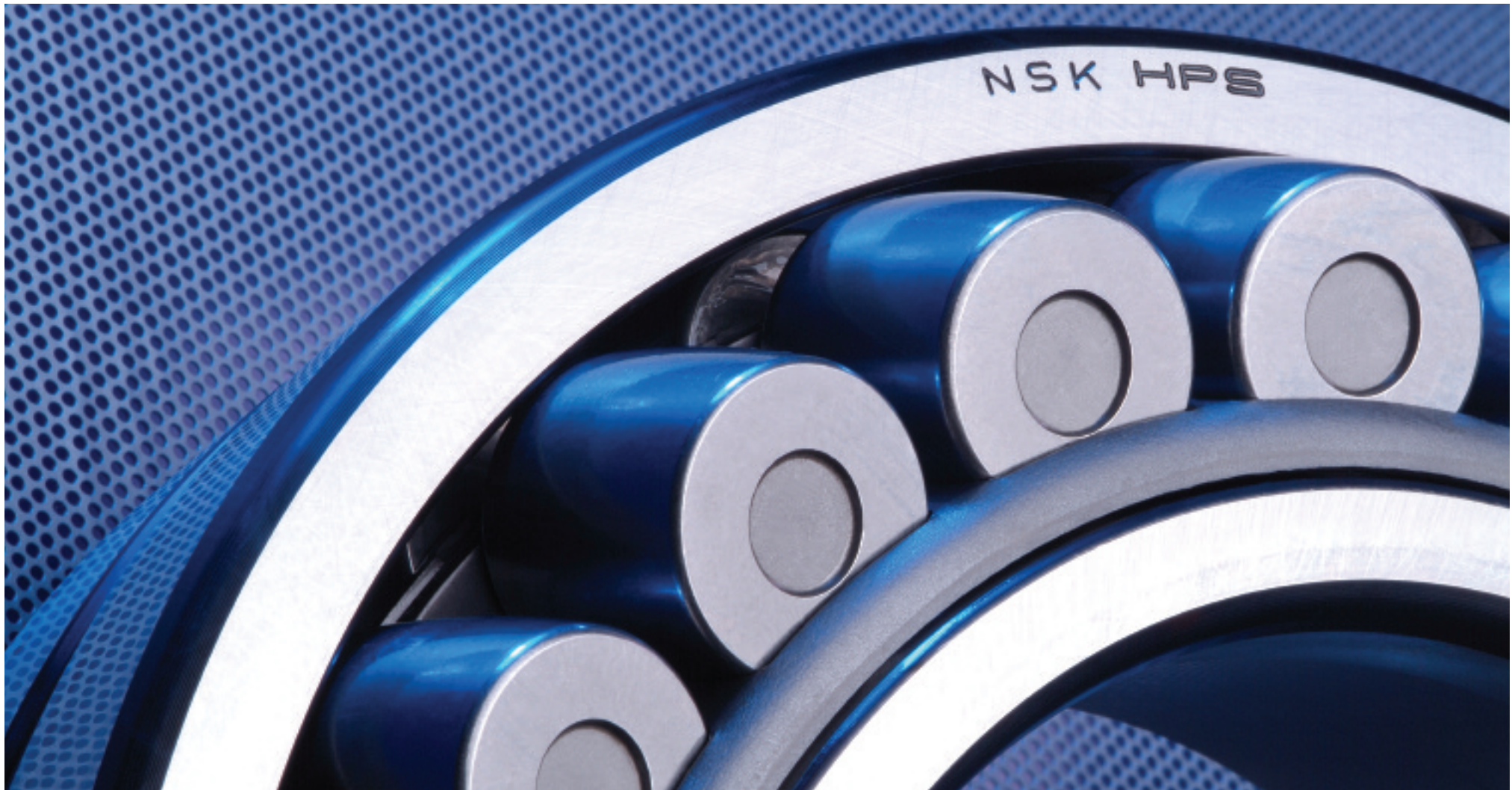


HPS™ **Spherical Roller Bearings**

MOTION & CONTROL
NSK


Introducing the newest series of advanced, high performing spherical roller bearings offering higher speed and load capacities suitable for a wide variety of industrial applications.



Demand for improved productivity is growing. You need bearings that perform to a higher standard. You need higher capacity and higher speed bearings that deliver longer operating times and reduce maintenance costs.

**Average
12% higher load
carrying capacity
compared to
competition...**

**...producing an
average 50%
increase in
bearing life...**

A close-up photograph of an NSK HPS spherical roller bearing. The bearing is shown in a cross-section, revealing the spherical rollers and the outer ring. The text 'NSK HPS' is engraved on the outer ring. Two rollers are highlighted with text overlays. The background is a soft, out-of-focus blue.

NSK HPS

NSK HPS spherical roller bearings give you exactly what you need: Longer bearing life. HPS bearings deliver high reliability, long life, better machine function, greater efficiency and outstanding performance.

...higher limiting speed...

...resulting in reduced maintenance and improved productivity.

Longer bearing life...lower maintenance costs ...greater productivity. How did we do it?

Optimum Design

High performance begins with advanced design. Instead of a guide ring, the HPS cage has an internal roller guide. Replacing the guide ring with inner and outer ring configurations makes it easier to place large or additional rollers. The result: Increased load capacity.

In addition, special surface treatments make the cage stronger and reduce wear, heat and friction resulting in higher speed tolerance. All this, and more make HPS bearings the top product in the market.

Advanced Materials

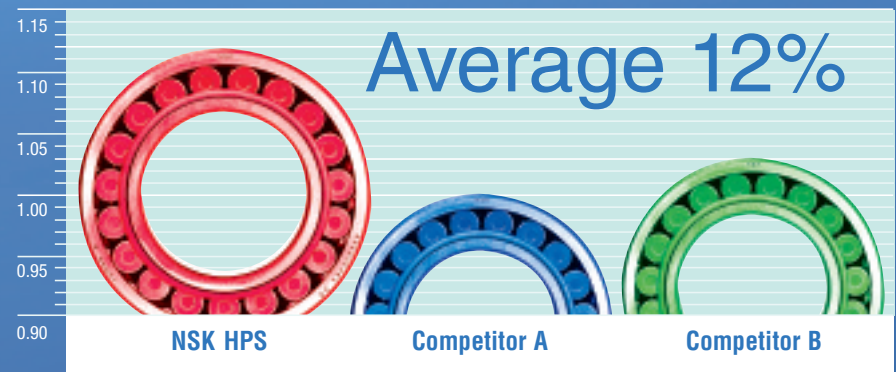
NSK's HPS spherical roller bearings are made from NSK's Z steel – pure, high-cleanliness steel that improves fatigue strength. In addition, special surface heat treatments add a layer of thickness to the cage making it more resistant to wear and more durable in a variety of applications.

Superior Cage Design

By eliminating the guide ring we were able to make a stronger, better-balanced cage. Space gained by removing the guide ring led to structural improvements that dramatically increased cage strength. The high-precision roller guide combined with special surface heat treatment also protect the cage against wear.

Dynamic Load Ratings

With roller guidance built right into the cage and design optimization of the inner and outer rings, the size and number of rollers a bearing holds is increased. Load capacity is substantially improved.



NSK's HPS spherical roller bearings have load capacity rating an average 12% higher than published values of the competitor A and an average 9% higher than published values of competitor B.

As a market leader, we set our own standards...and we always set them higher.

State of the Art Manufacturing

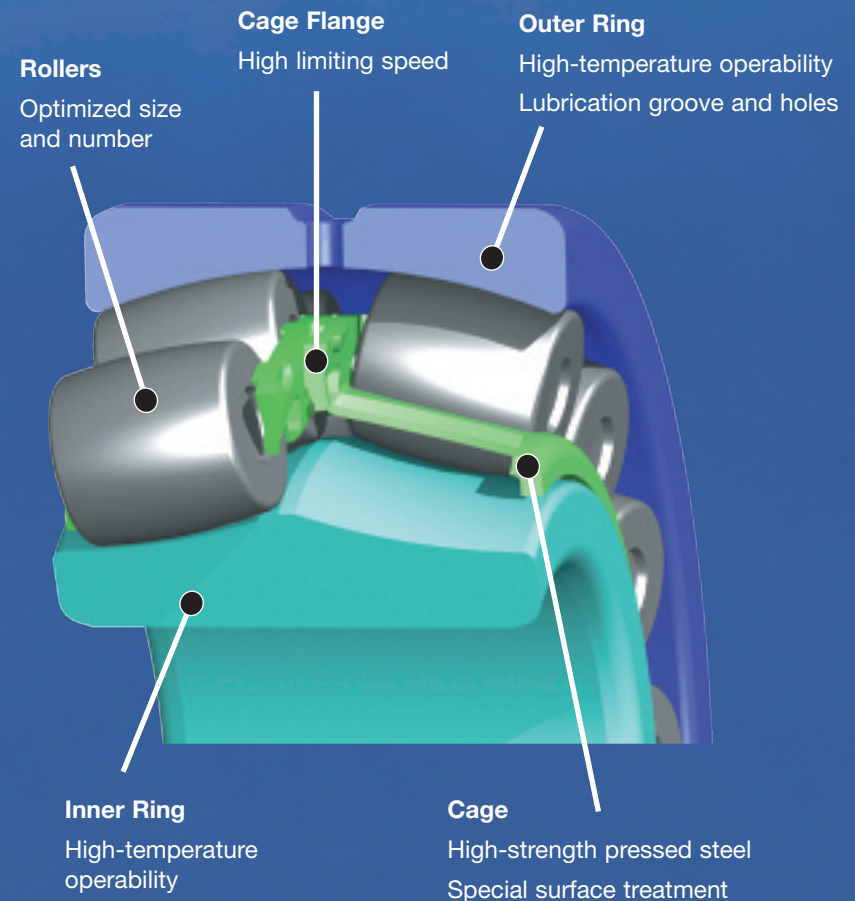
As global leaders in the bearing industry, we have continually invested in developing and refining our manufacturing technology and quality control procedures so that we are able to manufacture bearings of exceptional quality and accuracy.

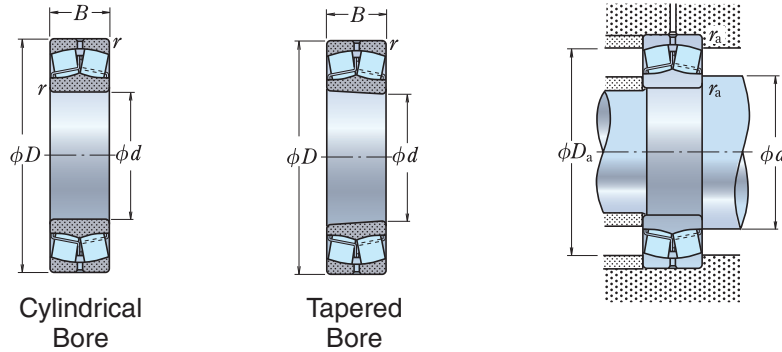
Design Technology Innovation

NSK's development and design process draws from years of research in material technology and manufacturing technique. Raw materials are thoroughly researched.

And by applying advanced production line and quality control standards, the integrity of the final product is assured.

Roller guidance improves and heat generation drops by incorporating a center guide to the cage and decreasing clearance between pockets and rollers. Friction is also reduced through a surface treatment. The result: a higher limiting speed.





Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values for e , Y_2 , Y_3 and Y_0 are given in the table below.

HPS™ Bearing table of spherical roller bearings

Bearing Numbers *	Dimensions (mm)				Basic Load Rating				Limiting Speeds (min ⁻¹)		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factor			Weight (approx.)		
	d	D	B	r	(N)		(lbs)		Grease	Oil	d_a		D_a		r_a		e	Y_2	Y_3	Y_0	(kg)	lbs
					C_r	C_{or}	C_r	C_{or}			min	max	max	min								
22208EAE4	40	80	23	1.1	113000	99500	25400	22300	6700	8500	47	49	73	70	1	0.28	3.6	2.4	2.4	0.50	1.10	
21308EAE4	40	90	23	1.5	118000	111000	26500	25000	6000	7500	49	54	81	75	1.5	0.25	3.9	2.7	2.6	0.73	1.61	
22308EAE4	40	90	33	1.5	170000	153000	38000	34500	5300	6700	49	52	81	77	1.5	0.35	2.8	1.9	1.9	0.98	2.16	
22209EAE4	45	85	23	1.1	118000	111000	26500	25000	6000	7500	52	54	78	75	1	0.25	3.9	2.7	2.6	0.55	1.21	
21309EAE4	45	100	25	1.5	149000	144000	33500	32500	5000	6300	54	65	91	89	1.5	0.23	4.3	2.9	2.8	0.96	2.12	
22309EAE4	45	100	36	1.5	207000	195000	46500	44000	4500	5600	54	59	91	86	1.5	0.34	2.9	2	1.9	1.34	2.95	
22210EAE4	50	90	23	1.1	124000	119000	27800	26700	5600	7100	57	60	83	81	1	0.24	4.3	2.9	2.8	0.61	1.34	
21310EAE4	50	110	27	2	178000	174000	40000	39000	4500	5600	60	72	100	98	2	0.23	4.4	3	2.9	1.21	2.67	
22310EAE4	50	110	40	2	246000	234000	55500	52500	4300	5300	60	64	100	93	2	0.35	2.8	1.9	1.9	1.78	3.92	
22211EAE4	55	100	25	1.5	149000	144000	33500	32500	5300	6700	64	65	91	89	1.5	0.23	4.3	2.9	2.8	0.81	1.79	
21311EAE4	55	120	29	2	178000	174000	40000	39000	4500	5600	65	72	110	98	2	0.23	4.4	3	2.9	1.58	3.48	
22311EAE4	55	120	43	2	292000	292000	65500	65500	3800	4800	65	73	110	103	2	0.34	2.9	2	1.9	2.30	5.07	
22212EAE4	60	110	28	1.5	178000	174000	40000	39000	4800	6000	69	72	101	98	1.5	0.23	4.4	3	2.9	1.10	2.43	
21312EAE4	60	130	31	2.1	238000	244000	53500	55000	3800	4800	72	87	118	117	2	0.22	4.5	3	3	1.98	4.37	
22312EAE4	60	130	46	2.1	340000	340000	76000	77000	3600	4500	72	79	118	111	2	0.34	3	2	1.9	2.89	6.37	
22213EAE4	65	120	31	1.5	221000	230000	49500	52000	4300	5300	74	80	111	107	1.5	0.24	4.2	2.8	2.7	1.51	3.33	
21313EAE4	65	140	33	2.1	264000	275000	59500	61500	3600	4500	77	94	128	126	2	0.22	4.6	3.1	3	2.45	5.40	
22313EAE4	65	140	48	2.1	375000	380000	84000	85500	3200	4000	77	84	128	119	2	0.33	3	2	2	3.52	7.76	
22214EAE4	70	125	31	1.5	225000	232000	50500	52000	4000	5300	79	84	116	111	1.5	0.23	4.3	2.9	2.8	1.58	3.48	
21314EAE4	70	150	35	2.1	310000	325000	70000	73500	3200	4000	82	101	138	135	2	0.22	4.6	3.1	3	3.00	6.61	
22314EAE4	70	150	51	2.1	425000	435000	95500	97500	3000	3800	82	91	138	129	2	0.33	3	2	2	4.28	9.44	

* Ratings also apply for tapered bore

Remarks: 1. The Maximum operating temperature of standard HPS spherical roller bearings is 200 C

2. The suffix E4 indicates that the bearing has an oil groove and holes. (The number and dimension of oil grooves and holes are shown in Tables 1 & 2.)

Table 1 Dimensions of Oil Grooves and Holes

Unit: mm

Nominal Outer Ring Width C		Oil Groove Width W	Hole Diameter d_{OH}
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

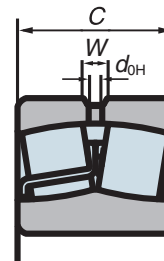


Table 2 Number of Oil Holes

Nominal Outer Ring Diameter (mm)		Number of Holes
over	incl.	
-	-	4
180	-	6
250	-	6
315	-	6
400	-	6
500	-	8
630	-	8
800	-	8
1000	-	8
1250	-	8
1600	-	8

Bearing Numbers *	Dimensions (mm)				Basic Load Rating				Limiting Speeds (min ⁻¹)		Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factor			Weight (approx.)	
	Cylindrical Bore d	D	B	r	(N)		(lbs)		Grease	Oil	d_a		D_a		r_a		Y_2	Y_3	Y_0	(kg)	lbs
					min	C_r	C_{or}	C_r			C_{or}	min	max	max							
22215EAE4	75	130	31	1.5	238000	244000	53500	55000	4000	5000	84	87	121	117	1.5	0.22	4.5	3	3	1.64	3.62
21315EAE4	75	160	37	2.1	310000	325000	70000	73500	3200	4000	87	101	148	134	2	0.22	4.6	3.1	3	3.64	8.02
22315EAE4	75	160	55	2.1	485000	505000	109000	113000	2800	3600	87	97	148	137	2	0.33	3	2	2	5.26	11.60
22216EAE4	80	140	33	2	264000	275000	59500	61500	3600	4500	90	94	130	126	2	0.22	4.6	3.1	3	2.01	4.43
21316EAE4	80	170	39	2.1	355000	375000	80000	84000	3000	3800	92	109	158	146	2	0.23	4.4	3	2.9	4.32	9.52
22316EAE4	80	170	58	2.1	540000	565000	122000	128000	2600	3400	92	103	158	145	2	0.33	3	2	2	6.23	13.73
22217EAE4	85	150	36	2	310000	325000	70000	73500	3400	4300	95	101	140	135	2	0.22	4.6	3.1	3	2.54	5.60
21317EAE4	85	180	41	3	360000	395000	81000	88500	3000	4000	99	108	166	142	2.5	0.24	4.3	2.9	2.8	5.20	11.46
22317EAE4	85	180	60	3	600000	630000	134000	141000	2400	3200	99	110	166	155	2.5	0.33	3.1	2.1	2	7.23	15.94
22218EAE4	90	160	40	2	360000	395000	81000	88500	3200	4000	100	108	150	142	2	0.24	4.3	2.9	2.8	3.30	7.28
21318EAE4	90	190	43	3	415000	450000	93000	101000	2800	3600	104	115	176	152	2.5	0.24	4.3	2.9	2.8	6.10	13.45
22318EAE4	90	190	64	3	665000	705000	150000	158000	2400	3000	104	115	176	163	2.5	0.33	3.1	2.1	2	8.56	18.87
22219EAE4	95	170	43	2.1	415000	450000	93000	101000	3000	3800	107	115	158	152	2	0.24	4.3	2.9	2.8	4.04	8.91
22319EAE4	95	200	67	3	735000	780000	165000	175000	2200	2800	109	121	186	172	2.5	0.33	3.1	2.1	2	9.91	21.85
22220EAE4	100	180	46	2.1	455000	490000	102000	110000	2800	3600	112	119	168	160	2	0.24	4.3	2.9	2.8	4.84	10.67
22320EAE4	100	215	73	3	860000	930000	194000	209000	2000	2600	114	130	201	184	2.5	0.33	3	2	2	12.7	28.00
22222EAE4	110	200	53	2.1	605000	645000	136000	145000	2600	3200	122	129	188	178	2	0.25	4	2.7	2.6	6.99	15.41
22322EAE4	110	240	80	3	1030000	1120000	231000	253000	1900	2400	124	145	226	206	2.5	0.33	3.1	2.1	2	17.6	38.80
22224EAE4	120	215	58	2.1	685000	765000	154000	172000	2400	3000	132	142	203	190	2	0.25	3.9	2.7	2.6	8.80	19.40
22324EAE4	120	260	86	3	1190000	1320000	268000	296000	1700	2200	134	157	246	222	2.5	0.32	3.1	2.1	2	22.2	48.94
22226EAE4	130	230	64	3	820000	940000	184000	211000	2200	2600	144	152	216	204	2.5	0.26	3.8	2.6	2.5	11.0	24.25

* Ratings also apply for tapered bore

Remarks: 1. The Maximum operating temperature of standard HPS spherical roller bearings is 200 C

2. The suffix E4 indicates that the bearing has an oil groove and holes. (The number and dimension of oil grooves and holes are shown in Tables 1 & 2.)



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