NSK

NSKHPS HIGH PERFORMANCE STANDARD

CYLINDRICAL & SPHERICAL ROLLER BEARINGS

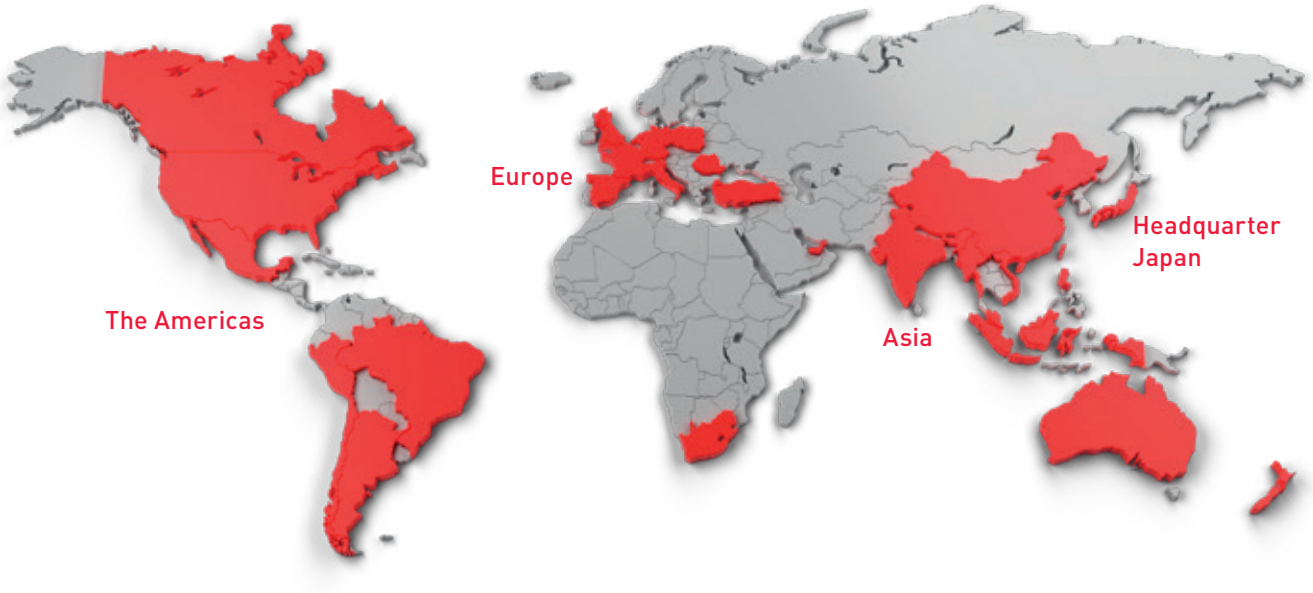


BRANDS OF **NSK EUROPE**

NSK RHP *bearings* PPL

OUR MOST IMPORTANT PRODUCT: OUR CUSTOMERS' STATISFACTION

We are among the leading manufacturers for rolling bearings, linear technology components and steering systems worldwide. We can be found on almost every continent – with production facilities, sales offices and technology centres – because our customers appreciate short decision-making channels, prompt deliveries and local service.



The NSK company

NSK commenced operations as the first Japanese manufacturer of rolling bearings back in 1916. Ever since, we have been continuously expanding and improving not only our product portfolio but also our range of services for various industrial sectors. In this context our worlwide research and production facilities are linked together in a global network. Here we concentrate not only on the development of new technologies, but also on the continuous optimisation of quality – at every process stage. Among other things, our research activities include product design, simulation applications using a variety of analytical systems and the development of different steels and lubricants for rolling bearings.

More about NSK under: www.nsk.com/eu-en/

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INTRODUCTION TO NSKHPS

NSK Roller Bearings

Extreme heavy and impact loads in steelmaking, mining and construction. Extreme speeds and high heat in papermaking. NSK roller bearings are employed in a vast array of applications, operating with high rigidity, high radial load capacity and high-speed performance. Extreme reliability where and when unexpected machine and equipment downtime is intolerable.

For the spherical roller bearings and cylindrical 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. That measure of differentiation is achieved by better manufacturing processes, better material technology, better design fundamentals. That differentiation is NSKHPS Roller Bearings.



Performance you can count on

NSKHPS Roller Bearings are the synthesis of NSK technologies, with material engineering, tribology, mechanical design and advanced manufacturing engaged and applied. NSKHPS deliver a high-performance standard for load capacities and operating life. Featuring cage design options to suit a wide range of general to heavy-duty applications, these bearings accommodate high loads and high speeds with superior roller guidance and extra-capacity performance, low running noise and reduced heat generation.
The outcome are roller bearings engineered to significantly outperform and outlast conventional iterations, meeting industry's ever-increasing challenges with significant and proven advantages:

- Longer and reliable operating life
- Higher dynamic load-carrying capacity
- Higher limiting speeds
- High temperature dimensional stability
- Improved lubricant flow promotes lower running temperature and low noise
- Higher permissible misalignment
- Downsizing potential with no machine capacity loss

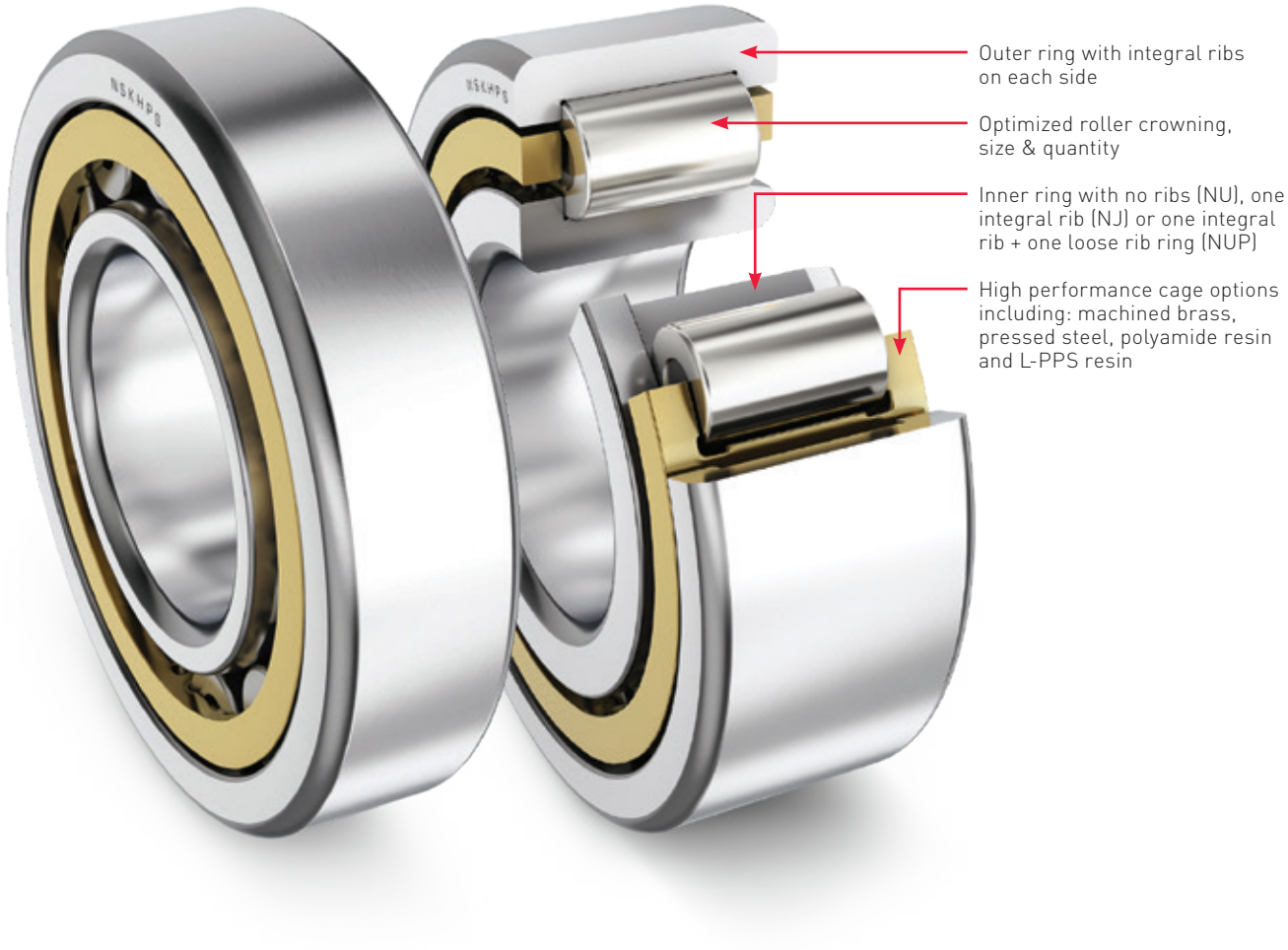




CYLINDRICAL ROLLER BEARINGS

DESIGN FEATURES AND OPERATING ADVANTAGES

NSKHPS Cylindrical Roller Bearings have an optimized internal design that delivers higher load carrying capacity. Under conventional application conditions this translates into longer operating life with reduced maintenance intervals, but also facilitates downsizing the design envelope for certain applications.

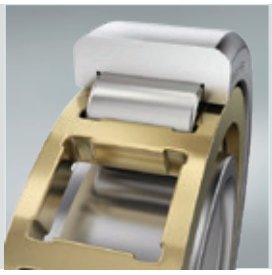


Design features

- Extra-capacity internal design with optimized size and quantity of rollers
- Available in three standard cylindrical roller bearing types:
- NU - allows axial displacement in both directionss
- NJ - locates the shaft axially in one direction
- NUP - locates the shaft axially in both directions
- Special roller crowning to reduce edge loading
- Cage material options suited to a wide variety of applications
- For dimensional series 2, 22, 3, 23
- Available for bore diameters from 25 to 220 mm
- With C-Normal, C3 and C4 clearance

CAGE OPTIONS

Cage selection can have a significant impact on rolling bearing performance. Operating stresses inherent to the application should be carefully considered. For our NSKHPS Cylindrical Roller Bearings, NSK offers cage material options suited to a wide array of applications.



Machined Brass Cage (EM)

- Heavy duty, one-piece, roller guided cage suitable for high loads, high speeds and high temperatures
- Cage pocket profiling relieves stress concentration and achieves accurate roller guidance with low noise and low temperature rise
- Promotes optimal oil film formation and lubricant flow



Pressed Steel Cage (EW)

- High strength, one-piece, window-type cage suitable for high loads, high speeds and high temperatures
- Cage design supports maximum rigidity and low noise in operation



Polyamide Resin Cage (ET)

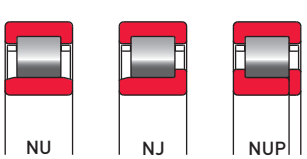
- Well suited to light / standard duty applications with high speeds
- For operating temperatures ranging from -40 to 120°C



L-PPS Resin Cage (ET7)

- Ideally developed for scroll and screw compressor applications
- Exceptional resistance to oil and chemicals
- Abrasion resistant
- Dimensional stability at temperatures as high as 200° C

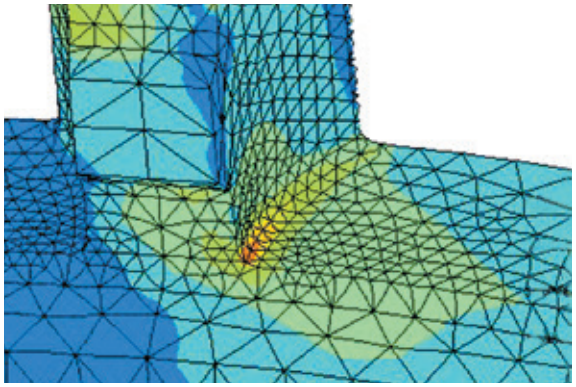
Range of availability - cage type

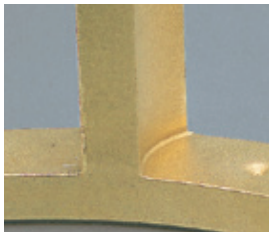
Bearing Type	Cage Type	EM	EW	ET	ET7
	Series	Machined Brass	Pressed Steel	Polyamide Resin	L-PPS Resin
	200	205 to 244	205 to 213	205 to 219	205 to 218
	2200	2205 to 2240	-	2205 to 2219	2205 to 2218
	300	305 to 332	305 to 311	305 to 316	305 to 316
	2300	2305 to2330	-	2305 to 2316	2305 to 2316

EM SERIES – RESULTS OF FEM ANALYSIS

Tests confirm that the stress levels of EM series cages are 50% lower than M Series.

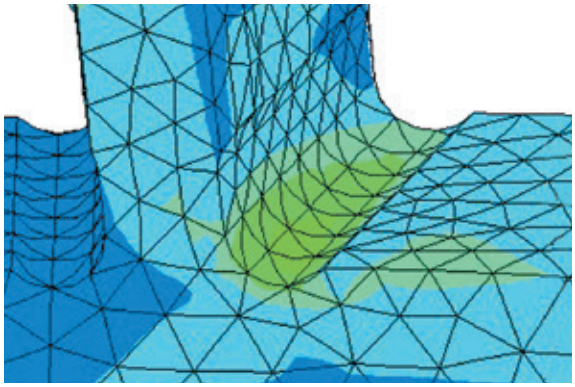
M Series

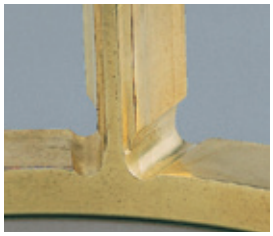




Maximum stress: 210 MPa

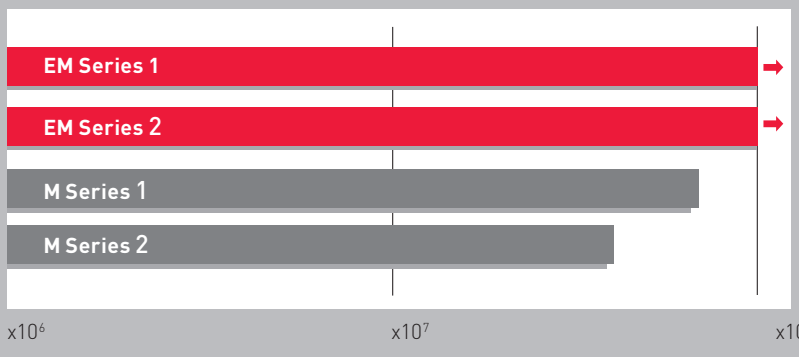
EM Series



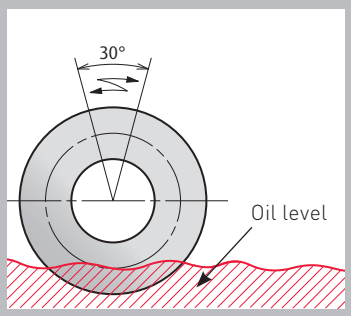


Maximum stress: 110 MPa

Cage strength test results



- Number of oscillations until breakage
- Number of oscillations until rivets loosen
- No breakage and test discontinued

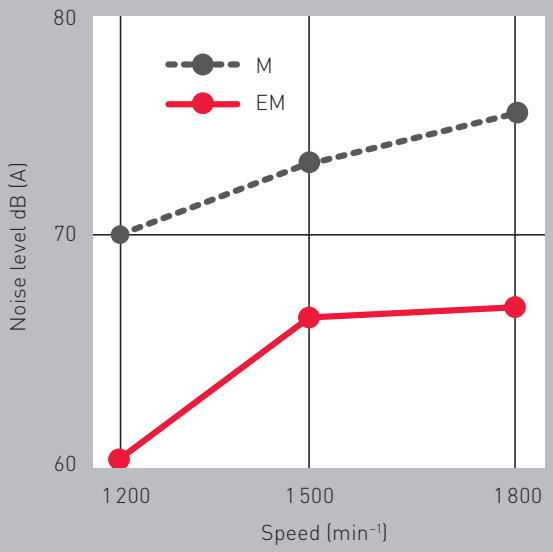


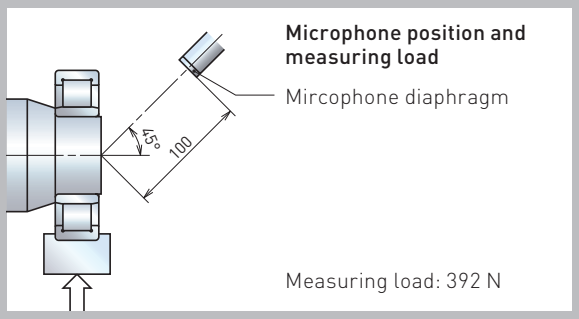
Test conditions

Test bearing:	NU308
Oscillation angle:	30°
Radial load:	7,4 kN
Lubrication method:	Oil bath

The tests confirm the EM series cages performance and strength.

Noise measurement test results





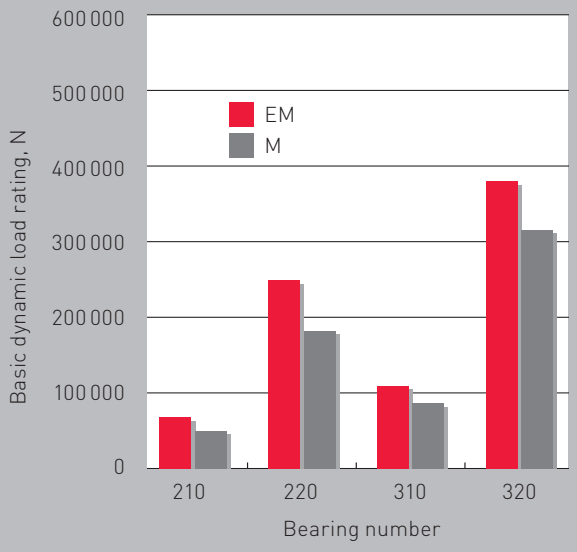
Measuring conditions

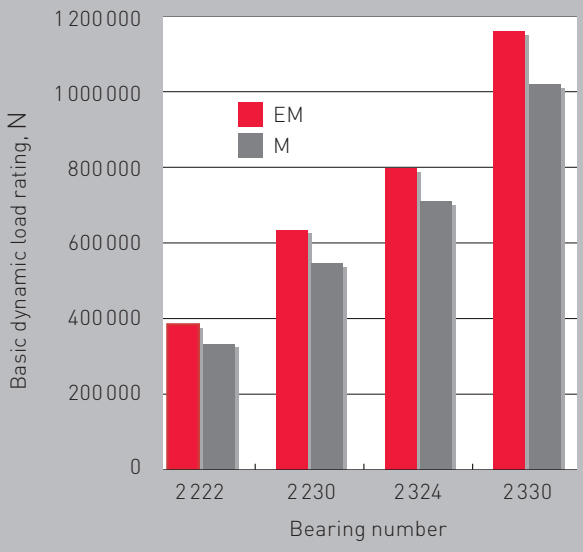
Bearing number: NU308
Method: JIS B1 548
Radial load: 392 N
Speed: 1 200 - 1 800 min^{-1}

The EM series exhibited noise levels 5 dB lower than two-piece cage designs.

Higher Load Rating

Comparison of dynamic load rating C_r



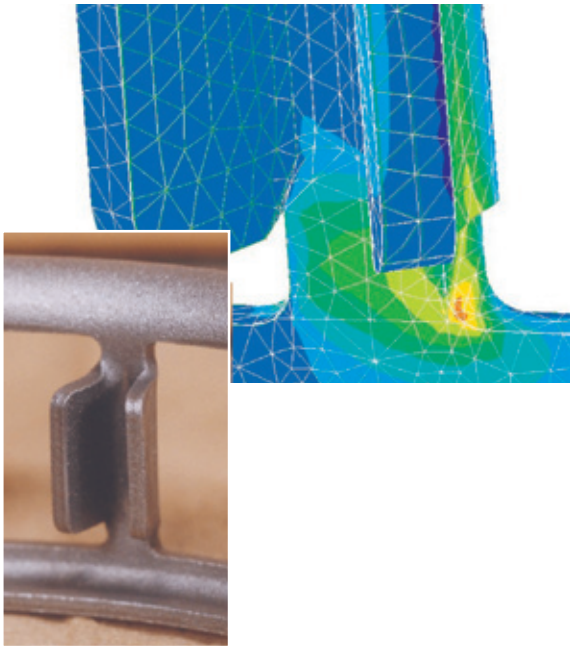


The EM series benefits from a 30% higher load-carrying capacity than the conventional M series.

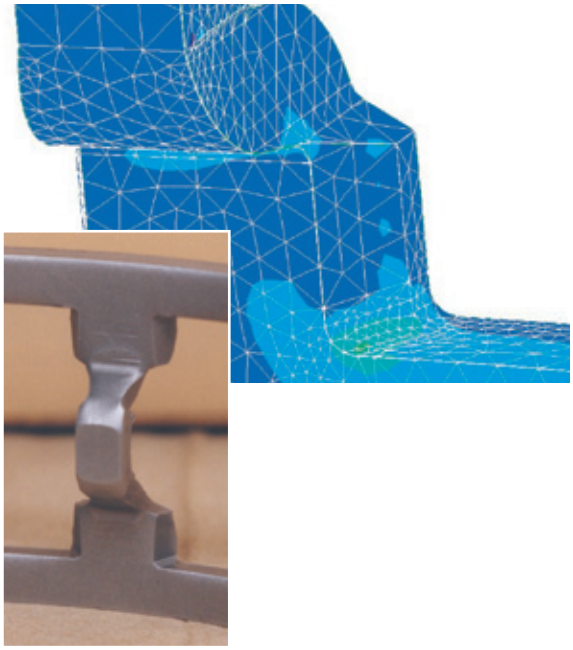
EW SERIES – RESULTS OF FEM ANALYSIS

Tests confirm that the stress levels of NSK's EW series cages are 40% lower than that of cages in conventional W Series.

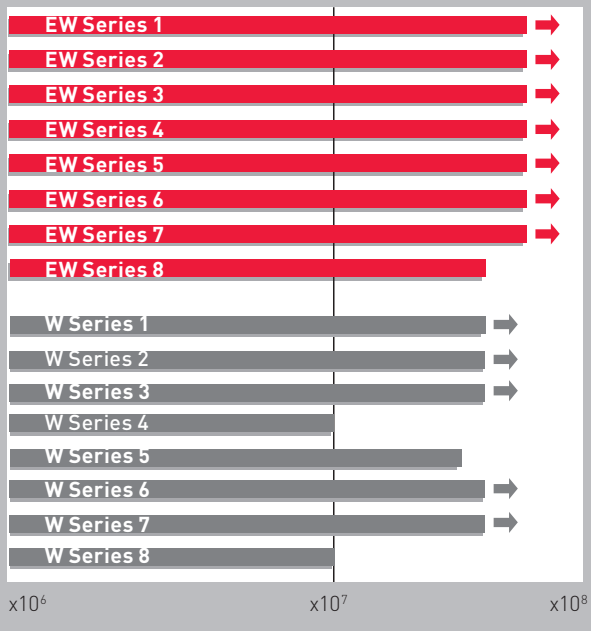
W Series

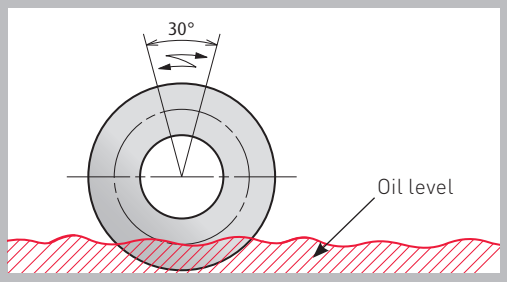


EW Series



Cage strength test results





Test conditions

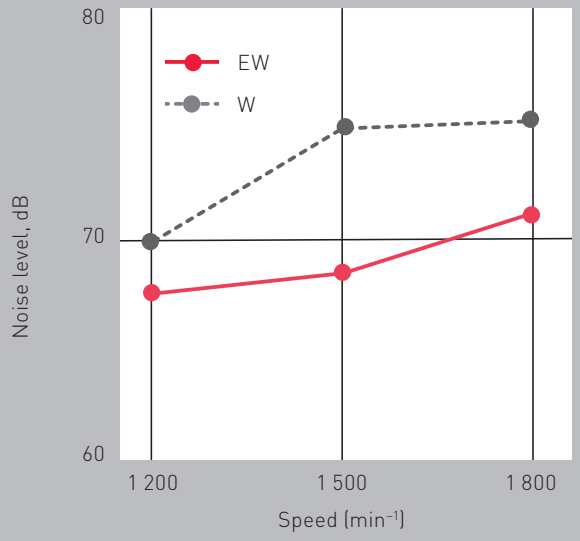
Test bearing:	NU308
Oscillating angle:	30°
Radial load:	7,4 kN
Lubrication method:	oil bath

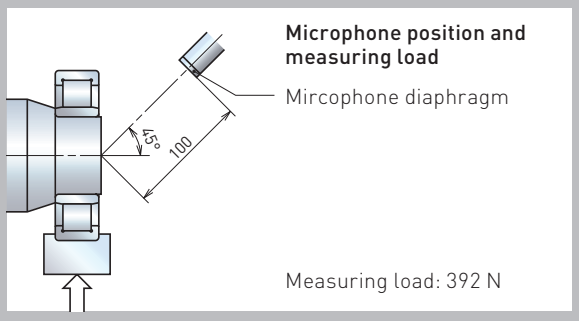
Number of oscillations until breakages

No breakage and Test discontinued

The tests confirm the EW series cage performance and strength.

Noise measurements test results





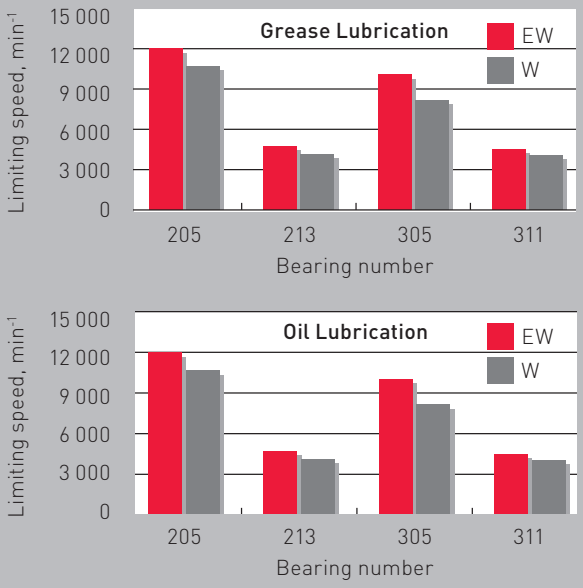
Measuring conditions

Bearing number: NU308
Method: JIS B1 548
Radial load: 392 N
Speed: 1 200 - 1 800 min^{-1}

The EW Series is 3 to 7 dB quieter than W series.

Higher Limiting Speed

Comparison of limiting speed



The limiting speed of the EW Series is 10 - 25% higher than that of conventional W Series.

Higher Load Rating

Comparison of dynamic load rating C_r



The load rating of the EW Series is 10 - 60% higher than that of conventional W Series.

CYLINDRICAL ROLLER BEARINGS

BEARING DIMENSIONS

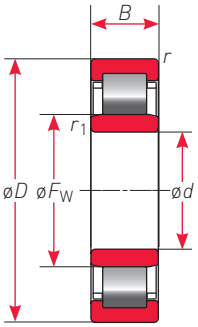


Wide Range Lineup

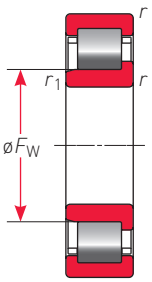
BEARING NOMENCLATURE

Example: NU3 | 08 | E | T7 | C3 | &

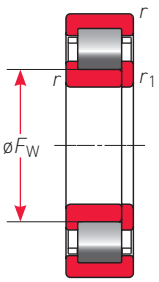
NU3	Bearing Series	NU2, NU22, NU3, NU23 NJ2, NJ22, NJ3, NJ23 : Cylindrical Roller Bearings NUP2, NUP22, NUP3, NUP23
08	Bore Reference	Bore number indicates bore diameter. Bore Number × 5 (mm)
E	Internal Design	E: High Load Capacity
T7	Cage Type	W: Pressed Steel Cage M: Machined Brass Cage T: Polyamide Resin Cage T7: L-PPS Resin Cage
C3	Internal Radial Clearance	Omitted: CN Clearance C3: Clearance Greater than CN C4: Clearance Greater than C3
&	NSKHPS	&: NSKHPS Bearings



NU



NJ



NUP

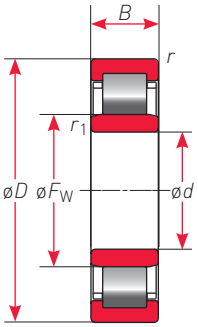
Bearing Numbers★						Boundary Dimensions (mm)						Basic Load Ratings (kN)		Speeds (min^{-1})			Permissible Axial Movement S (mm)
Basic Number & Internal Design	Cage				NSKHPS	d	D	B	r (min.)	r_1 (min.)	F_w	C_r	C_{0r}	Thermal Reference Speed	Limiting Speeds		
	W	M	T	T7											Mechanical	Grease	
NU205E	✱	✱	✱	✱	&	25	52	15	1	0.6	31.5	33.5	27.7	14 000	17 000	12 000	1.2
NU2205E		✱	✱	✱	&		52	18	1	0.6	31.5	40	34.5	14 000	20 000	12 000	1.2
NU305E	✱	✱	✱	✱	&		62	17	1.1	1.1	34	48	37.5	11 000	15 000	10 000	1.2
NU2305E		✱	✱	✱	&		62	24	1.1	1.1	34	65.5	56	11 000	18 000	9 000	1.2
NU206E	✱	✱	✱	✱	&	30	62	16	1	0.6	37.5	45	37.5	12 000	14 000	9 500	1.2
NU2206E		✱	✱	✱	&		62	20	1	0.6	37.5	56.5	50	12 000	17 000	9 500	1.2
NU306E	✱	✱	✱	✱	&		72	19	1.1	1.1	40.5	61	50	9 500	13 000	8 500	1.2
NU2306E		✱	✱	✱	&		72	27	1.1	1.1	40.5	86	77.5	9 500	16 000	8 000	1.2
NU207E	✱	✱	✱	✱	&	35	72	17	1.1	0.6	44	58	50	10 000	12 000	8 500	1.2
NU2207E		✱	✱	✱	&		72	23	1.1	0.6	44	71	65.5	11 000	15 000	8 500	2.2
NU307E	✱	✱	✱	✱	&		80	21	1.5	1.1	46.2	76.5	65.5	8 500	11 000	7 500	1.2
NU2307E		✱	✱	✱	&		80	31	1.5	1.1	46.2	107	101	9 000	14 000	6 700	1.2
NU208E	✱	✱	✱	✱	&	40	80	18	1.1	1.1	49.5	64	55.5	9 000	11 000	7 500	1.2
NU2208E		✱	✱	✱	&		80	23	1.1	1.1	49.5	83	77.5	9 000	13 000	7 500	1.2
NU308E	✱	✱	✱	✱	&		90	23	1.5	1.5	52	95.5	81.5	7 500	10 000	6 700	1.2
NU2308E		✱	✱	✱	&		90	33	1.5	1.5	52	131	122	8 000	12 000	6 000	1.2
NU209E	✱	✱	✱	✱	&	45	85	19	1.1	1.1	54.5	72.5	66.5	8 500	10 000	6 700	1.2
NU2209E		✱	✱	✱	&		85	23	1.1	1.1	54.5	87.5	84.5	8 500	12 000	6 700	1.2
NU309E	✱	✱	✱	✱	&		100	25	1.5	1.5	58.5	112	98.5	7 100	9 000	6 000	1.4
NU2309E		✱	✱	✱	&		100	36	1.5	1.5	58.5	158	153	7 100	11 000	5 300	1.4
NU210E	✱	✱	✱	✱	&	50	90	20	1.1	1.1	59.5	79.5	76.5	8 000	9 000	6 300	1.7
NU2210E		✱	✱	✱	&		90	23	1.1	1.1	59.5	96	97	7 500	11 000	6 300	1.2
NU310E	✱	✱	✱	✱	&		110	27	2	2	65	127	113	6 700	8 000	5 000	1.4
NU2310E		✱	✱	✱	&		110	40	2	2	65	187	187	6 700	10 000	5 000	1.9
NU211E	✱	✱	✱	✱	&	55	100	21	1.5	1.1	66	99	98.5	6 700	8 500	5 600	1.2
NU2211E		✱	✱	✱	&		100	25	1.5	1.1	66	117	122	6 700	10 000	5 600	1.2
NU311E	✱	✱	✱	✱	&		120	29	2	2	70.5	158	143	6 000	7 500	4 500	1.4
NU2311E		✱	✱	✱	&		120	43	2	2	70.5	231	233	6 000	9 000	4 500	1.4

✱ Available cage
★ NJ and NUP type bearings are available. Please consult NSK.

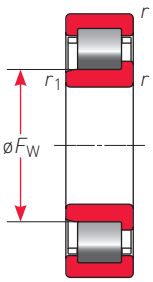
CYLINDRICAL ROLLER BEARINGS

Bearing Numbers*						Boundary Dimensions (mm)						Basic Load Ratings (kN)		Speeds (min^{-1})			Permissible Axial Movement S (mm)
Basic Number & Internal Design	Cage				NSKHPS	d	D	B	$r_{(min.)}$	$r_{1(min.)}$	F_w	C_r	C_{0r}	Thermal Reference Speed	Limiting Speeds		
	W	M	T	T7											Mechanical	Grease	
NU212E	*	*	*	*	&	60	110	22	1.5	1.5	72	112	107	6 300	7 500	5 300	1.2
NU2212E		*	*	*	&		110	28	1.5	1.5	72	151	157	6 300	9 500	5 300	1.2
NU312E		*	*	*	&		130	31	2.1	2.1	77	169	157	5 600	9 500	4 800	1.5
NU2312E		*	*	*	&		130	46	2.1	2.1	77	251	262	5 600	8 500	4 300	1.5
NU213E	*	*	*	*	&	65	120	23	1.5	1.5	78.5	124	119	6 000	7 100	4 800	1.4
NU2213E		*	*	*	&		120	31	1.5	1.5	78.5	171	181	6 000	8 500	4 800	1.4
NU313E		*	*	*	&		140	33	2.1	2.1	82.5	204	191	5 300	8 500	4 300	1.5
NU2313E		*	*	*	&		140	48	2.1	2.1	82.5	263	265	5 600	7 500	3 800	1.5
NU214E		*	*	*	&	70	125	24	1.5	1.5	83.5	136	137	5 600	9 000	5 000	1.4
NU2214E		*	*	*	&		125	31	1.5	1.5	83.5	179	194	5 600	8 000	4 500	1.4
NU314E		*	*	*	&		150	35	2.1	2.1	89	231	222	4 800	8 000	4 000	1.5
NU2314E		*	*	*	&		150	51	2.1	2.1	89	310	325	5 000	7 100	3 600	1.5
NU216E		*	*	*	&	80	140	26	2	2	95.3	160	167	5 000	8 000	4 500	1.4
NU2216E		*	*	*	&		140	33	2	2	95.3	214	243	5 000	7 100	4 000	1.4
NU316E		*	*	*	&		170	39	2.1	2.1	101	289	282	4 300	7 100	3 600	1.5
NU2316E		*	*	*	&		170	58	2.1	2.1	101	400	430	4 500	6 300	3 200	1.5
NU217E		*	*	*	&	85	150	28	2	2	100.5	192	199	4 800	7 500	4 300	1.3
NU2217E		*	*	*	&		150	36	2	2	100.5	250	279	4 800	6 700	3 800	1.3
NU317E		*			&		180	41	3	3	108	360	330	4 000	6 700	3 400	2.0
NU2317E		*			&		180	60	3	3	108	485	485	4 300	6 000	3 000	1.6
NU218E		*	*	*	&	90	160	30	2	2	107	205	217	4 800	7 100	4 000	1.4
NU2218E		*	*	*	&		160	40	2	2	107	274	315	4 800	6 300	3 600	1.9
NU318E		*			&		190	43	3	3	113.5	390	355	4 000	6 300	3 200	1.5
NU2318E		*			&		190	64	3	3	113.5	535	535	4 000	5 600	2 800	3.1
NU219E		*	*		&	95	170	32	2.1	2.1	112.5	249	265	4 300	6 700	3 800	1.4
NU2219E		*	*		&		170	43	2.1	2.1	112.5	325	370	4 500	6 000	3 400	1.4
NU319E		*			&		200	45	3	3	121.5	410	385	3 800	6 000	3 000	1.5
NU2319E		*			&		200	67	3	3	121.5	565	585	3 800	5 300	2 600	1.6
NU220E		*			&	100	180	34	2.1	2.1	119	305	305	4 300	6 300	3 600	1.4
NU2220E		*			&		180	46	2.1	2.1	119	410	445	4 300	5 600	3 200	1.4
NU320E		*			&		215	47	3	3	127.5	465	425	3 600	5 600	2 800	1.8
NU2320E		*			&		215	73	3	3	127.5	700	715	3 400	5 000	2 400	1.8
NU221E		*			&	105	190	36	2.1	2.1	125	320	310	4 300	6 000	3 400	1.4
NU321E		*			&		225	49	3	3	133	525	480	3 400	5 300	2 600	1.8
NU222E		*			&	110	200	38	2.1	2.1	132.5	360	365	4 000	5 600	3 200	1.4
NU2222E		*			&		200	53	2.1	2.1	132.5	470	515	4 000	5 000	2 800	1.4
NU322E		*			&		240	50	3	3	143	555	525	3 200	5 000	2 600	3.8
NU2322E		*			&		240	80	3	3	143	830	880	3 000	4 500	2 200	3.3

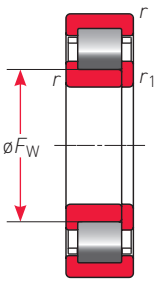
* Available cage
★ NJ and NUP type bearings are available. Please consult NSK.



NU



NJ



NUP

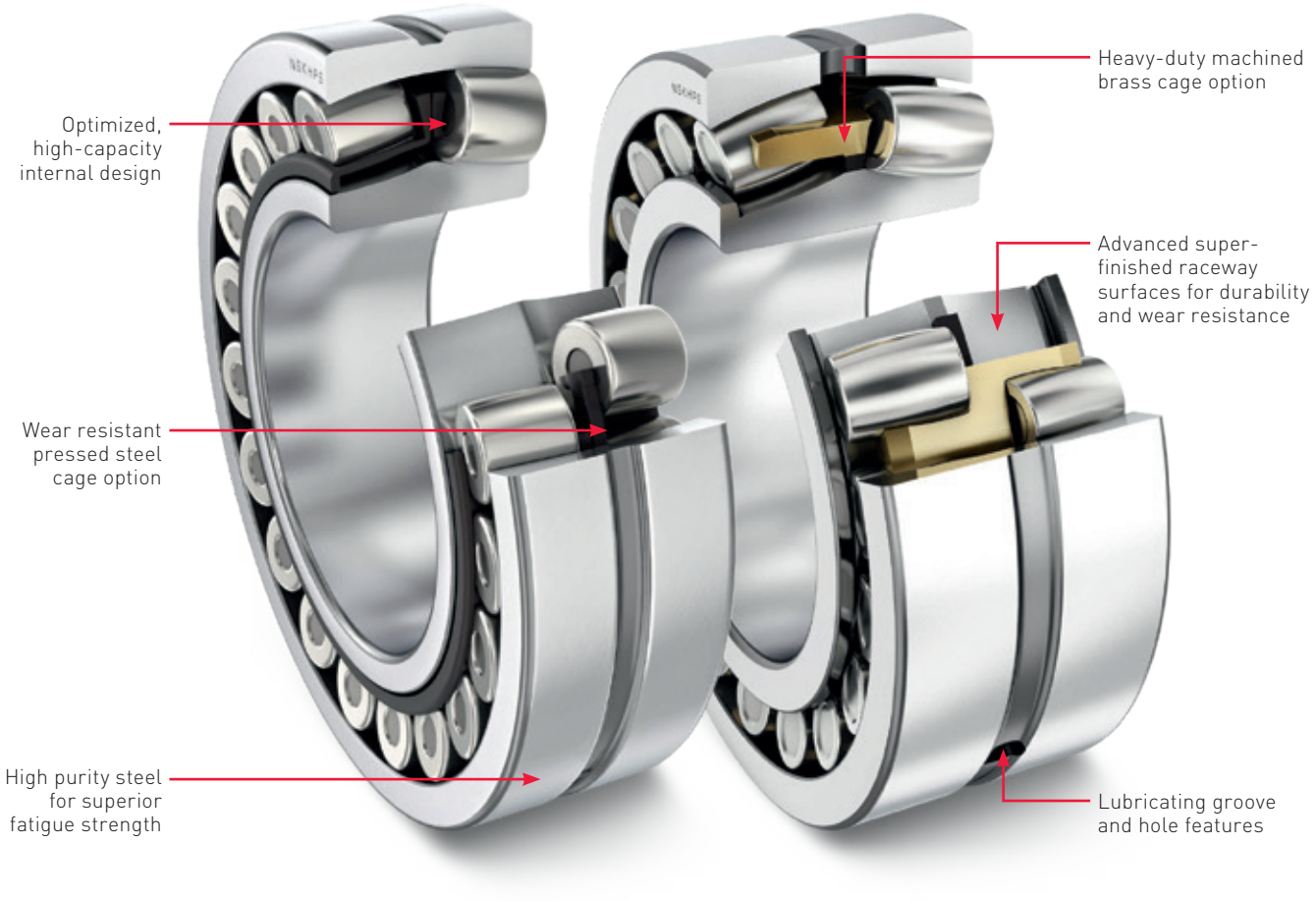
Bearing Numbers★						Boundary Dimensions (mm)						Basic Load Ratings (kN)		Speeds (min^{-1})			Permissible Axial Movement S (mm)
Basic Number & Internal Design	Cage				NSKHPS	d	D	B	r (min.)	r_1 (min.)	F_w	C_r	C_{0r}	Thermal Reference Speed	Limiting Speeds		
	W	M	T	T7											Mechanical	Grease	
NU224E		✱			&	120	215	40	2.1	2.1	143.5	410	420	3 600	5 300	3 000	1.5
NU2224E		✱			&		215	58	2.1	2.1	143.5	555	620	3 600	4 800	2 600	2.0
NU324E		✱			&		260	55	3	3	154	650	610	2 800	4 800	2 200	1.8
NU2324E		✱			&		260	86	3	3	154	975	1 030	2 600	4 300	2 000	2.8
NU226E		✱			&	130	230	40	3	3	153.5	445	455	3 400	5 000	2 600	1.5
NU2226E		✱			&		230	64	3	3	153.5	650	735	3 400	4 500	2 400	3.0
NU326E		✱			&		280	58	4	4	167	760	735	2 600	4 300	2 200	2.3
NU2326E		✱			&		280	93	4	4	167	1 130	1 230	2 400	3 800	1 900	2.3
NU228E		✱			&	140	250	42	3	3	169	485	515	3 200	4 500	2 400	1.5
NU2228E		✱			&		250	68	3	3	169	675	790	3 200	4 000	2 200	2.5
NU328E		✱			&		300	62	4	4	180	815	795	2 400	4 000	2 000	3.3
NU2328E		✱			&		300	102	4	4	180	1 250	1 380	2 200	2 600	1 700	2.8
NU230E		✱			&	150	270	45	3	3	182	550	595	2 800	4 300	2 200	1.5
NU2230E		✱			&		270	73	3	3	182	780	930	2 800	3 800	2 000	3.0
NU330E		✱			&		320	65	4	4	193	930	920	2 200	3 800	1 800	3.2
NU2330E		✱			&		320	108	4	4	193	1 430	1 600	2 000	2 400	1 600	2.2
NU232E		✱			&	160	290	48	3	3	195	615	665	2 600	4 000	2 200	1.8
NU2232E		✱			&		290	80	3	3	193	995	1 190	2 400	3 600	1 900	3.3
NU332E		✱			&		340	68	4	4	204	1 060	1 050	1 900	3 600	1 700	3.2
NU234E		✱			&	170	310	52	4	4	207	740	800	2 400	3 800	2 000	3.8
NU2234E		✱			&		310	86	4	4	205	1 140	1 330	2 200	3 200	1 800	2.8
NU236E		✱			&	180	320	52	4	4	217	770	850	2 200	3 600	1 900	2.2
NU2236E		✱			&		320	86	4	4	215	1 240	1 510	2 000	3 200	1 700	2.7
NU238E		✱			&	190	340	55	4	4	230	855	955	2 000	3 400	1 800	1.7
NU2238E		✱			&		340	92	4	4	228	1 360	1 670	1 900	3 000	1 600	1.7
NU240E		✱			&	200	360	58	4	4	243	945	1 060	1 900	3 200	1 700	2.2
NU2240E		✱			&		360	98	4	4	241	1 500	1 870	1 800	2 200	1 500	2.2
NU244E		✱			&	220	400	65	4	4	268	1 110	1 250	1 800	-	1 500	2.2

✱ Available cage
★ NJ and NUP type bearings are available. Please consult NSK.

SPHERICAL ROLLER BEARINGS

DESIGN FEATURES AND OPERATING ADVANTAGES

NSKHPS Spherical Roller Bearings are optimized by design to deliver higher load carrying capacity, operate with higher limiting speeds, and perform reliably for a longer operating life. In conventional applications, their high performance capacity can also enable downsizing the design envelope for machinery and equipment.



Design features

- Manufactured with high purity steel for superior fatigue strength
- Optimized, high capacity internal design
- With wear-resistant surface hardened pressed steel and heavy-duty machined brass cages
- Advanced raceway surface finishing for durability and wear resistance
- High temperature dimensional stability: up to 200° C
- Radial internal clearances C2, C-normal, C3, C4 and C5
- Dimensional series 213, 222, 223, 230, 231, 232, 239, 240 and 241
- For shaft diameters from 40 to 420 mm

CAGE OPTIONS

Cage selection can have a significant impact on rolling bearing performance. Operating stresses inherent to the application should be carefully considered.

For our NSKHPS Spherical Roller Bearings, NSK offers cage material options suited to a wide array of applications. The advantage of a pressed steel cage against a brass cages is the very small weight and the easier way to lubricate the bearing inside due to more space between inner and outer ring.



Pressed Steel Cage (EA)

- High-strength cage with special nitriding surface treatment for superior wear resistance enabling higher operating speeds
- Roller guidance is delivered by the central cage flanges, eliminating the need for a guide ring allowing for larger rollers, higher load capacity and longer life
- Dimensional stability at temperatures as high as 200° C



Machined Brass Cage (ECA & CA)

- Heavy duty cage design for superior performance inapplications subject to heavy and/or impact loading
- Cage pocket geometry and finger length provide superior roller guidance and controlled roller skew
- Precision-machined contours optimize lubricant flow to rolling contact surfaces
- High cage strength (no loss in strength) with highly optimized geometry and roller guided cage design

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 improving 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.

SPHERICAL ROLLER BEARINGS

BEARING DIMENSIONS



Limiting Speed
20% higher (Maximum)

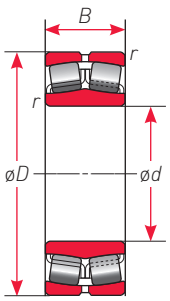
Working Temperature
up to 200°C

BEARING NOMENCLATURE

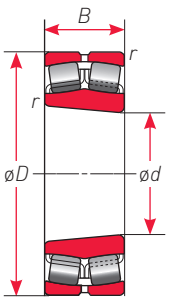
Example: 232 | 36 | E | CA | M | K | E4 | C3 | S11 | *H*

232	Bearing Series	239, 230, 240, 231, 241, 222, 232, 213, 223: Spherical Roller Bearings
36	Bore Reference	Bore number indicates bore diameter. Bore Number x 5 (mm)
EA / ECA / CA	Internal Design	EA, CA: High Load Capacity Cage
M	Cage Type	M: Machined Brass Cage (for CA Design) Omitted: Pressed Steel Cage (for EA Design)
K	Bore Type	K: Tapered Bore of Inner Ring (Taper 1:12) K30: Tapered Bore of Inner Ring (Taper 1:30)
E4	Lubrication Features	E4: Lubricating Groove in Outside Surface and Holes in Outer Ring
C3	Internal Radial Clearance	C2: Clearance Less than CN Omitted: CN Clearance C3: Clearance Greater than CN C4: Clearance Greater than C3 C5: Clearance Greater than C4
S11	Stability Specification	S11: Dimensional Stabiliging Treatment Working Temperature Lower than 200°C (Omitted for EA Design)
H	NSKHPS	*H*: NSKHPS Bearings

*1 Limiting speeds of CA-design bearings are equal to those of conventional bearings.



Cylindrical Bore

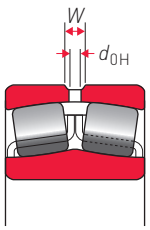


Tapered Bore

Dimensions of Oil, Groove and Holes

Unit: mm

Nominal Width B		Oil Groove Width W	Hole Diameter d_{0H}
Over	Incl.		
18	30	5	2.5
30	40	6	3
40	50	7	4
50	65	8	5
65	80	10	6
80	100	12	8
100	120	15	10
120	160	20	12
160	200	25	15
200	250	30	20
250	315	35	20
315	400	40	25
400	—	40	25



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	1000	8
1000	1250	8
1250	1600	8
1600	2000	8

Bearing Numbers			Boundary Dimensions (mm)				Basic Load Ratings (kN)		Speeds (min^{-1})		
									Thermal Reference Speed	Limiting Speeds	
Cylindrical Bore	Tapered Bore	NSKHPS	d	D	B	r (min.)	C_r	C_{0r}		Mechanical	Grease
22208ECAME4	22208ECAMKE4	*H*	40	80	23	1.1	108	93	**	**	**
22208EAE4	22208EAKE4	*H*		80	23	1.1	113	99	7 100	12 000	6 700
22308ECAME4	22308ECAMKE4	*H*		90	33	1.5	161	142	**	**	**
21308EAE4	21308EAKE4	*H*		90	23	1.5	118	111	6 700	11 000	6 000
22308EAE4	22308EAKE4	*H*		90	33	1.5	170	153	5 600	9 000	5 300
22209ECAME4	22209ECAMKE4	*H*	45	85	23	1.1	113	105	**	**	**
22209EAE4	22209EAKE4	*H*		85	23	1.1	118	111	6 300	11 000	6 000
21309EAE4	21309EAKE4	*H*		100	25	1.5	149	144	6 000	9 000	5 000
22309ECAME4	22309ECAMKE4	*H*		100	36	1.5	197	182	**	**	**
22309EAE4	22309EAKE4	*H*		100	36	1.5	207	195	5 000	8 000	4 500
22210ECAME4	22210ECAMKE4	*H*	50	90	23	1.1	119	113	**	**	**
22210EAE4	22210EAKE4	*H*		90	23	1.1	124	119	6 000	9 500	5 600
21310EAE4	21310EAKE4	*H*		110	27	2	178	174	5 300	8 000	4 500
22310ECAME4	22310ECAMKE4	*H*		110	40	2	233	219	**	**	**
22310EAE4	22310EAKE4	*H*		110	40	2	246	234	4 800	7 100	4 300

** Please consult NSK.

SPHERICAL ROLLER BEARINGS

Bearing Numbers			Boundary Dimensions (mm)				Basic Load Ratings (kN)		Speeds (min^{-1})		
									Thermal Reference Speed	Limiting Speeds	
Cylindrical Bore	Tapered Bore	NSKHPS	*d*	*D*	*B*	*r* (min.)	C_r	C_{0r}		Mechanical	Grease
22211ECAME4	22211ECAMKE4	*H*	55	100	25	1.5	143	136	**	**	**
22211EAE4	22211EAKE4	*H*		100	25	1.5	149	144	5 300	9 000	5 300
21311EAE4	21311EAKE4	*H*		120	29	2	178	174	5 300	8 000	4 500
22311ECAME4	22311ECAMKE4	*H*		120	43	2	278	274	**	**	**
22311EAE4	22311EAKE4	*H*		120	43	2	292	292	4 300	6 000	3 800
22212ECAME4	22212ECAMKE4	*H*	60	110	28	1.5	171	165	**	**	**
22212EAE4	22212EAKE4	*H*		110	28	1.5	178	174	5 300	8 000	4 800
21312EAE4	21312EAKE4	*H*		130	31	2.1	238	244	4 800	6 700	3 800
22312ECAME4	22312ECAMKE4	*H*		130	46	2.1	320	320	**	**	**
22312EAE4	22312EAKE4	*H*		130	46	2.1	340	340	4 000	5 600	3 600
22213ECAME4	22213ECAMKE4	*H*	65	120	31	1.5	212	219	**	**	**
22213EAE4	22213EAKE4	*H*		120	31	1.5	221	230	4 800	7 500	4 300
21313EAE4	21313EAKE4	*H*		140	33	2.1	264	275	4 500	6 000	3 600
22313ECAME4	22313ECAMKE4	*H*		140	48	2.1	375	380	**	**	**
22313EAE4	22313EAKE4	*H*		140	48	2.1	375	380	3 800	5 000	3 200
22214ECAME4	22214ECAMKE4	*H*	70	125	31	1.5	216	220	**	**	**
22214EAE4	22214EAKE4	*H*		125	31	1.5	225	232	4 500	7 100	4 000
21314EAE4	21314EAKE4	*H*		150	35	2.1	310	325	4 300	5 600	3 200
22314ECAME4	22314ECAMKE4	*H*		150	51	2.1	425	435	**	**	**
22314EAE4	22314EAKE4	*H*		150	51	2.1	425	435	3 600	4 800	3 000
22215ECAME4	22215ECAMKE4	*H*	75	130	31	1.5	229	232	**	**	**
22215EAE4	22215EAKE4	*H*		130	31	1.5	238	244	4 300	6 700	4 000
21315EAE4	21315EAKE4	*H*		160	37	2.1	310	325	4 000	5 600	3 200
22315ECAME4	22315ECAMKE4	*H*		160	55	2.1	485	505	**	**	**
22315EAE4	22315EAKE4	*H*		160	55	2.1	485	505	3 400	4 300	2 800

** Please consult NSK.

Bearing Numbers			Boundary Dimensions (mm)				Basic Load Ratings (kN)		Speeds (min^{-1})		
									Thermal Reference Speed	Limiting Speeds	
Cylindrical Bore	Tapered Bore	NSKHPS	*d*	*D*	*B*	*r* (min.)	C_r	C_{0r}		Mechanical	Grease
22216ECAME4	22216ECAMKE4	*H*	80	140	33	2	264	275	**	**	**
22216EAE4	22216EAKE4	*H*		140	33	2	264	275	4 000	6 000	3 600
21316ECAME4	21316ECAMKE4	*H*		170	39	2.1	355	375	**	**	**
21316EAE4	21316EAKE4	*H*		170	39	2.1	355	375	3 800	4 800	3 000
22316ECAME4	22316ECAMKE4	*H*		170	58	2.1	540	565	**	**	**
22316EAE4	22316EAKE4	*H*		170	58	2.1	540	565	3 200	3 800	2 600
22217ECAME4	22217ECAMKE4	*H*	85	150	36	2	310	325	**	**	**
22217EAE4	22217EAKE4	*H*		150	36	2	310	325	4 000	5 600	3 400
21317EAE4	21317EAKE4	*H*		180	41	3	360	395	3 800	5 000	3 000
22317ECAME4	22317ECAMKE4	*H*		180	60	3	600	630	**	**	**
22317EAE4	22317EAKE4	*H*		180	60	3	600	630	3 000	3 400	2 400
22218ECAME4	22218ECAMKE4	*H*	90	160	40	2	360	395	**	**	**
22218EAE4	22218EAKE4	*H*		160	40	2	360	395	3 800	5 000	3 200
21318ECAME4	21318ECAMKE4			190	43	3	415	450	**	**	**
21318EAE4	21318EAKE4	*H*		190	43	3	415	450	3 600	4 500	2 800
22318ECAME4	22318ECAMKE4			190	64	3	665	705	**	**	**
22318EAE4	22318EAKE4	*H*		190	64	3	665	705	2 800	3 000	2 400
22219ECAME4	22219ECAMKE4	*H*	95	170	43	2.1	415	450	**	**	**
22219EAE4	22219EAKE4	*H*		170	43	2.1	415	450	3 800	4 500	3 000
21319CAME4	21319CAMKE4	*H*		200	45	3	430	435	3 600	4 800	1 500
22319ECAME4	22319ECAMKE4	*H*		200	67	3	735	780	**	**	**
22319EAE4	22319EAKE4	*H*		200	67	3	735	780	2 600	3 000	2 200
22220ECAME4	22220ECAMKE4	*H*	100	180	46	2.1	455	490	**	**	**
22220EAE4	22220EAKE4	*H*		180	46	2.1	455	490	3 600	4 300	2 800
23220CAME4	23220CAMKE4	*H*		180	60.3	2.1	525	605	2 800	3 800	1 600
21320CAME4	21320CAMKE4	*H*		215	47	3	495	485	3 400	4 500	1 400
22320ECAME4	22320ECAMKE4	*H*		215	73	3	860	930	**	**	**
22320CAME4*	22320CAMKE4*	*H*		215	73	3	750	785	2 600	3 400	1 700

* EA is also available. Load rating of EA is around 10% higher than CAM's, please consult NSK.
** Please consult NSK.

SPHERICAL ROLLER BEARINGS

Bearing Numbers			Boundary Dimensions (mm)				Basic Load Ratings (kN)		Speeds (min^{-1})		
									Thermal Reference Speed	Limiting Speeds	
Cylindrical Bore	Tapered Bore	NSKHPS	*d*	*D*	*B*	*r* (min.)	C_r	C_{0r}		Mechanical	Grease
23122CAME4	23122CAMKE4	*H*	110	180	56	2	480	630	3 200	4 000	1 600
24122CAME4	24122CAMK30E4	*H*		180	69	2	575	750	2 200	3 400	1 600
22222ECAME4	22222ECAMKE4	*H*		200	53	2.1	605	645	**	**	**
22222EAE4	22222EAKE4	*H*		200	53	2.1	605	645	3 400	3 400	2 600
23222CAME4	23222CAMKE4	*H*		200	69.8	2.1	645	760	2 600	3 400	1 500
21322CAME4	21322CAMKE4	*H*		240	50	3	565	545	3 000	4 300	1 300
22322ECAME4	22322ECAMKE4	*H*		240	80	3	1 030	1 120	**	**	**
22322CAME4*	22322CAMKE4*	*H*		240	80	3	925	980	2 200	3 000	1 500
22224ECAME4	22224ECAMKE4	*H*	120	180	46	2	685	765	**	**	**
23024CAME4	23024CAMKE4	*H*		180	46	2	395	525	3 200	4 500	1 800
24024CAME4	24024CAMK30E4	*H*		180	60	2	480	680	2 600	3 600	1 500
23124CAME4	23124CAMKE4	*H*		200	62	2	580	720	2 800	3 600	1 400
24124CAME4	24124CAMK30E4	*H*		200	80	2	695	905	2 000	3 000	1 400
22224EAE4	22224EAKE4	*H*		215	58	2.1	685	765	3 200	3 000	2 400
23224CAME4	23224CAMKE4	*H*		215	76	2.1	790	970	2 200	3 000	1 300
22324ECAME4	22324ECAMKE4	*H*		260	86	3	1 190	1 320	**	**	**
22324CAME4*	22324CAMKE4*	*H*		260	86	3	1 060	1 120	1 900	2 800	1 400
23026CAME4	23026CAMKE4	*H*	130	200	52	2	500	655	3 000	3 800	1 700
24026CAME4	24026CAMK30E4	*H*		200	69	2	620	865	2 200	3 200	1 400
23126CAME4	23126CAMKE4	*H*		210	64	2	630	825	2 600	3 400	1 300
24126CAME4	24126CAMK30E4	*H*		210	80	2	735	1 010	1 800	2 800	1 300
22226ECAME4	22226ECAMKE4	*H*		230	64	3	820	940	**	**	**
22226EAE4	22226EAKE4	*H*		230	64	3	820	940	2 800	2 600	2 200
23226CAME4	23226CAMKE4	*H*		230	80	3	875	1 080	2 000	2 800	1 200
22326CAME4	22326CAMKE4	*H*		280	93	4	1 240	1 350	1 800	2 600	1 300

* EA is also available. Load rating of EA is around 10% higher than CAM's, please consult NSK.
** Please consult NSK.

Bearing Numbers			Boundary Dimensions (mm)				Basic Load Ratings (kN)		Speeds (min^{-1})		
									Thermal Reference Speed	Limiting Speeds	
Cylindrical Bore	Tapered Bore	NSKHPS	*d*	*D*	*B*	*r* (min.)	C_r	C_{0r}		Mechanical	Grease
23028CAME4	23028CAMKE4	*H*	140	210	53	2	525	715	2 800	3 800	1 600
24028CAME4	24028CAMK30E4	*H*		210	69	2	635	905	2 200	3 000	1 300
23128CAME4	23128CAMKE4	*H*		225	68	2.1	725	945	2 400	3 200	1 200
24128CAME4	24128CAMK30E4	*H*		225	85	2.1	835	1 160	1 600	2 600	1 200
22228CAME4	22228CAMKE4	*H*		250	68	3	835	945	2 600	3 200	1 400
23228CAME4	23228CAMKE4	*H*		250	88	3	1 040	1 300	1 800	2 600	1 100
22328CAME4	22328CAMKE4	*H*		300	102	4	1 450	1 590	1 700	2 400	1 200
23030CAME4	23030CAMKE4	*H*	150	225	56	2.1	590	815	2 600	3 600	1 400
24030CAME4	24030CAMK30E4	*H*		225	75	2.1	740	1 090	1 900	3 000	1 200
23130CAME4	23130CAMKE4	*H*		250	80	2.1	905	1 180	2 200	2 800	1 100
24130CAME4	24130CAMK30E4	*H*		250	100	2.1	1 070	1 450	1 400	2 400	1 100
22230CAME4	22230CAMKE4	*H*		270	73	3	955	1 120	2 400	3 000	1 300
23230CAME4	23230CAMKE4	*H*		270	96	3	1 220	1 560	1 700	2 400	1 100
22330CAME4	22330CAMKE4	*H*		320	108	4	1 530	1 690	1 600	2 200	1 100
23932CAME4	23932CAMKE4	*H*	160	220	45	2	450	675	3 000	3 200	1 400
23032CAME4	23032CAMKE4	*H*		240	60	2.1	675	955	2 400	3 200	1 300
24032CAME4	24032CAMK30E4	*H*		240	80	2.1	845	1 260	1 800	2 800	1 100
23132CAME4	23132CAMKE4	*H*		270	86	2.1	1 070	1 400	2 000	2 600	1 000
24132CAME4	24132CAMK30E4	*H*		270	109	2.1	1 240	1 670	1 300	2 200	1 000
22232CAME4	22232CAMKE4	*H*		290	80	3	1 140	1 320	2 200	2 800	1 200
23232CAME4	23232CAMKE4	*H*		290	104	3	1 370	1 770	1 500	2 200	1 000
22332CAME4	22332CAMKE4	*H*		340	114	4	1 700	1 900	1 400	2 200	1 100

SPHERICAL ROLLER BEARINGS

Bearing Numbers			Boundary Dimensions (mm)				Basic Load Ratings (kN)		Speeds (min^{-1})		
									Thermal Reference Speed	Limiting Speeds	
Cylindrical Bore	Tapered Bore	NSKHPS	*d*	*D*	*B*	*r* (min.)	C_r	C_{0r}		Mechanical	Grease
23934CAME4	23934CAMKE4	*H*	170	230	45	2	450	680	3 000	3 600	1 400
23034CAME4	23034CAMKE4	*H*		260	67	2.1	795	1 090	2 200	3 000	1 200
24034CAME4	24034CAMK30E4	*H*		260	90	2.1	1 030	1 520	1 600	2 400	1 000
23134CAME4	23134CAMKE4	*H*		280	88	2.1	1 180	1 570	1 800	2 600	1 000
24134CAME4	24134CAMK30E4	*H*		280	109	2.1	1 280	1 770	1 200	2 200	1 000
22234CAME4	22234CAMKE4	*H*		310	86	4	1 240	1 500	2 000	2 600	1 100
23234CAME4	23234CAMKE4	*H*		310	110	4	1 500	1 910	1 400	2 200	900
22334CAME4	22334CAMKE4	*H*		360	120	4	1 970	2 110	1 300	2 000	1 000
23936CAME4	23936CAMKE4	*H*	180	250	52	2	590	890	2 600	3 000	1 200
23036CAME4	23036CAMKE4	*H*		280	74	2.1	935	1 270	2 000	2 800	1 200
24036CAME4	24036CAMK30E4	*H*		280	100	2.1	1 210	1 750	1 500	2 200	950
23136CAME4	23136CAMKE4	*H*		300	96	3	1 320	1 760	1 700	2 200	900
24136CAME4	24136CAMK30E4	*H*		300	118	3	1 490	2 040	1 100	2 000	900
22236CAME4	22236CAMKE4	*H*		320	86	4	1 280	1 540	2 000	2 600	1 100
23236CAME4	23236CAMKE4	*H*		320	112	4	1 620	2 110	1 300	2 000	850
22336CAME4	22336CAMKE4	*H*		380	126	4	2 170	2 340	1 200	2 000	950
23938CAME4	23938CAMKE4	*H*	190	260	52	2	575	875	2 600	3 000	1 200
23038CAME4	23038CAMKE4	*H*		290	75	2.1	970	1 350	2 000	2 600	1 100
24038CAME4	24038CAMK30E4	*H*		290	100	2.1	1 220	1 840	1 400	2 200	900
23138CAME4	23138CAMKE4	*H*		320	104	3	1 480	2 020	1 600	2 200	850
24138CAME4	24138CAMK30E4	*H*		320	128	3	1 710	2 330	1 000	1 900	850
22238CAME4	22238CAMKE4	*H*		340	92	4	1 420	1 730	1 800	2 400	1 000
23238CAME4	23238CAMKE4	*H*		340	120	4	1 800	2 350	1 200	1 900	800
22338CAME4	22338CAMKE4	*H*		400	132	5	2 370	2 590	1 200	1 900	900

Bearing Numbers			Boundary Dimensions (mm)				Basic Load Ratings (kn)		Speeds (min^{-1})		
									Thermal Reference Speed	Limiting Speeds	
Cylindrical Bore	Tapered Bore	NSKHPS	*d*	*D*	*B*	*r* (min.)	C_r	C_{0r}		Mechanical	Grease
23940CAME4	23940CAMKE4	*H*	200	280	60	2.1	710	1 060	2 400	2 600	1 100
23040CAME4	23040CAMKE4	*H*		310	82	2.1	1 180	1 700	1 800	2 400	1 000
24040CAME4	24040CAMK30E4	*H*		310	109	2.1	1 420	2 120	1 300	2 000	850
23140CAME4	23140CAMKE4	*H*		340	112	3	1 700	2 330	1 500	2 000	800
24140CAME4	24140CAMK30E4	*H*		340	140	3	1 960	2 660	950	1 800	800
22240CAME4	22240CAMKE4	*H*		360	98	4	1 620	2 010	1 700	2 200	950
23240CAME4	23240CAMKE4	*H*		360	128	4	2 070	2 750	1 100	1 800	750
22340CAME4	22340CAMKE4	*H*		420	138	5	2 500	2 990	1 000	1 700	850
23944CAME4	23944CAMKE4	*H*	220	300	60	2.1	785	1 240	2 200	2 600	1 000
23044CAME4	23044CAMKE4	*H*		340	90	3	1 360	1 980	1 600	2 200	950
24044CAME4	24044CAMK30E4	*H*		340	118	3	1 640	2 490	1 200	1 900	750
23144CAME4	23144CAMKE4	*H*		370	120	4	1 960	2 710	1 300	1 800	710
24144CAME4	24144CAMK30E4	*H*		370	150	4	2 250	3 200	850	1 600	710
22244CAME4	22244CAMKE4	*H*		400	108	4	1 960	2 430	1 500	2 000	850
23244CAME4	23244CAMKE4	*H*		400	144	4	2 520	3 400	1 000	1 600	670
22344CAME4	22344CAMKE4	*H*		460	145	5	2 940	3 400	950	1 600	750
23948CAME4	23948CAMKE4	*H*	240	320	60	2.1	795	1 300	1 900	2 600	950
23048CAME4	23048CAMKE4	*H*		360	92	3	1 450	2 140	1 500	2 200	850
24048CAME4	24048CAMK30E4	*H*		360	118	3	1 730	2 730	1 100	1 800	710
23148CAME4	23148CAMKE4	*H*		400	128	4	2 230	3 100	1 200	1 700	670
24148CAME4	24148CAMK30E4	*H*		400	160	4	2 660	3 800	750	1 500	670
22248CAME4	22248CAMKE4	*H*		440	120	4	2 340	2 890	1 400	1 800	750
23248CAME4	23248CAMKE4	*H*		440	160	4	3 050	4 050	850	1 500	630
22348CAME4	22348CAMKE4	*H*		500	155	5	3 250	3 800	850	1 500	670

Bearing Numbers			Boundary Dimensions (mm)				Basic Load Ratings (kN)		Speeds (min^{-1})		
									Thermal Reference Speed	Limiting Speeds	
Cylindrical Bore	Tapered Bore	NSKHPS	*d*	*D*	*B*	*r* (min.)	C_r	C_{0r}		Mechanical	Grease
23952CAME4	23952CAMKE4	*H*	260	360	75	2.1	1 170	1 870	1 800	2 200	850
23052CAME4	23052CAMKE4	*H*		400	104	4	1 780	2 580	1 300	1 900	800
24052CAME4	24052CAMK30E4	*H*		400	140	4	2 270	3 500	950	1 600	630
23152CAME4	23152CAMKE4	*H*		440	144	4	2 700	3 750	1 100	1 500	600
24152CAME4	24152CAMK30E4	*H*		440	180	4	3 200	4 700	630	1 300	600
22252CAME4	22252CAMKE4	*H*		480	130	5	2 720	3 400	1 200	1 700	670
23252CAME4	23252CAMKE4	*H*		480	174	5	3 400	4 550	800	1 400	560
22352CAME4	22352CAMKE4	*H*		540	165	6	3 900	4 600	750	1 400	630
23956CAME4	23956CAMKE4	*H*	280	380	75	2.1	1 160	1 950	1 600	2 000	800
23056CAME4	23056CAMKE4	*H*		420	106	4	1 930	2 950	1 200	1 800	710
24056CAME4	24056CAMK30E4	*H*		420	140	4	2 350	3 800	850	1 500	600
23156CAME4	23156CAMKE4	*H*		460	146	5	2 790	4 000	1 000	1 500	560
24156CAME4	24156CAMK30E4	*H*		460	180	5	3 300	5 000	600	1 300	560
22256CAME4	22256CAMKE4	*H*		500	130	5	2 850	3 650	1 100	1 600	630
23256CAME4	23256CAMKE4	*H*		500	176	5	3 600	4 900	750	1 300	530
22356CAME4	22356CAMKE4	*H*		580	175	6	4 350	5 150	710	1 300	560
23960CAME4	23960CAMKE4	*H*	300	420	90	3	1 540	2 490	1 500	1 800	710
23060CAME4	23060CAMKE4	*H*		460	118	4	2 400	3 700	1 100	1 600	670
24060CAME4	24060CAMK30E4	*H*		460	160	4	2 890	4 600	800	1 400	530
23160CAME4	23160CAMKE4	*H*		500	160	5	3 350	4 800	900	1 400	500
24160CAME4	24160CAMK30E4	*H*		500	200	5	3 900	5 800	530	1 200	500
22260CAME4	22260CAMKE4	*H*		540	140	5	3 250	4 250	1 000	1 500	600
23260CAME4	23260CAMKE4	*H*		540	192	5	4 250	5 900	670	1 200	480

Bearing Numbers			Boundary Dimensions (mm)				Basic Load Ratings (kN)		Speeds (min^{-1})		
									Thermal Reference Speed	Limiting Speeds	
Cylindrical Bore	Tapered Bore	NSKHPS	*d*	*D*	*B*	*r* (min.)	C_r	C_{0r}		Mechanical	Grease
23964CAME4	23964CAMKE4	*H*	320	440	90	3	1 620	2 750	1 400	1 700	670
23064CAME4	23064CAMKE4	*H*		480	121	4	2 450	3 850	1 000	1 600	630
24064CAME4	24064CAMK30E4	*H*		480	160	4	3 050	5 050	710	1 300	500
23164CAME4	23164CAMKE4	*H*		540	176	5	3 850	5 500	800	1 300	480
24164CAME4	24164CAMK30E4	*H*		540	218	5	4 400	6 650	500	1 100	480
22264CAME4	22264CAMKE4	*H*		580	150	5	3 750	4 850	950	1 400	530
23264CAME4	23264CAMKE4	*H*		580	208	5	4 850	6 900	600	1 100	450
23968CAME4	23968CAMKE4	*H*	340	460	90	3	1 670	2 840	1 300	1 700	630
23068CAME4	23068CAMKE4	*H*		520	133	5	2 850	4 400	950	1 500	560
24068CAME4	24068CAMK30E4	*H*		520	180	5	3 650	6 050	670	1 200	480
23168CAME4	23168CAMKE4	*H*		580	190	5	4 500	6 600	710	1 200	430
24168CAME4	24168CAMK30E4	*H*		580	243	5	5 300	7 900	450	1 000	430
23972CAME4	23972CAMKE4	*H*	360	480	90	3	1 730	3 050	1 200	1 700	600
23072CAME4	23072CAMKE4	*H*		540	134	5	2 990	4 700	900	1 400	530
24072CAME4	24072CAMK30E4	*H*		540	180	5	3 650	6 100	630	1 200	450
23172CAME4	23172CAMKE4	*H*		600	192	5	4 800	7 100	670	1 100	400
24172CAME4	24172CAMK30E4	*H*		600	243	5	5 250	8 000	430	1 000	400
23976CAME4	23976CAMKE4	*H*	380	520	106	4	2 340	4 100	1 100	1 500	530
23076CAME4	23076CAMKE4	*H*		560	135	5	3 150	5 100	850	1 400	530
24076CAME4	24076CAMK30E4	*H*		560	180	5	3 850	6 600	600	1 200	430
23980CAME4	23980CAMKE4	*H*	400	540	106	4	2 370	4 250	1 000	1 400	530
23080CAME4	23080CAMKE4	*H*		600	148	5	3 700	5 900	800	1 300	480
24080CAME4	24080CAMK30E4	*H*		600	200	5	4 500	7 600	560	1 100	400
23984CAME4	23984CAMKE4	*H*	420	560	106	4	2 340	4 250	1 000	1 400	500

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