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MOTION & CONTROL™

NSK

BEARINGS FOR THE QUARRYING AND MINING INDUSTRIES



BRANDS OF **NSK EUROPE**

NSK RHP bearings



neuweg

OUR MOST IMPORTANT PRODUCT: OUR CUSTOMERS' SATISFACTION

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 worldwide 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 conti-

nuous 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.nskeurope.com

Trademarks: All NSK product and service names listed in this catalogue are trademarks or registered trademarks of NSK Ltd.

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QUARRYING AND MINING INDUSTRIES

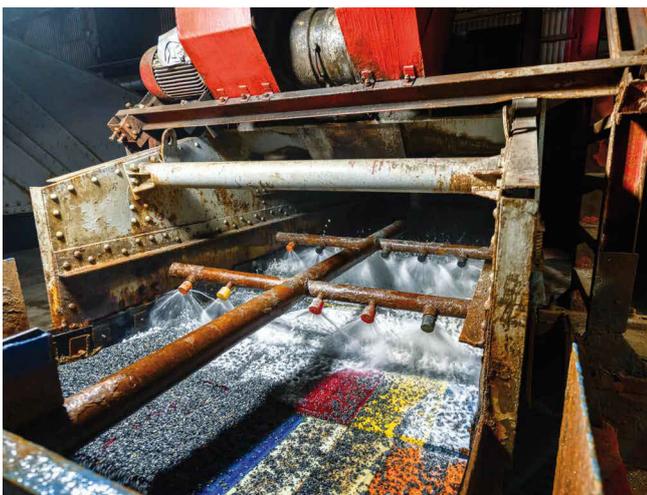
Worldwide, NSK is the acknowledged leader in advanced motion and control technology, rapidly driving major developments in materials, mechanical design, lubrication and sealing to downsize bearings and reduce costs without compromising machine performance.



Leaders in our field, we are not content simply to supply a range of products to meet the needs of today. At NSK we go much further: constantly challenging accepted thinking, exploring new and better methods of design and manufacture and, above all, looking beyond the needs of today to meet customer requirements in the future. Severe environments demand outstanding performance. NSK bearings provide the toughness required above all else. Dust, mud, and tremendous loads – these are the challenging conditions under which quarrying machinery must operate. Unlike typical passenger cars, quarrying and mining machinery must, first and foremost, be tough. Based on proprietary state-of-the-art technology, NSK has exceeded the limits of conventional bearings in terms of long operating life and high limiting speed. NSK continues to deliver the reliability required of mining machinery around the world.

NSK versatility – moving mountains

NSK bearings offer Quarry and Mine operators longer service life under the most challenging operating conditions to maximise uptime and reduce maintenance costs for improved productivity at mining sites. Durability and reliability are of paramount importance for mining machinery operating in remote locations such as mountains and deserts, where failure of a single component can impact the entire mining operation. NSK has applied state-of-the-art technology to exceed the life and limiting speed of conventional bearings. Our superior bearings offer high performance with robust design giving longer operating life, thereby reducing maintenance costs for mine operators.



QUARRYING AND MINING PROCESS



Extraction/Mining

Crushing/Screening



Ball & Roller Bearings – NSKHPS series



Ball & Roller Bearings – NSKHPS series



Spherical Roller Bearings – VS series



Cylindrical Roller Bearings – high load capacity



Ball & Roller Bearings – HTF/STF steel



Cylindrical Roller Bearings – EMM VS/VM series



Ball & Roller Bearings – HTF/STF steel



Plummer Blocks – SNN series



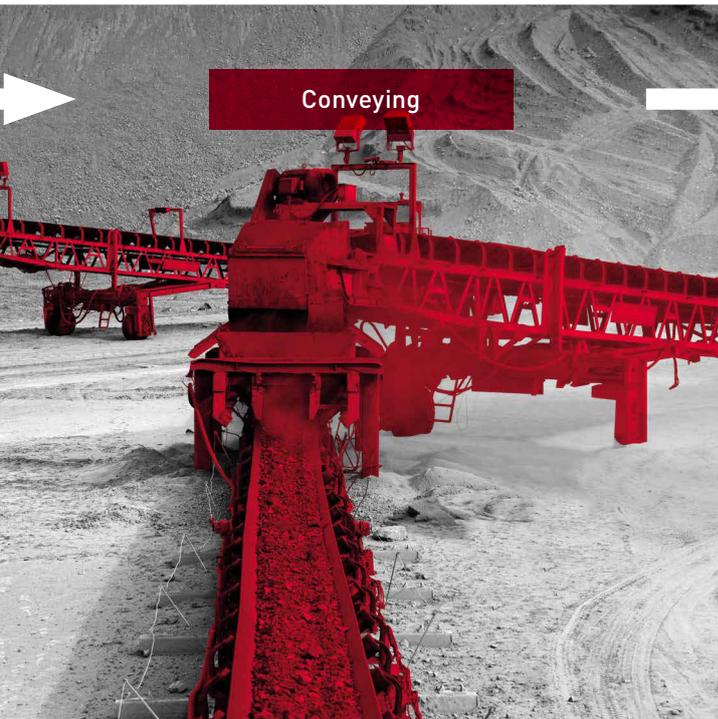
Integrated Bearing Assemblies



Tapered Roller Bearings – Single-Row



Crane Sheave Bearings



Conveying



Processing/Milling

Conveying



Ball & Roller Bearings – NSKHPS series



Plummer Blocks – SNN series



Spherical Roller Bearings with detachable seals – HTF steel



Self-Lube® Units

Processing



Ball & Roller Bearings – NSKHPS series



Spherical Roller Bearing – ultra-large



Cylindrical Roller Bearings – High Load Capacity



Plummer Blocks – SNN series



Spherical Roller Bearings with detachable seals – HTF steel

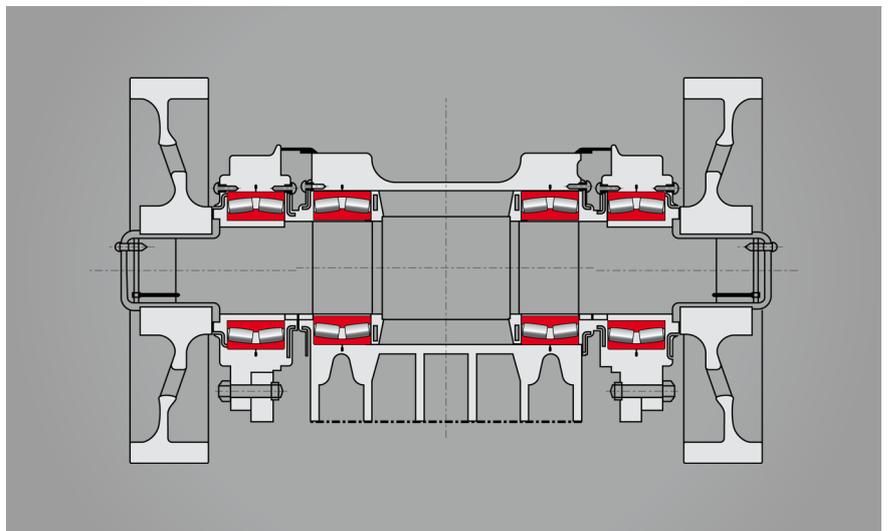
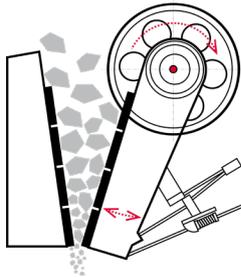
APPLICATIONS

CRUSHING

Jaw Crusher

NSK bearing solutions:

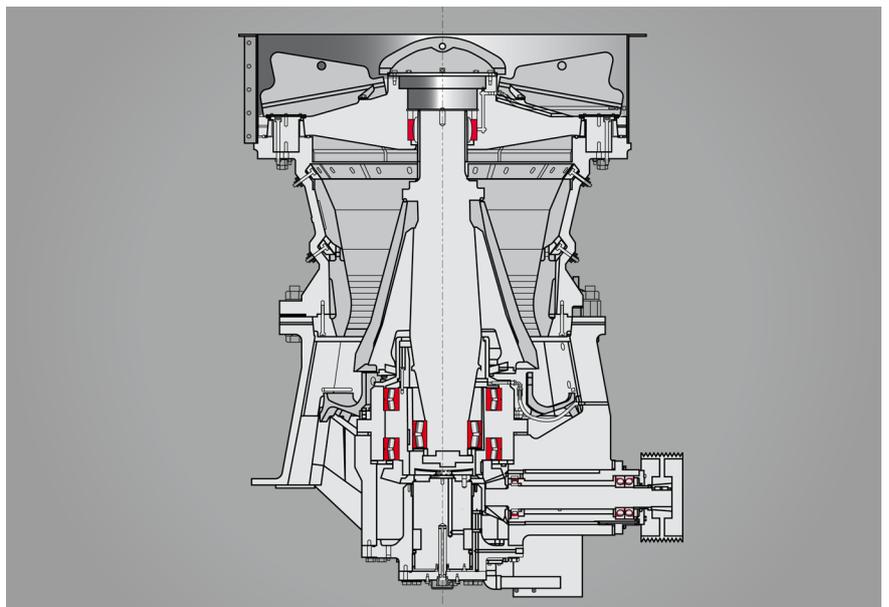
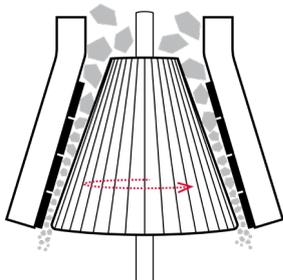
Spherical Roller Bearings – VS series; HTF/STF steel



Cone Crusher

NSK bearing solutions:

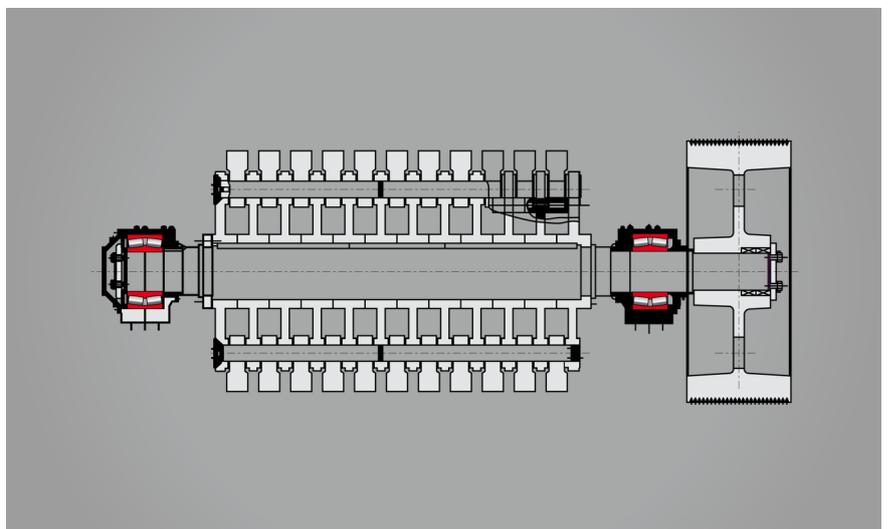
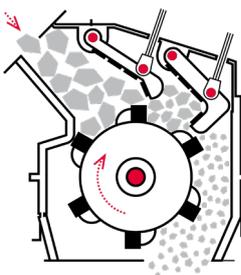
Cylindrical Roller Bearings – High Load Capacity; HTF/STF steel



Impact Crusher/Hammer Mill

NSK bearing solutions:

NSKHPS; HTF/STF steel

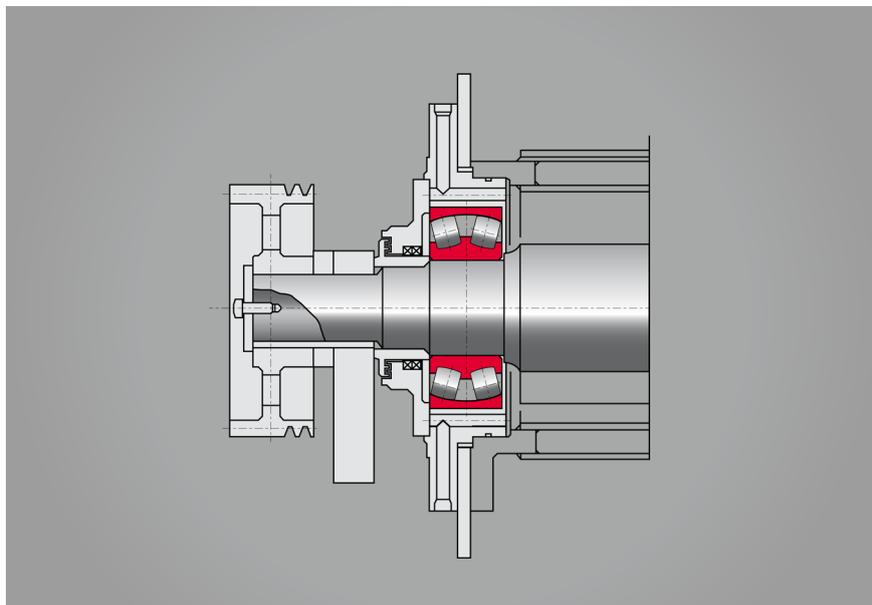
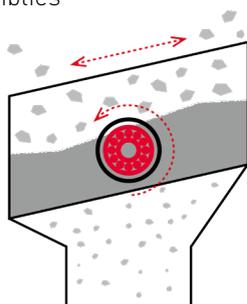


SCREENING

Vibrating Screen

NSK bearing solutions:

Spherical Roller Bearings – VS series;
Cylindrical Roller Bearings – EMM
VS/VM series; Integrated Bearing
Assemblies

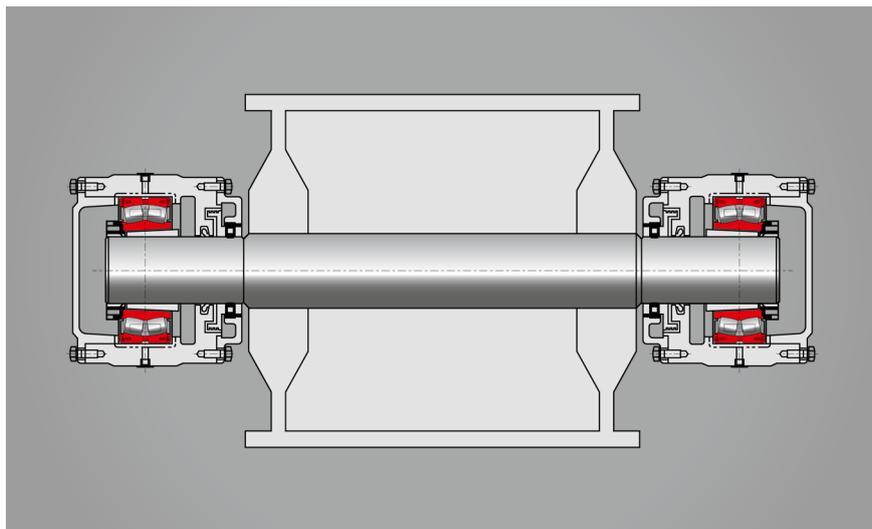
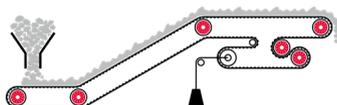


CONVEYING

Conveyor Tension Pulley

NSK bearing solutions:

Spherical Roller Bearing with
detachable seals; HTF steel

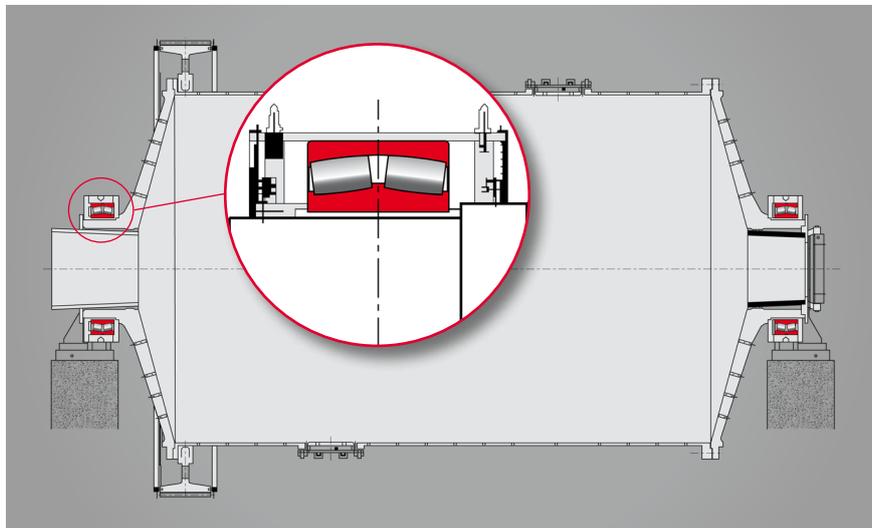
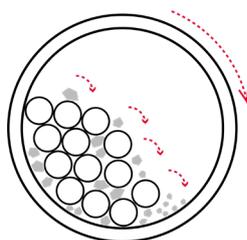


PROCESSING

Ball Mill

NSK bearing solutions:

Spherical Roller Bearings –
Ultra-large size



SPHERICAL ROLLER BEARINGS

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

NSKHPS Spherical Roller Bearings are optimised 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.



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



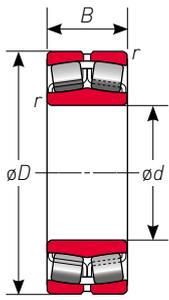
Machined brass cage (ECA & CA)

- Heavy duty cage design for superior performance in applications subject to heavy and/or impact loading
- Cage pocket geometry and finger length provide superior roller guidance and controlled roller skew
- Precision-machined contours optimise lubricant flow to rolling contact surfaces

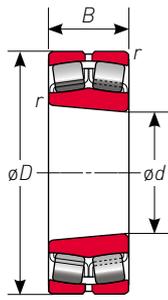
Bearing nomenclature

Example: **232** **36** **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/ECA: High load capacity
M	Cage type	M: Machined brass cage (for ECA/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: Dimensionally stabilised up to 200 °C (omitted for EA Design)
H	NSKHPS	*H*: NSKHPS Bearings



Cylindrical bore

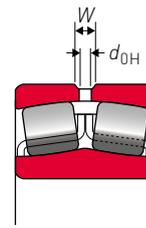


Tapered bore

Dimensions of oil groove and holes

Unit: mm

Nominal width <i>B</i>		Oil groove width <i>W</i>	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



Number of oil holes

Nominal outer ring diameter <i>D</i> (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

Bearing numbers			Boundary dimensions (mm)				Basic load ratings (kN)		Speeds (min ⁻¹)		
Cylindrical bore	Tapered bore	NSKHPS	<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> (min.)	<i>C_r</i>	<i>C_{0r}</i>	Thermal reference speed	Limiting speeds	
										Mechanical	Grease
22208EAE4	22208EAKE4	*H*	40	80	23	1.1	113	99	7 100	12 000	6 700
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
22209EAE4	22209EAKE4	*H*	45	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
22309EAE4	22309EAKE4	*H*		100	36	1.5	207	195	5 000	8 000	4 500
22210EAE4	22210EAKE4	*H*	50	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
22310EAE4	22310EAKE4	*H*		110	40	2	246	234	4 800	7 100	4 300
22211EAE4	22211EAKE4	*H*	55	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
22311EAE4	22311EAKE4	*H*		120	43	2	292	292	4 300	6 000	3 800
22212EAE4	22212EAKE4	*H*	60	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
22312EAE4	22312EAKE4	*H*		130	46	2.1	340	340	4 000	5 600	3 600
22213EAE4	22213EAKE4	*H*	65	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
22313EAE4	22313EAKE4	*H*		140	48	2.1	375	380	3 800	5 000	3 200
22214EAE4	22214EAKE4	*H*	70	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
22314EAE4	22314EAKE4	*H*		150	51	2.1	425	435	3 600	4 800	3 000

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	<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> (min.)	<i>C_r</i>	<i>C_{0r}</i>	Mechanical	Grease	
22215EAE4	22215EAKE4	*H*	75	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
22315EAE4	22315EAKE4	*H*		160	55	2.1	485	505	3 400	4 300	2 800
22216EAE4	22216EAKE4	*H*	80	140	33	2	264	275	4 000	6 000	3 600
21316EAE4	21316EAKE4	*H*		170	39	2.1	355	375	3 800	4 800	3 000
22316EAE4	22316EAKE4	*H*		170	58	2.1	540	565	3 200	3 800	2 600
22217EAE4	22217EAKE4	*H*	85	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
22317EAE4	22317EAKE4	*H*		180	60	3	600	630	3 000	3 400	2 400
22218EAE4	22218EAKE4	*H*	90	160	40	2	360	395	3 800	5 000	3 200
21318EAE4	21318EAKE4	*H*		190	43	3	415	450	3 600	4 500	2 800
22318EAE4	22318EAKE4	*H*		190	64	3	665	705	2 800	3 000	2 400
22219EAE4	22219EAKE4	*H*	95	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
22319EAE4	22319EAKE4	*H*		200	67	3	735	780	2 600	3 000	2 200
22220EAE4	22220EAKE4	*H*	100	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
22320CAME4*	22320CAMKE4*	*H*		215	73	3	750	785	2 600	3 400	1 700
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
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
22322CAME4*	22322CAMKE4*	*H*		240	80	3	925	980	2 200	3 000	1 500
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	
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
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 and ECAM are also available. Load rating of EA is around 10% higher than CAM's, please consult NSK.

Bearing numbers			Boundary dimensions (mm)				Basic load ratings (kN)		Speeds (min ⁻¹)		
Cylindrical bore	Tapered bore	NSKHPS	d	D	B	r (min.)	C _r	C _{0r}	Thermal reference speed	Limiting speeds	
										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	
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	

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
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
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
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

ECAM is also available, please contact NSK.

Bearing numbers			Boundary dimensions (mm)				Basic load ratings (kN)		Speeds (min ⁻¹)		
Cylindrical bore	Tapered bore	NSKHPS	d	D	B	r (min.)	C _r	C _{0r}	Thermal reference speed	Limiting speeds	
										Mechanical	Grease
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
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

CYLINDRICAL ROLLER BEARINGS

NSKHPS Cylindrical Roller Bearings have an optimised 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.



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

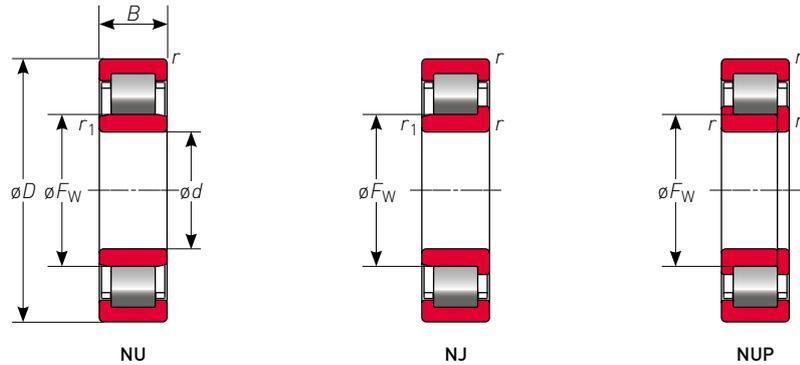
Range of availability – cage type

Bearing type	Cage type	EM	EW	ET	ET7
	series	Machined brass	Pressed steel	Polyamide resin	L-PPS resin
 NU NJ NUP	2	05 to 44	05 to 13	05 to 19	05 to 18
	22	05 to 40	-	05 to 19	05 to 18
	3	05 to 32	05 to 11	05 to 16	05 to 16
	23	05 to 30	-	05 to 16	05 to 16

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



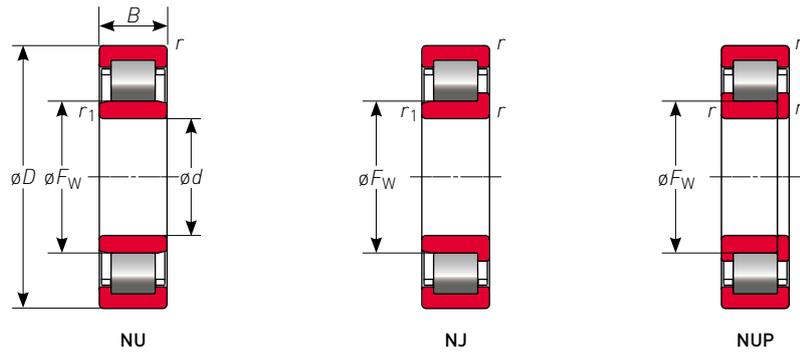
Bearing numbers*						Boundary dimensions (mm)					Basic load ratings (kN)		Speeds (min ⁻¹)			Permissible axial movement S (mm)	
Basic number & internal design	Cage				NSKHPS	d	D	B	r _(min.)	r _{1(min.)}	F _W	C _R	C _{0R}	Thermal reference speed	Limiting speeds		
	W	M	T	T7											Mechanical	Grease	
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

* 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	
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
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

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



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	
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
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

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

SPHERICAL ROLLER BEARINGS – VS SERIES

NSK's long-life VS series Spherical Roller Bearings are engineered specifically for vibrating machinery and equipment – screens, crushers, feeders and compactors – where a host of operating challenges come together in a relentless perfect storm. An optimised internal bearing design and tightly controlled clearance and dimensional tolerances deliver robust performance over a long operating life.

Spherical Roller Bearings – VS series Specifications

Improved surface finish and geometry

- Minimises sliding contact where loading is heaviest
- Reduced operating temperature
- Improved lubricant film

Floating guide ring

- Prevents roller end wear on cage
- Stabilises cage during heavy vibration
- Avoids contact and wear seen in outer ring guided cages



Reduced bore and outer diameter tolerances

- Reliable mounting and fitting conditions

Special clearance

- Minimises heat generation

Heavy duty machined brass cage

- Contoured for better roller guidance
- Special finger shape for better lubricant flow around roller

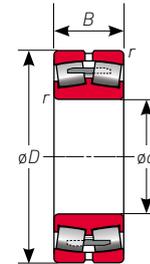
NSK's – VS3, VS4 specifications stabilise the load distribution by controlling the internal clearance and the dimensional tolerance of the bearing. The dimensional tolerance bearing is set at 1/2 relative to the outer

diameter tolerance and the internal diameter tolerance, whereas the radial internal clearance is set at 2/3 relative to standard Spherical Roller Bearings.

Bearing nomenclature

Example: **223** | **20** | **CA** | **M** | **E4** | **-VS3(4)**

223	Bearing series	
20	Bearing reference	
E/CA	Internal design	E: High load capacity CA: internal design
M	Cage type	Machined Brass Cage
E4	Lubrication features	Oil groove & holes in outer ring
-VS3(4)	Special features	VS: vibrating screen specification 3: C3 radial internal clearance



Bearing numbers	Boundary dimensions (mm)						Basic load ratings (kN)		Limiting speeds rpm		Radial clearance (cylindrical bore)	
	<i>d</i> (mm)	Diameter tolerance (µm)	<i>D</i> (mm)	Diameter tolerance (µm)	<i>B</i> (mm)	<i>r</i> (min)	<i>C_r</i>	<i>C_{0r}</i>	Grease	Oil	VS3 (µm)	VS4 (µm)
22308ECAME4 - VS()	40	0	90	-5	33	1.5	161	142	4 300	5 300	50 to 60	65 to 80
22309ECAME4 - VS()	45		100		36	1.5	197	182	3 800	4 800	60 to 75	85 to 100
22310ECAME4 - VS()	50	-7	110	-13	40	2.0	233	219	3 600	4 300	60 to 75	85 to 100
22311ECAME4 - VS()	55		120		43	2.0	278	274	3 200	4 000	75 to 90	100 to 120
22312ECAME4 - VS()	60	0	130	-18	46	2.1	320	320	3 000	3 600	75 to 90	100 to 120
22313ECAME4 - VS()	65		140		48	2.1	375	380	2 800	3 400	75 to 90	100 to 120
22314ECAME4 - VS()	70	-9	150	-5	51	2.1	425	435	2 600	3 200	90 to 110	120 to 145
22315ECAME4 - VS()	75		160		55	2.1	485	505	2 400	3 000	90 to 110	120 to 145
22316ECAME4 - VS()	80	-12	170	-10	58	2.1	540	565	2 200	2 800	90 to 110	120 to 145
22317ECAME4 - VS()	85		180		60	3.0	600	630	2 000	2 600	110 to 135	150 to 180
22318ECAME4 - VS()	90	0	190	-23	64	3.0	665	705	2 000	2 400	110 to 135	150 to 180
22319ECAME4 - VS()	95		200		67	3.0	735	780	1 900	2 400	110 to 135	150 to 180
22320ECAME4 - VS()	100	-15	215	-13	73	3.0	860	930	1 700	2 200	110 to 135	150 to 180
22322ECAME4 - VS()	110		240		80	3.0	1 030	1 120	1 600	1 900	135 to 160	180 to 210
22324ECAME4 - VS()	120	-18	260	-28	86	3.0	1 190	1 320	1 400	1 800	135 to 160	180 to 210
22326CAME4 - VS()	130		280		93	4.0	1 240	1 350	1 300	1 600	160 to 190	205 to 240
22328CAME4 - VS()	140	0	300	-13	102	4.0	1 450	1 590	1 200	1 500	160 to 190	205 to 240
22330CAME4 - VS()	150		320		108	4.0	1 530	1 690	1 100	1 400	190 to 220	240 to 280
22332CAME4 - VS()	160	-15	340	-28	114	4.0	1 700	1 900	1 100	1 300	190 to 220	240 to 280
22334CAME4 - VS()	170		360		120	4.0	1 970	2 110	1 000	1 200	200 to 240	260 to 310
22336CAME4 - VS()	180	0	380	-18	126	4.0	2 170	2 340	950	1 200	200 to 240	260 to 310
22338CAME4 - VS()	190		400		132	5.0	2 370	2 590	900	1 100	220 to 260	285 to 340

VS(): Replace parentheses and indicate "VS3" or "VS4" when ordering.

CYLINDRICAL ROLLER BEARINGS VIBRATING SCREEN AND VIBRATOR MOTOR

Cylindrical Roller Bearings EMM – VS series specifications

NSK's Cylindrical Roller Bearings EMM-VS series are designed to carry heavier loads and endure the harsh accelerations and demanding conditions of vibrating screens while being adaptive to misalignments and allowing for a smooth thermal expansion of the shaft.

Improved floating function in vibrating screen applications
No risk of axial overloading due to shaft thermal expansion

Outer-ring-guided machined brass cage
High-strength & wear resistant

Improved oil flow

Concave contact surface of cage pocket more accurately guides each roller

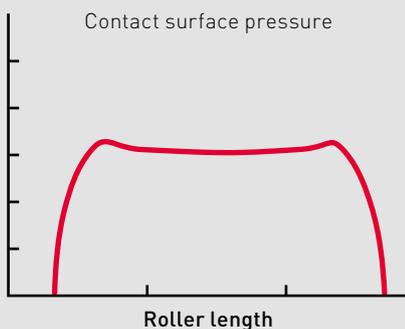
Large pocket corner radii relieve stress concentrations on the cage

Improved lubricant dispersion within the cage pockets dampens noise

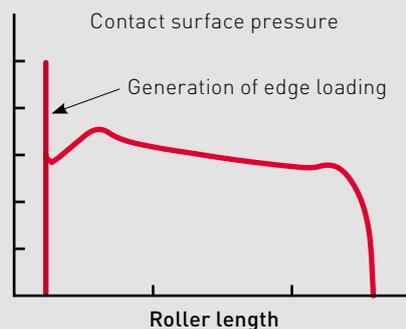


Standard specification

Heavy load with no misalignment
+
Standard roller specification

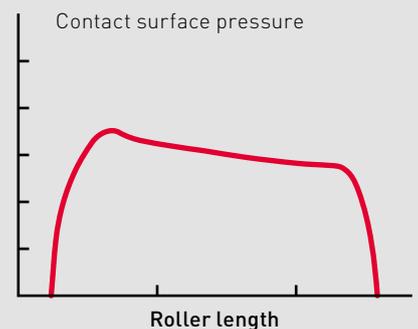


Heavy load with misalignment
+
Standard roller specification

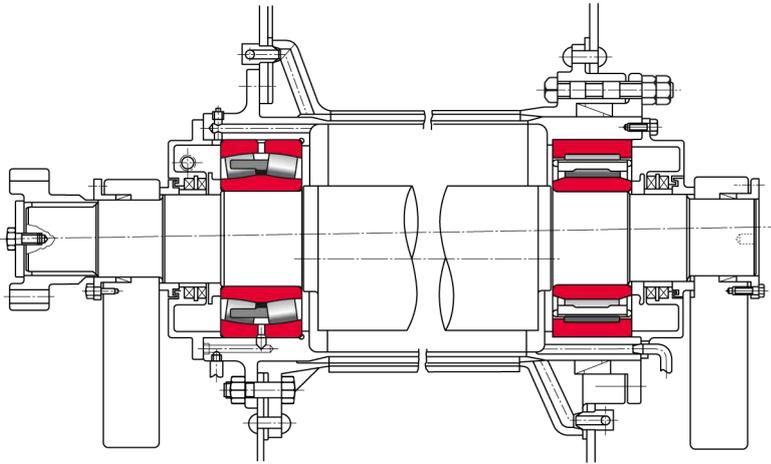


Special roller crowning EMM-VS

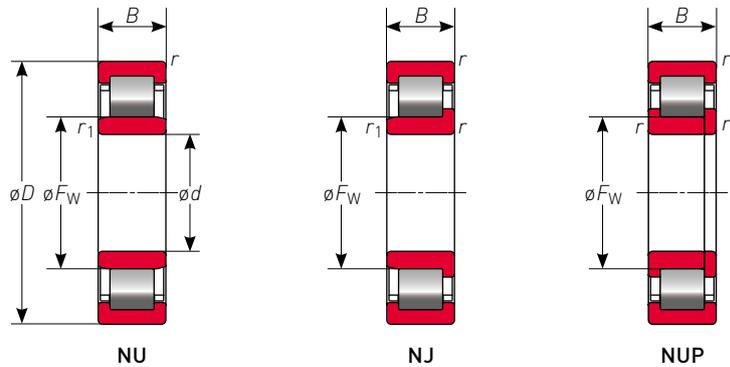
Heavy load with misalignment
+
Special roller crowning specification for vibrating equipment



CYLINDRICAL ROLLER BEARINGS VIBRATING SCREEN AND VIBRATOR MOTOR



Combined Spherical Roller Bearing and Cylindrical Roller Bearing on a vibrating screen shaft.



Bearing numbers	Boundary dimensions (mm)						Basic load ratings (kN)	
	<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> min.	<i>r</i> ₁ min.	<i>F_w</i>	<i>C_r</i>	<i>C_{0r}</i>
NU2308EMMC()-VS	40	90	33	1.5	1.5	52	114	122
NU2309EMMC()-VS	45	100	36	1.5	1.5	58.5	137	153
NU2310EMMC()-VS	50	110	40	2	2	65	163	187
NU2311EMMC()-VS	55	120	43	2	2	70.5	201	233
NU2312EMMC()-VS	60	130	46	2	2	77	222	262
NU2313EMMC()-VS	65	140	48	2.1	2.1	82.5	233	265
NU2314EMMC()-VS	70	150	51	2.1	2.1	89	274	325
NU2315EMMC()-VS	75	160	55	2.1	2.1	95	330	395
NU2316EMMC()-VS	80	170	58	2.1	2.1	101	355	430
NU2317EMMC()-VS	85	180	60	3	3	108	395	485
NU2318EMMC()-VS	90	190	64	3	3	113.5	435	535
NU2319EMMC()-VS	95	200	67	3	3	121.5	460	585
NU2320EMMC()-VS	100	215	73	3	3	127.5	570	715
NU2322EMMC()-VS	110	240	80	3	3	143	675	880
NU2324EMMC()-VS	120	260	86	3	3	154	795	1 030

[]: Replace parentheses and indicate "C3" or "C4" when ordering.

Cylindrical Roller Bearings – VM series specification

Vibrator motor manufacturers have specific requirements when it comes to bearings fitted in such challenging and versatile applications. NSK's Cylindrical Roller Bearings VM series meet all these requirements and ensure a reliable and long operating life.

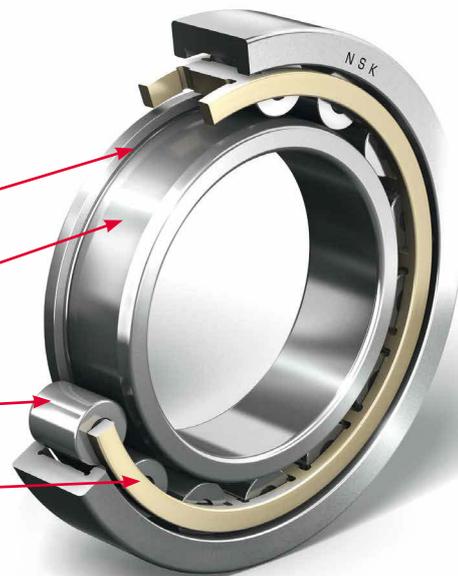
Optimised inner ring rib geometry

Special crowning of inner ring raceway

Enhanced roller precision

One piece machined brass cage

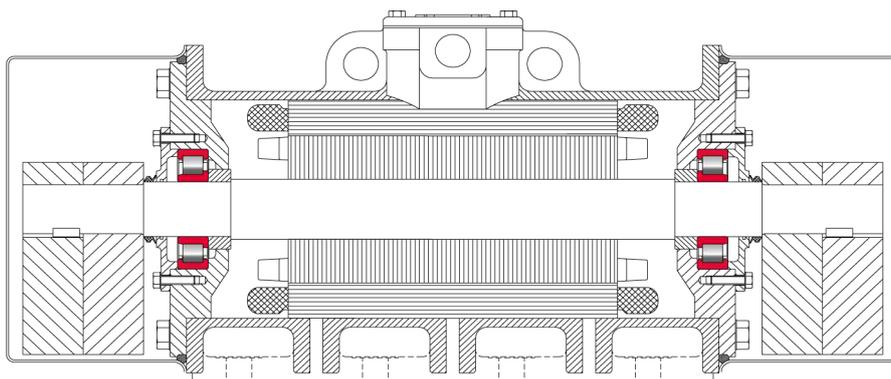
ET cage version (polyamide resin) also available



Bearing nomenclature

Example: **NJ23 11 E T C4 -VM**

NJ23	Bearing series	NU2, NU22, NU3, NU23 NJ2, NJ22, NJ3, NJ23 NUP2, NUP22, NUP3, NUP23	: Cylindrical Roller Bearings
11	Bore reference	Bore number indicates bore diameter. bore number × 5 (mm)	
E	Internal design	E: High Load Capacity	
T	Cage type	MM: Machined brass cage (vibrating equipment) M: Machined brass cage	T: Polyamide resin cage T7: L-PPS resin cage
C4	Internal radial clearance	Omitted: CN clearance C3: Clearance greater than CN C4: Clearance greater than C3	
-VM	Special specifications	VS: Bearings for vibrating screen VM: Bearings for vibrator motor	



Typical arrangement of NJ type Cylindrical Roller Bearings in a vibration motor.

Please consult NSK for available sizes and designs.

SUCCESS STORY: REAL LIFE BENEFITS OF THE PROVEN SOLUTION

Industry: QMC
 Application: Vibrating Screen
 Cost savings: € 73 012

Introduction

A customer in Central America, in the quarrying and mining industry, was experiencing reliability problems due to recurring bearing failures. The existing bearings failed after only 8 months. NSK engineers worked closely with the customer, analysing the failure, and recommended the VS series of bearings, designed to withstand aggressive operating conditions.

Key facts

The bearings work in a vibrating screen under the severe environment of vibration and contamination. This caused production stoppages of more than 8 hrs for each bearing failure.

NSK recommended the use of Spherical Roller Bearing – VS series which are designed to withstand aggressive operating conditions.

After NSK Spherical Roller Bearings VS series had been installed the application bearing life doubled.

Value proposals

- NSK supported the customer during the bearing inspection
- NSK provided an objective failure analysis with root cause identification and recommendations
- It was recommend to exchange the existing bearings by NSK Spherical Roller Bearings – VS series
- Twice the service life of conventional bearings
- With an improved bearing performance and equipment reliability
- This led to significant annual cost savings



Vibrating Screen



Spherical Roller Bearing – Vibrating Screen series

Cost saving breakdown

Before	Cost p. a.
Bearing costs	€ 1 222
Engineering costs	€ 35
Costs of lost production	72 774
Total costs	€ 74 031

NSK Solution	Cost p. a.
Bearing costs	€ 1 018
Engineering costs	€ 0
Costs of lost production	€ 0
Total costs	€ 1 018

SPHERICAL ROLLER BEARINGS WITH DETACHABLE SEAL – HTF

Combining the TF steel material technology with an advanced and easy-to-install seal, NSK delivered a high capacity and high performing solution to contaminant and installation – related bearing failures in conveyor applications.

Design features

Bearing boundary dimension

Thanks to the life extending attribute of TF steel bearing material, SSRB features the same boundary dimensions with – in most cases – a higher load rating when compared to the standard unsealed bearing making therefore interchanging trouble-free and without any modifications required to the surrounding components.

Special bearing material & heat treatment

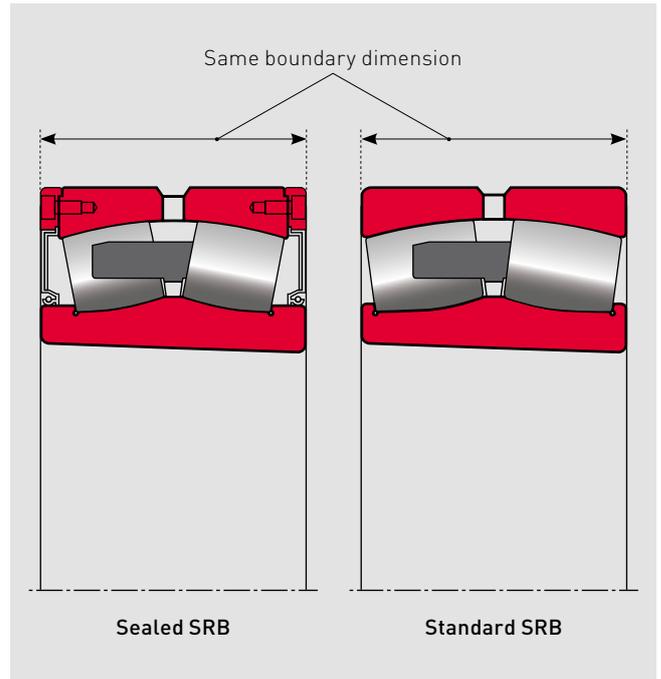
The adoption of TF steel for the inner & outer rings extends bearing life and prevents wear on the raceway under contaminated and severe lubrication conditions.

Seal design

The innovative sealing concept featuring a garter spring loaded lip ensures high sealing performance with ability to compensate for bearing misalignment while the bolt-fastened seal holder allows for the valuable direct measurement of radial internal clearance during the installation process.

Hydrogenated nitrile butadiene rubber is used as seal material tolerating an operating temperature of up to 100 °C.

NSK supplies the SSRB without packed grease giving end users the flexibility of choice or integration with other grease lubricated bearing positions.





Bearing nomenclature

Example: **HTF** **320** **SLE** **316** **A** **G** **DD2** **K** **E4** **C3**

HTF	Hi-Tough steel
320	Bore diameter (mm)
SLE	Special Sealed Spherical Roller Bearing
316	Series code
A	Internal design
G	Case hardened material
DD2	Seal design
K	Tapered bore
E4	Lubrication groove & lubrication hole
C3	Internal radial clearance C3

SSRB reference number	<i>d</i> (mm)	<i>D</i> (mm)	<i>B</i> (mm)	<i>C_r</i> (kN)	<i>C_{0r}</i> (kN)	Speed-limit (rpm)	Equivalent standard reference number
HTF120SLE226AGDD2KE4C3	120	215	58	480	525	1 050	[22224EAKE4C3]
HTF130SLE226AGDD2KE4C3	130	230	64	565	635	970	[22226EAKE4C3]
HTF140SLE226AGDD2KE4C3	140	250	68	680	765	890	[22228CAMKE4C3]
HTF150SLE226AGDD2KE4C3	150	270	73	780	895	820	[22230CAMKE4C3]
HTF160SLE226AGDD2KE4C3	160	290	80	900	1 050	780	[22232CAMKE4C3]
HTF170SLE316AGDD2KE4C3	170	280	88	915	1 230	770	[23134CAMKE4C3]
HTF180SLE316AGDD2KE4C3	180	300	96	1 060	1 400	720	[23136CAMKE4C3]
HTF190SLE316AGDD2KE4C3	190	320	104	1 190	1 540	670	[23138CAMKE4C3]
HTF200SLE316AGDD2KE4C3	200	340	112	1 360	1 790	630	[23140CAMKE4C3]
HTF220SLE316AGDD2KE4C3	220	370	120	1 570	2 140	580	[23144CAMKE4C3]
HTF240SLE316AGDD2KE4C3	240	400	128	1 830	2 470	540	[23148CAMKE4C3]
HTF260SLE316AGDD2KE4C3	260	440	144	2 210	2 980	490	[23152CAMKE4C3]
HTF280SLE316AGDD2KE4C3	280	460	146	2 330	3 300	460	[23156CAMKE4C3]
HTF300SLE316AGDD2KE4C3	300	500	160	2 770	4 000	430	[23160CAMKE4C3]
HTF320SLE316AGDD2KE4C3	320	540	176	3 400	4 850	400	[23164CAMKE4C3]
HTF340SLE316AGDD2KE4C3	340	580	190	3 850	5 450	370	[23168CAMKE4C3]
HTF360SLE316AGDD2KE4C3	360	600	192	3 900	5 600	360	[23172CAMKE4C3]
HTF380SLE316AGDD2KE4C3	380	620	194	4 000	5 850	350	[23176CAMKE4C3]
HTF400SLE316AGDD2KE4C3	400	650	200	4 200	6 300	330	[23180CAMKE4C3]
HTF420SLE316AGDD2KE4C3	420	700	224	5 250	7 700	310	[23184CAMKE4C3]
HTF440SLE316AGDD2KE4C3	440	720	226	5 450	8 200	300	[23188CAMKE4C3]
STF460SLE316AGDD2KE4C3	460	760	240	6 050	9 150	280	[23192CAMKE4C3]
STF480SLE316AGDD2KE4C3	480	790	248	6 550	10 100	270	[23196CAMKE4C3]

SUCCESS STORY: REAL LIFE BENEFITS OF THE PROVEN SOLUTION

Industry: QMC
Application: Ship Loading Conveyor
 Conveyor Pulley
Cost savings: € 77 376

Introduction

At an iron ore port facility in Australia, a bend pulley on a ship loading conveyor was determined to have only 6 months operating life before an exchange was necessary, due to heavy iron ore particle ingress and water contamination in the lubricant leading to short operating life. NSK Engineering designed a Spherical Roller Bearing for the ship loading conveyor application that offered the HTF material solution and removable nitrile rubber (HNBR) garter sprung seals to extend the operating life. Tough steel is an effective countermeasure to the wear commonly found on the outer ring raceway, where the fixed load zone material wears under fine particle ingress.

Key facts

- NSK investigated the bearing failure and found out that contaminant ingress in the lubricant lead to the short operating life
- Short operating life requires regular and costly maintenance man hours and lost production costs
- NSK Solution: Spherical Roller Bearings in HTF material with removable nitrile rubber seal
- Increase of bearing life time

Value proposals

- NSK proven removable garter sprung seals provided port facility end user
- Ability to check radial internal clearance during fitting using feeler gauges
- Seal wear compensation by sprung lip
- Lip contact pressure maintained under misalignment
- NSK Sealed Spherical Roller Bearings were installed and achieved 12 months operation life



Quarry conveyor



Spherical Roller Bearing – detachable seal

Cost saving breakdown

Before	Cost p. a.
Bearing costs	€ 3 511
Costs of lost production	€ 85 049
Other costs	€ 30 607
Total costs	€ 119 167

NSK Solution	Cost p. a.
Bearing costs	€ 3 074
Costs of lost production	€ 28 350
Other costs	€ 10 368
Total costs	€ 41 791

TF TECHNOLOGY – HTF & STF MATERIALS

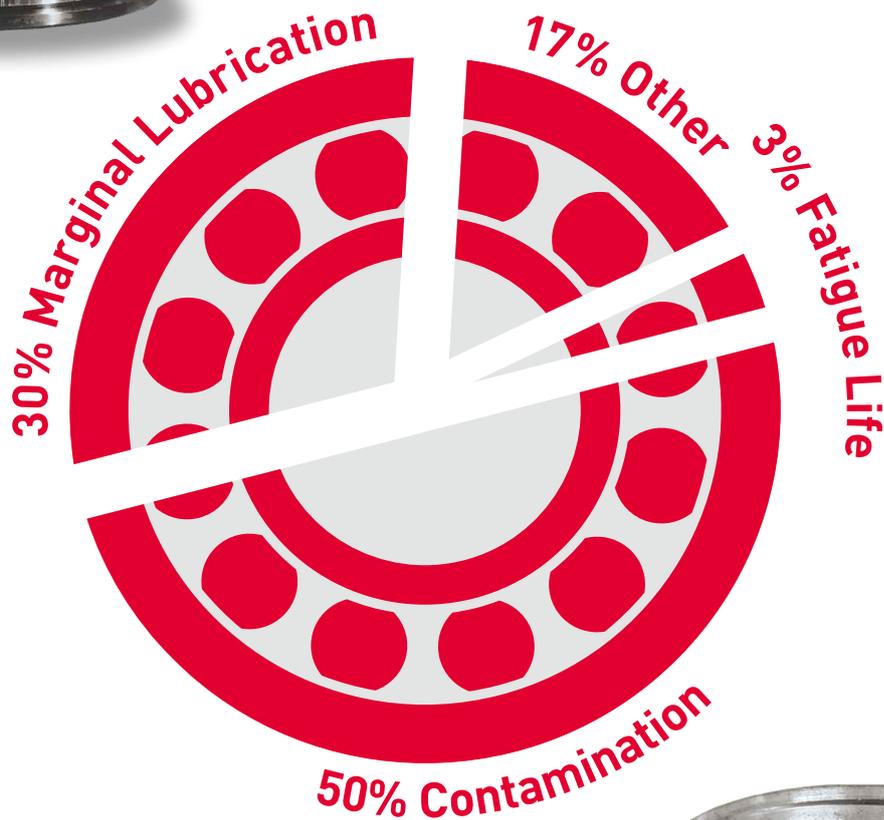
The issue

Most bearings don't reach their full L10 calculated life. NSK's TF Technology addresses the root causes of over 80 percent of bearing failures seen in failure analysis labs: marginal lubrication and contamination.

The theory

NSK's concept of long life in contaminated environments is unique in the bearing industry. NSK's research has enabled it to be the first to recognise the relationship between the retained austenite and rolling fatigue life in contaminated environments (fig. 2)

Metal particles or other hard contaminants in the lubricant make dents in the contact surfaces. Stress is concentrated around these dents which can be represented as seen in fig. 1. The greater the value of "r/c", the smaller the stress concentration and the longer the service life of the bearing.



TF TECHNOLOGY – HTF & STF MATERIALS

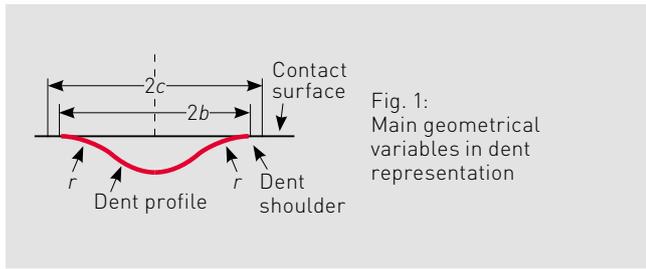


Fig. 1: Main geometrical variables in dent representation



Fig. 3: Comparison of bearing-steel behaviour after hard contaminant indentation

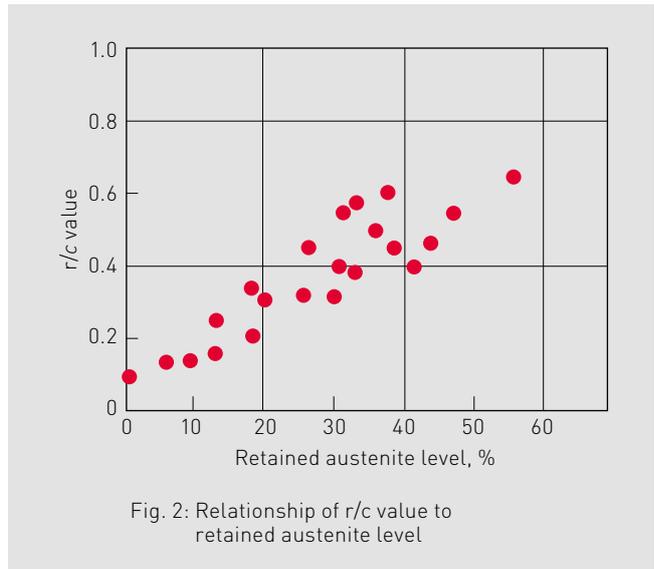
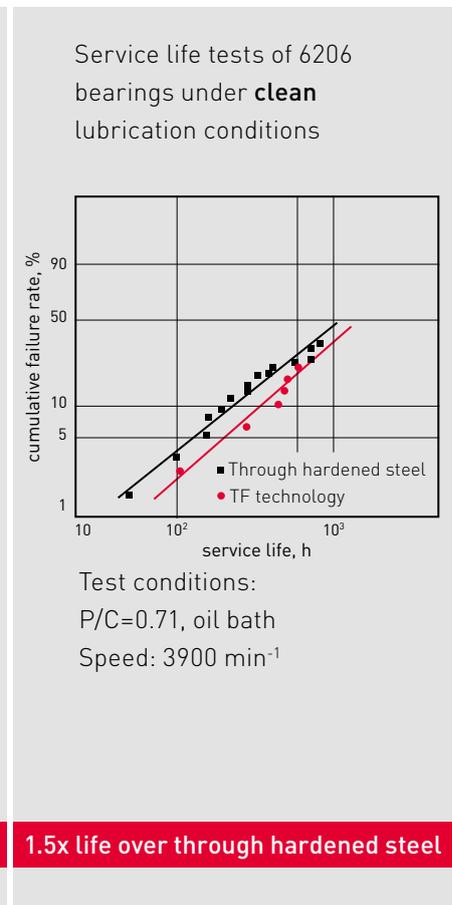
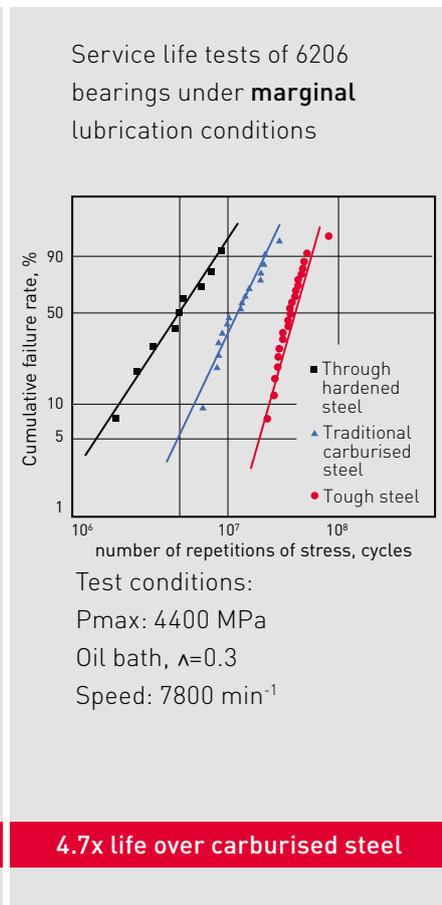
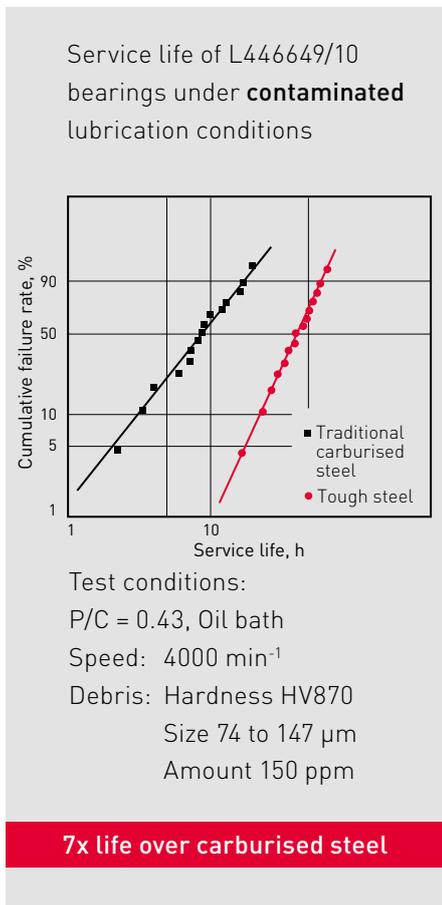


Fig. 2: Relationship of r/c value to retained austenite level

Proving the theory

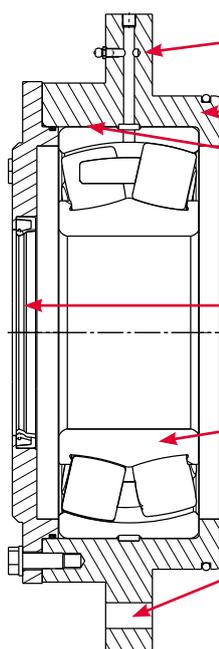
The following lab tests show that TF technology steel outlasts carburised and through hardened steel under many different conditions.

See page 47 for a real-life example of the benefits of using TF technology to mitigate the effects of contamination and improve operating lifetime.



VIBRATING SCREEN SX UNITS

Suitable for both equipment makers as well as end-users, NSK's integrated vibrating screen units are a safe and reliable solution to the sometimes problematic mounting and resultant residual clearance which is critical in the overall lifetime and performance of the Vibrating Screen Bearings.



- Provision for re-lubrication**
 - Standardised grease nipples
- High-strength SG (spheroidal graphite) iron housing**
 - Designs for both free and fixed ends are available
- Accurate manufacturing and predictable interference fit**
 - Reliable operation of the machine due to correct residual clearance in the bearing
- Integrated and customised sealing solution**
 - No need for specialised fitting tools
- Long-Life VS series Spherical Roller Bearings**
 - Proven and reliable bearing solution
- Flanged housing configuration with bolt holes**
 - Quick and simple mounting – dismounting

Bearing nomenclature

Example: **SX** | **162**

SX	Special assembly
162	Series code

Please contact NSK for available designs and sizes



SUCCESS STORY: REAL LIFE BENEFITS OF THE PROVEN SOLUTION

Industry: QMC
 Application: Vibrating Screen
 Cost savings: € 117 000

Introduction

A Vibrating Screen manufacturer was experiencing difficulties with consistency of the bearing mounting in their shaker box assembly. At the same time they were looking for opportunities to save manufacturing cost and improve the overall performance of their machines. NSK engineers worked closely with this manufacturer and proposed that a complete bearing assembly be designed such that the resultant unit could simply be bolted down to the machine frame without complex assembly of bearings, seals and lubrication.

Key facts

- Severe environment requiring special bearings
- Pressure to reduce manufacturing costs
- NSK employed special vibratory screen bearings
- NSK bespoke design for supply of complete housing, bearing and sealing solution
- Resultant bolt on complete solution
- Reduced need for complex fitting

Value proposals

- NSK design review of the original machine
- Bespoke design created with full CAD drawings for approval by the customer
- NSK took over the manufacture and assembly of the complete housing, seals and bearing assembly
- Product supplied to the customer as a built unit, packed and pre-greased ready to run
- NSK worked with the customer to develop a simple bolt on assembly process
- Significant reduction in manufacturing costs documented
- Bearing performance and reliability improved



Vibrating Screen



Integrated bearing assembly

Cost saving breakdown

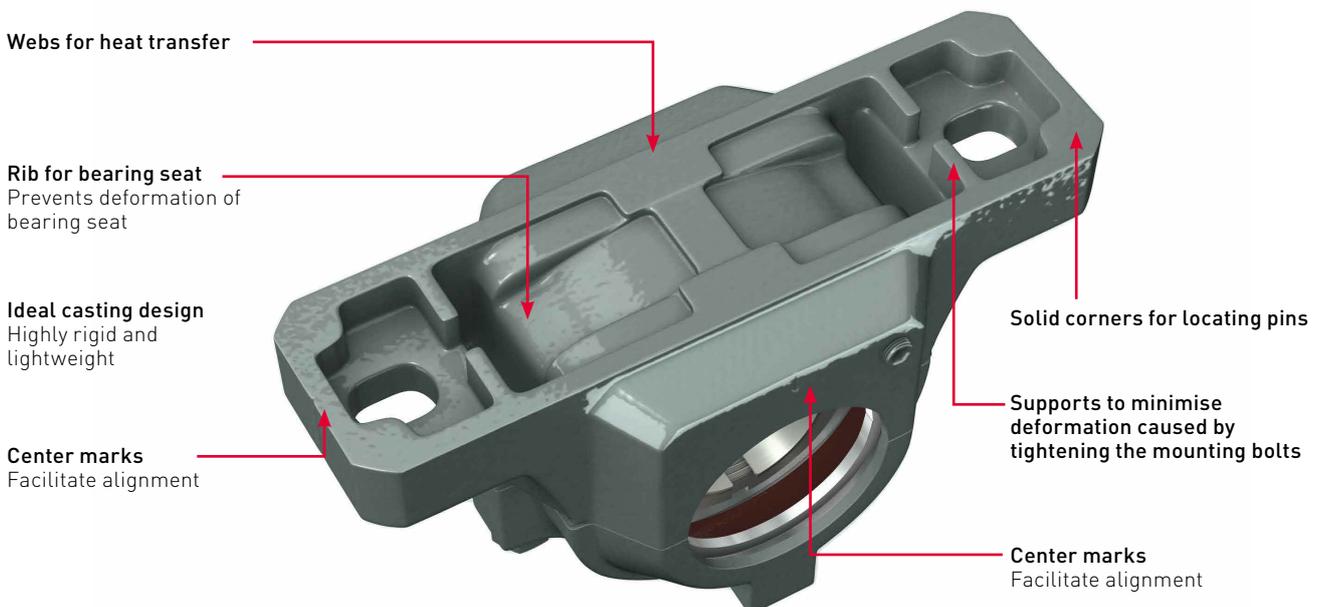
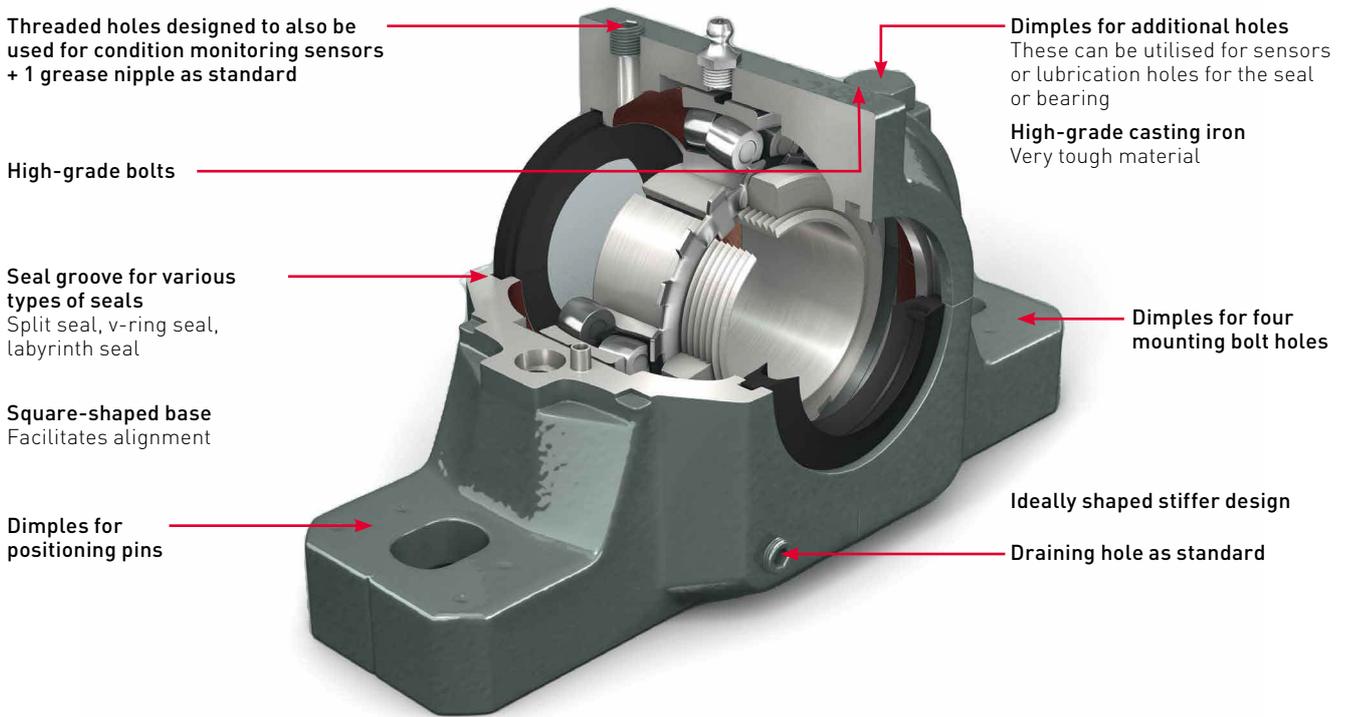
Before	Cost p. a.
Annual cost of manufacturing housings in-house, together with bearing purchase and assembly cost	€ 273 000
Total costs	€ 273 000

NSK Solution	Cost p. a.
Annual cost of pre-assembled bearing housings from NSK	€ 156 000
Total costs	€ 156 000

PLUMMER BLOCKS – SNN & SD SERIES

Our modular SNN housing range offers various technical options to match the needs of the most demanding applications in the quarrying and mining industries. The components are easy to fit, remove and maintain. Equipped with NSK High Performance Bearings, SNN

split housings will support you in achieving your cost reduction plans. Same housing can be used with both Double-Row Self-Aligning Ball Bearings or NSKHPS Double-Row Spherical Roller Bearings.



HOUSING FEATURES – DESIGNATION



Housings features

- Colour: RAL 7001, Pantone 444C
- Housing material: Cast iron Grade 200
- Cap bolts: Mild steel AISI1010 Grade 8.8
- Metal plugs: Mild steel AISI 1010
- Tolerance of bearing seating: H7
- The bearing seating is protected against corrosion, all the non machined internal parts are primed
- Each housing is supplied with a straight grease nipple (see dimensions in the lubrication section)
- Each SNN housing is supplied with 2 lubrication holes on the cap and 1 drain hole on the base

Bearing Nomenclature

Example: **SNN** | **511** | **609**

SNN	Housing design code
511-609	Size code

Housings designation

500 series for light series bearings with tapered bore 1200K, 2200K, 22200K, 23200K.

600 series for medium series bearings with tapered bore 1300K, 2300K, 21300K, 22300K.

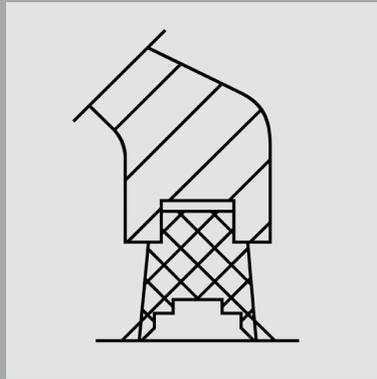
The SNN 500 and 600 series comprise a number of housings which, when combined with different seal options and ball or Spherical Roller Bearings, provide an answer for most plummer block applications with shaft diameters ranging from 20 mm to 140 mm.

The plummer block housings detailed in this brochure are manufactured in accordance with ISO/R113 standards.

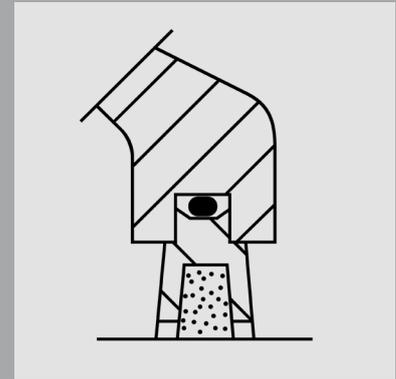
SNN STANDARD SEALING ARRANGEMENTS

There are several different types of seal designs for the use in SNN housings. Many alternative choices are available to the user to ensure that the most suitable solution will be found to meet a wide range of application conditions.

G seals



C seals

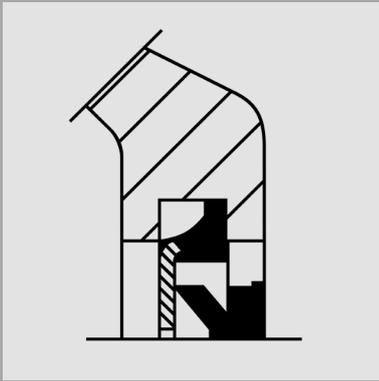


Seal type	G type	C type	
Material	NBR	Mild steel + wool & rayon	
Temperature	-35 °C to +80 °C	-40 °C to +100 °C	
Max. Speed	5 m/s*	4 m/s	
Max. Misalignment	0.5 to 1°	up to 0.5°	
Grease Lubrication	Excellent	Good	
Low Friction Torque	Good	Poor	
Axial Shaft Displacement	Excellent	Excellent	
Performance when exposed to:			
Dust	Excellent	Excellent	
Large Particles	Good	Good	
Water	Good	Fair	
	4 halves, to equip both sides of the housing	4 NBR o-rings, 4 halves/steel adapters, 4 felt strips, to equip both sides of housing	

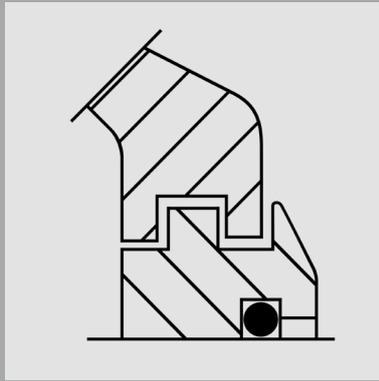
Remarks

- * With grease lubrication
- ** Up to 12 m/s with v-ring securing ring
- *** Depends on shaft diameter

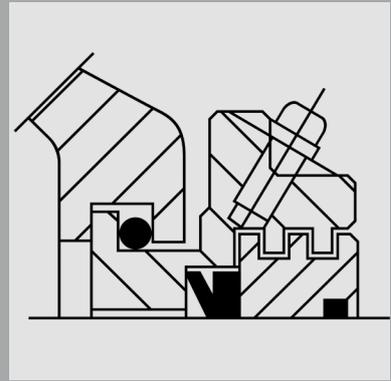
V seals



TS-U seals



TACK seals

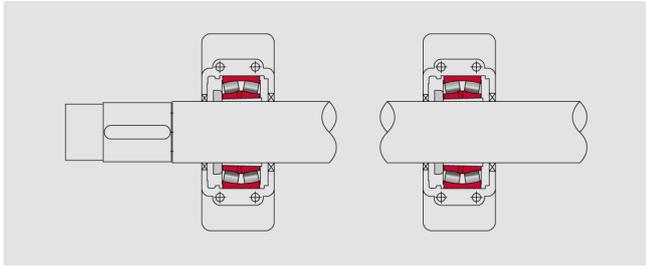


	V type	TS-U type	TACK type
	Mild steel & NBR	Cast iron + NBR	Cast iron + NBR
	-20 °C to +100 °C	-40 °C to +120 °C	-40 °C to +100 °C
	7 m/s**	Same as bearing	7 m/s***
	1 to 1.5°	up to 0.3°	up to 0.5°
	Excellent	Good	Good
	Good	Excellent	Good
	Poor	Fair	Poor
Performance when exposed to:			
	Excellent	Good	Excellent
	Poor	Good	Good
	Good	Poor	Good
	2 NBR v-rings, mild steel + NBR plates, to equip both sides of the housing	1 cast iron labyrinth + 1 NBR o-ring, to equip 1 side of the housing	1 cast iron labyrinth 2 NBR o-ring, 1 NBR v-ring, 1 cast iron body and 1 grease nipple, to equip 1 side of the housing

RELATIONSHIP BETWEEN CIRCUMFERENTIAL AND ROTATIONAL SPEED

Shaft diameter (mm)	Circumferential speed			
	4 m/s	5 m/s	7 m/s	12 m/s
	Corresponding rotational speed min ⁻¹			
20	3 820	4 775	6 685	11 460
25	3 060	3 825	5 355	9 170
30	2 550	3 188	4 463	7 640
35	2 180	2 725	3 815	6 550
40	1 910	2 388	3 343	5 730
45	1 700	2 125	2 975	5 090
50	1 530	1 913	2 678	4 580
55	1 390	1 738	2 433	4 170
60	1 270	1 588	2 223	3 820
65	1 180	1 475	2 065	3 530
70	1 090	1 363	1 908	3 270
75	1 020	1 275	1 785	3 060
80	950	1 188	1 663	2 860
85	900	1 125	1 575	2 700
90	850	1 063	1 488	2 550
95	800	1 000	1 400	2 410
100	760	950	1 330	2 290
110	690	863	1 208	2 080
115	660	825	1 155	1 990
120	640	800	1 120	1 910
125	610	763	1 068	1 830
130	590	738	1 033	1 760
135	570	713	998	1 700
140	550	688	963	1 640
145	530	663	928	1 580
150	510	638	893	1 530
155	490	613	858	1 480
165	460	575	805	1 390
175	440	550	770	1 310

HOW TO ORDER SNN COMPLETE PLUMMER BLOCKS FROM NSK



Example 1 – Application with 2 Plummer Blocks

Free end

Through shaft diam 50 mm, equipped with 1 Spherical Roller Bearing 22211EAK, double lip seals on both sides.

Parts required:

- 1 NSK housing SNN511-609
- 1 NSK bearing 22211EAKE4
- 1 NSK adapter sleeve H311
- 1 seal pack G511-KIT [2 seals included]

Fixed end

Through shaft, diam 50 mm, equipped with 1 Spherical Roller Bearing 22211EAK, double lip seals on both sides.

Parts required:

- 1 NSK housing SNN511-609
- 1 NSK bearing 22211EAKE4
- 1 NSK adapter sleeve H311
- 1 locating ring kit SR100/9.5-KIT [2 rings included]
- 1 seal pack G511-KIT [2 seals included]

Plummer Blocks typical arrangement

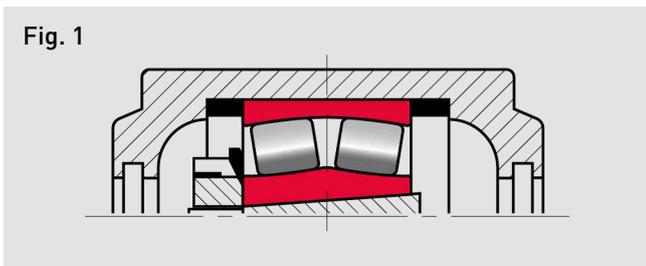
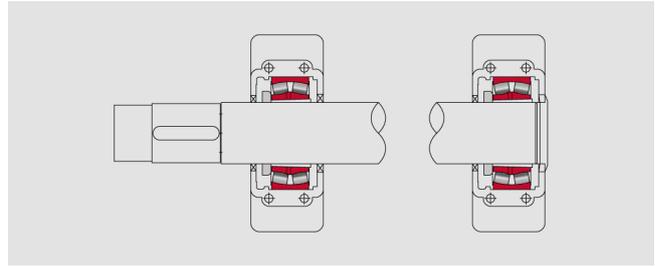


Fig. 1: In the fixed plummer block, to prevent axial displacement of the bearing, 2 locating rings are installed, one on either side of the bearing. Locating rings are manufactured in aluminium.



Example 2 – Application with 2 Plummer Blocks

Free end

Through shaft diam 75 mm, equipped with 1 Spherical Roller Bearing 22217EAK, labyrinth seals on both sides.

Parts required:

- 1 NSK housing SNN517
- 1 NSK bearing 22217EAKE4
- 1 NSK adapter sleeve H317
- 2 seals TS517U (the kit includes 1 labyrinth and o-ring)

Fixed end

Shaft end, diam 75 mm, equipped with 1 Spherical Roller Bearing 22217EAK, labyrinth seal on 1 side.

Parts required:

- 1 NSK housing SNN517
- 1 NSK bearing 22217EAKE4
- 1 NSK adapter sleeve H317
- 1 locating ring kit SR150/12.5-KIT [2 rings included]
- 1 seal TS517U (the kit includes 1 labyrinth and o-ring)
- 1 end cover 517A

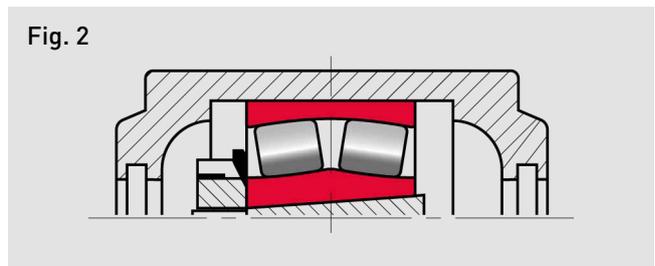
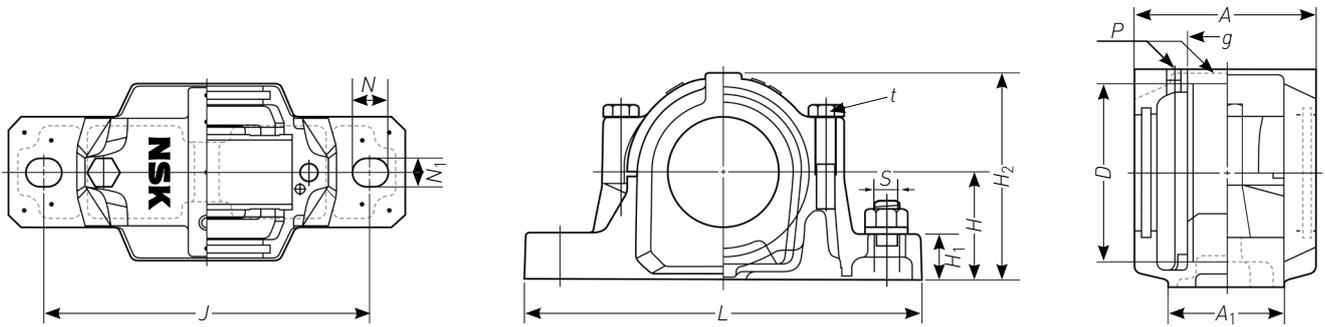


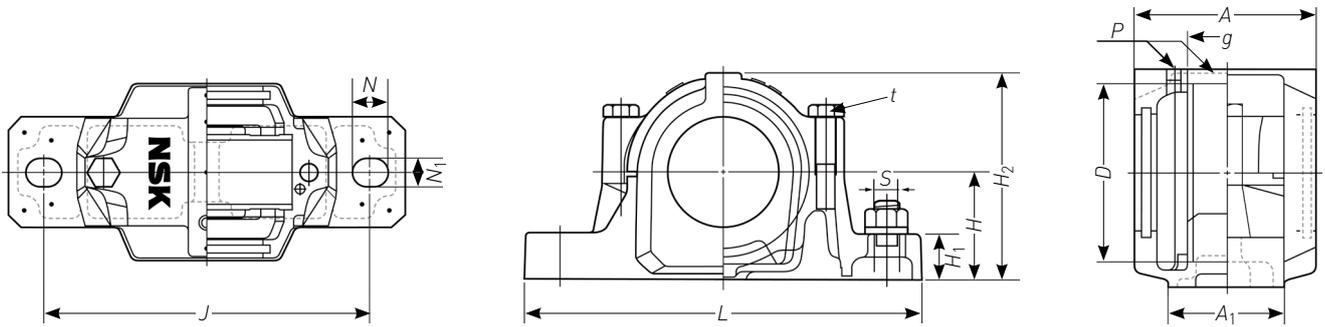
Fig. 2: One bearing should be free to move axially. This plummer block should not be assembled with locating rings.

DIMENSIONS – SHAFT DIAMETER 20-55 MM

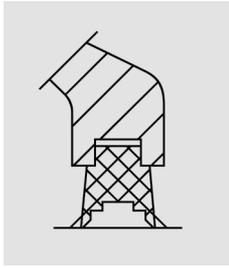


Shaft diam. <i>d</i> (mm)	Bearing		Adapter sleeve	Locating ring kit (2 rings)	Housing designation	<i>D</i> (mm)	<i>H</i> (mm)	<i>J</i> (mm)	<i>A</i> (mm)	<i>L</i> (mm)	<i>A</i> ₁ (mm)	<i>H</i> ₁ (mm)	<i>H</i> ₂ (mm)
	Ball	Roller											
20	1205K	-	H205	SR52 x 5	SNN505	52	40	130	70	165	46	22	73
	2205K	22205K	H305	SR52 x 3.5									
	1305K	21305K	H305	SR62 x 7.5									
	2305K	-	H2305	SR62 x 4									
25	1206K	-	H206	SR62 x 8	SNN506-605	62	50	150	80	185	52	22	88
	2206K	22206K	H306	SR62 x 6									
	1306K	21306K	H306	SR72 x 7.5									
	2306K	-	H2306	SR72 x 3.5									
30	1207K	-	H207	SR72 x 8.5	SNN507-606	72	50	150	85	185	52	22	93
	2207K	22207K	H307	SR72 x 5.5									
	1307K	21307K	H307	SR80 x 9									
	2307K	-	H2307	SR80 x 4									
35	1208K	-	H208	SR80 x 10.5	SNN508-607	80	60	170	90	205	60	25	107
	2208K	22208K	H308	SR80 x 8									
	1308K	21308K	H308	SR90 x 9									
	2308K	22308K	H2308	SR90 x 4									
40	1209K	-	H209	SR85 x 5.5	SNN509	85	60	170	90	205	60	25	111
	2209K	22209K	H309	SR85 x 3.5									
	1309K	21309K	H309	SR100 x 9.5									
	2309K	22309K	H2309	SR100 x 4									
45	1210K	-	H210	SR90 x 10.5	SNN510-608	90	60	170	95	205	60	25	113
	2210K	22210K	H310	SR90 x 9									
	1310K	21310K	H310	SR110 x 10.5									
	2310K	22310K	H2310	SR110 x 4									
50	1211K	-	H211	SR100 x 11.5	SNN511-609	100	70	210	100	255	70	28	129
	2211K	22211K	H311	SR100 x 9.5									
	1311K	21311K	H311	SR120 x 11									
	2311K	22311K	H2311	SR120 x 4									
55	1212K	-	H212	SR110 x 13	SNN512-610	110	70	210	110	255	70	30	134
	2212K	22212K	H312	SR110 x 10									
	1312K	21312K	H312	SR130 x 12.5									
	2312K	22312K	H2312	SR130 x 5									

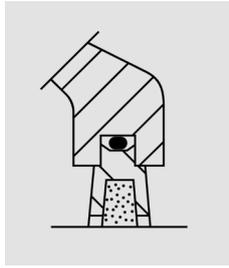
DIMENSIONS – SHAFT DIAMETER 65-140 MM



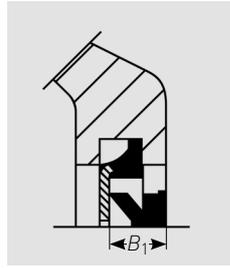
Shaft diam. <i>d</i> (mm)	Bearing		Adapter sleeve	Locating ring kit (2 rings)	Housing designation	<i>D</i> (mm)	<i>H</i> (mm)	<i>J</i> (mm)	<i>A</i> (mm)	<i>L</i> (mm)	<i>A</i> ₁ (mm)	<i>H</i> ₁ (mm)	<i>H</i> ₂ (mm)
	Ball	Roller											
60	1213K	-	H213	SR120 x 14	SNN513-611	120	80	230	115	275	80	30	150
	2213K	22213K	H313	SR120 x 10									
	1313K	21313K	H313	SR140 x 12.5									
	2313K	22313K	H2313	SR140 x 5									
65	1215K	-	H215	SR130 x 15.5	SNN515-612	130	80	230	120	280	80	30	155
	2215K	22215K	H315	SR130 x 12.5									
	1315K	21315K	H315	SR160 x 14									
	2315K	22315K	H2315	SR160 x 5									
70	1216K	-	H216	SR140 x 16	SNN516-613	140	95	260	130	315	90	32	175
	2216K	22216K	H316	SR140 x 12.5									
	1316K	21316K	H316	SR170 x 14.5									
	2316K	22316K	H2316	SR170 x 5									
75	1217K	-	H217	SR150 x 16.5	SNN517	150	95	260	135	320	90	32	183
	2217K	22217K	H317	SR150 x 12.5									
	1317K	21317K	H317	SR180 x 14.5	SNN520-617	180	112	320	160	380	110	40	215
	2317K	22317K	H2317	SR180 x 5									
80	1218K	-	H218	SR160 x 17.5	SNN518-615	160	100	290	145	345	100	35	193
	2218K	22218K	H318	SR160 x 12.5									
	-	23218K	H2318	SR160 x 6.25									
85	1219K	-	H219	SR170 x 18	SNN519-616	170	112	290	145	345	100	35	210
	2219K	22219K	H319	SR170 x 12.5									
	1319K	21319K	H319	SR200 x 17.5	SNN522-619	200	125	350	175	410	120	45	240
	2319K	22319K	H2319	SR200 x 6.5									
90	1220K	-	H220	SR180 x 18	SNN520-617	180	112	320	160	380	110	40	215
	2220K	22220K	H320	SR180 x 12									
	-	23220K	H2320	SR180 x 4.75									
	1320K	21320K	H320	SR215 x 19.5									
100	2320K	22320K	H2320	SR215 x 6.5	SNN524-620	215	140	350	185	410	120	45	271
	1222K	-	H222	SR200 x 21									
	2222K	22222K	H322	SR200 x 13.5	SNN522-619	200	125	350	175	410	120	45	240
	-	23222K	H2322	SR200 x 5									
110	-	22224K	H3124	SR215 x 14	SNN524-620	215	140	350	185	410	120	45	271
	-	23224K	H2324	SR215 x 5									



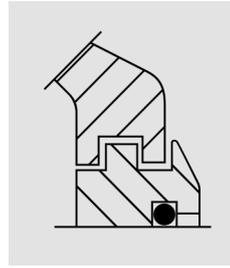
G seals



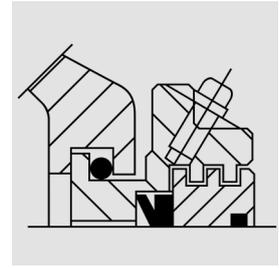
C seals



V seals



TS-U seals



TACK seals

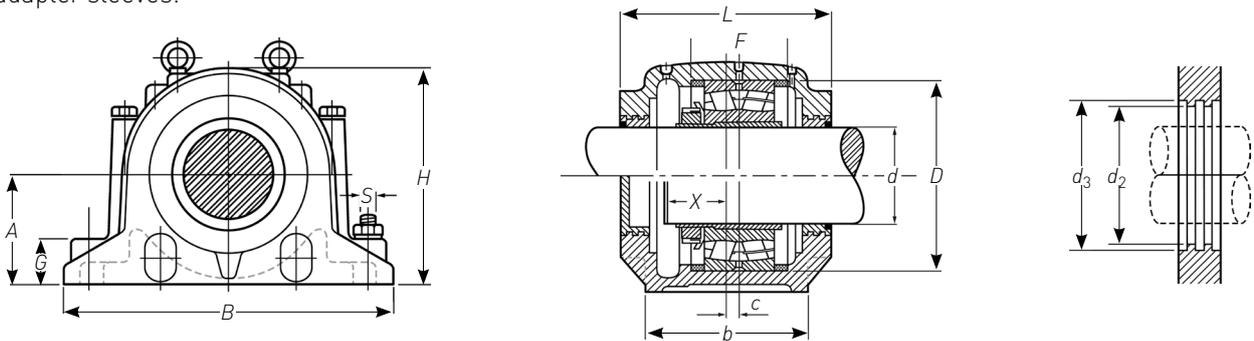
	<i>g</i> (mm)	<i>t</i>	<i>N</i> (mm)	<i>N</i> ₁ (mm)	<i>s</i> (mm)	<i>P</i>	G seals kit	C seals kit	V seals kit (<i>B</i> ₁ : Fitted width)	TS-U seals	TACK seals	End cover	Mass (kg)
	51	M12	24	18	M16	R1/8	G513-KIT	C513-KIT	V513-KIT (7 ±1)	TS513U	TACK513	513A 513A	6.60
	58	M16	28	22	M20	R1/4	G613-KIT	C613-KIT	V613-KIT (7 ±1)	TS613U	TACK613	516A 516A	10.20
	56	M12	24	18	M16	R1/8	G515-KIT	C515-KIT	V515-KIT (7 ±1)	TS515U	TACK515	515A 515A	6.80
	65	M16	28	22	M20	R1/4	G615-KIT	C615-KIT	V615-KIT (7 ±1)	TS615U	TACK615	518A 518A	13.00
	58	M16	28	22	M20	R1/4	G516-KIT	C516-KIT	V516-KIT (9 ±1.2)	TS516U	TACK516	516A	10.20
	68	M16	28	22	M20	R1/4	G616-KIT	C616-KIT	V616-KIT (9 ±1.2)	TS616U	TACK616	519A	14.50
	61	M16	28	22	M20	R1/4	G517-KIT	C517-KIT	V517-KIT (9 ±1.2)	TS517U	TACK517	517A	11.20
	70	M20	32	22	M24	R1/4	G617-KIT	C617-KIT	V617-KIT (9 ±1.2)	TS617U	TACK617	520A	18.30
	65	M16	28	26	M20	R1/4	G518-KIT	C518-KIT	V518-KIT (9 ±1.2)	TS518U	TACK518	518A	13.00
	68	M16	28	22	M20	R1/4	G519-KIT	C519-KIT	V519-KIT (9 ±1.2)	TS519U	TACK519	519A	14.50
	80	M20	32	26	M24	R1/4	G619-KIT	C619-KIT	V619-KIT (9 ±1.2)	TS619U	TACK619	522A	24.00
	70	M20	32	26	M24	R1/4	G520-KIT	C520-KIT	V520-KIT (9 ±1.2)	TS520U	TACK520	520A	18.30
	86	M20	32	26	M24	R3/8	G620-KIT	C620-KIT	V620-KIT (9 ±1.2)	TS620U	TACK620	524A	26.20
	80	M20	32	26	M24	R1/4	G522-KIT	C522-KIT	V522-KIT (9 ±1.2)	TS522U	TACK522	522A	24.00
	86	M20	32	26	M24	R3/8	G524-KIT	C524-KIT	V524-KIT (9 ±1.2)	TS524U	TACK524	524A	26.20

DIMENSIONS – SHAFT DIAMETER 65-140 MM

Shaft diam. <i>d</i> (mm)	Bearing		Adapter sleeve	Locating ring kit (2 rings)	Housing designation	<i>D</i> (mm)	<i>H</i> (mm)	<i>J</i> (mm)	<i>A</i> (mm)	<i>L</i> (mm)	<i>A</i> ₁ (mm)	<i>H</i> ₁ (mm)	<i>H</i> ₂ (mm)
	Ball	Roller											
115	-	22226K	H3126	SR230 x 13	SNN526	230	150	380	190	445	130	50	288
	-	23226K	H2326	SR230 x 5									
125	-	22228K	H3128	SR250 x 15	SNN528	250	150	420	205	500	150	50	298
	-	23228K	H2328	SR250 x 5									
135	-	22230K	H3130	SR270 x 16.5	SNN530	270	160	450	220	530	160	60	322
	-	23230K	H2330	SR270 x 5									
140	-	22232K	H3132	SR290 x 17	SNN532	290	170	470	235	550	160	60	342
	-	23232K	H2332	SR290 x 5									

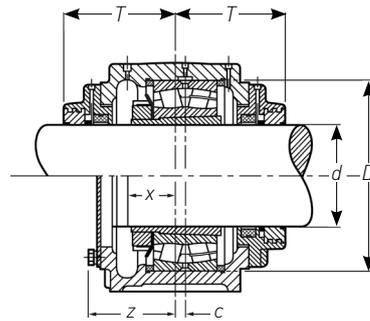
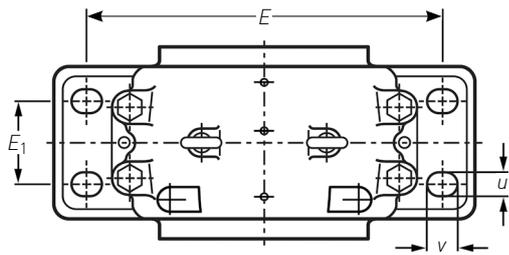
PLUMMER BLOCKS SD 31 SERIES

Plummer Blocks of series SD31 are used with large Spherical Roller Bearings of series 231 with tapered bore on adapter sleeves.



Housing	Shaft diameter (<i>d</i>)		Dimensions mm																	
	Metric	Inch	<i>d</i>	<i>d</i> ₂ (H12)	<i>d</i> ₃ (H12)	<i>A</i>	<i>B</i>	<i>F</i>	<i>E</i>	<i>b</i>	<i>G</i>	<i>H</i>	<i>L</i>	<i>C</i>	<i>E</i> ₁	<i>X</i>	<i>T</i>	<i>Z</i>	<i>U</i>	<i>V</i>
SD3134	150	6	280	187	197	170	510	108	430	180	70	335	230	14	100	76	154	120	28	35
SD3136	160	6.1/2	300	195	205	180	530	116	450	190	75	355	240	15	110	81	159	130	30	38
SD3138	170	6.3/4	320	217	230	190	560	124	480	210	80	375	260	10	120	86	168	140	35	48
SD3140	180	7	340	222	237	210	610	132	510	230	85	410	280	10	130	91	178	150	35	42
SD3144	200	8	370	246	265	220	640	140	540	240	90	435	290	12	140	96	184	155	36	46
SD3148	220	9	400	265	285	240	700	148	600	260	95	475	310	12	150	102	194	160	38	46
SD3152	240	9.1/2	440	285	305	260	770	164	650	280	100	515	320	13	160	112	200	170	45	60
SD3156	260	10	460	307	327	280	790	166	670	280	105	550	330	16	160	115	200	170	45	60
SD3160	280	11	500	325	345	300	830	180	710	310	110	590	350	22	190	124	213	190	45	64
SD3164	300		540	345	365	320	880	196	750	330	115	630	370	23	200	135	224	200	45	72
SD3168	320		580	368	390	340	965	210	840	380	120	670	390	25	240	155	244	220	52	70
SD3172	340		600	388	408	360	1040	212	890	390	130	720	400	22	255	159	249	225	60	77
SD3176	360		620	408	428	380	1120	214	980	400	135	750	405	22	255	162	260	240	68	88
SD3180	380		650	428	448	400	1245	220	1050	420	140	790	425	22	270	167	276	260	75	96

g (mm)	t	N (mm)	N_1 (mm)	s (mm)	P	G seals kit	C seals kit	V seals kit (B_1 : Fitted width)	TS-U seals	TACK seals	End cover	Mass (kg)
90	M24	35	28	M24	R3/8	G526-KIT	C526-KIT	V526-KIT (9 ± 1.2)	TS526U	TACK526	526A	33.00
98	M24	42	35	M30	R3/8	G528-KIT	C528-KIT	V528-KIT (9 ± 1.2)	TS528U	TACK528	528A	40.00
106	M24	42	35	M30	R3/8	G530-KIT	C530-KIT	V530-KIT (9 ± 1.2)	TS530U	TACK530	530A	49.00
114	M24	42	35	M30	R3/8	G532-KIT	C532-KIT	V532-KIT (9 ± 1.2)	TS532U	TACK532	532A	55.00



Bolt diameter S	Spherical Roller Bearing	Adapter sleeve		Weight kg	Locating ring kit (2 rings)	Housing	Labyrinth seal	End cover
		Metric	Inch					
M24	23134K	H3134	HE3134	66	FR 280/10	SD3134	TS34	TSA34
M24	23136K	H3136	HE3136	75	FR 300/10	SD3136	TS36	TSA36
M24	23138K	H3138	HE3138	87	FR 320/10	SD3138	TS38	TSA38
M30	23140K	H3140	HE3140	113	FR 340/10	SD3140	TS40	TSA40
M30	23144K	H3144		129	FR 370/10	SD3144	TS44	TSA44
M30	23148K	H3148		163	FR 400/10	SD3148	TS48	TSA48
M36	23152K	H3152		199	FR 440/10	SD3152	TS52	TSA52
M36	23156K	H3156		226	FR 460/10	SD3156	TS56	TSA56
M36	23160K	H3160		283	FR 500/10	SD3160	TS60	TSA60
M36	23164K	H3164		346	FR 540/10	SD3164	TS64	TSA64
M36	23168K	H3168		514	FR 580/10	SD3168	TS68	TSA68
M48	23172K	H3172		594	FR 600/10	SD3172	TS72	TSA72
M56	23176K	H3176		702	FR 620/10	SD3176	TS76	TSA76
M64	23180K	H3180		740	FR 650/10	SD3180	TS80	TSA80

PLUMMER BLOCKS – LUBRICATION



SNN Plummer Blocks have been developed primarily for grease lubrication.

NSK SNN housings are equipped as standard with 1 straight grease nipple, 2 lubrication holes, 1 on one side of the cap, the other in the centre of the cap to enable lubrication through the bearing outer ring grease groove. This re-lubrication method is preferred as fresh grease is delivered directly to the bearing. SNN housings are also equipped with a threaded drain hole.

The application conditions (speeds, loads, temperature) will determine the grease re-lubrication intervals and quantity. However, in addition to the bearing grease fill, it is necessary to fill the housing with a certain quantity of grease before the first use. For recommended grease weight/initial fill, please refer to the table on the right side.

Housing	Size of grease nipple	Size of threaded drain hole
SNN505 to SNN515-612	R1/8	R1/8
SNN516-613 to SNN522-619	R1/4	R1/4
SNN524-620 to SNN532	R3/8	R3/8

SNN housing	Grease weight initial fill (g)
SNN505	25
SNN506-605	40
SNN507-606	50
SNN508-607	60
SNN509	65
SNN510-608	75
SNN511-609	100
SNN512-610	150
SNN513-611	180
SNN515-612	230
SNN516-613	280
SNN517	330
SNN518-615	430
SNN519-616	480
SNN520-617	630
SNN522-619	850
SNN524-620	1 000
SNN526	1 100
SNN528	1 400
SNN530	1 700
SNN532	2 000

SUCCESS STORY: REAL LIFE BENEFITS OF THE PROVEN SOLUTION

Industry: QMC
Application: Overland Conveyor
 Head Pulley
Cost savings: € 4 538 304

Mining Conveyor Pulley

A quarrying company was experiencing bearing failures due to contamination on each side of the conveyor head pulley. This caused increased maintenance cost, reduced lifetime of the bearing and a downtime in production every 18 months. NSK analysed the bearing and recommended to use bearings in High Tough steel (HTF). After the bearings were put into service they lasted 6 years.

Key facts

- Highly abrasive conditions including water and grit
- Failure of the bearing through contamination with consequential loss of production
- NSK Solution: bearings in High Tough Quality (HTF)
- Changing to bearings in HTF steel increased the life time to 6 years
- Cost savings generated based on reduced maintenance and downtime cost

Value proposals

- NSK performed a bearing analysis showing root cause as ingress of water and grit
- Application assessment showed highly abrasive conditions
- Technical support provided for improved bearing performance
- NSK recommended to replace the bearings by products with HTF material
- HTF Bearings were put into service and lasted 6 years instead of 18 months



Quarry Conveyor



Bearings in High-Tough steel (HTF)

Cost saving breakdown

Before	Cost p. a.
6 People, working 12 hours @ 32 € per hour	€ 2 304
7 000 tons per hour x 12 hour stoppage x 4 times x 13.5 € per ton	€ 4 536 000
Total costs	€ 4 538 304

NSK Solution	Cost p. a.
No maintenance necessary	€ 0
No lost production stoppages	€ 0
Total costs	€ 0

NSK Sales Offices – Europe, Middle East and Africa

UK

NSK UK Ltd.
Northern Road, Newark
Nottinghamshire NG24 2JF
Tel. +44 (0) 1636 605123
Fax +44 (0) 1636 643276
info-uk@nsk.com

France

NSK France S.A.S.
Quartier de l'Europe
2, rue Georges Guynemer
78283 Guyancourt Cedex
Tel. +33 (0) 1 30573939
Fax +33 (0) 1 30570001
info-fr@nsk.com

**Germany, Austria, Benelux,
Switzerland, Nordic**

NSK Deutschland GmbH
Harkortstraße 15
40880 Ratingen
Tel. +49 (0) 2102 4810
Fax +49 (0) 2102 4812290
info-de@nsk.com

Italy

NSK Italia S.p.A.
Via Garibaldi, 215
20024 Garbagnate
Milanese (MI)
Tel. +39 02 995 191
Fax +39 02 990 25 778
info-it@nsk.com

Middle East

NSK Bearings Gulf Trading Co.
JAFZA View 19, Floor 24 Office 2/3
PO Box 262163
Jebel Ali Downtown, Dubai, UAE
Tel. +971 (0) 4 804 8205
Fax +971 (0) 4 884 7227
info-me@nsk.com

Poland & CEE

NSK Polska Sp. z o.o.
Warsaw Branch
Ul. Migdatowa 4/73
02-796 Warszawa
Tel. +48 22 645 15 25
Fax +48 22 645 15 29
info-pl@nsk.com

South Africa

NSK South Africa (Pty) Ltd.
25 Galaxy Avenue
Linbro Business Park
Sandton 2146
Tel. +27 (011) 458 3600
Fax +27 (011) 458 3608
nsk-sa@nsk.com

Spain

NSK Spain, S.A.
C/ Tarragona, 161 Cuerdo Bajo
2ª Planta
08014 Barcelona
Tel. +34 93 2892763
Fax +34 93 4335776
info-es@nsk.com

Turkey

NSK Rulmanları Orta Doğu Tic. Ltd. Şti.
Cevizli Mah. D-100 Güney Yan Yol
Kuriş Kule İş Merkezi No:2 Kat:4
Kartal – İstanbul
Tel. +90 216 5000 675
Fax +90 216 5000 676
turkey@nsk.com

Please also visit our website: www.nskeurope.com

Global NSK: www.nsk.com

