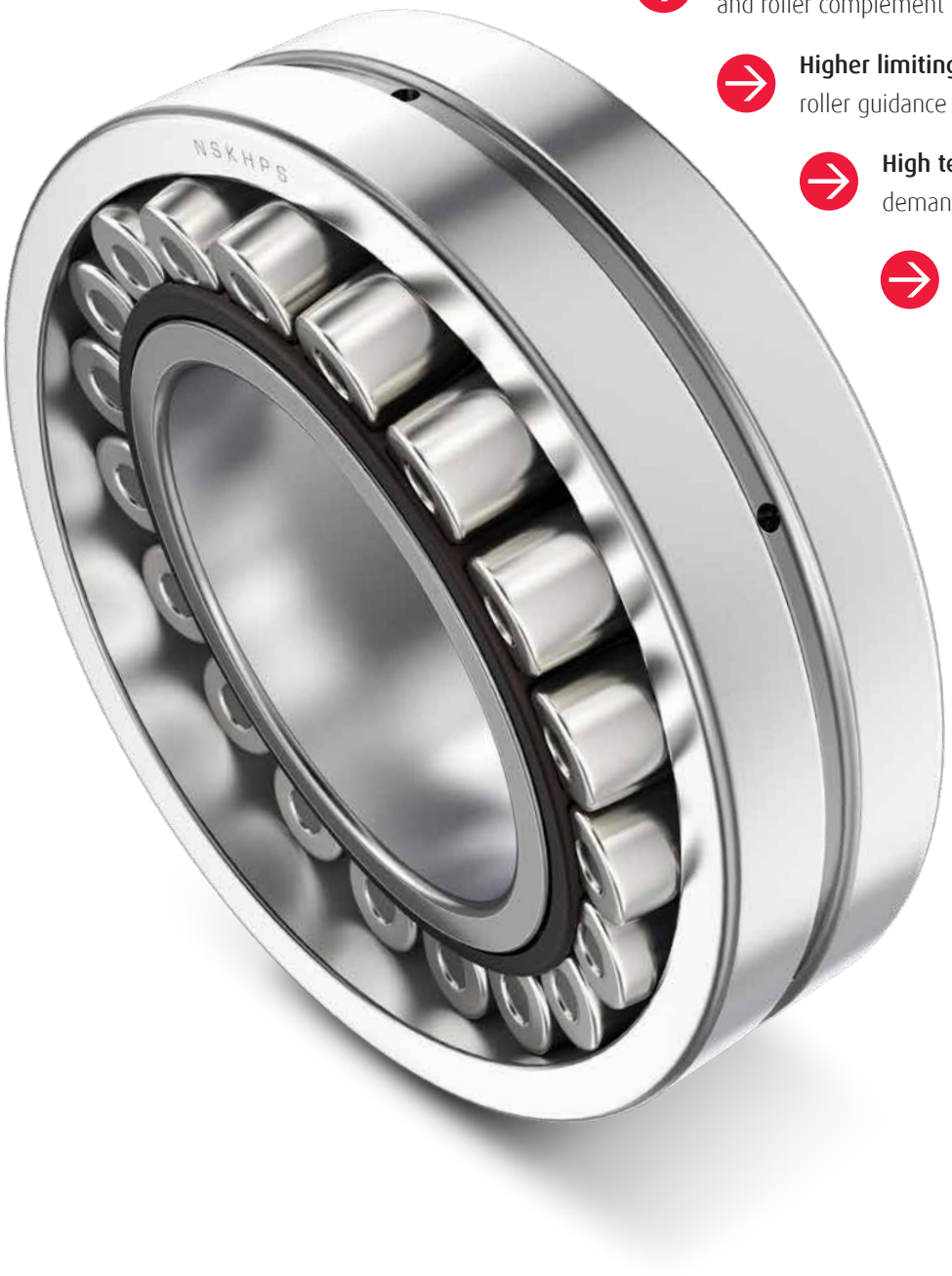
That distinction is NSKHPS Spherical Roller Bearings.

HIGH PERFORMANCE STANDARD

NSKHPS Spherical Roller Bearings are the synthesis of NSK technologies, with material engineering, tribology, mechanical design and advanced manufacturing fully engaged and applied.

The outcome is a spherical roller bearing engineered to outperform and outlast conventional designs, rising to industry's most demanding challenges with significant and proven operating benefits:

- **Longer fatigue life** with high reliability owing to stringently high steel purity and high-capacity design
- **Higher load ratings** derived from an optimized internal design and roller complement
- **Higher limiting speeds** are achieved with smooth roller guidance
- **High temperature dimensional stability** in demanding applications
- **Design downsizing potential** with no compromise to machine capacity



DESIGN FEATURES AND OPERATING CHARACTERISTICS

DESIGN FEATURES

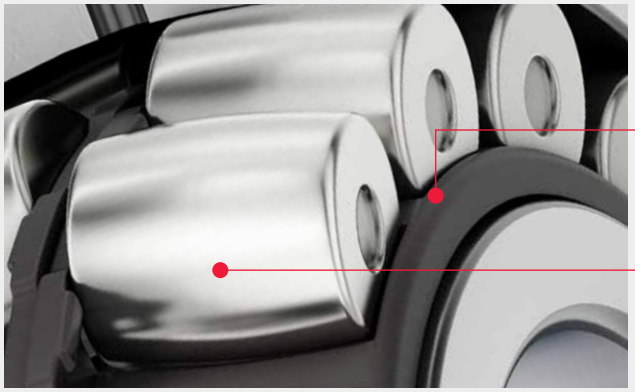
NSKHPS spherical roller bearings are engineered to deliver a high standard of performance and a reliably long operating life in a wide range of machinery and applications, with design features including:

- Manufactured with high-purity steel for superior fatigue strength and a long operating life
- Optimized, high-capacity internal design
- Advanced raceway surface finish for improved lubrication characteristics and wear resistance
- EA design type, with high-strength, surface-hardened pressed steel cage
- CA design type, with heavy-duty machined brass cage and center guide ring
- High-temperature dimensional stability up to 200°C
- With cylindrical and tapered bores
- For dimension series 213, 222, 223, 230, 231, 232, 239, 240 and 241
- For shaft diameters ranging from 40 to 420 millimeters
- With internal clearances C2, C-Normal, C3, C4 and C5

ADVANCED RACEWAY SURFACE FINISH

With NSKHPS spherical roller bearings, superior ring grinding technology in conjunction with optimized roller-to-raceway profiles control roller motion within the bearing, reducing bearing wear and extending bearing fatigue life.

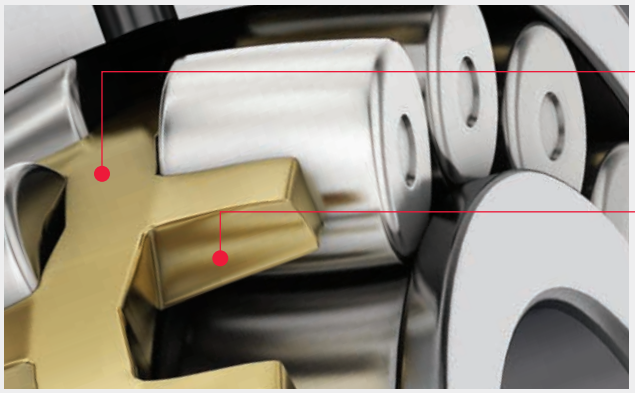
Additionally, NSK applies a super-finish process to raceway surfaces to remove remaining material asperity peaks - at a micro level – to improve lubrication performance and augment wear resistance.



HIGH-PERFORMANCE CAGES

High-strength, wear-resistant pressed steel cage with special nitriding surface treatment enables higher operating speeds

Optimized roller guidance from interior cage flanges eliminates the need for a center guide ring, allowing for larger rollers and achieving higher capacity



Heavy-duty machined brass cage design delivers superior performance in applications with heavy loading and impact loading

Superior roller guidance and controlled roller skew are achieved by cage pocket geometry and cage finger length

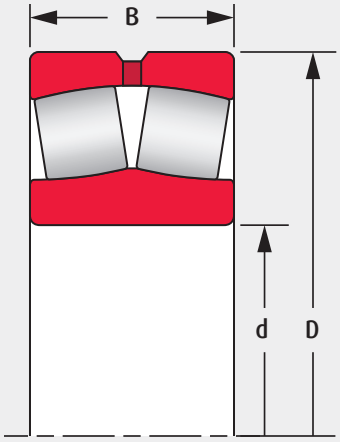
RANGE OF AVAILABILITY - CAGE TYPE AND BORE REFERENCE

Dimension series	213	222	223	230	231	232	239	240	241
Machined Brass Cage	19 to 22	28 to 64	26 to 56	24 to 80	22 to 72	20 to 64	32 to 84	24 to 80	22 to 72
Pressed Steel Cage	08 to 18	08 to 26	08 to 24						

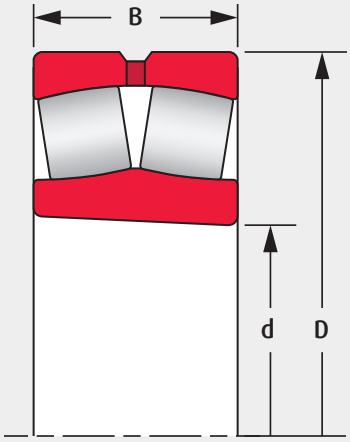
Refer to **Dimensions and Operating Values** on pages 6 to 17 for additional details.

BEARING DIMENSIONS AND OPERATING VALUES

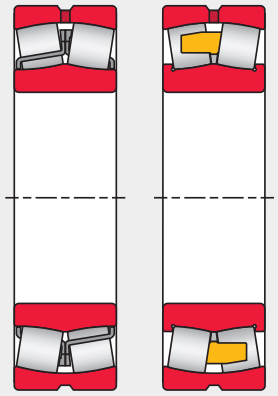
BORE DIAMETER: 40 - 95 MM



cylindrical bore



tapered bore



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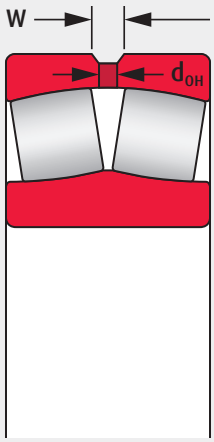
BOUNDARY DIMENSIONS			BASIC BEARING No.	BASIC LOAD RATINGS		SPEED RATINGS, min^{-1}			
mm				N		Thermal Reference	Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
40	80	23	**22208 EAE4**	113 000	99 500	7 100	12 000	6 700	8 500
	90	23	**21308 EAE4**	118 000	111 000	6 700	11 000	6 000	7 500
	90	33	**22308 EAE4**	170 000	153 000	5 600	9 000	5 300	6 700
45	85	23	**22209 EAE4**	118 000	111 000	6 300	11 000	6 000	7 500
	100	25	**21309 EAE4**	149 000	144 000	6 000	9 000	5 000	6 300
	100	36	**22309 EAE4**	207 000	195 000	5 000	8 000	4 500	5 600
50	90	23	**22210 EAE4**	124 000	119 000	6 000	9 500	5 600	7 100
	110	27	**21310 EAE4**	178 000	174 000	5 300	8 000	4 500	5 600
	110	40	**22310 EAE4**	246 000	234 000	4 800	7 100	4 300	5 300
55	100	25	**22211 EAE4**	149 000	144 000	5 300	9 000	5 300	6 700
	120	29	**21311 EAE4**	178 000	174 000	5 300	8 000	4 500	5 600
	120	43	**22311 EAE4**	292 000	292 000	4 300	6 000	3 800	4 800
60	110	28	**22212 EAE4**	178 000	174 000	5 300	8 000	4 800	6 000
	130	31	**21312 EAE4**	238 000	244 000	4 800	6 700	3 800	4 800
	130	46	**22312 EAE4**	340 000	340 000	4 000	5 600	3 600	4 500
65	120	31	**22213 EAE4**	221 000	230 000	4 800	7 500	4 300	5 300
	140	33	**21313 EAE4**	264 000	275 000	4 500	6 000	3 600	4 500
	140	48	**22313 EAE4**	375 000	380 000	3 800	5 000	3 200	4 000

Designations listed refer to NSKHPS spherical roller bearings with cylindrical bore. For a complete explanation of designations, including tapered bore bearings, refer to page 18.

Dimensions of oil grooves and holes, mm

NOMINAL BEARING WIDTH B over	NOMINAL BEARING WIDTH B incl.	OIL GROOVE WIDTH W	OIL HOLE DIAMETER d_{OH}
18	**30**	5	2.5
30	**40**	6	3
40	**50**	7	4
50	**65**	8	5
65	**80**	10	6



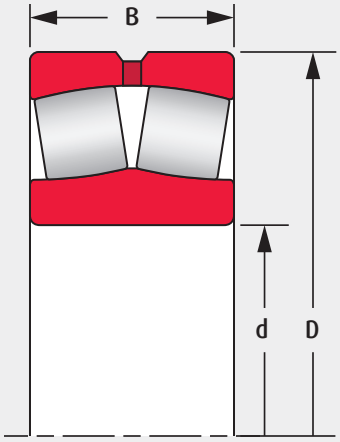
Number of oil holes

NOMINAL BEARING O.D. D over	NOMINAL BEARING O.D. D incl.	NUMBER OF HOLES
--	**180**	4
180	**250**	6

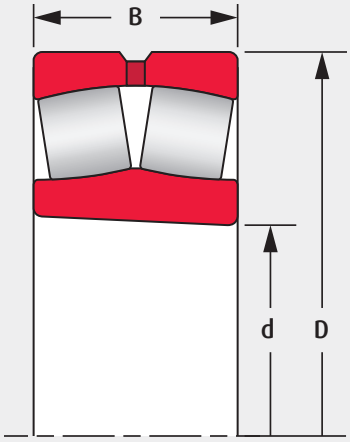
BOUNDARY DIMENSIONS mm d	D	B	BASIC BEARING No.	BASIC LOAD RATINGS N Dynamic	Static	SPEED RATINGS, min^{-1} Thermal Reference	Limiting Speed Mechanical	Grease	Oil
70	125	31	**22214 EAE4**	225 000	232 000	4 500	7 100	4 000	5 300
	150	35	**21314 EAE4**	310 000	325 000	4 300	5 600	3 200	4 000
	150	51	**22314 EAE4**	425 000	435 000	3 600	4 800	3 000	3 800
75	130	31	**22215 EAE4**	238 000	244 000	4 300	6 700	4 000	5 000
	160	37	**21315 EAE4**	310 000	325 000	4 000	5 600	3 200	4 000
	160	55	**22315 EAE4**	485 000	505 000	3 400	4 300	2 800	3 600
80	140	33	**22216 EAE4**	264 000	275 000	4 000	6 000	3 600	4 500
	170	39	**21316 EAE4**	355 000	375 000	3 800	4 800	3 000	3 800
	170	58	**22316 EAE4**	540 000	565 000	3 200	3 800	2 600	3 400
85	150	36	**22217 EAE4**	310 000	325 000	4 000	5 600	3 400	4 300
	180	41	**21317 EAE4**	360 000	395 000	3 800	5 000	3 000	4 000
	180	60	**22317 EAE4**	600 000	630 000	3 000	3 400	2 400	3 200
90	160	40	**22218 EAE4**	360 000	395 000	3 800	5 000	3 200	4 000
	190	43	**21318 EAE4**	415 000	450 000	3 600	4 500	2 800	3 600
	190	64	**22318 EAE4**	665 000	705 000	2 800	3 000	2 400	3 000
95	170	43	**22219 EAE4**	415 000	450 000	3 800	4 500	3 000	3 800
	200	45	**21319 CAME4**	430 000	435 000	3 600	4 800	1 500	2 000
	200	67	**22319 EAE4**	735 000	780 000	2 600	3 000	2 200	2 800

BEARING DIMENSIONS AND OPERATING VALUES

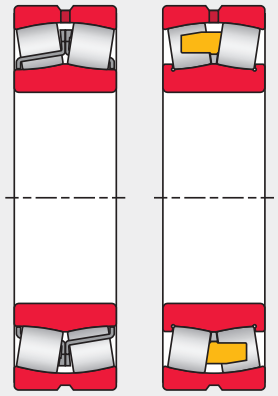
BORE DIAMETER: 100 - 130 MM



cylindrical bore



tapered bore



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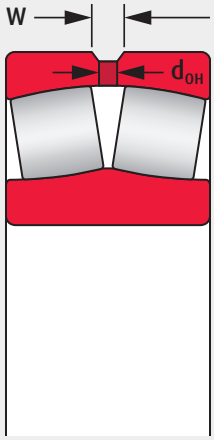
BOUNDARY DIMENSIONS			BASIC BEARING No.	BASIC LOAD RATINGS		SPEED RATINGS, min^{-1}			
mm				N		Thermal Reference	Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
100	180	46	**22220 EAE4**	455 000	490 000	3 600	4 300	2 800	3 600
	180	60.3	**23220 CAME4**	525 000	605 000	2 800	3 800	1 600	2 200
	215	47	**21320 CAME4**	495 000	485 000	3 400	4 500	1 400	1 900
	215	73	**22320 EAE4**	860 000	930 000	2 400	2 400	1 800	2 400
110	180	56	**23122 CAME4**	480 000	630 000	3 200	4 000	1 600	2 000
	180	69	**24122 CAME4**	575 000	750 000	2 200	3 400	1 600	2 000
	200	53	**22222 EAE4**	605 000	645 000	3 400	3 400	2 600	3 200
	200	69.8	**23222 CAME4**	645 000	760 000	2 600	3 400	1 500	1 900
	240	50	**21322 CAME4**	565 000	545 000	3 000	4 300	1 300	1 700
	240	80	**22322 EAE4**	1 030 000	1 120 000	2 200	1 900	1 400	1 900

Designations listed refer to NSKHPS spherical roller bearings with cylindrical bore. For a complete explanation of designations, including tapered bore bearings, refer to page 18.

Dimensions of oil grooves and holes, mm

NOMINAL BEARING WIDTH		OIL GROOVE WIDTH	OIL HOLE DIAMETER
B			
over	incl.	W	d_{OH}
40	**50**	7	4
50	**65**	8	5
65	**80**	10	6
80	**100**	12	8



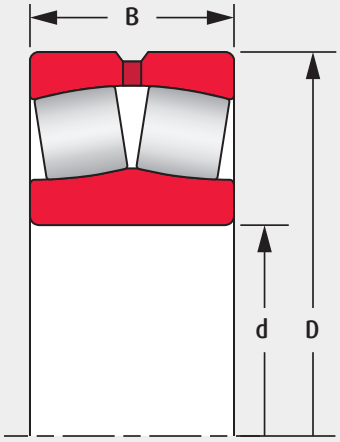
Number of oil holes

NOMINAL BEARING O.D.		NUMBER OF HOLES
D		
over	incl.	
--	**180**	4
180	**250**	6
250	**315**	6

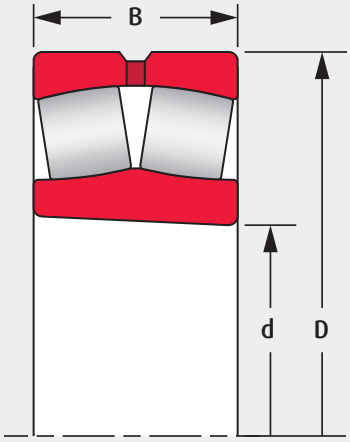
BOUNDARY DIMENSIONS			BASIC BEARING No.	BASIC LOAD RATINGS		SPEED RATINGS, min^{-1}			
mm				N		Thermal Reference	Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
120	180	46	**23024 CAME4**	395 000	525 000	3 200	4 500	1 800	2 200
	180	60	**24024 CAME4**	480 000	680 000	2 600	3 600	1 500	2 000
	200	62	**23124 CAME4**	580 000	720 000	2 800	3 600	1 400	1 800
	200	80	**24124 CAME4**	695 000	905 000	2 000	3 000	1 400	1 800
	215	58	**22224 EAE4**	685 000	765 000	3 200	3 000	2 400	3 000
	215	76	**23224 CAME4**	790 000	970 000	2 200	3 000	1 300	1 700
	260	86	**22324 EAE4**	1 190 000	1 320 000	1 900	1 400	1 100	1 400
130	200	52	**23026 CAME4**	500 000	655 000	3 000	3 800	1 700	2 000
	200	69	**24026 CAME4**	620 000	865 000	2 200	3 200	1 400	1 800
	210	64	**23126 CAME4**	630 000	825 000	2 600	3 400	1 300	1 700
	210	80	**24126 CAME4**	735 000	1 010 000	1 800	2 800	1 300	1 700
	230	64	**22226 EAE4**	820 000	940 000	2 800	2 600	2 200	2 600
	230	80	**23226 CAME4**	875 000	1 080 000	2 000	2 800	1 200	1 600
	280	93	**22326 CAME4**	1 240 000	1 350 000	1 800	2 600	1 300	1 600

BEARING DIMENSIONS AND OPERATING VALUES

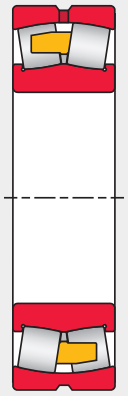
BORE DIAMETER: 140 - 170 MM



cylindrical bore



tapered bore



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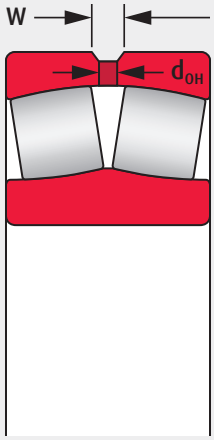
BOUNDARY DIMENSIONS			BASIC BEARING No.	BASIC LOAD RATINGS		SPEED RATINGS, min^{-1}			
mm				N		Thermal Reference	Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
140	210	53	**23028 CAME4**	525 000	715 000	2 800	3 800	1 600	1 900
	210	69	**24028 CAME4**	635 000	905 000	2 200	3 000	1 300	1 700
	225	68	**23128 CAME4**	725 000	945 000	2 400	3 200	1 200	1 600
	225	85	**24128 CAME4**	835 000	1 160 000	1 600	2 600	1 200	1 600
	250	68	**22228 CAME4**	835 000	945 000	2 600	3 200	1 400	1 700
	250	88	**23228 CAME4**	1 040 000	1 300 000	1 800	2 600	1 100	1 500
	300	102	**22328 CAME4**	1 450 000	1 590 000	1 700	2 400	1 200	1 500
150	225	56	**23030 CAME4**	590 000	815 000	2 600	3 600	1 400	1 800
	225	75	**24030 CAME4**	740 000	1 090 000	1 900	3 000	1 200	1 500
	250	80	**23130 CAME4**	905 000	1 180 000	2 200	2 800	1 100	1 400
	250	100	**24130 CAME4**	1 070 000	1 450 000	1 400	2 400	1 100	1 400
	270	73	**22230 CAME4**	955 000	1 120 000	2 400	3 000	1 300	1 600
	270	96	**23230 CAME4**	1 220 000	1 560 000	1 700	2 400	1 100	1 400
	320	108	**22330 CAME4**	1 530 000	1 690 000	1 600	2 200	1 100	1 400

Designations listed refer to NSKHPS spherical roller bearings with cylindrical bore. For a complete explanation of designations, including tapered bore bearings, refer to page 18.

Dimensions of oil grooves and holes, mm

NOMINAL BEARING WIDTH B over	NOMINAL BEARING WIDTH B incl.	OIL GROOVE WIDTH W	OIL HOLE DIAMETER d_{OH}
40	50	7	4
50	65	8	5
65	80	10	6
80	100	12	8
100	120	15	10



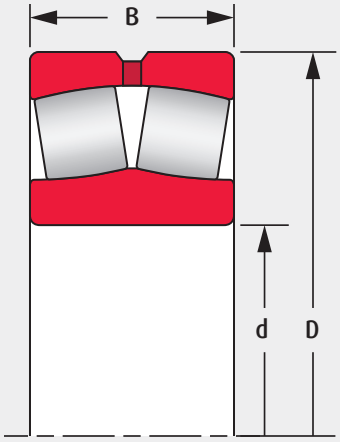
Number of oil holes

NOMINAL BEARING O.D. D over	NOMINAL BEARING O.D. D incl.	NUMBER OF HOLES
180	250	6
250	315	6
315	400	6

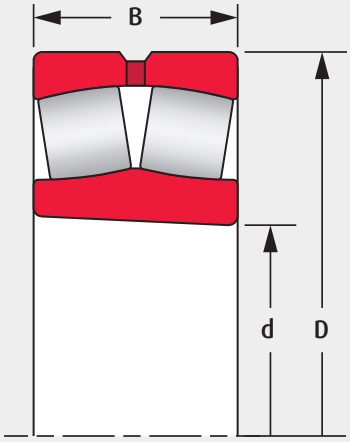
BOUNDARY DIMENSIONS mm d	D	B	BASIC BEARING No.	BASIC LOAD RATINGS N Dynamic	Static	SPEED RATINGS, min^{-1} Thermal Reference	Limiting Speed Mechanical	Grease	Oil
160	220	45	**23932 CAME4**	450 000	675 000	3 000	3 200	1 400	1 800
	240	60	**23032 CAME4**	675 000	955 000	2 400	3 200	1 300	1 700
	240	80	**24032 CAME4**	845 000	1 260 000	1 800	2 800	1 100	1 400
	270	86	**23132 CAME4**	1 070 000	1 400 000	2 000	2 600	1 000	1 300
	270	109	**24132 CAME4**	1 240 000	1 670 000	1 300	2 200	1 000	1 300
	290	80	**22232 CAME4**	1 140 000	1 320 000	2 200	2 800	1 200	1 500
	290	104	**23232 CAME4**	1 370 000	1 770 000	1 500	2 200	1 000	1 300
	340	114	**22332 CAME4**	1 700 000	1 900 000	1 400	2 200	1 100	1 300
170	230	45	**23934 CAME4**	450 000	680 000	3 000	3 600	1 400	1 800
	260	67	**23034 CAME4**	795 000	1 090 000	2 200	3 000	1 200	1 600
	260	90	**24034 CAME4**	1 030 000	1 520 000	1 600	2 400	1 000	1 300
	280	88	**23134 CAME4**	1 180 000	1 570 000	1 800	2 600	1 000	1 300
	280	109	**24134 CAME4**	1 280 000	1 770 000	1 200	2 200	1 000	1 300
	310	86	**22234 CAME4**	1 240 000	1 500 000	2 000	2 600	1 100	1 400
	310	110	**23234 CAME4**	1 500 000	1 910 000	1 400	2 200	900	1 200
	360	120	**22334 CAME4**	1 970 000	2 110 000	1 300	2 000	1 000	1 200

BEARING DIMENSIONS AND OPERATING VALUES

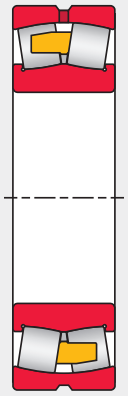
BORE DIAMETER: 180 - 220 MM



cylindrical bore



tapered bore



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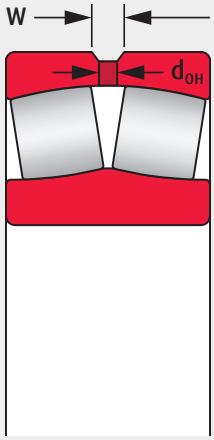
BOUNDARY DIMENSIONS			BASIC BEARING No.	BASIC LOAD RATINGS		SPEED RATINGS, min^{-1}			
mm				N		Thermal Reference	Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
180	250	52	**23936 CAME4**	590 000	890 000	2 600	3 000	1 200	1 600
	280	74	**23036 CAME4**	935 000	1 270 000	2 000	2 800	1 200	1 400
	280	100	**24036 CAME4**	1 210 000	1 750 000	1 500	2 200	950	1 200
	300	96	**23136 CAME4**	1 320 000	1 760 000	1 700	2 200	800	1 200
	300	118	**24136 CAME4**	1 490 000	2 040 000	1 100	2 000	900	1 200
	320	86	**22236 CAME4**	1 280 000	1 540 000	2 000	2 600	1 100	1 300
	320	112	**23236 CAME4**	1 620 000	2 110 000	1 300	2 000	850	1 100
	380	126	**22336 CAME4**	2 170 000	2 340 000	1 200	2 000	950	1 200
190	260	52	**23938 CAME4**	575 000	875 000	2 600	3 000	1 200	1 500
	290	75	**23038 CAME4**	970 000	1 350 000	2 000	2 600	1 100	1 400
	290	100	**24038 CAME4**	1 220 000	1 840 000	1 400	2 200	900	1 200
	320	104	**23138 CAME4**	1 480 000	2 020 000	1 600	2 200	850	1 100
	320	128	**24138 CAME4**	1 710 000	2 330 000	1 000	1 900	850	1 100
	340	92	**22238 CAME4**	1 420 000	1 730 000	1 800	2 400	1 000	1 200
	340	120	**23238 CAME4**	1 800 000	2 350 000	1 200	1 900	800	1 100
	400	132	**22338 CAME4**	2 370 000	2 590 000	1 200	1 900	900	1 100

Designations listed refer to NSKHPS spherical roller bearings with cylindrical bore. For a complete explanation of designations, including tapered bore bearings, refer to page 18.

Dimensions of oil grooves and holes, mm

NOMINAL BEARING WIDTH B		OIL GROOVE WIDTH	OIL HOLE DIAMETER
over	incl.	W	d_{OH}
50	**65**	8	5
65	**80**	10	6
80	**100**	12	8
100	**120**	15	10
120	**160**	20	12



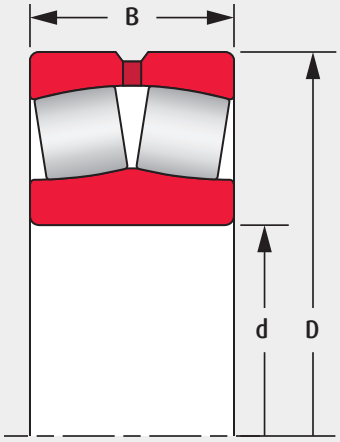
Number of oil holes

NOMINAL BEARING O.D. D		NUMBER OF HOLES
over	incl.	
180	**250**	6
250	**315**	6
315	**400**	6
400	**500**	6

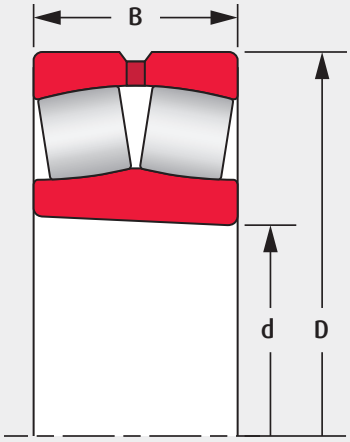
BOUNDARY DIMENSIONS mm			BASIC BEARING No.	BASIC LOAD RATINGS N		SPEED RATINGS, min^{-1} Thermal Reference			
							Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
200	280	60	**23940 CAME4**	710 000	1 060 000	2 400	2 600	1 100	1 400
	310	82	**23040 CAME4**	1 180 000	1 700 000	1 800	2 400	1 000	1 300
	310	109	**24040 CAME4**	1 420 000	2 120 000	1 300	2 000	850	1 100
	340	112	**23140 CAME4**	1 700 000	2 330 000	1 500	2 000	800	1 000
	340	140	**24140 CAME4**	1 960 000	2 660 000	950	1 800	800	1 000
	360	98	**22240 CAME4**	1 620 000	2 010 000	1 700	2 200	950	1 200
	360	128	**23240 CAME4**	2 070 000	2 750 000	1 100	1 800	750	1 000
	420	138	**22340 CAME4**	2 500 000	2 990 000	1 100	1 700	850	1 000
220	300	60	**23944 CAME4**	785 000	1 240 000	2 200	2 600	1 000	1 300
	340	90	**23044 CAME4**	1 360 000	1 980 000	1 600	2 200	950	1 200
	340	118	**24044 CAME4**	1 640 000	2 490 000	1 200	1 900	750	1 000
	370	120	**23144 CAME4**	1 960 000	2 710 000	1 300	1 800	710	950
	370	150	**24144 CAME4**	2 250 000	3 200 000	850	1 600	710	950
	400	108	**22244 CAME4**	1 960 000	2 430 000	1 500	2 000	850	1 000
	400	144	**23244 CAME4**	2 520 000	3 400 000	1 000	1 600	670	900
	460	145	**22344 CAME4**	2 940 000	3 400 000	950	1 600	750	950

BEARING DIMENSIONS AND OPERATING VALUES

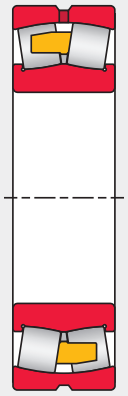
BORE DIAMETER: 240 - 300 MM



cylindrical bore



tapered bore



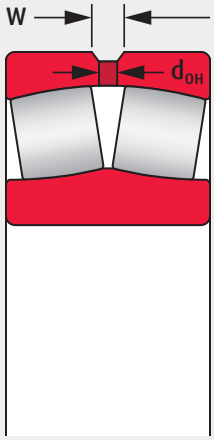
CAM

BOUNDARY DIMENSIONS			BASIC BEARING No.	BASIC LOAD RATINGS		SPEED RATINGS, min^{-1}			
mm				N		Thermal Reference	Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
240	320	60	**23948 CAME4**	795 000	1 300 000	1 900	2 600	950	1 200
	360	92	**23048 CAME4**	1 450 000	2 140 000	1 500	2 200	850	1 100
	360	118	**24048 CAME4**	1 730 000	2 730 000	1 100	1 800	710	950
	400	128	**23148 CAME4**	2 230 000	3 100 000	1 200	1 700	670	850
	400	160	**24148 CAME4**	2 660 000	3 800 000	750	1 500	670	850
	440	120	**22248 CAME4**	2 340 000	2 890 000	1 400	1 800	750	950
	440	160	**23248 CAME4**	3 050 000	4 050 000	850	1 500	630	800
	500	155	**22348 CAME4**	3 250 000	3 800 000	850	1 500	670	850
260	360	75	**23952 CAME4**	1 170 000	1 870 000	1 800	2 200	850	1 000
	400	104	**23052 CAME4**	1 780 000	2 580 000	1 300	1 900	800	950
	400	140	**24052 CAME4**	2 270 000	3 500 000	950	1 600	630	850
	440	144	**23152 CAME4**	2 700 000	3 750 000	1 100	1 500	600	800
	440	180	**24152 CAME4**	3 200 000	4 700 000	630	1 300	600	800
	480	130	**22252 CAME4**	2 720 000	3 400 000	1 200	1 700	670	850
	480	174	**23252 CAME4**	3 400 000	4 550 000	800	1 400	560	750
	540	165	**22352 CAME4**	3 900 000	4 600 000	750	1 400	630	800

Designations listed refer to NSKHPS spherical roller bearings with cylindrical bore. For a complete explanation of designations, including tapered bore bearings, refer to page 18.

Dimensions of oil grooves and holes, mm

NOMINAL BEARING WIDTH		OIL GROOVE WIDTH	OIL HOLE DIAMETER
B			
over	incl.	W	d_{OH}
50	65	8	5
65	80	10	6
80	100	12	8
100	120	15	10
120	160	20	12
160	200	25	15



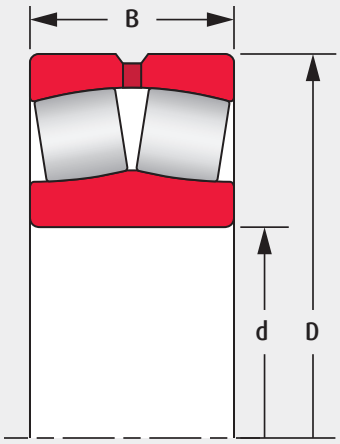
Number of oil holes

NOMINAL BEARING O.D.		NUMBER OF HOLES
D		
over	incl.	
315	400	6
400	500	6
500	630	8

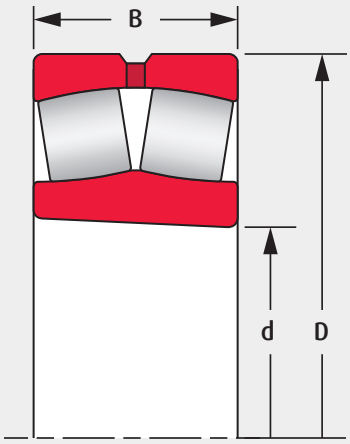
BOUNDARY DIMENSIONS			BASIC BEARING No.	BASIC LOAD RATINGS		SPEED RATINGS, min^{-1}			
mm				N		Thermal Reference	Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
280	380	75	23956 CAME4	1 160 000	1 950 000	1 600	2 000	800	950
	420	106	23056 CAME4	1 930 000	2 950 000	1 200	1 800	710	900
	420	140	24056 CAME4	2 350 000	3 800 000	850	1 500	600	800
	460	146	23156 CAME4	2 790 000	4 000 000	1 000	1 500	560	750
	460	180	24156 CAME4	3 300 000	5 000 000	600	1 300	560	750
	500	130	22256 CAME4	2 850 000	3 650 000	1 100	1 600	630	800
	500	176	23256 CAME4	3 600 000	4 900 000	750	1 300	530	670
	580	175	22356 CAME4	4 350 000	5 150 000	670	1 300	560	710
300	420	90	23960 CAME4	1 540 000	2 490 000	1 500	1 800	710	900
	460	118	23060 CAME4	2 400 000	3 700 000	1 100	1 600	670	850
	460	160	24060 CAME4	2 890 000	4 600 000	800	1 400	530	710
	500	160	23160 CAME4	3 350 000	4 800 000	900	1 400	500	670
	500	200	24160 CAME4	3 900 000	5 800 000	530	1 200	500	670
	540	140	22260 CAME4	3 250 000	4 250 000	1 000	1 500	600	750
	540	192	23260 CAME4	4 250 000	5 900 000	670	1 200	480	630

BEARING DIMENSIONS AND OPERATING VALUES

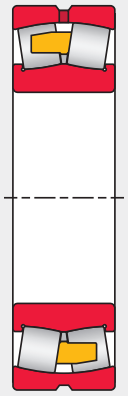
BORE DIAMETER: 320 - 420 MM



cylindrical bore



tapered bore



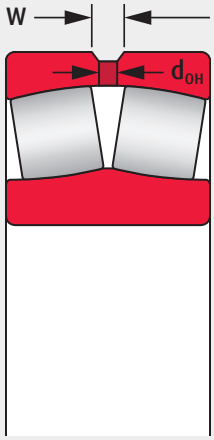
CAM

BOUNDARY DIMENSIONS			BASIC BEARING No.	BASIC LOAD RATINGS		SPEED RATINGS, min^{-1}			
mm				N		Thermal Reference	Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
320	440	90	**23964 CAME4**	1 620 000	2 750 000	1 400	1 700	670	850
	480	121	**23064 CAME4**	2 450 000	3 850 000	1 000	1 600	630	800
	480	160	**24064 CAME4**	3 050 000	5 050 000	710	1 300	500	670
	540	176	**23164 CAME4**	3 850 000	5 500 000	800	1 300	480	600
	540	218	**24164 CAME4**	4 400 000	6 650 000	480	1 100	480	600
	580	150	**22264 CAME4**	3 750 000	4 850 000	950	1 400	530	670
	580	208	**23264 CAME4**	4 850 000	6 900 000	600	1 100	450	600
340	460	90	**23968 CAME4**	1 670 000	2 840 000	1 300	1 700	630	800
	520	133	**23068 CAME4**	2 850 000	4 400 000	950	1 500	560	710
	520	180	**24068 CAME4**	3 650 000	6 050 000	670	1 200	480	600
	580	190	**23168 CAME4**	4 500 000	6 600 000	710	1 200	430	560
	580	243	**24168 CAME4**	5 300 000	7 900 000	450	1 000	430	560
360	480	90	**23972 CAME4**	1 730 000	3 050 000	1 200	1 700	600	750
	540	134	**23072 CAME4**	2 990 000	4 700 000	900	1 400	530	670
	540	180	**24072 CAME4**	3 650 000	6 100 000	630	1 200	450	600
	600	192	**23172 CAME4**	4 800 000	7 100 000	670	1 100	400	530
	600	243	**24172 CAME4**	5 250 000	8 000 000	430	1 000	400	530

Designations listed refer to NSKHPS spherical roller bearings with cylindrical bore. For a complete explanation of designations, including tapered bore bearings, refer to page 18.

Dimensions of oil grooves and holes, mm

NOMINAL BEARING WIDTH		OIL GROOVE WIDTH	OIL HOLE DIAMETER
B			
over	incl.	W	d_{OH}
80	**100**	12	8
100	**120**	15	10
120	**160**	20	12
160	**200**	25	15
200	**250**	30	20



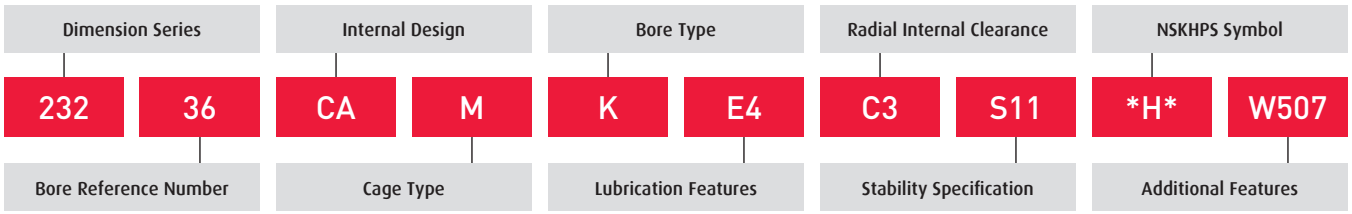
Number of oil holes

NOMINAL BEARING O.D.		NUMBER OF HOLES
D		
over	incl.	
400	**500**	6
500	**630**	8

BOUNDARY DIMENSIONS			BASIC BEARING No.	BASIC LOAD RATINGS		SPEED RATINGS, min^{-1}			
mm				N		Thermal Reference	Limiting Speed		
d	D	B		Dynamic	Static		Mechanical	Grease	Oil
380	520	106	**23976 CAME4**	2 340 000	4 100 000	1 100	1 500	530	670
	560	135	**23076 CAME4**	3 150 000	5 100 000	850	1 400	530	630
	560	180	**24076 CAME4**	3 850 000	6 600 000	600	1 200	430	560
400	540	106	**23980 CAME4**	2 370 000	4 250 000	1 000	1 400	530	630
	600	148	**23080 CAME4**	3 700 000	5 900 000	800	1 300	480	600
	600	200	**24080 CAME4**	4 500 000	7 600 000	560	1 100	400	500
420	560	106	**23984 CAME4**	2 340 000	4 250 000	1 000	1 400	500	600

DESIGNATION SYSTEM

NSKHPS SPHERICAL ROLLER BEARINGS



DESIGNATION		ATTRIBUTE
Dimension Series	213	extra heavy duty type
	222	medium duty type
	223	heavy duty type
	230	very light duty type
	231	light duty type
	232	medium duty type, wide
	239	extra-light duty type
	240	very light duty type, wide
	241	light duty type, wide
Bore Reference Number		multiply x 5 for bearing bore diameter in millimeters
Internal Design	EA	high capacity design, steel cage
	CA	high capacity design, brass cage
Cage Type	blank	pressed steel cage
	M	machined brass cage
Bore Type	blank	cylindrical bore
	K	1:12 tapered bore
	K30	1:30 tapered bore
Lubrication Features	E4	lubrication groove and holes in the outer ring
	E7	lubrication groove and holes in the inner and outer ring

DESIGNATION		ATTRIBUTE
Radial Internal Clearance	C2	less than normal clearance
	blank	normal clearance (CN)
	C3	greater than normal clearance
	C4	greater than C3
	C5	greater than C4
Stability Specification	S11	dimensionally stabilized up to 200°C, normally omitted from the aftermarket part number
NSKHPS Symbol	*H*	High Performance Standard
Additional Features	W31	special inspection measure of superior raceway finish + upgraded packaging
	W507	W31 + E4 + S11 (with E4 and S11 omitted from the part number)
	W509	W31 + E7 + S11 (with E7 and S11 omitted from the part number)

RANGE OF AVAILABILITY

DIMENSION SERIES AND BORE SIZE

NSK

NSK

NSK AMERICAS

UNITED STATES
NSK Corporation
Ann Arbor MI
1.888.446.5675

CANADA
NSK Canada Inc.
Brampton ON
1.905.890.9740

MEXICO
NSK Rodamientos Mexicana,
S.A. de C.V.
Silao Guanajuato MX
52.472.500.9500

BRAZIL
NSK Brasil Ltda.
Suzano SP
55.11.4744.2500

ARGENTINA
NSK Argentina SRL
Buenos Aires
54.11.4704.5100

LATIN AMERICA
NSK Latin America Inc.
Miramar FL
1.305.477.0605

Website: www.nsk.com/am-en
NSK Global: www.nsk.com

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