INDUSTRY SOLUTIONS

(*1)

(*1)

Part D

INDUSTRY SOLUTIONS

Note (*1): Photo courtesy of NIPPON STEEL & SUMITOMO METAL CORPORATION KASHIMA WORKS pamphlet.

Air Turbine Bearings for Dental Handpieces

NSK Bearings:
Ten Times Higher Corrosion Resistance
Improves Bearing Replacement Cycle

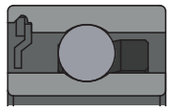
A Product Line that Matches Specific Applications

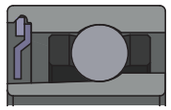
■A Product Line that Matches Specific Applications

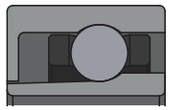
Outstanding Features of Dental Handpiece Bearings

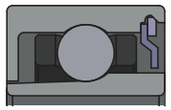
This bearing series has been developed to cover the wide range of sizes and shapes used in the air-turbine market (43 types in total)

・Bearing-type

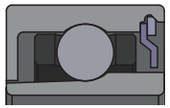

Deep groove type

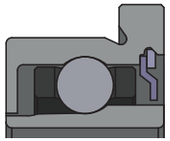

Angular type

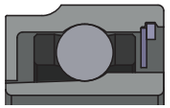

Integral angular type

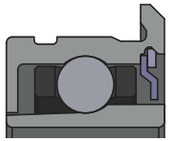

Integral + shield angular type

・Shape


Smooth type


Flange type


Groove type


Special type

Long Life and High Corrosion Resistance ES1 Stainless Steel Bearing

NSK has developed a high corrosion resistant material called ES1 that is highly suitable for manufacturing dental handpiece bearings. ES1 has made it possible to improve the life of bearings significantly and assure highly effective sterilization with no cross-contamination. The use of ES1 has improved the bearing material, and as a result, the bearing has far superior corrosion resistance than the conventional SUS440C stainless steel bearings. The electrical and chemical verification result of our anodic polarization measurement confirms that the current density (corrosion rate) in the passive state range of ES1 bearing is about one-tenth lower than conventional stainless steel bearings, which proves that ES1 has superior corrosion resistance.

Ultra-high Speed Rotation

To maintain ultra-high speed rotation and long rolling life of air turbine bearings, it is particularly necessary to produce a high precision cage based on the optimal design. NSK makes continuous efforts to optimize the design and improve the precision of cage parts for ultra-high speed rotation. As a result, we have been successful in maintaining a stable number of revolutions even at 500,000rpm.

Formulation of Bearings for Numbers

Please use the following example product code of an NSK standard dental handpiece bearing (Smooth type 100 series) as a guide to select a bearing according to requirements such as bearing width, material, and lubricant to be used.

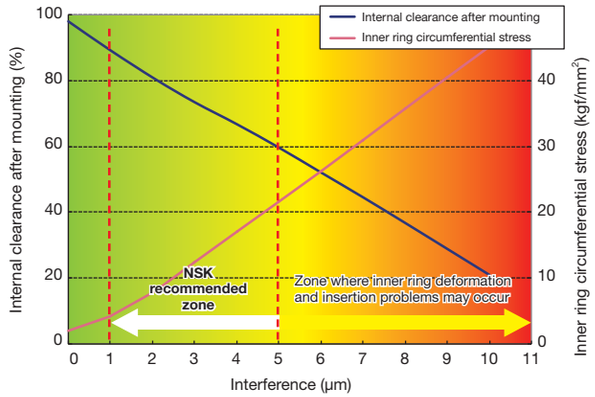
B3Z100X -H-20SN34 T52C ZS CG9 7A U438 CF1X
(1) (2) (3) (4) (5) (6) (7) (8)

(1) B3Z100X: Model name indicating basic bearing number for air turbine
(2) -H-20SN34: Ceramic ball (**-H-26:** Optional stainless steel ball)
(3) T52C: Torlon® polyamide-imide cage
C, J, P, etc.: Cage type
(4) ZS: Single shield
(5) CG9: RIC 0.008mm to 0.010mm (Recommended by NSK)
(6) 7A: Special tolerance class (ABEC7+ID: ABEC9)
(7) U438: Special specification for air turbine
(8) CF1X: Special oil (Food grade) or **BF7N:** Special grease

Importance of a Perfect Fitting

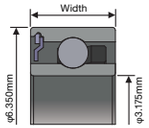
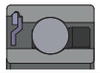
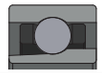
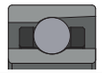
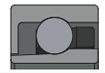
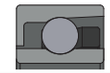
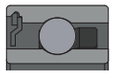
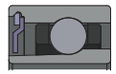
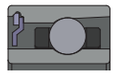
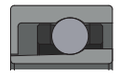
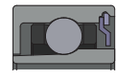
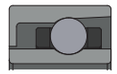
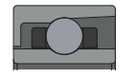
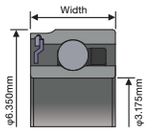
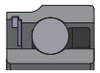
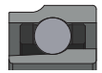
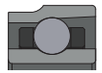
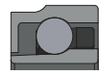
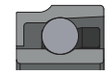
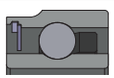
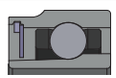
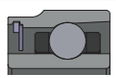
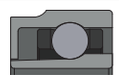
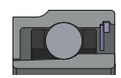
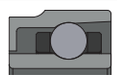
To get optimal performance out of air turbine bearings, the bearings must be correctly fitted on the shaft and in the housing. To provide this optimal performance, Class ABEC9 tolerance (from -0.0025mm to 0mm) is used for the inner ring bore of NSK bearings. NSK can supply bearings with two classifications of ring bore diameter tolerance (from -0.0025 to -0.00125, and from -0.00125 to 0mm). This choice of tolerance makes it easy to stabilize the bearing fitting on the shaft. A stable fitting reduces air turbine vibrations, noises, and irregularities in the revolutions per minute, thereby assuring long life.

- **Shaft material: Martensitic stainless steel (SUS400 family)**
  (Please contact NSK to use bearings for shafts made of stainless steel other than martensitic stainless steel.)



A Product Line that Matches Specific Applications

Line-up

Bearing Series	Width	Deep Groove Bearing	Angular Contact Bearing			Integral Bearing			
			Inner Ring Counterbore	Outer Ring Counterbore		Inner Ring Counterbore		Outer Ring Counterbore	
100 Series (Smooth type) 	**2.380mm** (0.0937")								
		B3Z-**100X**	BH3Z-**101X**	BH3Z-**102X**		BH3Z-**103X**		BH3Z-**104X**	
	2.779mm (0.1094")								
		B3Z-**100**	BH3Z-**101A**	BH3Z-**102A**		BH3Z-**103A**	BH3Z-**103B**	BH3Z-**104A**	BH3Z-**104**
150 Series (Groove type) 	**2.380mm** (0.0937")								
		B3Z-**150X**	BH3Z-**151X**	BH3Z-**152X**		BH3Z-**153X**		BH3Z-**154X**	
	2.779mm (0.1094")								
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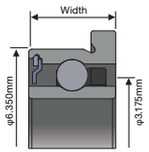
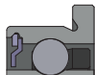
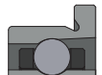
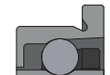
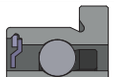
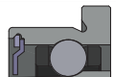
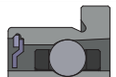
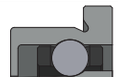
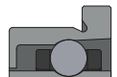
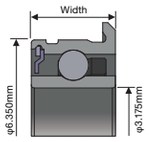
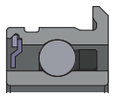
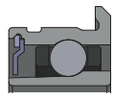
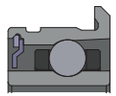
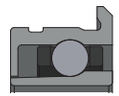
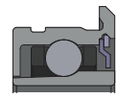
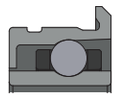
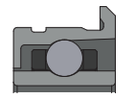
200 Series (Flange type) 	**2.380mm** (0.0937")								
		FBC3Z-**200X**	FBH3Z-**201X**	FBH3Z-**202X**		FBH3Z-**203X**		FBH3Z-**204X**	
	2.779mm (0.1094")								
		FBC3Z-**200**	FBH3Z-**201A**	FBH3Z-**202A**		FBH3Z-**203A**	FBH3Z-**203B**	FBH3Z-**204A**	FBH3Z-**204**
250 Series 	**2.779mm** (0.1094")								
		FBC3Z-**250**	FBH3Z-**251A**	FBH3Z-**252A**		FBH3Z-**253A**	FBH3Z-**253B**	FBH3Z-**254A**	FBH3Z-**254**

Standard Specifications

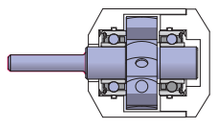
- Ceramic ball bearings
- To maximize bearing performance, NSK has adopted ABEC9(P2) grade tolerance for the inner ring bore diameter. The tolerance of other parts is ABEC7(P4) grade.
- NSK can supply bearings with two classifications of the inner ring bore diameter tolerance (from -0.0025 to -0.00125, and from -0.00125 to 0mm).
- NSK can manufacture bearings with custom laser markings upon request.
- NSK uses the high-safety low-viscosity lubricating oil CF1 as standard specification. Bearings with BF7 grease are also available.

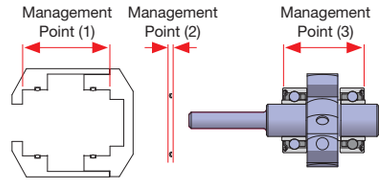
Optional Specifications

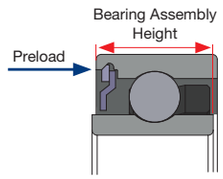
- Stainless steel ball bearings are also available.
- Bearings with different widths for the outer ring and inner ring are also available.

Preload Stabilization

Stabilization of preloading using a spring is extremely important for air turbine bearings. There are three management points ((1) to (3) below) for this task. For optimal performance of bearings, the bearing assembly height at the time of preloading is absolutely important. NSK can verify the design setting value of the bearing assembly height at your company to assure stable preloading.



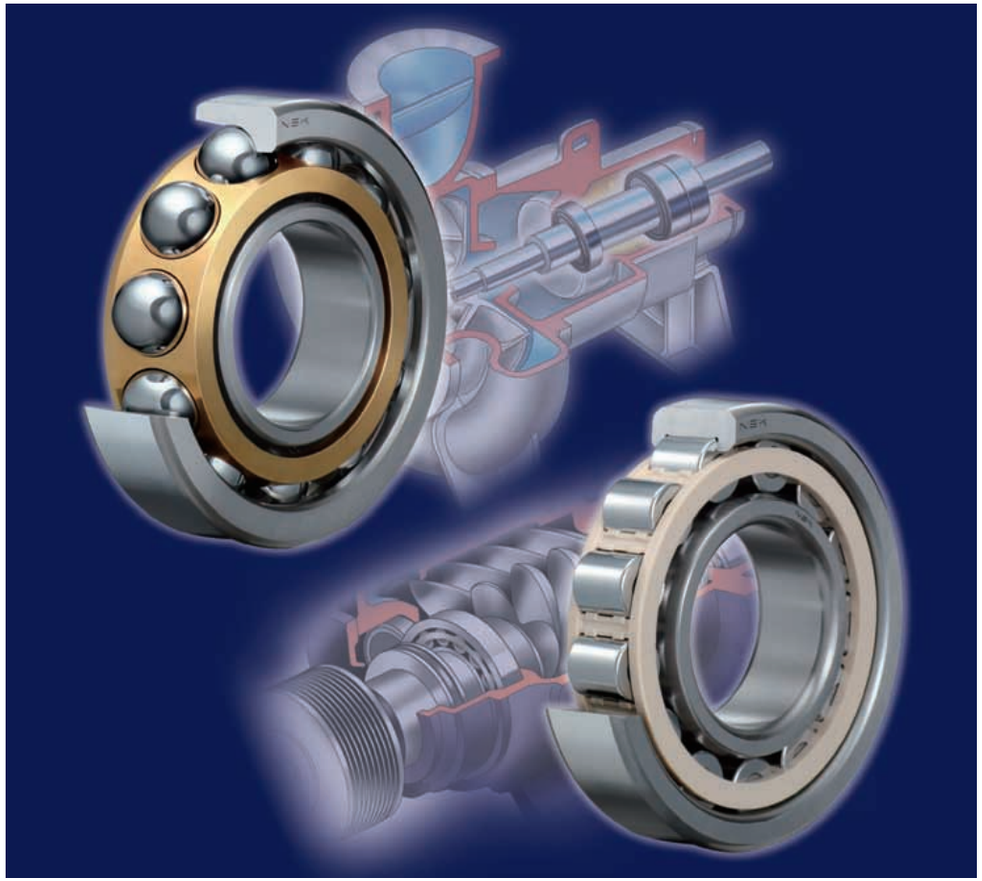




Air Turbine Dental Handpieces
Pumps & Compressors
Agricultural Machinery
Construction Machinery
Mining Machinery
Railway Rolling Stock
Papermaking Machines
Wind Power Industry
Steel Industry
INDUSTRY SOLUTIONS

Bearings for Pumps & Compressors

NSK high performance rolling element bearings for pumps and compressors deliver reliable and energy efficient operation with long life.



Bearings for Pumps
A Product Line that Matches Specific Applications

Bearings Table

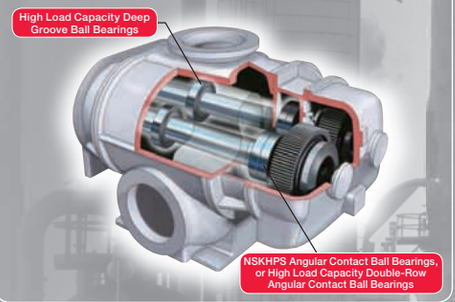
Bearings for Compressors
A Product Line that Matches Specific Applications

Bearings Table

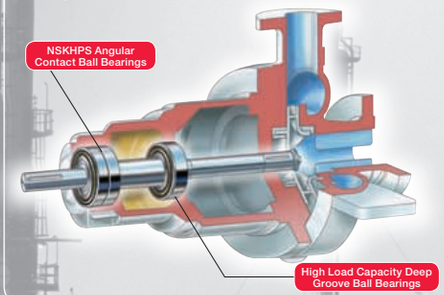
Bearings for Pumps

Advanced machined brass cage provide strength and endurance.
Optimized internal geometries allow efficient lubricant flow through the bearing.

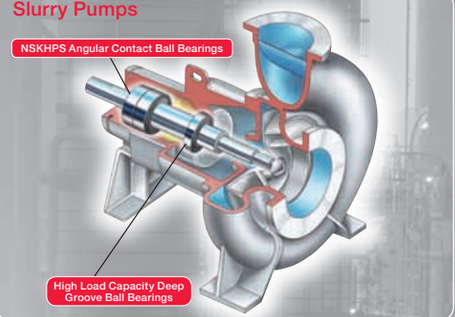
Vacuum Pumps



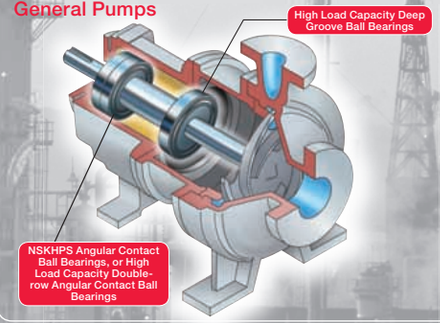
Pumps for Petroleum and Chemicals



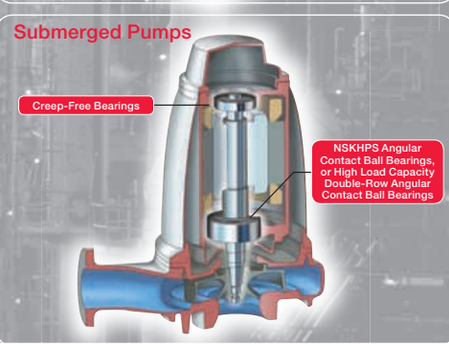
Slurry Pumps



General Pumps



Submerged Pumps



Features of Bearings for Pumps

NSKHPS™ / High Load Capacity Single-Row Angular Contact Ball Bearings

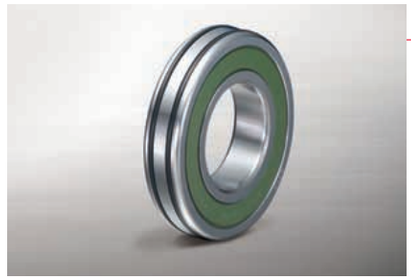
- High load capacity angular contact ball bearings,adopting machined brass cages.
- Improved bearing life up to 90% longer than conventional bearings reduces maintenance frequency and improves reliability.

High Load Capacity Double-Row Angular Contact Ball Bearings

- High load capacity double-row angular contact ball bearings have advanced internal bearing geometry.
- Improved bearing life up to 50% longer than conventional bearings reduces maintenance frequency and improves reliability.

High Load Capacity Deep Groove Ball Bearings (Open Type)

- Open-type high load capacity deep groove ball bearings have advanced internal bearing geometry.
- Improved bearing life up to 70% longer than conventional bearings reduces maintenance frequency and improves reliability.



Creep-Free Bearings™

- Outer ring creep prevention is significantly improved with O-ring tension in the housing.
- Standard principal dimensions are maintained to eliminate the head for re-machining housings. Suitable as a bearing on the free side of motor-integrated pumps.

Features of Bearings for Pumps

NSKHPS™ / High Load Capacity Single-Row Angular Contact Ball Bearings

Application

- Petroleum and Chemical industry (API standards*1, etc.)
- Paper and Pulp industry (ANSI standards*2, etc.)

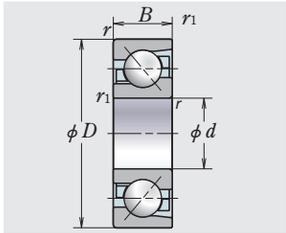
*1 Standards related to petroleum specified by the American Petroleum Institute
*2 Standards of industrial products in the U.S. specified by the American National Standards Institute

High load capacity and outstanding lubrication performance. Enables reduced pump size and extended maintenance intervals.

- Bearing life: 90% longer
- Maximum rotational speed: 20% faster
- Universal arrangement as standard
- 40° contact angle

Axial Internal Clearance in Combined ACBBs (Measured Clearance) Unit: μm

Nominal bore diameter *d* (mm)		CNB		GA	
Over	Incl.	Min.	Max.	Min.	Max.
12	18	17	25	–2	6
18	30	20	28		
30	50	24	32		
50	80	29	41	–3	9



Bearing Number

Example: 7310 | B | EA | MR | SU | GA

- 7310: Basic number
- B: Contact angle symbol: 40°
- EA: Internal symbol: High load capacity
- MR: Cage symbol: Machined cage
- SU: Arrangement symbol: Universal arrangement (single unit)
- GA: Internal clearance symbol

Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (N)		Limiting Speeds (min^{-1})	
	d	*D*	*B*	*r* (min.)	r_1 (min.)	C_r	C_{0r}	Grease	Oil
∗7304BEA	20	52	15	1.1	0.6	19 800	10 500	13 000	18 000
∗7305BEA	25	62	17	1.1	0.6	27 200	14 900	10 000	15 000
∗7206BEA	30	62	16	1	0.6	23 700	14 300	10 000	14 000
∗7306BEA	30	72	19	1.1	0.6	36 500	20 600	9 000	13 000
∗7207BEA	35	72	17	1.1	0.6	32 500	19 600	8 500	12 000
∗7307BEA	35	80	21	1.5	1	40 500	24 400	8 000	11 000
∗7208BEA	40	80	18	1.1	0.6	38 500	24 500	7 500	11 000
∗7308BEA	40	90	23	1.5	1	53 000	33 000	7 100	10 000
∗7209BEA	45	85	19	1.1	0.6	40 500	27 100	7 100	10 000
∗7309BEA	45	100	25	1.5	1	62 500	39 500	6 300	9 000
∗7210BEA	50	90	20	1.1	0.6	42 000	29 700	6 300	9 500
∗7310BEA	50	110	27	2	1	78 000	50 500	5 600	8 000
∗7211BEA	55	100	21	1.5	1	51 500	37 000	6 000	8 500
∗7311BEA	55	120	29	2	1	89 000	58 500	5 000	7 500
∗7212BEA	60	110	22	1.5	1	61 500	45 000	5 300	7 500
∗7312BEA	60	130	31	2.1	1.1	102 000	68 500	4 800	6 700
∗7213BEA	65	120	23	1.5	1	70 000	53 500	4 800	7 100
∗7313BEA	65	140	33	2.1	1.1	114 000	77 000	4 300	6 300
∗7214BEA	70	125	24	1.5	1	75 500	58 500	4 500	6 700
∗7314BEA	70	150	35	2.1	1.1	124 000	87 500	4 000	6 000
∗7215BEA	75	130	25	1.5	1	78 500	63 500	4 300	6 300
∗7315BEA	75	160	37	2.1	1.1	134 000	98 500	3 800	5 600
∗7216BEA	80	140	26	2	1	87 500	70 000	4 000	6 000
∗7316BEA	80	170	39	2.1	1.1	144 000	110 000	3 600	5 300
7217BEA	85	150	28	2	1	96 000	81 500	3 800	5 600
7317BEA	85	180	41	3	1.1	157 000	133 000	3 400	5 000
7218BEA	90	160	30	2	1	109 000	93 500	3 600	5 300
7318BEA	90	190	43	3	1.1	169 000	146 000	3 200	4 500
7219BEA	95	170	32	2.1	1.1	123 000	107 000	3 400	5 000
7319BEA	95	200	45	3	1.1	180 000	160 000	3 000	4 500
7220BEA	100	180	34	2.1	1.1	136 000	122 000	3 200	4 500
7320BEA	100	215	47	3	1.1	202 000	187 000	2 800	4 000
7221BEA	105	190	36	2.1	1.1	148 000	133 000	3 000	4 500
7321BEA	105	225	49	3	1.1	213 000	203 000	2 600	4 000
7222BEA	110	200	38	2.1	1.1	154 000	144 000	2 800	4 300
7322BEA	110	240	50	3	1.1	226 000	226 000	2 600	3 800
7224BEA	120	215	40	2.1	1.1	179 000	177 000	2 600	3 800
7324BEA	120	260	55	3	1.1	238 000	250 000	2 200	3 400

Remarks

∗NSKHPS™ angular contact ball bearings with running accuracy to ISO tolerance class 5 and dimensional accuracy to ISO tolerance class 6.
No asterisk refers to high load capacity angular contact ball bearings with running accuracy P6 and dimensional accuracy P6.

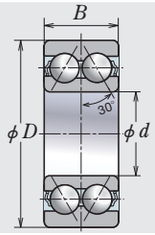
Features of Bearings for Pumps

High Load Capacity Double-Row Angular Contact Ball Bearings

Application
- Paper and Pulp industry (ANSI standards, etc.)
- Water/Sewage and Irrigation, etc.

Improved bearing life and thrust load capacity.
Enables reduced pump size and extended maintenance intervals.

- Bearing life: 50% longer
- Thrust load capacity: Twice as high as conventional bearings
- Improved installation with advanced lead in chamfer
- Class P6 as standard



Bearing Number

Example: 3309 | F | CGXX

- 3309: Basic number
- F: Contact angle symbol: 30°
- CGXX: Radial internal clearance

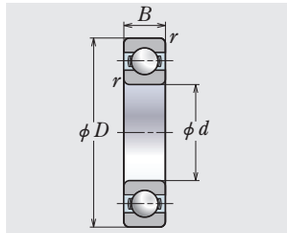
Bearing Numbers	Boundary Dimensions (mm)			Basic Load Ratings (N)	
	d	D	B	C_r (dynamic)	C_{0r} (static)
3305F	25	62	25.4	30 500	20 500
3306F	30	72	30.2	39 500	27 300
3307F	35	80	34.9	49 500	35 000
3308F	40	90	36.5	60 500	44 000
3309F	45	100	39.7	66 500	49 500
3310F	50	110	44.4	85 500	64 500
3311F	55	120	49.2	106 000	82 000
3312F	60	130	54	122 000	95 500
3313F	65	140	58.7	138 000	109 000

High Load Capacity Deep Groove Ball Bearings (Open Type)

Application
- Petroleum and Chemical industry (API standards, etc.)
- Paper and Pulp industry (ANSI standards, etc.)
- Semi-conductor and Liquid Crystal Panel (vacuum pumps)

High load capacity.
Enables reduced pump size and extended maintenance intervals.

- Bearing life: 70% longer



Bearing Number

Example: HR | 6305 | C3

- HR: High load capacity symbol
- 6305: Basic number
- C3: Internal clearance symbol

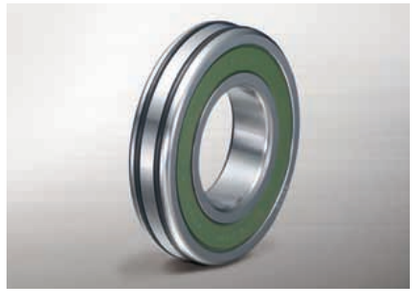
Bearing Numbers	Boundary Dimensions (mm)				Basic Load Ratings (N)	
	d	D	B	r (min.)	C_r (dynamic)	C_{0r} (static)
HR 6202	15	35	11	0.6	8 550	3 950
HR 6302	15	42	13	1.0	13 300	5 900
HR 6203	17	40	12	0.6	11 300	5 350
HR 6303	17	47	14	1.0	15 600	7 100
HR 6304	20	52	15	1.1	18 200	9 050
HR 6205	25	52	15	1.0	15 300	8 100
HR 6305	25	62	17	1.1	23 700	12 200
HR 6206	30	62	16	1.0	23 300	12 800
HR 6306	30	72	19	1.1	29 800	15 800
HR 6207	35	72	17	1.1	28 300	16 000
HR 6307	35	80	21	1.5	39 500	21 500
HR 6208	40	80	18	1.1	32 500	19 900
HR 6308	40	90	23	1.5	47 000	26 200
HR 6209	45	85	19	1.1	36 500	22 600
HR 6309	45	100	25	1.5	57 000	34 500
HR 6210	50	90	20	1.1	39 000	25 800
HR 6310	50	110	27	2.0	66 500	40 500
HR 6211	55	100	21	1.5	48 000	32 000
HR 6311	55	120	29	2.0	78 000	46 000
HR 6212	60	110	22	1.5	58 000	38 000

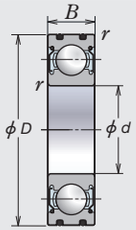
Features of Bearings for Pumps

Creep-Free Bearings™

Application • Water/Sewage and Irrigation, etc.

Outer ring creep prevention is significantly improved with O-ring tension in the housing. Standard principal dimensions are maintained to eliminate the need for re-machining housings, providing a convenient solution to reduce costs.
(Recommended fits: G6 or H7)



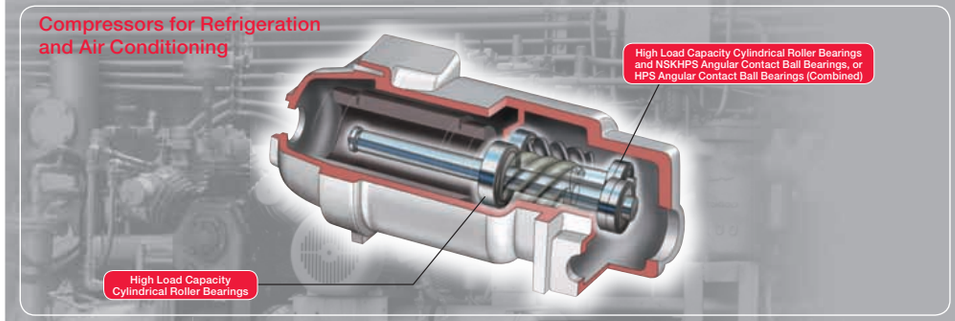


Bearing Numbers	Boundary Dimensions (mm)				Basic Load Ratings (N)	
	d	D	B	r (min.)	C_r (dynamic)	C_{0r} (static)
6000	10	26	8	0.3	4 550	1 970
6200	10	30	9	0.6	5 100	2 390
6300	10	35	11	0.6	8 100	3 450
6001	12	28	8	0.3	5 100	2 370
6201	12	32	10	0.6	6 800	3 050
6301	12	37	12	1.0	9 700	4 200
6002	15	32	9	0.3	5 600	2 830
6202	15	35	11	0.6	7 650	3 750
6302	15	42	13	1.0	11 400	5 450
6003	17	35	10	0.3	6 000	3 250
6203	17	40	12	0.6	9 550	4 800
6303	17	47	14	1.0	13 600	6 650
6004	20	42	12	0.6	9 400	5 000
6204	20	47	14	1.0	12 800	6 600
6304	20	52	15	1.1	15 900	7 900
6005	25	47	12	0.6	10 100	5 850
6205	25	52	15	1.0	14 000	7 850
6305	25	62	17	1.1	20 600	11 200
6006	30	55	13	1.0	13 200	8 300
6206	30	62	16	1.0	19 500	11 300
6306	30	72	19	1.1	26 700	15 000
6007	35	62	14	1.0	16 000	10 300
6207	35	72	17	1.1	25 700	15 300
6307	35	80	21	1.5	33 500	19 200
6008	40	68	15	1.0	16 800	11 500
6208	40	80	18	1.1	29 100	17 900
6308	40	90	23	1.5	40 500	24 000
6009	45	75	16	1.0	20 900	15 200
6209	45	85	19	1.1	31 500	20 400
6309	45	100	25	1.5	53 000	32 000

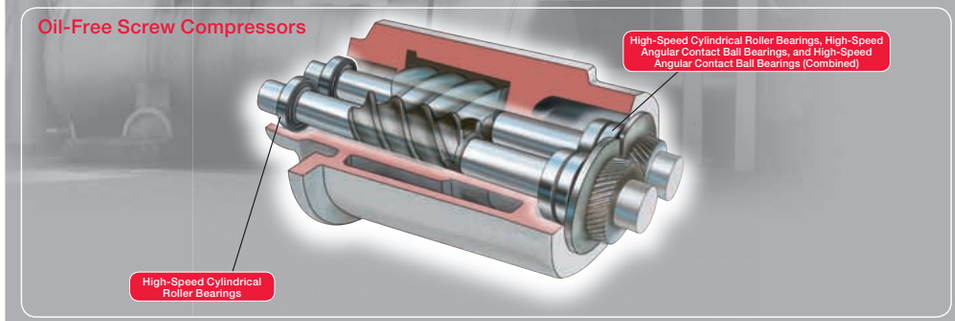
Bearings for Compressors

L-PPS (Linear-Polyphenylene Sulfide) cages are chemically stable and resist wear better than steel or brass. Optimized internal geometries allow efficient lubricant flow through the bearing.

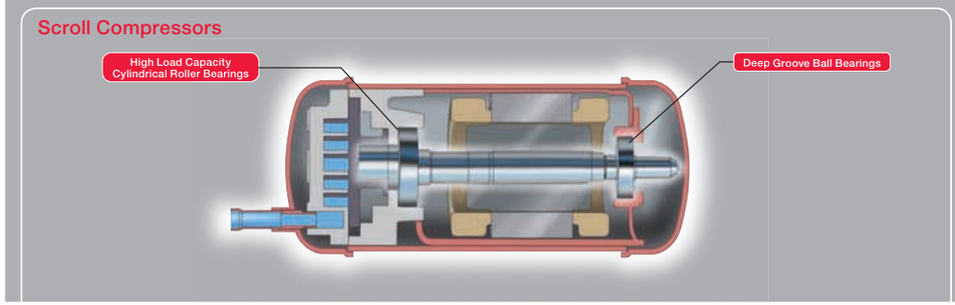
Compressors for Refrigeration and Air Conditioning



Oil-Free Screw Compressors



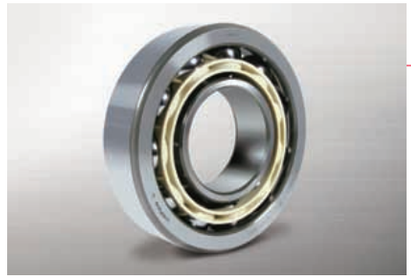
Scroll Compressors



Features of Bearings for Compressors

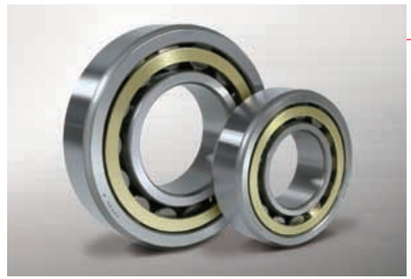
High Load Capacity Cylindrical Roller Bearings (L-PPS cage)

- High load capacity cylindrical roller bearings, adopting high performance L-PPS plastic cages.
- Heat-resistant L-PPS plastic cage delivers chemical stability that ensures strength with little to no deterioration, even in compressor oil, refrigeration machine oil, or ammonia refrigerant, while also providing excellent abrasion resistance.



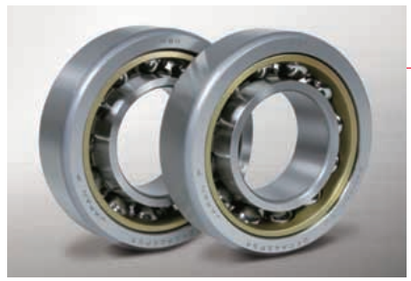
NSKHPS™ Angular Contact Ball Bearings (L-PPS cage)

- High load capacity angular contact ball bearings, adopting high performance L-PPS plastic cages.
- Improved bearing life up to 90% longer than conventional bearings reduces maintenance frequency and improves reliability.



High-Speed Cylindrical Roller Bearings

- High-speed cylindrical roller bearings, adopting outer-ring guided machined brass cages.
- Class P5 tolerances as standard bearing precision ensure stable performance at high speeds.



High-Speed Angular Contact Ball Bearings

- High-speed angular contact ball bearings, adopting outer-ring guided machined brass cages.
- Class P5 tolerances as standard bearing precision ensures stable performance at high speeds.

Features of Bearings for compressors

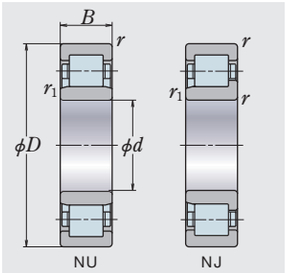
High Load Capacity Cylindrical Roller Bearings (L-PPS Cage)

Application
- Refrigeration and air conditioning screw compressors
- Air and gas screw compressors

Outstanding load capacity and lubrication performance—allowing for reduced compressor size and extended maintenance intervals.

Radial internal clearance Unit: μm

Nominal bore diameter *d* (mm)		Interchangeable CN clearance		Non-interchangeable CC clearance	
Over	Incl.	Min.	Max.	Min.	Max.
10	24	20	45	20	30
24	30	20	45	25	35
30	40	25	50	25	40
40	50	30	60	30	45
50	65	40	70	35	50
65	80	40	75	40	60
80	100	50	85	45	70



Bearing Number

Example: NU 310 E T7

- Type symbol
- Basic number
- Internal symbol: High load capacity
- Cage symbol: L-PPS cage
- Clearance symbol

Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (N)	
	d	*D*	*B*	*r* (min.)	r_1 (min.)	C_r (dynamic)	C_{0r} (static)
NU (NJ) 204ET7	20	47	14	1	0.6	25 700	22 600
NU (NJ) 304ET7	20	52	15	1.1	0.6	31 500	26 900
NU (NJ) 2204ET7	20	47	18	1	0.6	30 500	28 300
NU (NJ) 2304ET7	20	52	21	1.1	0.6	42 000	39 000
NU (NJ) 205ET7	25	52	15	1	0.6	29 300	27 700
NU (NJ) 305ET7	25	62	17	1.1	1.1	41 500	37 500
NU (NJ) 2205ET7	25	52	18	1.	0.6	35 000	34 500
NU (NJ) 2305ET7	25	62	24	1.1	1.1	57 000	56 000
NU (NJ) 206ET7	30	62	16	1	0.6	39 000	37 500
NU (NJ) 306ET7	30	72	19	1.1	1.1	53 000	50 000
NU (NJ) 2206ET7	30	62	20	1	0.6	49 000	50 000
NU (NJ) 2306ET7	30	72	27	1.1	1.1	74 500	77 500
NU (NJ) 207ET7	35	72	17	1.1	0.6	50 500	50 000
NU (NJ) 307ET7	35	80	21	1.5	1.1	66 500	65 500
NU (NJ) 2207ET7	35	72	23	1.1	0.6	61 500	65 000
NU (NJ) 2307ET7	35	80	31	1.5	1.1	93 000	101 000
NU (NJ) 208ET7	40	80	18	1.1	1.1	55 500	55 500
NU (NJ) 308ET7	40	90	23	1.5	1.5	83 000	81 500
NU (NJ) 2208ET7	40	80	23	1.1	1.1	72 500	77 500
NU (NJ) 2308ET7	40	90	33	1.5	1.5	114 000	122 000
NU (NJ) 209ET7	45	85	19	1.1	1.1	63 000	66 500
NU (NJ) 309ET7	45	100	25	1.5	1.5	97 500	98 500
NU (NJ) 2209ET7	45	85	23	1.1	1.1	76 000	84 500
NU (NJ) 2309ET7	45	100	36	1.5	1.5	137 000	153 000
NU (NJ) 210ET7	50	90	20	1.1	1.1	69 000	76 500
NU (NJ) 310ET7	50	110	27	2	2	110 000	113 000
NU (NJ) 2210ET7	50	90	23	1.1	1.1	86 500	97 000
NU (NJ) 2310ET7	50	110	40	2	2	163 000	187 000
NU (NJ) 211ET7	55	100	21	1.5	1.1	86 500	98 500
NU (NJ) 311ET7	55	120	29	2	2	137 000	143 000
NU (NJ) 2211ET7	55	100	25	1.5	1.1	101 000	122 000

Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (N)	
	d	*D*	*B*	*r* (min.)	r_1 (min.)	C_r (dynamic)	C_{0r} (static)
NU (NJ) 2311ET7	55	120	43	2	2	201 000	233 000
NU (NJ) 212ET7	60	110	22	1.5	1.5	97 500	107 000
NU (NJ) 312ET7	60	130	31	2.1	2.1	150 000	157 000
NU (NJ) 2212ET7	60	110	28	1.5	1.5	131 000	157 000
NU (NJ) 2312ET7	60	130	46	2.1	2.1	222 000	262 000
NU (NJ) 213ET7	65	120	23	1.5	1.5	108 000	119 000
NU (NJ) 313ET7	65	140	33	2.1	2.1	181 000	191 000
NU (NJ) 2213ET7	65	120	31	1.5	1.5	149 000	181 000
NU (NJ) 2313ET7	65	140	48	2.1	2.1	233 000	265 000
NU (NJ) 214ET7	70	125	24	1.5	1.5	119 000	137 000
NU (NJ) 314ET7	70	150	35	2.1	2.1	205 000	222 000
NU (NJ) 2214ET7	70	125	31	1.5	1.5	156 000	194 000
NU (NJ) 2314ET7	70	150	51	2.1	2.1	274 000	325 000
NU (NJ) 215ET7	75	130	25	1.5	1.5	130 000	156 000
NU (NJ) 315ET7	75	160	37	2.1	2.1	240 000	263 000
NU (NJ) 2215ET7	75	130	31	1.5	1.5	162 000	207 000
NU (NJ) 2315ET7	75	160	55	2.1	2.1	330 000	395 000
NU (NJ) 216ET7	80	140	26	2	2	139 000	167 000
NU (NJ) 316ET7	80	170	39	2.1	2.1	256 000	282 000
NU (NJ) 2216ET7	80	140	33	2	2	186 000	243 000
NU (NJ) 2316ET7	80	170	58	2.1	2.1	355 000	430 000
NU (NJ) 217ET7	85	150	28	2	2	167 000	199 000
NU (NJ) 2217ET7	85	150	36	2	2	217 000	279 000
NU (NJ) 2317ET7	85	180	60	3	3	395 000	485 000
NU (NJ) 218ET7	90	160	30	2	2	182 000	217 000
NU (NJ) 2218ET7	90	160	40	2	2	242 000	315 000
NU (NJ) 2318ET7	90	190	64	3	3	435 000	535 000
NU (NJ) 220ET7	100	180	34	2.1	2.1	310 000	305 000
NU (NJ) 320ET7	100	215	47	3	3	380 000	425 000
NU (NJ) 2220ET7	100	180	46	2.1	2.1	335 000	445 000
NU (NJ) 2320ET7	100	215	73	3	3	570 000	715 000

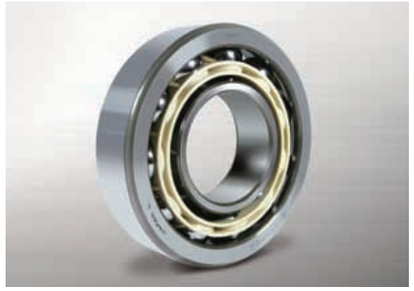
Features of Bearings for compressors

NSKHPS™ Angular Contact Ball Bearings (L-PPS Cage)

Application
- Refrigeration and air conditioning screw compressors
- Air and gas screw compressors

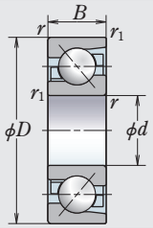
Outstanding load capacity and lubrication performance—allowing for reduced compressor size and extended maintenance intervals.

- Bearing life: up to 90% longer
- Maximum rotational speed: up to 20% faster
- Universal arrangement as standard
- 40° contact angle



Axial internal clearance Unit: μm

Nominal bore diameter *d* (mm)		CNB		GA	
Over	Incl.	Min.	Max.	Min.	Max.
12	18	17	25	−2	6
18	30	20	28		
30	50	24	32		
50	80	29	41	−3	9



Bearing Number

Example: 7310 | B | EA | T7 | SU | CNB

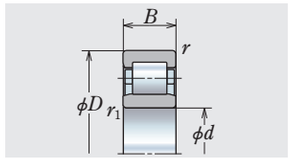
- 7310: Basic number
- B: Contact angle symbol: 40°
- EA: Internal symbol: High load capacity
- T7: Cage symbol: L-PPS cage
- SU: Arrangement symbol: Universal arrangement (single unit)
- CNB: Internal clearance symbol

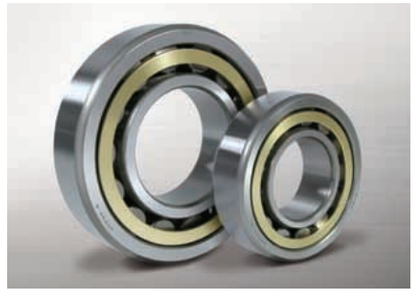
Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (N)		Maximum Rotational Speed (min^{-1})
	d	*D*	*B*	*r* (min.)	r_1 (min.)	C_r (dynamic)	C_{0r} (static)	Oil
7201BEA	12	32	10	0.6	0.3	8 150	3 750	30 000
7301BEA	12	37	12	1	0.6	11 100	4 950	26 000
7202BEA	15	35	11	0.6	0.3	9 800	4 800	26 000
7302BEA	15	42	13	1	0.6	14 300	6 900	22 000
7203BEA	17	40	12	0.6	0.3	11 600	6 100	22 000
7303BEA	17	47	14	1	0.6	16 800	8 300	20 000
7204BEA	20	47	14	1	0.6	15 600	8 150	19 000
7304BEA	20	52	15	1.1	0.6	19 800	10 500	18 000
7205BEA	25	52	15	1	0.6	17 600	10 200	17 000
7305BEA	25	62	17	1.1	0.6	27 200	14 900	15 000
7206BEA	30	62	16	1	0.6	23 700	14 300	14 000
7306BEA	30	72	19	1.1	0.6	36 500	20 600	13 000
7207BEA	35	72	17	1.1	0.6	32 500	19 600	12 000
7307BEA	35	80	21	1.5	1	40 500	24 400	11 000
7208BEA	40	80	18	1.1	0.6	38 500	24 500	11 000
7308BEA	40	90	23	1.5	1	53 000	33 000	10 000
7209BEA	45	85	19	1.1	0.6	40 500	27 100	10 000
7309BEA	45	100	25	1.5	1	62 500	39 500	9 000
7210BEA	50	90	20	1.1	0.6	42 000	29 700	9 500
7310BEA	50	110	27	2	1	78 000	50 500	8 000
7211BEA	55	100	21	1.5	1	51 500	37 000	8 500
7311BEA	55	120	29	2	1	89 000	58 500	7 500
7212BEA	60	110	22	1.5	1	61 500	45 000	7 500
7312BEA	60	130	31	2.1	1.1	102 000	68 500	6 700
7213BEA	65	120	23	1.5	1	70 000	53 500	7 100
7313BEA	65	140	33	2.1	1.1	114 000	77 000	6 300
7214BEA	70	125	24	1.5	1	75 500	58 500	6 700
7314BEA	70	150	35	2.1	1.1	124 000	87 500	6 000
7215BEA	75	130	25	1.5	1	78 500	63 500	6 300
7216BEA	80	140	26	2	1	87 500	70 000	6 000

High-Speed Cylindrical Roller Bearings

Application
- Air (oil-free) screw compressors

High-speed cylindrical roller bearings, adopting outer-ring guided machined brass cages. $d_m n$: 1 300 000 (See Remarks 1 & 2) Bearing accuracy of more than Class P5 as standard.





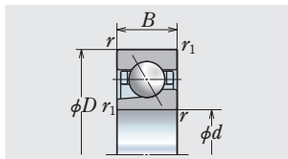
Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (N)	
	d	*D*	*B*	*r* (min.)	r_1 (min.)	C_r (dynamic)	C_{0r} (static)
NU205EMM	25	52	15	1	0.6	29 300	27 700
NU206EMM	30	62	16	1	0.6	39 000	37 500
NU207EMM	35	72	17	1.1	0.6	50 500	50 000
NU208EMM	40	80	18	1.1	1.1	55 500	55 500
NU209EMM	45	85	19	1.1	1.1	63 000	66 500
NU210EMM	50	90	20	1.1	1.1	69 000	76 500

Remarks 1: Under general forced-lubrication condition
2: Contact NSK for maximum rotational speed, which can vary according to service conditions, and lubricating system.

High-Speed Angular Contact Ball Bearings

Application
- Air (oil-free) screw compressors

High-speed angular contact bearings, adopting outer-ring guided machined brass cages. $d_m n$: 1 300 000 (See Remarks 1 & 2) Bearing accuracy of more than Class P5 as standard.



Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (N)	
	d	*D*	*B*	*r* (min.)	r_1 (min.)	C_r (dynamic)	C_{0r} (static)
20BA02A	20	47	14	1	0.6	13 600	7 550
25BA02A	25	52	15	1	0.6	15 400	9 500
30BA03B	30	72	19	1.5	0.6	31 500	19 000
35BA03B	35	80	21	1.5	0.6	39 000	24 000
40BA02A	40	80	18	1.5	0.6	34 500	24 100
45BA03A2	45	100	25	1.5	1	60 000	40 000
50BA03A1	50	110	27	1	2.5	70 000	47 500

Remarks 1: Under general forced-lubrication condition
2: Contact NSK for maximum rotational speed, which can vary according to service conditions, and lubricating system.

Bearings for Agricultural Machinery

NSK's high-performance bearings provide high reliability and efficiency for agricultural implements and machinery.

A Product Line that Matches Specific Applications

Bearings Table

A Product Line that Matches Specific Applications

Line-up

Power Train
Engine/Electrical Accessories

Plastic Pulley for Accessory & Timing Belt

Water Pump Bearings

Deep Groove Ball Bearings

UR Bearing
(Special Carbonitriding Heat-Treatment Technology)

HR Series Tapered Roller Bearings

NSKHPS™ Deep Groove Ball Bearing

Drive Train
Transmission/Differential Gear/Propeller Shaft

Needle Roller Bearings

Creep-Free Bearings™ Series

Double-Row Angular Contact Ball Bearings

Thrust Ball Bearings

Long-Life Pinion Shaft with Cage and Rollers

TM Series
Sealed Deep Groove Ball Bearings

Other

Ball Bearing Units

Implements

Agril Disc Hub

Chassis
Wheel/Steering

NSKHPS™ Spherical Roller Bearings

Hub Unit Bearings (HUB I)

Hi-TF Bearings

■A Product Line that Matches Specific Applications

High-Performance Standard for Industial Machinery NSKHPS™ Deep Groove Ball Bearings/Cylindrical Roller Bearings/Spherical Roller Bearings Series

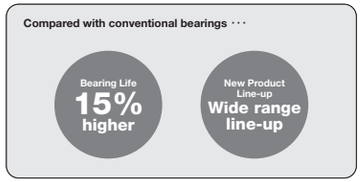
NSKHPS™ Deep Groove Ball Bearings The new standard that defi nes the concept of standard bearings - NSKHPS™

- Improved reliability
  Bearing life has increased by a maximum of 2 times compared with that of conventional bearings by the optimization of the bearing's internal design and improvement of processing technology. As a result, the NSKHPS™ bearings contribute to reducing maintenance cost and facilitate the downscaling of related equipment.
- New product line-up
  The standard dimensions are the same as for the standardsize bearings. NSK has expanded the line-up of NSKHPS™ bearings focusing on a wide range of sizes offering a high degree of versatility for various general-purpose applications

For the NSKHPS™ DGBBs dimensions table, please refer to Pages C020 to C035. Please refer to Page D038 for detailed information of NSKHPS™ CRBs and SRBs

Features

Compared with conventional bearings ···



High-Load Bearings (Tapered Roller Bearings/Deep Groove Ball Bearings) HR Series

The HR series of high-load bearings provides excellent performance in diverse applications.

Features

- Higher load-carrying capacity and longer operating life.

Tapered roller bearings
Optimal cage design allows increased size and number of rollers.

Deep groove ball bearings
The standard dimensions are the same as for the standard-size bearings and feature designs with optimized ball diameter and quantity.

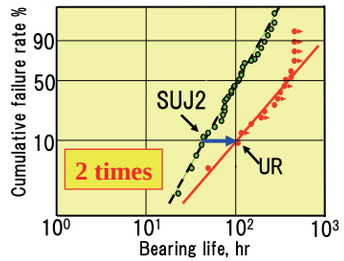
UR Bearing

Achieve long life by special carbonitriding heat treatment(UR) to through harden bearing steel.

Features

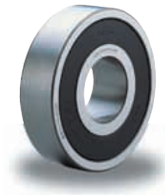
- Over 2 times bearing life to standard bearings under harsh and contaminated lubrication conditions.
- Additional longer life is available by the combination with High Capacity Standard Series.
- UR heat treatment is available to various types of bearing, because it is applied to through harden bearing steel, most popular material for rolling bearings.

Under contaminated lubrication conditions



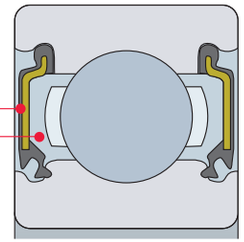
Sealed Deep Groove Ball Bearings TM Series

The TM series delivers longer operating life under environments contaminated with foreign particles by incorporating a special seal that prevents the entry of foreign particles and has been especially effective in agricultural machinery and automobile transmission systems.



Features

- Seal lip structure prevents entry of foreign matter while allowing entry of oil.
- Lower torque than conventional contact seal bearings.
- Sealed-in grease with a high affinity for gear oil to aid initial lubrication.

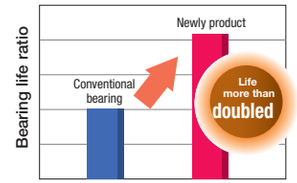


Bearing Series	TM302-TM314 / TM203-TM214	Major dimensions are the same as the Series 62 and Series 63 of deep groove ball bearings.

Long-Life Pinion Shaft with Cage and Rollers

These bearings have improved durability and reliability and achieve long service life under harsh operating conditions, such as continuous operation for long periods of time, by utilizing a pinion shaft with a cage and rollers as a single assembly.

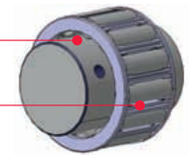
Comparison of life test results for conventional and newly developed bearing



Features

- Special heat treatment and improved raceway surfaces extend service life by more than twofold.

Pinion shaft
・Raceway polished to a mirror-smooth finish to ensure a sufficiently thick oil film.
・Special heat treatment applied to pinion shaft as a measure against contaminated-lubricant conditions.
Cage and rollers
・Roller running surface polished to a mirror-smooth finish to ensure a sufficiently thick oil film.
・Special heat treatment applied to rollers as a measure against contaminated-lubricant conditions.



Corresponding size:
Inscribed circle diameter up to 32 mm

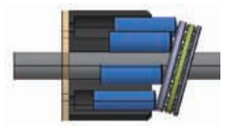
HST Long-Life, High-Reliability Cage-Equipped Thrust Ball Bearings for Agricultural Machinery

Contributing to the Long Life and High Reliability of
Agricultural Machinery by Increasing the Life of Bearings.

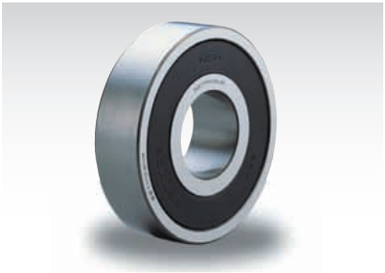
Features

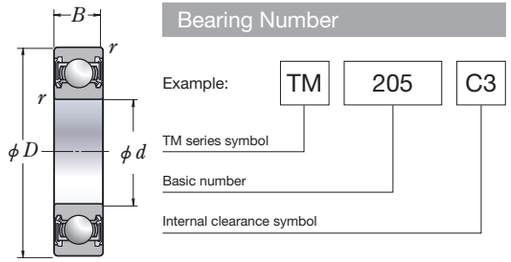
Achieve the twice or more life compared with conventional bearings by adopting the long-life.

- Long-life Technology
  Uses EP steel, which is strong against sub-surface fatigue, For the inner and outer ring. Adopts a special heat treatment, which is resistant to surface fatigue, for the inner and outer ring and balls.
- High-reliability Cage
  Improves the reliability of cage by utilizing a plastic cage which is resistant to cage load.



Sealed Deep Groove Ball Bearings TM Series





Bearing Number

Example: TM | 205 | C3

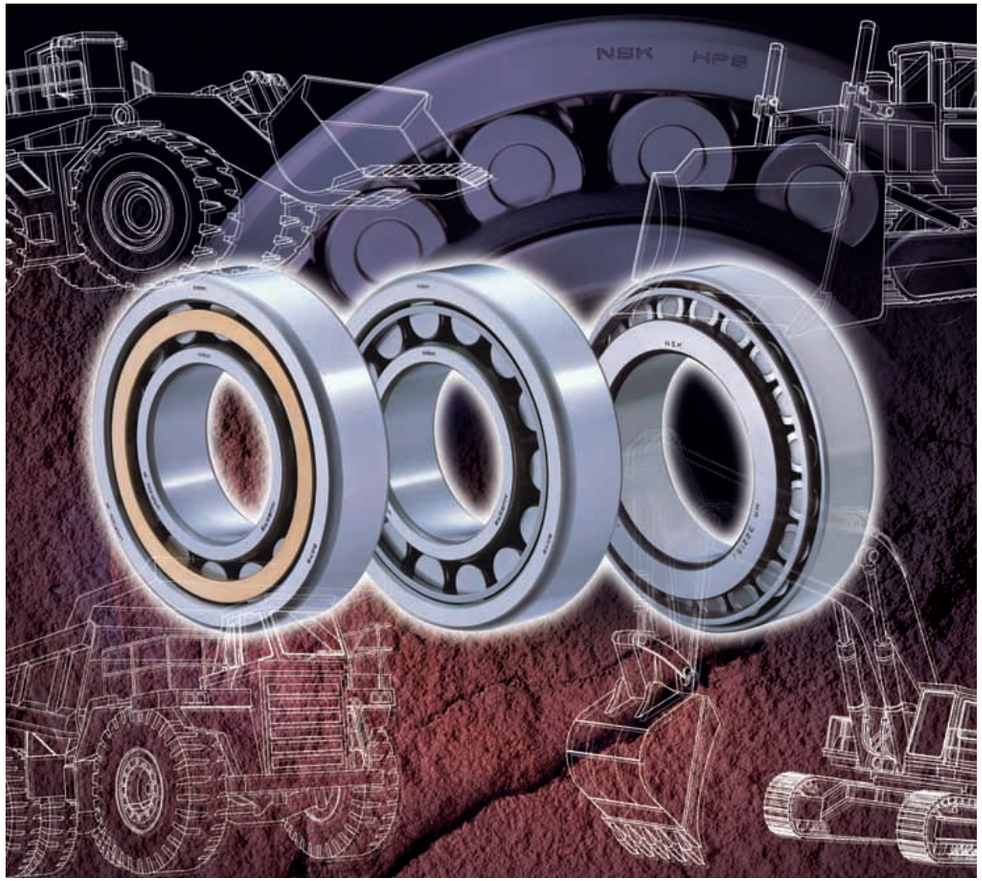
- TM: TM series symbol
- 205: Basic number
- C3: Internal clearance symbol

Bearing Numbers	Boundary Dimensions (mm)			Basic Load Ratings (N)	
	d	D	B	C_r	C_{0r}
TM203	17	40	12	9 550	4 800
TM303	17	47	14	13 600	6 650
TM204	20	47	14	12 800	6 600
TM304	20	52	15	15 900	7 900
TM2/22	22	50	14	12 900	6 800
TM3/22	22	56	16	18 400	9 250
TM205	25	52	15	14 000	7 850
TM305	25	62	17	20 600	11 200
TM2/28	28	58	16	16 600	9 500
TM3/28	28	68	18	26 700	14 000
TM206	30	62	16	19 500	11 300
TM306	30	72	19	26 700	15 000
TM2/32	32	65	17	20 700	11 600
TM3/32	32	75	20	29 400	17 000
TM207	35	72	17	25 700	15 300
TM307	35	80	21	33 500	19 200
TM208	40	80	18	29 100	17 800
TM308	40	90	23	40 500	24 000
TM209	45	85	19	31 500	20 400
TM309	45	100	25	53 000	32 000
TM210	50	90	20	35 000	23 200
TM310	50	110	27	62 000	38 500
TM211	55	100	21	43 500	29 300
TM311	55	120	29	71 500	44 500
TM212	60	110	22	52 500	36 000
TM312	60	130	31	82 000	52 000
TM213	65	120	23	57 500	40 000
TM313	65	140	33	92 500	60 000
TM214	70	125	24	62 000	44 000
TM314	70	150	35	104 000	68 000

Note Maximum continuous operating temperature for standard nitrile rubber seals is 110°C.

Bearings for Construction Machinery

Long service life under harsh conditions—tough bearings reflect NSK's accumulated technological prowess.

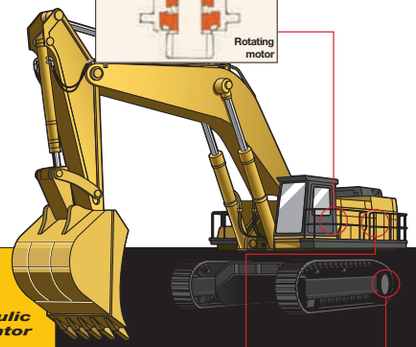


A Product Line that Matches Specific Applications

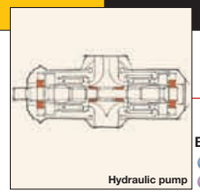
A Product Line that Matches Specific Applications

Line-up

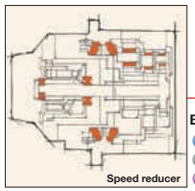
Hydraulic excavator



Rotating motor
Bearings typically used:
- Tapered Roller Bearings
- Deep Groove Ball Bearings
- Needle Roller Bearings

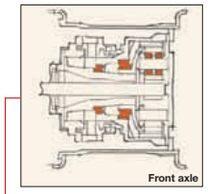


Hydraulic pump
Bearings typically used:
- Cylindrical Roller Bearings
- Needle Roller Bearings

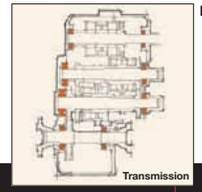


Speed reducer
Bearings typically used:
- Cylindrical Roller Bearings
- Angular Contact Ball Bearings
- Needle Roller Bearings

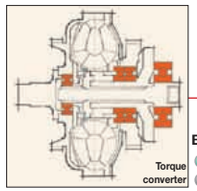
Wheel loader



Front axle
Bearings typically used:
- Tapered Roller Bearings

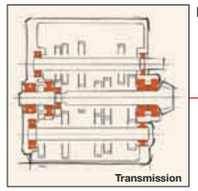


Transmission
Bearings typically used:
- Cylindrical Roller Bearings
- Tapered Roller Bearings
- Deep Groove Ball Bearings

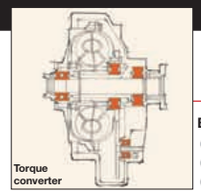


Torque converter
Bearings typically used:
- Deep Groove Ball Bearings
- Angular Contact Ball Bearings

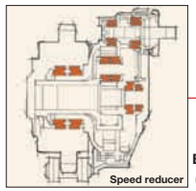
Crawler dozer



Transmission
Bearings typically used:
- Cylindrical Roller Bearings
- Tapered Roller Bearings
- Spherical Roller Bearings

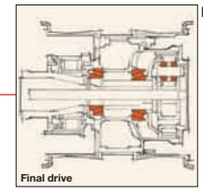


Torque converter
Bearings typically used:
- Cylindrical Roller Bearings
- Deep Groove Ball Bearings
- Angular Contact Ball Bearings

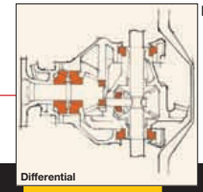


Speed reducer
Bearings typically used:
- Tapered Roller Bearings

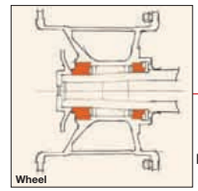
Off-highway truck



Final drive
Bearings typically used:
- Tapered Roller Bearings



Differential
Bearings typically used:
- Cylindrical Roller Bearings
- Tapered Roller Bearings



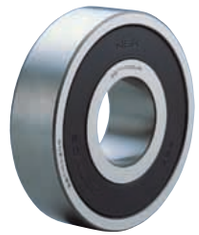
Wheel
Bearings typically used:
- Tapered Roller Bearings

NSKHPS™ Spherical Roller Bearings

NSKHPS™ Cylindrical Roller Bearings

Tapered Roller Bearings HR Series

Hi-TF Bearings



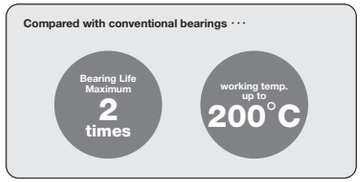
Sealed Deep Groove Ball Bearings TM Series

Long-Life Pinion Shaft with a Cage and Rollers

■A Product Line that Matches Specific Applications

NSKHPS™ Spherical Roller Bearings

Features Compared to the conventional bearing :

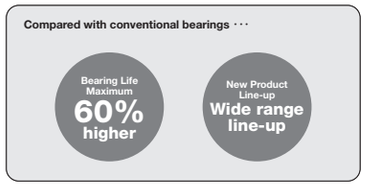


1. Improved reliability
Bearing life has increased by a maximum of 2 times compared with that of conventional bearings by the optimization of the bearing's internal design and improvement of processing technology.

2. High temperature dimensional stabilizing treatment comes standard
High temperature dimensional stabilization of up to 200°C has been achieved through the application of NSK's proprietary material heat treatment technology.

NSKHPS™ Cylindrical Roller Bearings

Features Compared to the conventional bearing :

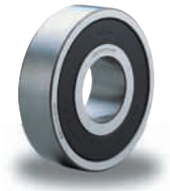


1. Improved reliability
Bearing life has increased by a maximum of 60% compared with that of conventional bearings by the optimization of the bearing's internal design and improvement of processing technology.

2. Wide-range product line-up
NSK has offerd the wide-range line-up of NSKHPS bearings with four types of cages focusing on a wide range of sizes offering a high degree of versatility for various general-purpose applications.
- Pressed steel cage with high cost perfomance
- Highly reliable machined brass cage
- Polyamide resin cage that excels in heat resistance and chemical resistance

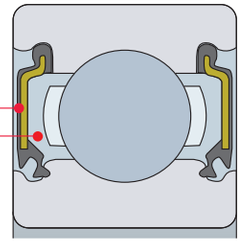
Sealed Deep Groove Ball Bearings TM Series

The TM series delivers longer operating life under environments contaminated with foreign particles by incorporating a special seal that prevents the entry of foreign particles and has been especially effective in agricultural machinery and automobile transmission systems.



Features

- Seal lip structure prevents entry of foreign matter while allowing entry of oil.
- Lower torque than conventional contact seal bearings.
- Sealed-in grease with a high affinity for gear oil to aid initial lubrication.



Bearing Series	TM302-TM314 / TM203-TM214	Major dimensions are the same as the Series 62 and Series 63 of deep groove ball bearings.

Tapered Roller Bearings HR Series

The HR series of high-load capacity, standard-size tapered roller bearings offer high-load capacity for boosting the performance in diverse applications.

Features

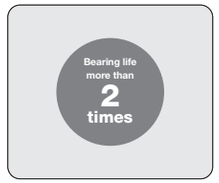
Optimal cage design allows increased size and number of rollers

Higher load-carrying capacity and longer operating life

Long-Life Pinion Shaft with Cage and Rollers

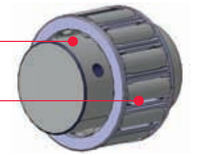
These bearings have improved durability and reliability and achieve long service life under harsh operating conditions, such as continuous operation for long periods of time, by utilizing a pinion shaft with a cage and rollers as a single assembly.

Features



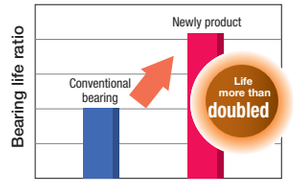
Pinion shaft
- Raceway polished to a mirror-smooth finish to ensure a sufficiently thick oil film.
- Special heat treatment applied to pinion shaft as a measure against contaminated-lubricant conditions.

Cage and rollers
- Roller running surface polished to a mirror-smooth finish to ensure a sufficiently thick oil film.
- Special heat treatment applied to rollers as a measure against contaminated-lubricant conditions.



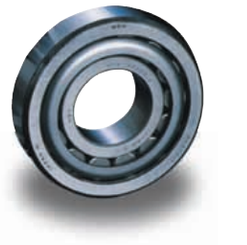
Corresponding size:
Inscribed circle diameter up to 32 mm

Comparison of life test results for conventional and newly developed bearing



Hi-TF Bearings

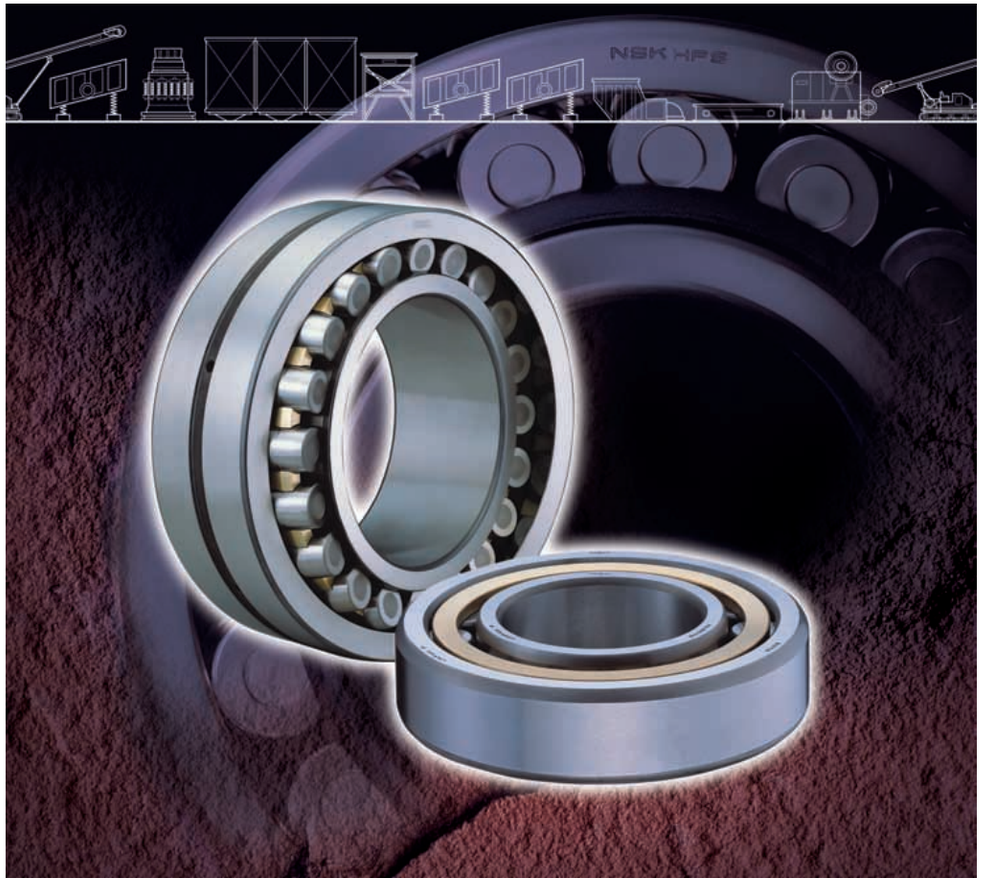
Bearings manufactured from NSK's Hi-TF material have been specifically designed for outstanding toughness under harsh operating conditions, surpassing even NSK's earlier TF bearings. Hi-TF bearings incorporating this new material and a new heat-treatment technology provide long service life under contaminated lubrication conditions with superior resistance to wear, seizure, and heat. Hi-TF bearings are capable of handling the foreseeable needs of the future as well as meeting today's requirements.



Features Achieves longer bearing life even under harsh conditions with excellent resistance to wear, seizure, and heat

Bearings for Mining Machinery

Tough bearings offer longer service life under demanding mining conditions through NSK's wealth of outstanding technologies.



A Product Line that Matches Specific Applications

Bearings Table

A Product Line that Matches Specific Applications

Jaw Crusher

Work material is crushed between two opposing jaw plates. One plate opens and shuts, crushing raw material against the stationary jaw plate.

Cone Crusher

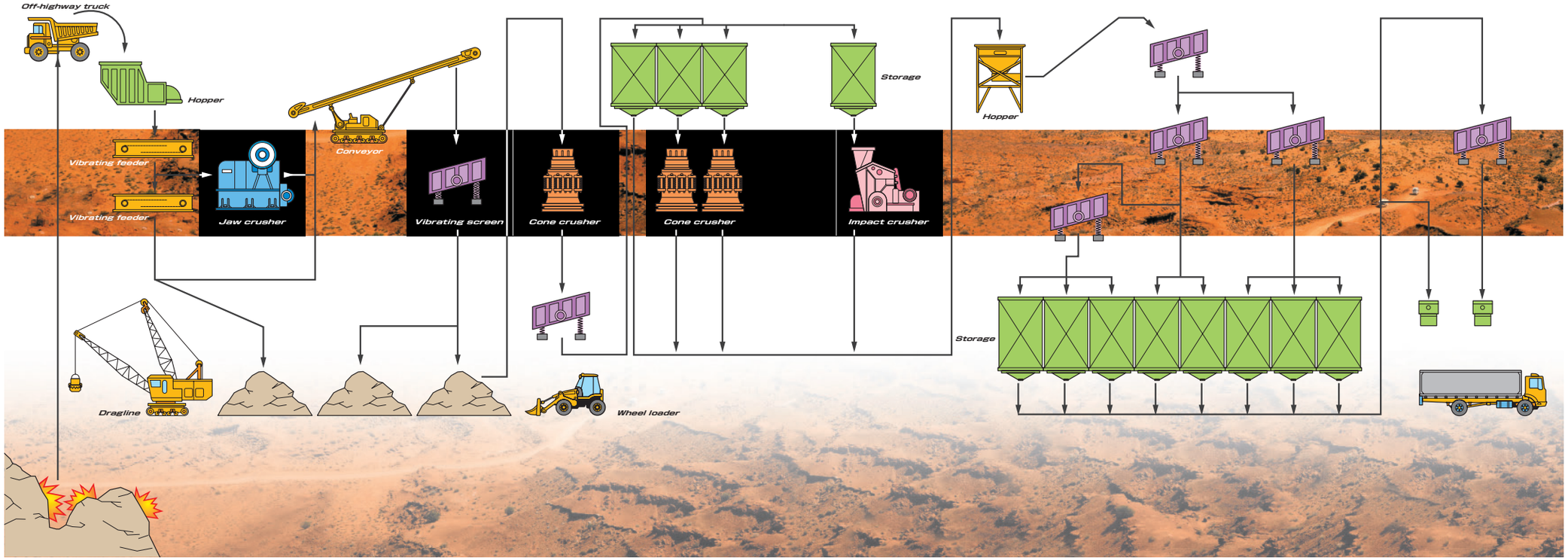
Material is fed into the crusher cavity and processed by the eccentric rotating action of the inner cone against the outer cone. Work can be reduced to a diameter ranging from 50 mm to 100 mm.

Vibrating Screen

The vibrating screen consists of a case with a shaft and housing installed inside, with springs supporting the case. The swing and rotation of the shaft is produced by the attached unbalanced weight, which generates vibration. This vibration sifts the material set on the screen on the top of the case.

Impact Crusher

As indicated by its name, this machine crushes ore through impact, and steadily reduces the size of the crushed particles through sharp, repeated impact with a rapidly spinning hammer, steel plate, or stick.



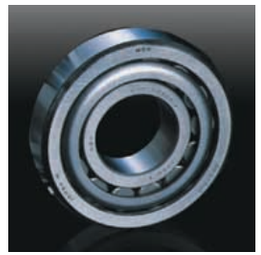
NSKHPS™ Spherical Roller Bearings

NSKHPS™ Cylindrical Roller Bearings

Super Long-Life Spherical Roller Bearings for Vibrating Equipment CA-VS3,CA-VS4 Series

Bearings for Mining Machinery EMM-VS Series of Cylindrical Roller Bearings for Vivrating Equipment

Plummer Block

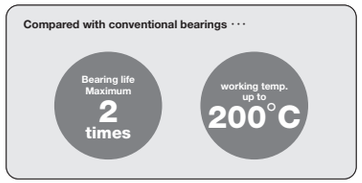


Hi-TF Bearings

■A Product Line that Matches Specific Applications

NSKHPS™ Spherical Roller Bearings

Features Compared to the conventional bearing :



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NSKHPS™ Cylindrical Roller Bearings

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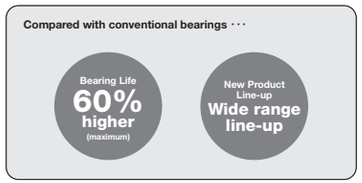

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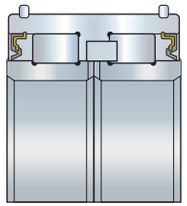
- Pressed steel cage with high cost perfomance
- Highly reliable machined brass cage
- Polyamide resin cage that excels in heat resistance and chemical resistance

Full Complement Cylindrical Roller Bearings for Crane Sheaves

This cylindrical roller bearing incorporates seals to prevent the entry of foreign matter.

Features

- Improved seal: Contact seal increases resistance to entry of foreign matter or water.
- High load capacity: Larger radial load and axial load capacity compared to conventional sheave bearings.
- Corrosion resistance: Phosphate surface treatment improves resistance to rust.
- Easier grease replenishment: Sealed bearing includes inner ring holes to facilitate grease replenishment.
- Fewer mounted components: With snap rings for the outer ring, fewer components are required around the bearing, making for a more cost-effective sheave.



Spherical Roller Bearings CA-VS Series

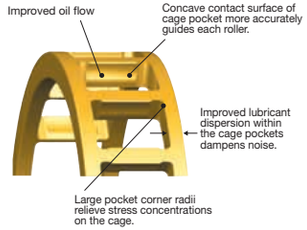
The CA series is a standard-size bearing with a machined brass cage,tough and wear-resistant capabilities,and is ideal for applications operating under heavy or shock load conditions. NSK offers the U15 and VS units specifically for vibrating screens,feeders,and other vibrating applications.

Features

- Highly resistant to heavy or shock loads.
- Long service life for vibrating applications.
- Excellent self-aligning ability.
- Preventive measure against shaft deflection.
- Easy to install

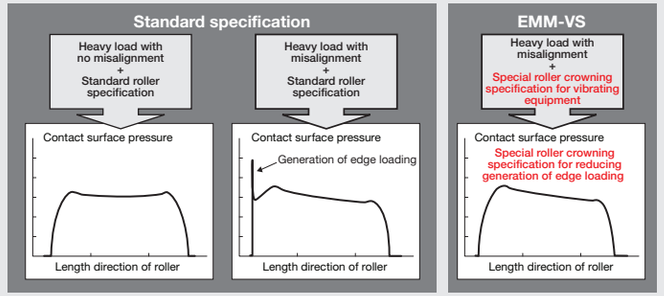
Bearings for Mining Machinery EMM-VS Series of Cylindrical Roller Bearings for Vibrating Equipment

EMM series with outer-ring-guided machined brass cage



- Machined brass cage (High-strength and wear-resistant cage)
- Outer-ring-guided one-piece cage

■Analysis results of roller surface pressure



Hi-TF Bearings

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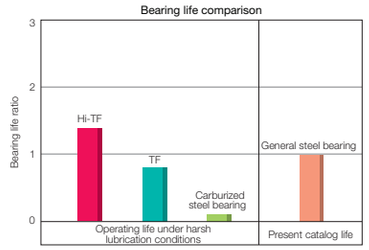
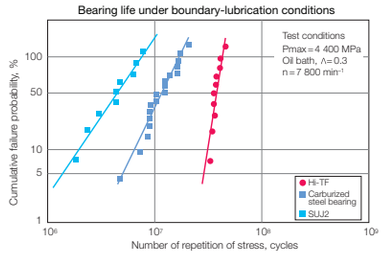
Features Achieves longer bearing life even under harsh conditions with excellent resistance to wear, seizure, and heat





Plummer Block

Plummer block housings can be used with high-capacity spherical roller bearings or self-aligning ball bearings. They are manufactured from high-strength cast iron as standard but are also available in cast steel or spheroidal graphite cast iron.

■A Product Line that Matches Specific Applications

Super Long-Life Spherical Roller Bearings for Vibrating Equipment CA-VS3, CA-VS4 Series

Example: **223 20 CAM E4 -VS3**

- 223: Bearing series symbols (Bearing type+width series+diameter series)
- 20: Bearing bore (Bore number)
- CAM: Cage type symbol — CAM: High load capacity machined brass cage
- E4: Outer ring with oil groove and oil hole (External features symbol)
- -VS3:
  - •Bearings for vibrating equipment
  - •Special accuracy for vibrating equipment
  - •Special internal clearance for vibrating equipment

Dimensional Tolerance and Radial Clearance

NSK's -VS3, VS4 specifications stabilize the load distribution by controlling the internal clearance and the dimensional tolerance of the bearing.

■ VS3,VS4 series has succeeded to U15 specification (special tolerance for vibrating equipment) that has been adopted to spherical roller bearing CA-VS series. However to clarify the simplification of the suffix and the difference between new series and conventional series, suffix U15 is omitted.

■ Number symbols (3 and 4) of VS3 and VS4 mean bearing internal clearance "C3U15 and C4U15"

• The dimensional tolerance bearing is set at 1/2 relative to the outer diameter tolerance and the internal diameter tolerance.

• The radial internal clearance is set at 2/3 relative to the standard.

Bearing Numbers	Basic Load Ratings (N)		Boundary Dimensions (mm)					Radial Clearance (Cylindrical Bore)	
	C_r	C_{0r}	d (mm)	diameter tolerance (μm)	D (mm)	diameter tolerance (μm)	B (mm)	VS3(μm)	VS4(μm)
22308CAME4-VS( )	152	129	40	0 -7	90		33	50 to 60	65 to 80
22309CAME4-VS( )	185	167	45		100		36	60 to 75	85 to 100
22310CAME4-VS( )	232	211	50		110	-5 -13	40		
22311CAME4-VS( )	261	241	55	0 -9	120		43	75 to 90	100 to 120
22312CAME4-VS( )	305	288	60		130		46		
22313CAME4-VS( )	330	315	65		140		48		
22314CAME4-VS( )	380	370	70		150		51	90 to 110	120 to 145
22315CAME4-VS( )	425	415	75		160	-5 -18	55		
22316CAME4-VS( )	485	480	80		170		58		
22317CAME4-VS( )	520	510	85	0 -12	180		60	110 to 135	150 to 180
22318CAME4-VS( )	605	595	90		190	-10 -23	64		
22319CAME4-VS( )	655	675	95		200		67		
22320CAME4-VS( )	750	785	100		215		73		
22322CAME4-VS( )	925	980	110		240		80	135 to 160	180 to 210
22324CAME4-VS( )	1 060	1 120	120		260		86		
22326CAME4-VS( )	1 240	1 350	130	0 -15	280		93	160 to 190	205 to 240
22328CAME4-VS( )	1 450	1 590	140		300		102		
22330CAME4-VS( )	1 530	1 690	150		320	-13 -28	108	190 to 220	240 to 280
22332CAME4-VS( )	1 700	1 900	160		340		114		
22334CAME4-VS( )	1 970	2 110	170		360		120	200 to 240	260 to 310
22336CAME4-VS( )	2 170	2 340	180		380		126		
22338CAME4-VS( )	2 370	2 590	190	0 -18	400		132	220 to 260	285 to 340

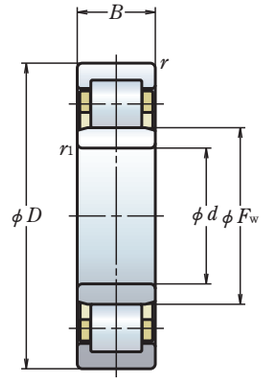
Remark VS( ) : Replace parentheses and indicate "VS3" or "VS4" when ordering.

Bearings for Mining Machinery EMM-VS Series of Cylindrical Roller Bearings for Vibrating Equipment

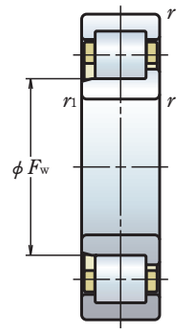
Example: **NU 23 08 EMM C3(4) -VS**

- NU: Bearing Type (NU,NJ,NUP)
- 23: Bearing Series Symbols
- 08: Bore Number
- EMM: EMM-VS : Bearings for Vibrating Equipment
- C3(4): Internal Radial Clearance

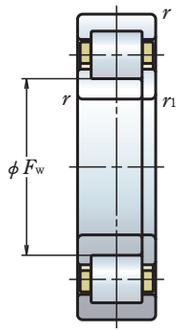
NU



NJ



NUP



Bearing Numbers		Boundary Dimensions (mm)						Basic Load Ratings (N)	
		d	D	B	r min.	r_1 min.	F_w	C_r	C_{0r}
NU2308EMMC3-VS	**NU2308EMMC4-VS**	40	90	33	1.5	1.5	52	114 000	122 000
NU2309EMMC3-VS	**NU2309EMMC4-VS**	45	100	36	1.5	1.5	58.5	137 000	153 000
NU2310EMMC3-VS	**NU2310EMMC4-VS**	50	110	40	2	2	65	163 000	187 000
NU2311EMMC3-VS	**NU2311EMMC4-VS**	55	120	43	2	2	70.5	201 000	233 000
NU2312EMMC3-VS	**NU2312EMMC4-VS**	60	130	46	2	2	77	222 000	262 000
NU2313EMMC3-VS	**NU2313EMMC4-VS**	65	140	48	2.1	2.1	82.5	233 000	265 000
NU2314EMMC3-VS	**NU2314EMMC4-VS**	70	150	51	2.1	2.1	89	274 000	325 000
NU2315EMMC3-VS	**NU2315EMMC4-VS**	75	160	55	2.1	2.1	95	330 000	395 000
NU2316EMMC3-VS	**NU2316EMMC4-VS**	80	170	58	2.1	2.1	101	355 000	430 000
NU2317EMMC3-VS	**NU2317EMMC4-VS**	85	180	60	3	3	108	395 000	485 000
NU2318EMMC3-VS	**NU2318EMMC4-VS**	90	190	64	3	3	113.5	435 000	535 000
NU2319EMMC3-VS	**NU2319EMMC4-VS**	95	200	67	3	3	121.5	460 000	585 000
NU2320EMMC3-VS	**NU2320EMMC4-VS**	100	215	73	3	3	127.5	570 000	715 000
NU2322EMMC3-VS	**NU2322EMMC4-VS**	110	240	80	3	3	143	675 000	880 000
NU2324EMMC3-VS	**NU2324EMMC4-VS**	120	260	86	3	3	154	795 000	1 030 000

Bearings for Railway Rolling Stock

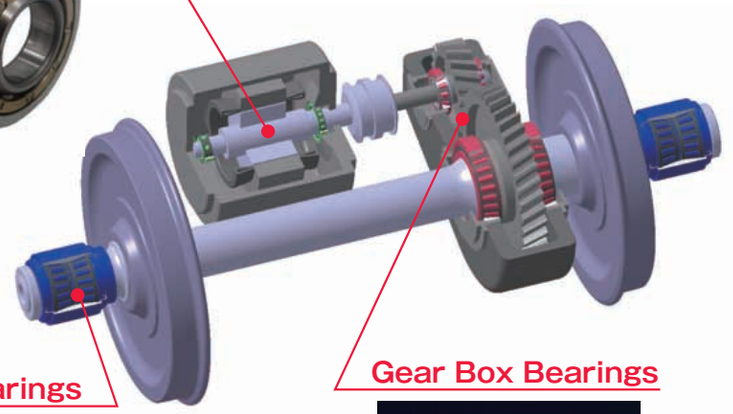
A Product Line that Matches Specific Applications

Bearings Table

A Product Line that Matches Specific Applications

These bearings must have high reliability, as they are one of the most important parts used in rolling stock.
There are three bearing types typically used in rolling stock: axle bearings, which carry the heavy weight of rolling stock on the shafts; traction motor bearings, which support the main shaft of the traction motor; and gearbox bearings, which transmit drive power from the traction motor to the axle shaft.
NSK supplies these specifically designed bearings for each application.

Traction Motor Bearings



Axle Bearings

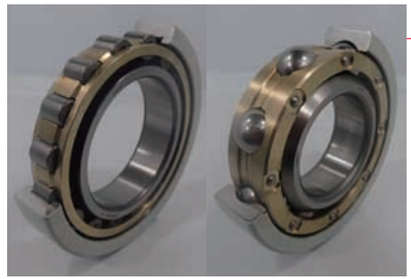
Gear Box Bearings

Axle Bearings

- NSK has developed high-speed, lightweight, and low-maintenance axle bearings.
  -Sealed-Clean Rotating End Cap Tapered Roller Bearings with Grease Lubrication
  -Sealed-Clean Rotating End Cap Cylindrical Roller Bearings with Grease Lubrication
  -Open-Type Cylindrical Roller Bearings (With oil bath or Grease Lubrication)
  -Open-Type Tapered Roller Bearing (With oil bath Lubrication)
- NSK offers axle bearings with sensors to provide higher reliability.
- NSK is certified by the AAR (Association of American Railways). Please ask NSK in detail.

Gear Box Bearings

- NSK bearings have higher seizure resistance under high-speed rotation due to our special designs.
- A high-toughness cage can be used in severe condition.

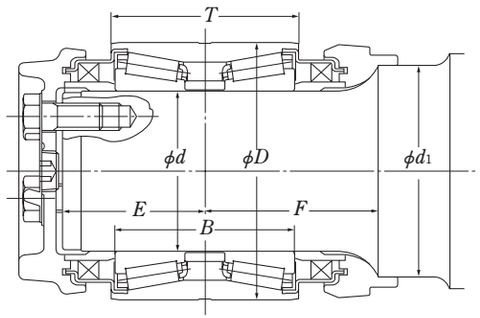


Traction Motor Bearings

- Designed for high-speed, inverter-controlled Traction Motors by adopting a dimension-stabilizing treatment. Application of long-life grease is recommended.
- NSK has two solutions to prevent electric current penetration (electrolytic corrosion) through the bearing.
  -Ceramic Insulated Bearings
  -PPS Molded Bearing
- High-capacity bearings are used in large traction motors in electric train locomotives.

Axle Bearings

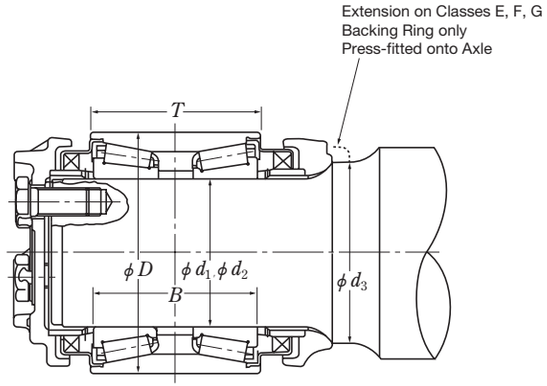
Sealed-Clean Rotating End Cap Tapered Roller Bearing



Bearing Numbers	Dimensions (mm)							Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
	d	D	T	B	d_1	E	F		
J-908	90	154	90	80	110	55	80	297 000	480 000
J-318	110	175	130	125	155	105	135	470 000	940 000
J-910	110	188	150	145	150	100	120	605 000	1 110 000
J-901	110	190	150	145	150	100	120	605 000	1 110 000
J-905	110	195	150	145	150	100	120	650 000	1 180 000
J-909	110	205	140	130	150	85	105	745 000	1 270 000
J-902	110	220	145	144	155	112	110	690 000	1 090 000
J-900	115	210	150	145	144	98	117	710 000	1 250 000
J-319	120	195	142	136	155	113	135	645 000	1 290 000
J-904	120	220	145	145	155	120	117	750 000	1 250 000
J-355	120	220	155	155	150	125	100	845 000	1 530 000
J-907A	120	220	155	150	149	146.5	117	780 000	1 310 000
J-320	130	208	152	146	165	115	139	660 000	1 350 000
J-913	130	220	155	155	160	168	100	765 000	1 410 000
J-920	130	220	155	155	171	115	140.7	820 000	1 550 000
J-934	130	230	160	150	149	146.5	117	915 000	1 670 000
J-937	130	230	160	150	160	149	117	915 000	1 670 000
J-936B	130	240	165	160	160	203.5	117	1 040 000	1 800 000
J-943	130	240	160	160	160	90	101	1 040 000	1 800 000
J-921C	150	250	185	179.5	185	122	133	915 000	1 700 000
J-942	185	280	160	155	225	—	115.5	915 000	1 900 000

Axle Bearings

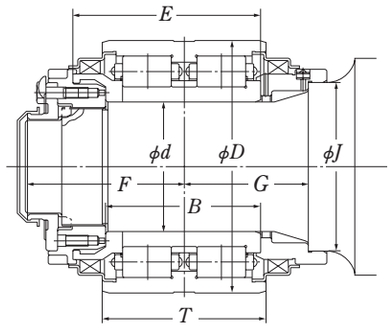
Sealed-Clean Rotating End Cap Tapered Roller Bearing
AAR No.22



Class	Journal Size	Unit Number	Bearing Numbers		d_1(bearing) max.-min.	d_2(axle) max.-min.	Dimensions mm(upper line) / Inch(lower line) D	T	B	d_3	Basic Dynamic Load Rating N (lbf)	Basic Static Load Rating N (lbf)
B	4 1/4 X 8	J-371	**HM120848R**	**HM120817XDR**	101.625-101.600 4.001-4.000	101.702-101.676 4.0040-4.0030	165.100 6 1/2	114.300 4 1/2	106.362 4 3/16	127.000 5	415 000 (93 000)	775 000 (174 000)
C	5 X 9	J-372	**HM124646R**	**HM124618XDR**	119.087-119.062 4.6885-4.6875	119.164-119.139 4.6915-4.6905	195.262 7 11/16	142.875 5 5/8	136.525 5 3/8	149.225 5 7/8	585 000 (132 000)	1 140 000 (255 000)
D	5 1/2 X 10	J-373	**HM127446R**	**HM127415XDR**	131.775-131.750 5.1880-5.1870	131.864-131.839 5.1915-5.1905	207.962 8 3/16	152.600 6	146.050 5 3/4	161.925 6 3/8	635 000 (143 000)	1 250 000 (282 000)
E	6 X 11	J-374	**HM129848R**	**HM129814XDR**	144.475-144.450 5.6880-5.6870	144.564-144.539 5.6915-5.6905	220.662 8 11/16	163.512 6 7/16	155.575 6 1/8	178.613-178.562 7.032-7.030	665 000 (149 000)	1 350 000 (305 000)
F	6 1/2 X12	J-375	**HM133444R**	**HM133416XDR**	157.175-157.150 6.1880-6.1870	157.264-157.239 6.1915-6.1905	252.412 9 15/16	184.150 7 1/4	177.800 7	191.313-191.262 7.532-7.530	905 000 (204 000)	1 840 000 (415 000)
G	7 X 12	J-376	**HM136948R**	**HM136916XDR**	177.812-177.787 7.0005-6.9995	177.902-177.876 7.0040-7.0030	276.225 10 7/8	185.725 7.312	180.075 7 1/8	203.251-203.200 8.002-8.000	1 010 000 (227 000)	2 170 000 (485 000)

Axle Bearings

Sealed-Clean Rotating End Cap Cylindrical Roller Bearing

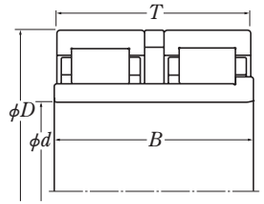


Bearing Numbers	Dimensions (mm)								Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
	d	*D*	*T*	*B*	*J*	*E*	*F*	*G*		
J-580A	100	195	150	175	130	—	120	105	670 000	1 040 000
J-447B	110	220	160	154	170	—	135	140	875 000	1 370 000
J-577	110	220	170	182	140	210	128	112	875 000	1 370 000
J-504	120	195	140	134	155	176	135	132	545 000	915 000
120JRF11	120	215	146	146	—	—	—	—	830 000	1 350 000
J-809	120	220	145	145	155	171	145	117	700 000	1 120 000
J-805	120	220	155	157	150	190	113	100	765 000	1 250 000
J-806	120	220	160	172	160	200	128	112	765 000	1 250 000
J-810A	120	220	160	185.5	145	—	128	104	765 000	1 250 000
J-811	120	220	160	204	150	242	128	112	815 000	1 320 000
J-817	120	220	175	175	144	197	118	113	850 000	1 430 000
J-605	120	220	175	182	140	210	128	112	850 000	1 430 000
J-803	120	220	175	182	150	210	128	112	850 000	1 430 000
J-594	120	230	150	142	155	171	145	113	830 000	1 290 000
J-574	120	240	160	162	168	193	158	113	935 000	1 420 000
J-574A	120	240	160	162	168	196	120	125	935 000	1 420 000
J-480B	120	240	160	164	150	197	128	112	935 000	1 450 000
J-556B	120	240	170	180	168	218	130	125	1 020 000	1 580 000
J-802	120	240	170	182	150	205	128	112	1 020 000	1 580 000
J130-20DR	130	220	124	124	—	—	—	—	805 000	1 320 000
J-814	130	230	160	185.5	155	—	128	104	800 000	1 340 000
J-816	130	240	160	160	160	188	100	112	825 000	1 310 000
J-807	130	240	160	160	160	188	118	112	825 000	1 310 000
J-801	130	240	160	160	165	188	116	105	825 000	1 310 000
J-589	130	240	160	160	170	188	131	116	825 000	1 310 000
J-567	130	250	170	170	165	208	95	135	1 030 000	1 610 000
J-578	130	260	175	182	160	212.5	128	112	1 030 000	1 610 000
J-555	130	260	180	182	160	215	128	112	1 030 000	1 610 000
160JRT02	160	280	159	180	—	—	—	—	1 060 000	1 730 000

Axle Bearings

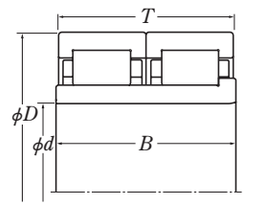
Open Type Cylindrical Roller Bearings

Type E



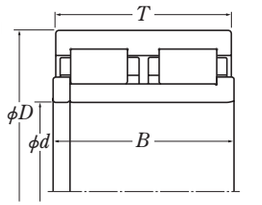
Bearing Numbers	Dimensions (mm) d	D	T	B	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
85JRJ02	85	150	120.0	125	365 000	585 000
90JRJ01	90	160	118.5	130	355 000	530 000
110JRJ01	110	200	150.0	160	625 000	995 000
2J110-2	110	220	180.0 (80×2)	190	875 000	1 370 000
120JRJ01	120	220	180.0	183	850 000	1 430 000
2J120-1	120	240	180.0 (80×2)	190	935 000	1 450 000
2J120-3M	120	240	180.0 (80×2)	180	935 000	1 450 000

Type F



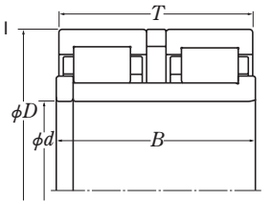
Bearing Numbers	Dimensions (mm) d	D	T	B	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
2J110-1	110	225	70×2	150	935 000	1 430 000
120JRJ02A	120	240	160	180	935 000	1 450 000

Type H



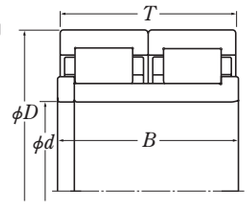
Bearing Number	Dimensions (mm) d	D	T	B	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
JC14	130	260	160	160	1 140 000	1 840 000

Type I



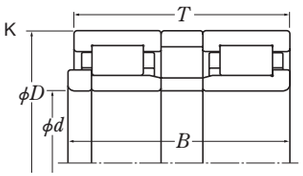
Bearing Numbers	Dimensions (mm) d	D	T	B	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
95JRT02	95	170	115	125	440 000	685 000
95JRT01	95	190	125	130	800 000	1 340 000
2O100-1	100	200	170	170	650 000	1 030 000
2O110-1	110	220	180	185	875 000	1 370 000
120JRT04	120	220	160	165	810 000	1 340 000
2O120-11	120	220	180	183	850 000	1 430 000
JC34	120	230	165	170	945 000	1 460 000
120JRT01	120	240	180	185	935 000	1 450 000
2O120-4	120	240	180	185	935 000	1 450 000
JC38A	125	235	165	170	945 000	1 470 000
JC39A	125	236	165	175.5	960 000	1 500 000
130JRT08	130	235	165	170	895 000	1 520 000
2O130-7	130	240	180	185	915 000	1 490 000
130JRT01	130	260	180	185	1 030 000	1 610 000
2O130-6	130	260	180	185	1 030 000	1 610 000
JC37A	130	265	166	166	1 140 000	1 700 000
2O140-1	140	250	155	160	865 000	1 480 000
170JRT01	170	340	230	230	1 660 000	2 760 000

Type J



Bearing Numbers	Dimensions (mm) d	D	T	B	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
JC27X	120	230	150	177	935 000	1 440 000
JC400K	120	230	150	177	885 000	1 340 000

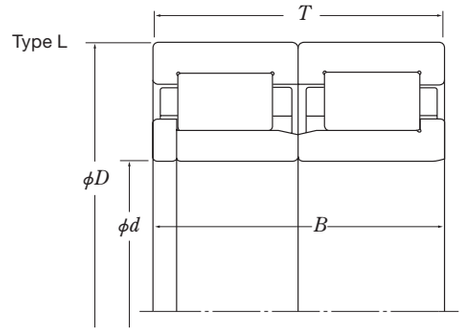
Type K



Bearing Number	Dimensions (mm) d	D	T	B	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
J130-5/U130-5DB+KL38	130	240	198 (80×2)	204	880 000	1 450 000

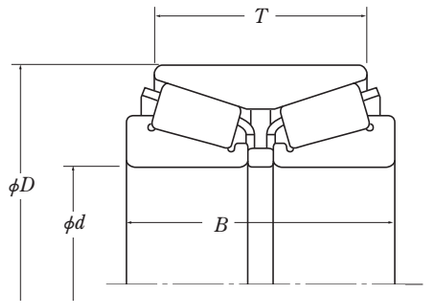
Axle Bearings

Open Type Cylindrical Roller Bearing



Bearing Numbers	Dimensions (mm) d	D	T	B	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
J110-2/U110-4DB	110	215	73 × 2	73 × 2	800 000	1 240 000
42724T/152724T	120	240	80 × 2	80 × 2	910 000	1 400 000
J120-1C/U120-2C	120	240	80 × 2	80 × 2	960 000	1 500 000
J120-1D/U120-2D	120	240	80 × 2	80 × 2	960 000	1 500 000
42726TT/152726TT	130	250	80 × 2	80 × 2	1 030 000	1 610 000
J130-3/U130-4	130	250	80 × 2	80 × 2	1 030 000	1 610 000
JC130M	130	250	160	160	1 030 000	1 610 000
J130-18/U130-16	130	220	62 × 2	62 × 2	785 000	1 340 000
J130-16/U130-14	130	220	73 × 2	73 × 2	860 000	1 510 000
J150-5/U150-2	150	270	160 (80 × 2)	160 (80 × 2)	1 020 000	1 700 000

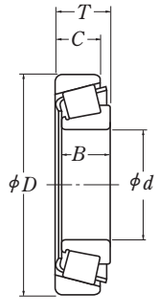
Open Type Tapered Roller Bearing



Bearing Numbers	Dimensions (mm) d	D	T	B	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
110KBE2201+L	110	220	115	145	820 000	1 350 000
120KBE2001+L	120	200	84	100	515 000	865 000
120KBE52X+L	120	215	109	132	720 000	1 170 000
JT21	120	220	130	155	860 000	1 480 000
JT21A	120	220	130	155	860 000	1 480 000
JT21B	120	220	130	155	860 000	1 480 000
130KBE2302+L	130	230	115	145	850 000	1 480 000
140KBE2302+L	140	230	110	140	820 000	1 550 000
140KBE2701+L	140	270	95	120	870 000	1 440 000
150KBE2502+L	150	250	95	115	745 000	1 320 000
160KBE2701A+L	160	270	120	140	860 000	1 510 000
170KBE2802A+L	170	280	130	150	1 110 000	2 160 000
180KBE3401+L	180	340	140	180	1 410 000	2 510 000

Gear Box Bearings

Tapered Roller Bearings

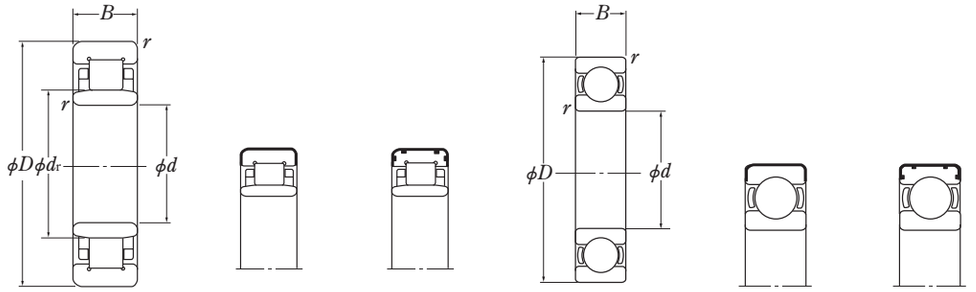


Bearing Numbers	Dimensions (mm)					Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)	Application(1)
	d	*D*	*T*	*B*	*C*			
QT30	60	130	33.5	31	22	127 000	139 000	Gear (P)
30312DQWAP6	60	130	33.5	31	22	127 000	139 000	Gear (P)
30313DQWAP6U1	65	140	36	33	23	147 000	163 000	Gear (P)
QT9	70	150	38	35	25	165 000	185 000	Gear (P)
QT9A	70	150	38	35	25	165 000	185 000	Gear (P)
QT9B-2	70	150	38	35	25	165 000	185 000	Gear (P)
QT9F	70	150	38	35	25	165 000	185 000	Gear (P)
QT9J	70	150	38	35	25	165 000	185 000	Gear (P)
R70-25	70	150	38	35	25	165 000	185 000	Gear (P)
30314DAQWAP6A	70	150	38	35	25	165 000	185 000	Gear (P)
30314QWAP6	70	150	38	35	30	194 000	218 000	Gear (P)
QT31	70	150	40	37	27	172 000	198 000	Gear (P)
QT7A	75	160	40	37	27	189 000	224 000	Gear (P)
30315DXQWAP6	75	160	40	37	26	189 000	224 000	Gear (P)
30315QWAP6	75	160	40	37	31	209 000	233 000	Gear (P)
R80-1	80	170	42.5	39	28	196 000	222 000	Gear (P)
QT4A	80	170	42.5	39	28	208 000	241 000	Gear (P)
30316QWAP6	80	170	42.5	39	33	235 000	265 000	Gear (P)
30317DQWAP6A	85	180	44.5	41	29	233 000	269 000	Gear (P)
30317QWAP6A	85	180	44.5	41	34	262 000	300 000	Gear (P)
QT18	85	180	45.5	42	29	244 000	285 000	Gear (P)
30328QWAP6	140	300	67.75	62	53	600 000	740 000	Gear (G)
QT1(2)	190	280	49	46	36.5	605 000	1 240 000	Gear (G)
QT29(3)	193.675	282.575	50.800	47.625	36.512	360 000	600 000	Gear (G)
QT26	195	280	58	60	41	410 000	780 000	Gear (G)
QT25	200	280	51	48	41	410 000	780 000	Gear (G)
32940QSA	200	280	51	48	41	410 000	780 000	Gear (G)
QT13(2)	200	290	49	46	36.5	625 000	1 330 000	Gear (G)
QT27	200	290	55	60	41	410 000	790 000	Gear (G)
QT34A	202	290	58	60	41	435 000	855 000	Gear (G)
QT33	205	283	51	48	41	415 000	795 000	Gear (G)
QT38	205	310	60	60	47	545 000	1 020 000	Gear (G)
R205-1	205	310	60	60	47	545 000	1 020 000	Gear (G)
R205-4	205	310	60	60	47	545 000	1 020 000	Gear (G)
QT5	210	320	70	66	56	665 000	1 180 000	Gear (G)
QT35	215	315	65	70	49	595 000	1 130 000	Gear (G)
R215-3	215	315	65	70	49	595 000	1 130 000	Gear (G)
QT32	218	315	65	70	49	595 000	1 130 000	Gear (G)
32944QWASA	220	300	51	48	41	425 000	855 000	Gear (G)
32052Q	260	400	87	82	71	1 130 000	2 020 000	Gear (G)

Notes (1) Gear (P): Pinion-Side Bearing of Gear Unit, Gear (G): Gear-Side Bearing of Gear Unit
(2) Double-Row Configuration
(3) Sizes have been converted to millimeters from inches.

Traction Motor Bearings

Bearings for Electric Car Traction Motors



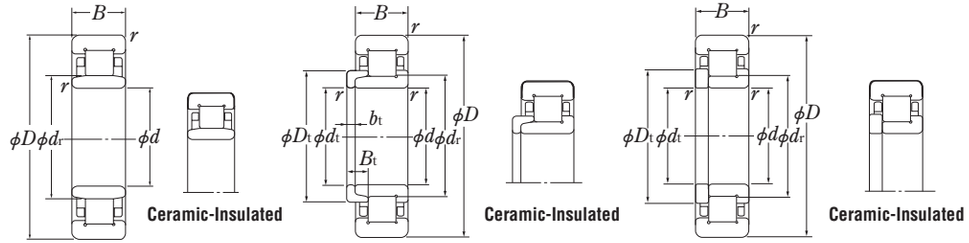
Non-Insulated | Ceramic-Insulated | PPS-Insulated | Non-Insulated | Ceramic-Insulated | PPS-Insulated

Cylindrical Roller Bearing | Ball Bearing

Loaded Side, Cylindrical Roller Bearings	Dimensions (mm)					Non-Loaded Side, Ball Bearings	Dimensions (mm)		
	d	D	B	d_r	r (min.)		d	D	B
NU210E(1)	50	90	20	59.5	1.1	**6016**	80	125	22
NU212	60	110	22	73.5	1.5	**6310**	50	110	27
NU312	60	130	31	77.0	2.1	**6310**	50	110	27
NU213	65	120	23	79.6	1.5	**6310**	50	110	27
NU313	65	140	33	83.5	2.1	**6311**	55	120	29
NU214	70	125	24	84.5	1.5	**6310**	50	110	27
						6311	55	120	29
NU314	70	150	35	90.0	2.1	**6311**	55	120	29
NU215	75	130	25	88.5	1.5	**6311**	55	120	29
						6312	60	130	31
NU315	75	160	37	95.5	2.1	**6311**	55	120	29
						6312	60	130	31
						6314	70	150	35
NU415	75	190	45	104.5	3.0	**6313**	65	140	33
NU216	80	140	26	95.3	2.0	**6312**	60	130	31
NU316	80	170	39	103.0	2.1	**6312**	60	130	31
NU416	80	200	48	110.0	3.0	**6313**	65	140	33
NU217	85	150	28	101.8	2.0	**6217**	85	150	28
NU218	90	160	30	107.0	2.0	**6218**	90	160	30
NU219	95	170	32	113.5	2.1	**6219**	95	170	32

Note (1) E: High-Capacity

Bearings for Electric Locomotive Trains Traction Motors



Non-Insulated Cylindrical Roller Bearing (NU Type) | **Non-Insulated Cylindrical Roller Bearing (NH Type)** | **Non-Insulated Cylindrical Roller Bearing (NUP Type)**

2xx Series (Free End-Bearings)

Boundary Dimensions (mm)					Basic Numbers	Internal Design(1)	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
d	D	B	d_r	r (min.)				
120	215	40	143.5	2.1	**NU224**	E	320 000	395 000
130	230	40	153.5	3.0	**NU226**	E	345 000	425 000

Note (1) E: High-Capacity

3xx Series (Free End-Bearings)

Boundary Dimensions (mm)					Basic Numbers	Internal Design(1)	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
d	D	B	d_r	r (min.)				
90	190	43	113.5	3	**NU318**	E	315 000	355 000
100	215	47	127.5	3	**NU320**	E	380 000	425 000
110	240	50	143.0	3	**NU322**	E	425 000	485 000
120	260	55	154.0	3	**NU324**	E	530 000	610 000
130	280	58	165.0	4	**NU326**	B	655 000	795 000
			167.0			E	615 000	735 000
140	300	62	180.0	4	**NU328**	E	665 000	795 000
			178.0			F	705 000	860 000
150	320	65	193.0	4	**NU330**	E	760 000	920 000
			193.0			EA	715 000	855 000
			190.5			J	800 000	985 000
			190.0			L	790 000	970 000
160	340	68	204.0	4	**NU332**	E	860 000	1 050 000
180	380	75	231.0	4	**NU336**	E	985 000	1 230 000

Note (1) E, EA: High-Capacity Type B, F, J, L: Specific Types,respectively

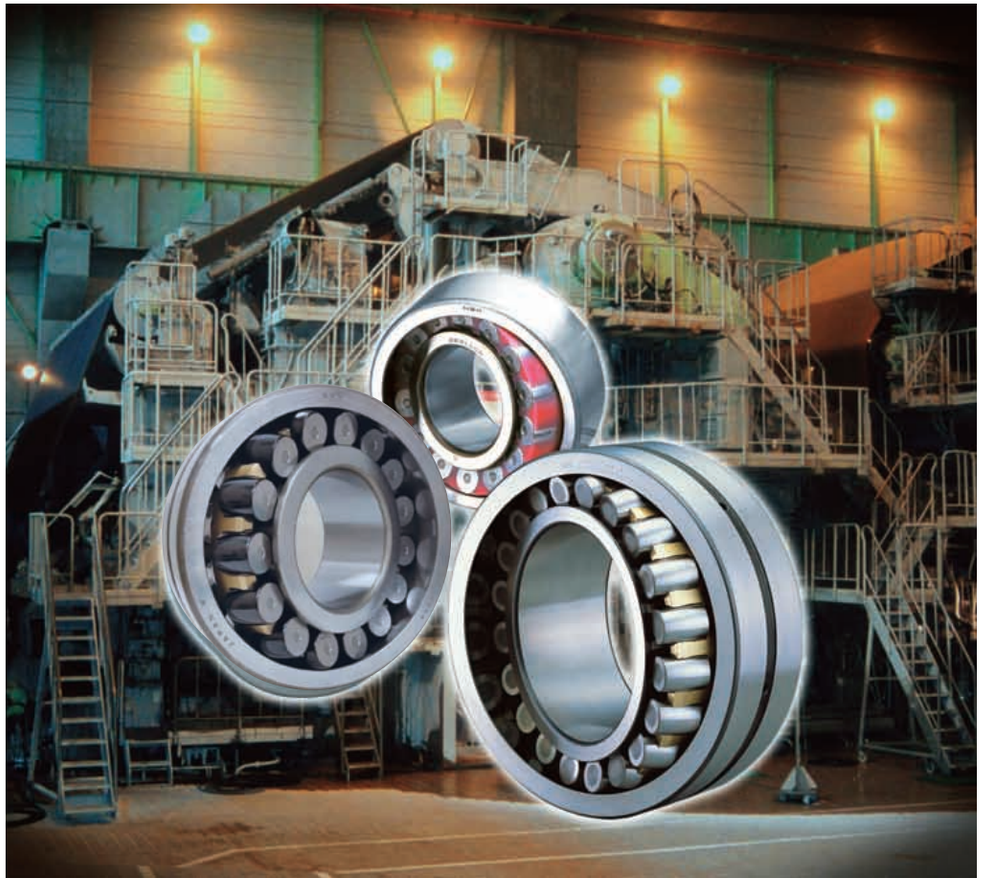
3xx Series (NH Type, NUP Type)

Dimensions (mm)								Basic Numbers	Internal Design(1)	Basic Dynamic Load Rating (N)	Basic Static Load Rating (N)
d, d_t	D	B	d_r	D_t	B_t	b_t	r (min.)				
80	170	39	101.0	111.8	17.0	11.0	2.1	**NH316**	E	256 000	282 000
90	190	43	115.0	125.0	21.0	12.0	3.0	**NH318**	—	240 000	265 000
			113.5	124.2	18.5				E	315 000	355 000
90	190	43	115.0	125.0	—	—	3.0	**NUP318**	B	240 000	265 000
			113.5	124.2					E	315 000	355 000
100	215	47	129.5	140.5	22.5	13.0	3.0		A	310 000	355 000
			129.5	140.5	22.5			**NH320**	B	310 000	355 000
			127.5	139.0	20.5				E	380 000	425 000
110	240	50	143.0	155.0	22.0	14.0	3.0	**NH322**	E	425 000	485 000
120	260	55	154.0	168.5	23.5	14.0	3.0	**NH324**	—	475 000	550 000
130	280	58	167.0	182.0	24.0	14.0	4.0	**NH326**	—	560 000	665 000
				181.0					E	615 000	735 000
140	300	62	180.0	196.0	26.0	15.0	4.0	**NH328**	—	615 000	745 000

Note (1) E:High-Capacity Type A,B:Specific Types, respectively

Bearings for Papermaking Machines

Excellent durability under high-temperature conditions including moisture and dust laden environments, resulting in longer life, higher limiting speed and dramatically enhanced productivity.

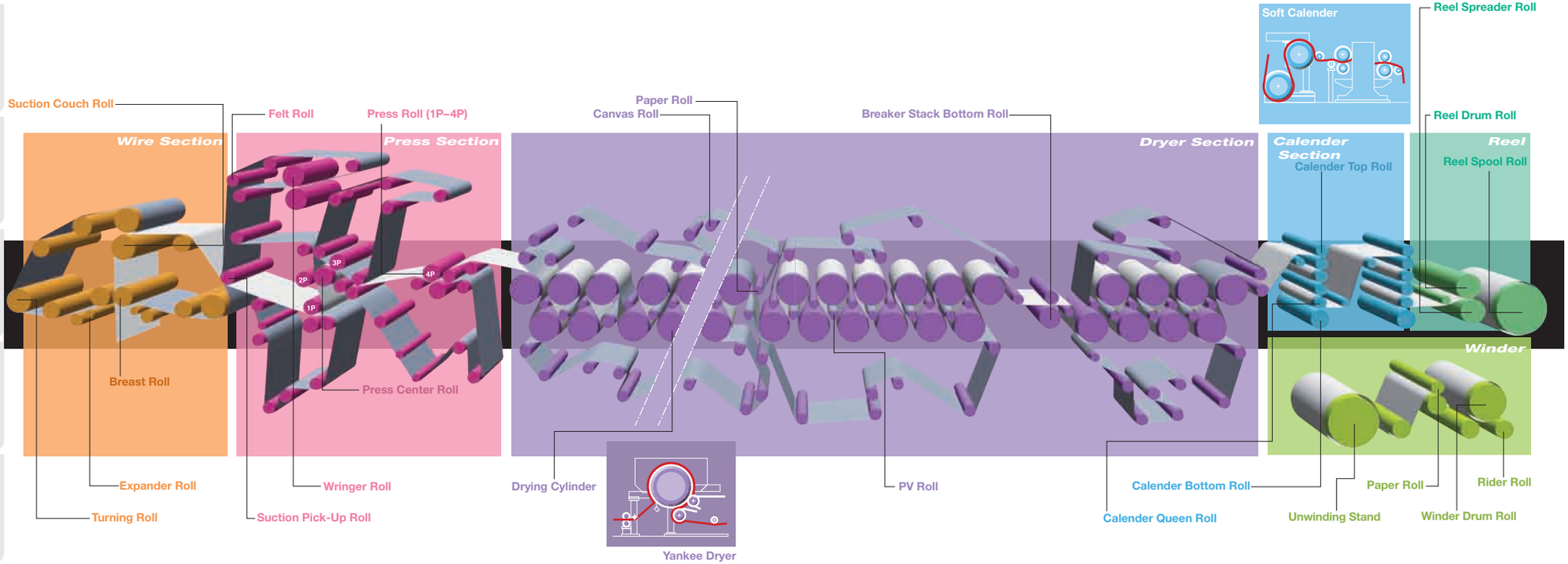


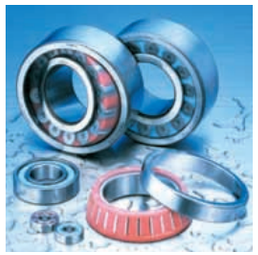
A Product Line that Matches Specific Applications

Bearings Table

A Product Line that Matches Specific Applications

The Papermaking Process and Bearing Specifications





Molded-Oil™ Bearings

Excellent performance in environments exposed to moisture or paper dust, without oil leakage.
Molded oil using an optimized molding method with optimal composition provides higher speed operation, is easy to handle, and safe for the environment.

Major applications: raw material conveyors, carrier rope sheaves, suction rolls

Triple Ring Bearings

Uniquely structured bearing for ease of use and no creep
while offering high precision and long life.

Major applications: press rolls, breaker stack rolls

Smear-Resistant Spherical Roller Bearings

The anti-smearing performance of the new product compared to conventional products by applying a DLC coating to the rolling elements.

Major application: Inner side bearings for suction rolls
soft calendar rolls

Spherical Roller Bearings CA Series

Superior radial load capacity and alignment, featuring high load capacity and excellent strength; equipped with a machined cage. This product lineup includes high running accuracy to ISO tolerance class 5.

Major applications: large diameter rolls such as suction rolls, press rolls, calender rolls and reel drum rolls.

Spherical Roller Bearings TL Series

Ideal for high temperature equipment, with resistance to
inner ring fracture.
Tough, long-life TL bearings boost productivity and lower costs.

Major applications: Press Roll,Drying Roll,Canvas Roll, PV Roll,Calernder Roll

Deep Groove Ball Bearings for High-Speed Expander Rolls

Special bearings that suppress friction torque and surface damage such as smearing and others.

■A Product Line that Matches Specific Applications

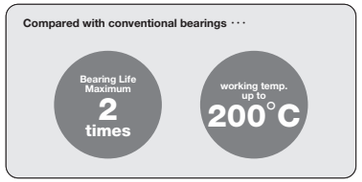
High Performance Standard Bearings for Industrial Machinery

NSKHPS™, redefining the standard.

Continually developing products with greater strength and higher accuracy, NSK's new NSKHPS™ fully incorporate the advantages of NSK's world-class design, materials, and manufacturing technologies, setting a new standard for bearings.

NSKHPS™ Spherical Roller Bearings

Features



1. Improved reliability
Bearing life has increased by a maximum of 2 times compared with that of conventional bearings by optimization of the bearing's internal design and improved processing technology.
As a result, the NSKHPS™ bearings contribute to reducing maintenance costs and facilitate the downscaling of related equipment.

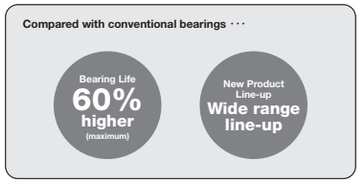
2. High temperature dimensional stabilizing treatment comes standard
High-temperature dimensional stabilization of up to 200°C has been achieved through the application of NSK's proprietary material heat treatment technology.
As a result, this series of bearing can be used in a wide range of applications.

3. Wide range line-up
Even the giant large size depends on line-up, one for paper making machines
It became applicable to the wide roll size.

Bearing No. Pages C266 to C287

NSKHPS™ Cylindrical Roller Bearings

Features



1. Improved reliability
Bearing life has increased by a maximum of 60% compared with that of conventional bearings by the optimization of the bearing's internal design and improvement of processing technology.

2. Wide-range product line-up
NSK has offerd the wide-range line-up of NSKHPS bearings with four types of cages focusing on a wide range of sizes offering a high degree of versatility for various general-purpose applications.
- Pressed steel cage with high cost perfomance
- Highly reliable machined brass cage
- Polyamide resin cage that excels in heat resistance and chemical resistance

Bearing No. Pages C132 to C147

Spherical Roller Bearings TL Series

Dryer rolls are generally used under high-temperature conditions, which can lead to fracturing of the bearing inner ring, and in the worst case, result in work stoppage. NSK's solution is the TL (Tough and Long-life) bearing, which features sufficient strength to resist inner ring fractures, superior dimensional stability under high temperature conditions, and long life due to superior hardness. All these characteristics mean improved productivity.

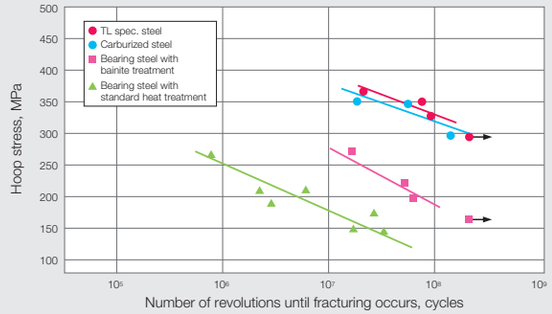
<Applications>
It's used for all except for Drying/Calernder Roll and large size bearing for press rolls.

Bearing No. Pages D076 to D081

Features

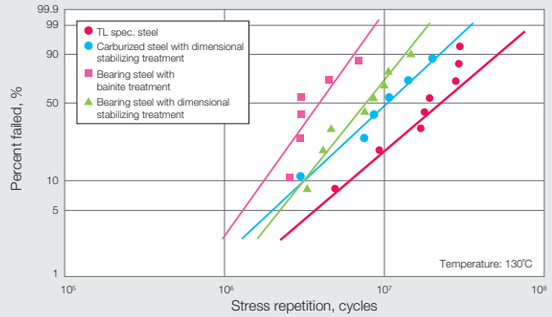
Enhanced inner ring strength

Adoption of a special steel and surface hardening heat treatment, developed by NSK, dramatically enhance inner ring strength against increasing hoop stress caused by rising shaft temperature.



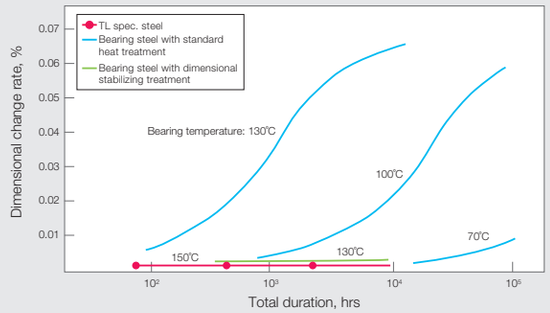
Longer life

Increased hardness of raceway surface provides longer life when foreign debris is present than that of other bearings.



Dimensional stability under high temperatures

Dimensional stability under high temperatures is adopted as a standard specification.
(Max. 200°C)



■A Product Line that Matches Specific Applications

Molded-Oil™ Bearings

Molded-Oil™ bearings are lubricated with NSK's own oil-impregnated material, Molded-Oil™ consists of lubricating oil and polyolefin resin that has an affinity for oil. Oil slowly seeping from this material provides ample lubrication to the bearing for extended periods.

Bearing No.	Pages D082 and D083
CAT. No.	E1216

Features

Excellent performance in water- and dust-contaminated environments

The bearings are designed to prevent liquids such as water, which can wash out the lubricating oil, and dust from getting inside the bearings. Sealed types can be used in environments exposed to water and dust.

*Water and dust dramatically accelerate bearing damage. In order to realize stable operation, we recommend using seals to prevent water and dust from getting in the bearing.

Optimal composition and molding methods enable high-speed operation

Optimization of composition and molding method of Molded-Oil™ improves strength and enables high-speed operation.

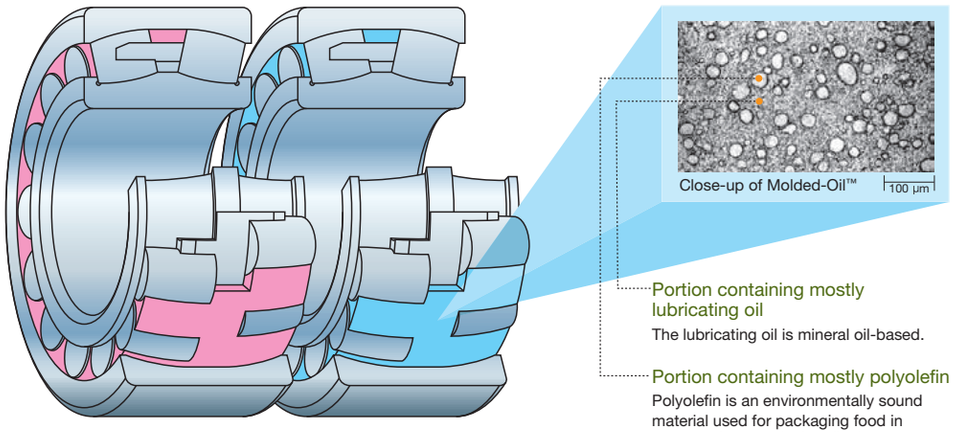
Low torque

Packing with Molded-Oil™ after providing the bearing surface with special treatment realizes smooth rotation of rolling elements.

Environmentally friendly

The bearings are lubricated by minute quantities of oil exuded by Molded-Oil™, which consequently minimizes oil leakage.

<Applications>
Material processing equipment (conveyers, agitators), paper mill line equipment (support for wire part rolls), maintenance facilities (carrier rope sheave pulley), and carrier line equipment



Be aware that this bearing has certain restrictions in regards to ambient operating temperatures and limiting speeds ($d_m n$). Refer to the NSK Molded-Oil™ Bearings catalog (Cat. No. E1216) for details. Furthermore, handling precautions for maintainig the excellent, long-term lubricating capacity of the Molded-Oil™ bearings are listed on page 3 of the same catalog.

Smear-Resistant Spherical Roller Bearings

The newly developed smear-resistant spherical roller bearing is treated with NSK's originally developed DLC* coating (NSK DLC coating) on the rolling contact surface of the rollers which could excel the durability.

*DLC: Hard coating mainly consisting of carbon (diamond-like carbon)

The phenomenon of smearing—or micro-seizing—caused by slippage between the raceway surface of the inner and outer rings and the roller surface may occur in bearings used in light-load areas inside papermaking machinery and areas with poor lubrication conditions.
NSK drastically improved the anti-smearing performance of the new product compared to conventional products by applying a DLC coating to the rolling elements.

Inner bore dimensions ranging from 80mm to 240mm

<Applications>
・Inner side bearings for suction rolls in press process parts
・Bearings for soft calendar rolls in calendar process parts

Features

NSK independently developed a DLC coating for bearings. The coating follows the base metal's elastic deformation even better than before, since its elastic modulus is close to that of the substrate base metal. Further, the adhesion between the coating and base metal was improved, making it less likely to come off, even under high surface pressure.(Fig 1)

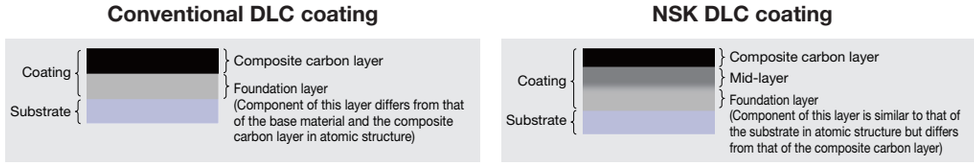


Fig. 1

Twin-disk test

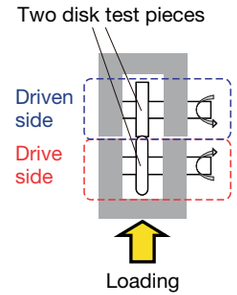
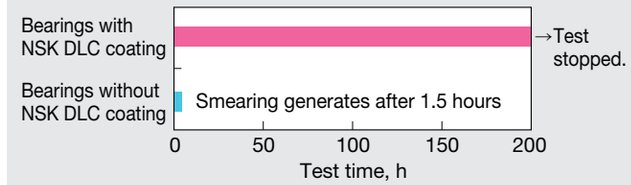


Fig. 2

A rolling-contact test was conducted under boundary lubrication conditions in addition to sliding contact conditions in which the speeds of two disk test pieces are set differently.(Fig2)



■A Product Line that Matches Specific Applications

Triple Ring Bearings

Combination tapered roller bearings have typically been used for the outside of controlled crown rolls (CCR) and spherical roller bearings for the inside. Switching to high-precision, high load capacity triple ring bearings prevents creep, facilitates easier mounting, and extends operating life.

Bearing No.	Page D084

Features

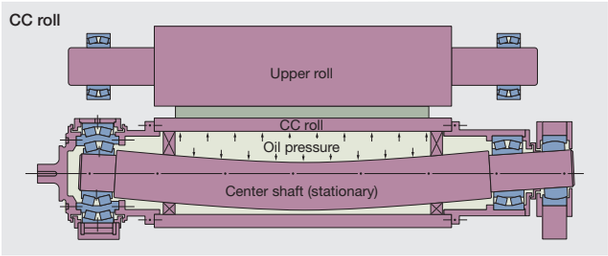
High-load capacity design

Long life
(uses vacuum melted, carburized steel)

High precision
(dimensional and rotational precision)

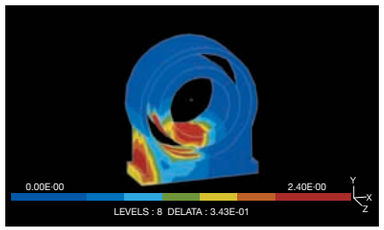
Optimal inner ring design for lubrication

Lubrication hole and groove provided on inner and outer rings



Finite element analysis of housing design for triple ring bearings.

Bearing load distribution is minimized by finite element method (FEM) analysis, thereby contributing to optimal structural design of the housing for paper machine manufacturers.



Maximum principle stress distribution

Deep Groove Ball Bearings

Deep Groove Ball Bearings are characterized by high performance and quality, displaying NSK's technological excellence. This top of the line design includes special bearings for high-speed expander rolls with low friction torque that minimize surface damage such as smearing, maintenance-free sealed ball bearings with high-performance seals, and silent ball bearings suitable for motors and pumps.

Bearing Numbers

Spherical Roller Bearings TL Series

Bearing Number

Example : TL | 23152 | CA | g3 | M | K | E4 | C3 | S11

- TL: Spherical roller bearings (Bearing type); Width series 3 (Bearing series symbols); Diameter series 1 (Bearing series symbols); Bearing bore 260 mm (Bore number)
- CA: Machined brass cage (Cage type symbol)
- g3: TL spec.Inner ring. (Special spec, material symbol) g5: Inner and outer ring
- M: Tapered bore (External features symbol)
- K: Outer ring with oil groove and oil holes (External features symbol)
- E4: Radial clearance C3 (Internal clearance symbol)
- C3: Max.operating tempecature:less than 200°C (Special specification symbol)
- S11

Molded-Oil™ Bearings

Bearing Number

Example : 22212 | L12 | CAM | C3

- 22212: Spherical roller bearings (Bearing type); Width series 2 (Bearing series symbols); Diameter series 3 (Bearing series symbols); Bearing bore 90 mm (Bore number)
- L12: Molded-Oil™ for high-speed (L11 is for general use)
- CAM: Machined brass cage (Cage type symbol)
- C3: Radial clearance C3 (Internal clearance symbol)

Triple Ring Bearings

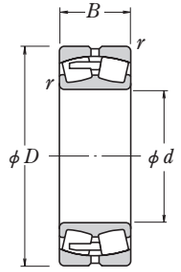
Bearing Number

Example : 2SL | 180-2 | UPA

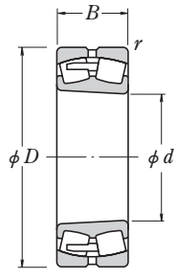
- 2SL: Triple ring bearings (Spherical roller bearings)
- 180-2: Bearing bore 180 mm
- UPA: Special accuracy (Tolerance class symbol)

Spherical Roller Bearings TL Series

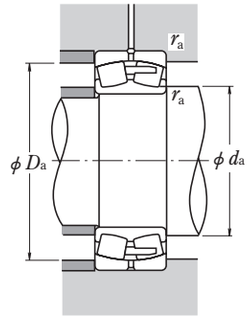
Bore Diameter 40 – 160 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

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

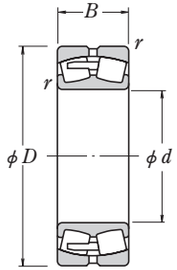
Boundary Dimensions (mm)				Basic Load Ratings (kN)		Basic Load Ratings {kgf}		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}	Cylindrical Bore	Tapered Bore(1)	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
40	90	33	1.5	122	129	12 400	13 200	**TL22308CAME4**	**TL22308CAMKE4**	49	—	81	77	1.5	0.38	2.6	1.8	1.7	1.0
55	120	43	2	209	241	21 300	24 600	**TL22311CAME4**	**TL22311CAMKE4**	65	—	110	103	2	0.36	2.8	1.9	1.8	2.3
60	130	46	2.1	246	288	25 100	29 400	**TL22312CAME4**	**TL22312CAMKE4**	72	—	118	111	2	0.36	2.8	1.9	1.9	2.9
65	140	48	2.1	375	380	38 000	38 500	**TL22313EAE4**	**TL22313EAKE4**	77	84	128	119	2	0.33	3.0	2.0	2.0	3.5
70	150	51	2.1	425	435	43 500	44 000	**TL22314EAE4**	**TL22314EAKE4**	82	91	138	129	2	0.33	3.0	2.0	2.0	4.3
75	130	31	2.1	340	415	34 500	42 000	**TL22315CAME4**	**TL22215CAMKE4**	87	—	148	134	2	0.35	2.9	2.0	1.9	3.6
80	170	58	2.1	390	480	39 500	48 500	**TL22316CAME4**	**TL22316CAMKE4**	92	—	158	145	2	0.35	2.9	2.0	1.9	6.2
90	190	64	3	665	705	68 000	72 000	**TL22318EAE4**	**TL22318EAKE4**	104	115	176	163	2.5	0.33	3.1	2.1	2.0	8.6
95	200	67	3	525	675	53 500	68 500	**TL22319CAME4**	**TL22319CAMKE4**	109	—	186	172	2.5	0.35	2.9	1.9	1.9	9.9
100	215	73	3	860	930	88 000	94 500	**TL22320EAE4**	**TL22320EAKE4**	114	130	201	184	2.5	0.33	3.0	2.0	2.0	12.7
110	170	45	2	293	465	29 900	47 500	**TL23022CDE4**	**TL23022CDKE4**	120	124	160	153	2	0.24	4.2	2.8	2.8	3.76
	200	69.8	2.1	515	760	52 500	77 500	**TL23222CE4**	**TL23222CKE4**	122	130	188	170	2	0.34	3.0	2.0	1.9	9.54
	240	80	3	1 030	1 120	105 000	115 000	**TL22322EAE4**	**TL22322EAKE4**	124	145	226	206	2.5	0.30	3.1	2.1	2.0	17.6
120	260	86	3	1 190	1 320	122 000	134 000	**TL22324EAE4**	**TL22324EAKE4**	134	157	246	222	2.5	0.32	3.1	2.1	2.0	22.2
130	280	93	4	995	1 350	101 000	137 000	**TL22326CAME4**	**TL22326CAMKE4**	148	—	262	236	3	0.34	2.9	2.0	1.9	27.8
140	210	53	2	420	715	43 000	73 000	**TL23028CDE4**	**TL23028CDKE4**	150	157	200	190	2	0.22	4.5	3.0	2.9	6.49
	250	68	3	645	930	65 500	95 000	**TL22228CDE4**	**TL22228CDKE4**	154	167	236	219	2.5	0.25	4.0	2.7	2.6	14.5
	250	88	3	835	1 300	85 000	133 000	**TL23228CE4**	**TL23228CKE4**	154	163	236	213	2.5	0.25	2.9	1.9	1.9	18.8
150	225	56	2.1	470	815	48 000	83 000	**TL23030CDE4**	**TL2303CDKE4**	162	168	213	203	2	0.22	4.6	3.1	3.0	7.9
	225	56	2.1	470	815	48 000	83 000	**TL23030CAME4**	**TL23030CAMKE4**	162	—	213	203	2	0.22	4.6	3.1	3.0	7.9
	250	80	2.1	725	1 180	74 000	121 000	**TL23130CAME4**	**TL23130CAMKE4**	162	—	238	218	2	0.3	3.4	2.3	2.2	15.8
	270	73	3	765	1 120	78 000	114 000	**TL22230CDE4**	**TL22230CDKE4**	164	179	256	236	2.5	0.26	3.9	2.6	2.5	18.4
	320	108	4	1 220	1 690	125 000	172 000	**TL22330CAME4**	**TL22330CAMKE4**	168	—	302	270	3	0.35	2.9	1.9	1.9	41.5
160	240	60	2.1	540	955	55 000	97 500	**TL23032CDE4**	**TL23032CDKE4**	172	179	228	216	2	0.22	4.5	3.0	2.9	9.66
	290	80	3	910	1 320	93 000	135 000	**TL22232CDE4**	**TL22232CDKE4**	174	190	276	255	2.5	0.26	3.8	2.6	2.5	23.1
	290	104	3	1 100	1 770	112 000	180 000	**TL23232CE4**	**TL23232CKE4**	174	189	276	245	2.5	0.34	2.9	2.0	1.9	30.5

Note (1) The suffix K represents bearings with tapered bores. (taper 1:12)

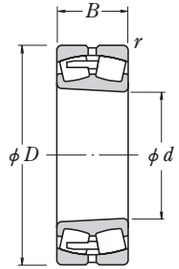
Remark The suffix E4 indicates that the bearing has an oil groove and holes.

Spherical Roller Bearings TL Series

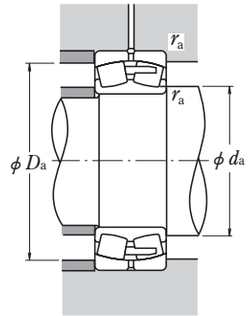
Bore Diameter 170 – 260 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

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

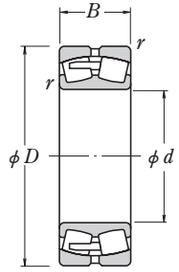
Boundary Dimensions (mm)				Basic Load Ratings (kN)		Basic Load Ratings {kgf}		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}	Cylindrical Bore	Tapered Bore(1)	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
170	230	45	2	350	660	35 500	67 500	**TL23934BCAME4**	**TL23934BCAMKE4**	180	—	220	213	2	0.17	5.8	3.9	3.8	5.38
	260	67	2.1	640	1 090	65 000	112 000	**TL23034CDE4**	**TL23034CDKE4**	182	191	248	233	2	0.23	4.3	2.9	2.9	13
	280	88	2.1	940	1 570	96 000	160 000	**TL23134CAME4**	**TL23134CAMKE4**	182	—	268	245	2	0.29	3.5	2.3	2.3	21
	360	120	4	1 580	2 110	161 000	215 000	**TL22334CAME4**	**TL22334CAMKE4**	188	—	342	304	3	0.35	2.9	1.9	1.9	57.9
180	280	74	2.1	750	1 270	76 000	129 000	**TL23036CDE4**	**TL23036CDKE4**	192	202	268	249	2	0.24	4.2	2.8	2.8	17.1
	320	112	4	1 300	2 110	133 000	215 000	**TL23236CAME4**	**TL23236CAMKE4**	198	—	302	274	3	0.35	2.9	1.9	1.9	38.5
190	290	75	2.1	775	1 350	79 000	138 000	**TL23038CAME4**	**TL23038CAMKE4**	202	—	278	261	2	0.24	4.2	2.8	2.8	17.6
	320	104	3	1 190	2 020	121 000	206 000	**TL23138CAME4**	**TL23138CAMKE4**	204	—	306	276	3.5	0.31	3.2	2.2	2.1	34
	340	92	4	1 140	1 730	116 000	176 000	**TL22238CAME4**	**TL22238CAMKE4**	208	—	322	296	3	0.26	3.8	2.6	2.5	35.5
	340	120	4	1 440	2 350	147 000	240 000	**TL23238CAME4**	**TL23238CAMKE4**	208	—	322	288	3	0.35	2.9	1.9	1.9	46.5
	400	132	5	1 890	2 590	193 000	264 000	**TL22338CAME4**	**TL22338CAMKE4**	212	—	378	338	4	0.34	2.9	2.0	1.9	77.6
200	310	82	2.1	940	1 700	96 000	174 000	**TL23040CAME4**	**TL23040CAMKE4**	212	—	298	279	2	0.25	4.0	2.7	2.6	22.6
	340	112	3	1 360	2 330	139 000	238 000	**TL23140CAME4**	**TL23140CAMKE4**	214	—	326	293	2.5	0.32	3.2	2.1	2.1	41.5
	360	98	4	1 300	2 010	133 000	204 000	**TL22240CAME4**	**TL22240CAMKE4**	218	—	342	315	3	0.26	3.8	2.6	2.5	42.6
	360	128	4	1 660	2 750	169 000	281 000	**TL23240CAME4**	**TL23240CAMKE4**	218	—	342	307	3	0.35	2.9	1.9	1.9	57
220	340	90	3	1 090	1 980	111 000	202 000	**TL23044CAME4**	**TL23044CAMKE4**	234	—	326	302	2.5	0.24	4.1	2.8	2.7	29.7
	370	120	4	1 570	2 710	160 000	276 000	**TL23144CAME4**	**TL23144CAMKE4**	238	—	352	320	3	0.31	3.2	2.2	2.1	52
	400	108	4	1 570	2 430	160 000	247 000	**TL22244CAME4**	**TL22244CAMKE4**	238	—	382	348	3	0.27	3.7	2.5	2.4	59
	400	144	4	2 520	3 400	257 000	350 000	**TL23244CAME4**	**TL23244CAMKE4**	238	—	382	337	3	0.36	2.8	1.9	1.8	79.5
	460	145	5	2 350	3 400	240 000	345 000	**TL22344CAME4**	**TL22344CAMKE4**	242	—	438	391	4	0.33	3.0	2.0	2.0	116
240	320	60	2.1	635	1 300	65 000	133 000	**TL23948CAME4**	**TL23948CAMKE4**	252	—	308	298	2	0.17	6.0	4.0	3.9	13.3
	350	92	3	1 160	2 140	118 000	218 000	**TL23048CAME4**	**TL23048CAMKE4**	254	—	346	324	2.5	0.24	4.2	2.8	2.7	32.6
	400	128	4	1 790	3 100	182 000	320 000	**TL23148CAME4**	**TL23148CAMKE4**	258	—	382	347	3	0.31	3.3	2.2	2.2	64.5
	500	155	5	2 600	3 800	265 000	385 000	**TL22348CAME4**	**TL22348CAMKE4**	262	—	478	423	4	0.32	3.2	2.1	2.1	147
250	350	75	2.1	930	1 870	95 000	191 000	**TL23952CAME4**	**TL23952CAMKE4**	272	—	348	333	2	0.19	5.4	3.6	3.5	23
	400	104	4	1 430	2 580	145 000	263 000	**TL23052CAME4**	**TL23052CAMKE4**	278	—	382	356	3	0.25	4.1	2.7	2.7	46.6
260	440	144	4	2 160	3 750	221 000	385 000	**TL23152CAME4**	**TL23152CAMKE4**	278	—	422	380	3	0.32	3.2	2.1	2.1	88.2

Note (1) The suffix K represents bearings with tapered bores. (taper 1:12)

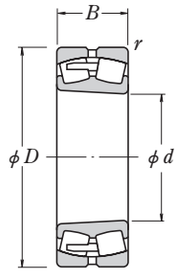
Remark The suffix E4 indicates that the bearing has an oil groove and holes.

Spherical Roller Bearings TL Series

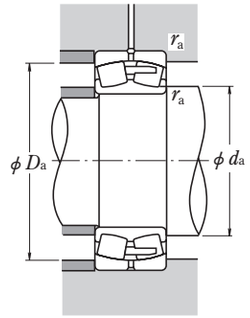
Bore Diameter 280 – 500 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

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

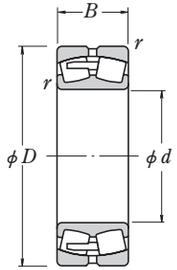
Boundary Dimensions (mm)				Basic Load Ratings (kN)		Basic Load Ratings {kgf}		Bearing Numbers		Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}	Cylindrical Bore	Tapered Bore[1]	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
280	380	75	2.1	925	1 950	94 500	199 000	**TL23956CAME4**	**TL23956CAMKE4**	292	—	368	351	2	0.18	5.7	3.9	3.8	24.5
	420	106	4	1 540	2 950	157 000	300 000	**TL23056CAME4**	**TL23056CAMKE4**	298	—	402	377	3	0.24	4.2	2.8	2.7	50.5
	460	146	5	2 230	4 000	228 000	410 000	**TL23156CAME4**	**TL23156CAMKE4**	302	—	438	400	4	0.3	3.3	2.2	2.2	94.3
	500	176	5	2 880	4 900	294 000	500 000	**TL23256CAME4**	**TL23256CAMKE4**	302	—	478	425	4	0.35	2.9	1.9	1.9	147
300	420	90	3	1 230	2 490	125 000	254 000	**TL23960CAME4**	**TL23960CAMKE4**	314	—	406	386	2.5	0.19	5.2	3.5	3.4	38.2
	460	118	4	1 920	3 700	196 000	375 000	**TL23060CAME4**	**TL23060CAMKE4**	318	—	442	413	3	0.24	4.2	2.8	2.7	70.5
	500	160	5	2 670	4 800	273 000	490 000	**TL23160CAME4**	**TL23160CAMKE4**	322	—	478	433	4	0.31	3.3	2.2	2.2	125
	540	192	5	3 400	5 900	350 000	600 000	**TL23260CAME4**	**TL23260CAMKE4**	322	—	518	458	4	0.35	2.9	1.9	1.9	189
320	540	176	5	3 050	5 500	315 000	560 000	**TL23164CAME4**	**TL23164CAMKE4**	342	—	518	466	4	0.31	3.2	2.1	2.1	162
340	520	133	5	2 280	4 400	232 000	445 000	**TL23068CAME4**	**TL23068CAMKE4**	362	—	458	465	4	0.24	4.2	2.8	2.8	101
	580	190	5	3 600	6 600	370 000	670 000	**TL23168CAME4**	**TL23168CAMKE4**	362	—	558	499	4	0.31	3.2	2.1	2.1	206
360	540	134	4	2 390	4 700	244 000	480 000	**TL23072CAME4**	**TL23072CAMKE4**	382	—	518	485	4	0.24	4.2	2.8	2.8	106
380	520	106	4	1 870	4 100	190 000	420 000	**TL23976CAME4**	**TL23976CAMKE4**	398	—	502	482	3	0.18	5.5	3.7	3.6	65.4
400	600	148	5	2 970	5 900	305 000	605 000	**TL23080CAME4**	**TL23080CAMKE4**	422	—	578	540	4	0.23	4.4	3.0	2.9	146
420	560	106	4	1 870	4 250	191 000	430 000	**TL23984CAME4**	**TL23984CAMKE4**	438	—	542	521	3	0.17	6.0	4.0	3.9	71.6
440	650	157	6	3 150	6 350	320 000	645 000	**TL23088CAME4**	**TL23088CAMKE4**	468	—	622	587	5	0.23	4.3	2.9	2.8	173
460	620	118	4	2 220	4 950	227 000	505 000	**TL23992CAME4**	**TL23992CAMKE4**	478	—	602	573	3	0.17	5.9	4.0	3.9	100
500	670	128	5	2 460	5 550	250 000	565 000	**TL239/500CAME4**	**TL239/500CAMKE4**	522	—	648	622	4	0.17	6.0	4.0	3.9	124

Note [1] The suffix K represents bearings with tapered bores. (taper 1:12)

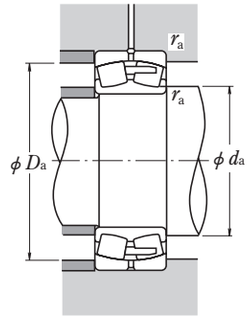
Remark The suffix E4 indicates that the bearing has an oil groove and holes.

■Molded-Oil™ Bearings

Bore Diameter 35 – 160 mm



Cylindrical Bore



Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

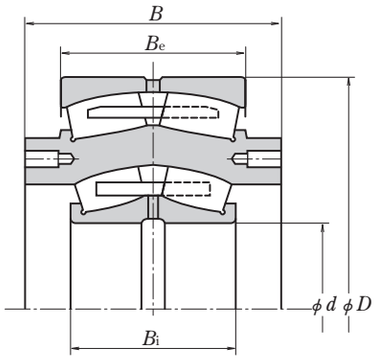
$P_0 = F_r + Y_0 F_a$

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

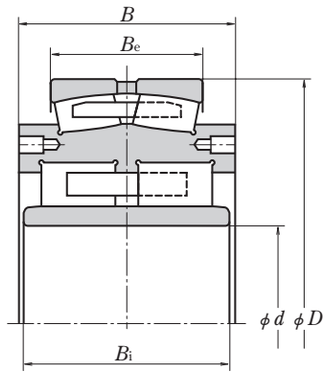
Boundary Dimensions (mm)				Basic Load Ratings (kN)		{kgf}		Bearing Numbers	Abutment and		Fillet Dimensions (mm)			Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}	Cylindrical Bore	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
35	80	21	1.5	71	76	7 250	7 750	**21307L12CAM**	44	—	71	67	1.5	0.29	3.5	2.3	2.3	0.52
40	90	23	1.5	82	93	8 350	9 500	**21308L11ACAM**	49	—	81	80	1.5	0.25	4.0	2.7	2.6	0.72
	90	33	1.5	122	129	12 400	13 200	**22308L11CAM**	49	—	81	77	1.5	0.38	2.6	1.8	1.7	1.00
45	85	23	1.1	778	88	7 950	9 000	**22209L11CAM**	52	—	78	75	1	0.28	3.6	2.4	2.4	0.57
	100	36	1.5	148	167	15 100	17 100	**22309L12CAM**	54	—	91	85	1.5	0.36	2.8	1.9	1.8	1.24
50	90	23	1.1	82	93	8 350	9 500	**22210L11CAM**	57	—	83	80	1	0.25	4.0	2.7	2.6	0.67
55	120	43	2	209	241	21 300	24 600	**22311L12CAM**	65	—	110	103	2	0.36	2.8	1.9	1.8	2.30
60	110	28	1.5	127	154	12 900	15 700	**22212L12CAM**	69	—	101	97	1.5	0.25	4.0	2.7	2.6	1.13
65	120	31	1.5	152	190	15 500	19 300	**22213L11CAM**	74	—	111	106	1.5	0.26	3.9	2.6	2.6	1.46
	140	48	2.1	265	315	27 000	32 500	**22313L11CAM**	77	—	128	117	2	0.35	2.9	1.9	1.9	3.56
	140	48	2.1	265	315	27 000	32 500	**22313L12CAM**	77	—	128	117	2	0.35	2.9	1.9	1.9	3.56
70	125	31	1.5	163	205	16 600	20 900	**22214L11CAM**	79	—	116	111	1.5	0.25	4.0	2.7	2.7	1.46
75	160	55	2.1	340	415	34 500	42 000	**22315L12CAM**	87	—	148	135	2	0.35	2.9	2.0	1.9	5.26
80	140	33	2	181	232	18 500	23 700	**22216L11CAM**	90	—	130	124	2	0.24	4.3	2.9	2.8	2.14
85	150	36	2	215	276	21 900	28 200	**22217L12CAM**	95	—	140	134	2	0.24	4.3	2.9	2.8	2.60
90	160	40	2	256	340	26 200	34 500	**22218L12CAM**	100	—	150	142	2	0.25	4.1	2.7	2.7	3.44
95	170	43	2.1	296	395	30 000	40 000	**22219L12CAM**	107	—	158	150	2	0.25	4.1	2.7	2.7	3.87
100	165	52	2	345	530	35 500	54 000	**23120L11CAM**	110	—	155	144	2	0.30	3.4	2.3	2.2	4.14
	215	73	3	600	785	61 500	80 000	**22320L11CAM**	114	—	201	183	2.5	0.35	2.9	1.9	1.9	12.7
110	200	53	2.1	425	585	43 500	59 500	**22222L12CAM**	122	—	188	176	2	0.24	4.2	2.8	2.7	7.23
120	180	46	2	315	525	32 000	53 500	**23024L11CAM**	130	—	170	163	2	0.22	4.5	3.0	2.9	4.15
	200	62	2	465	720	47 500	73 500	**23124L12CAM**	130	—	190	175	2	0.29	3.5	2.4	2.3	7.94
130	230	64	3	565	815	57 500	83 000	**22226L11CAM**	144	—	216	203	2.5	0.26	3.9	2.6	2.6	11.0
160	220	45	2	360	675	37 000	69 000	**23932L11CAM**	170	—	210	203	2	0.18	5.6	3.8	3.7	4.97

Remark The above table lists examples of available bearing numbers for the Molded -Oil™ bearing.

Triple Ring Bearings



2SL



2PSL

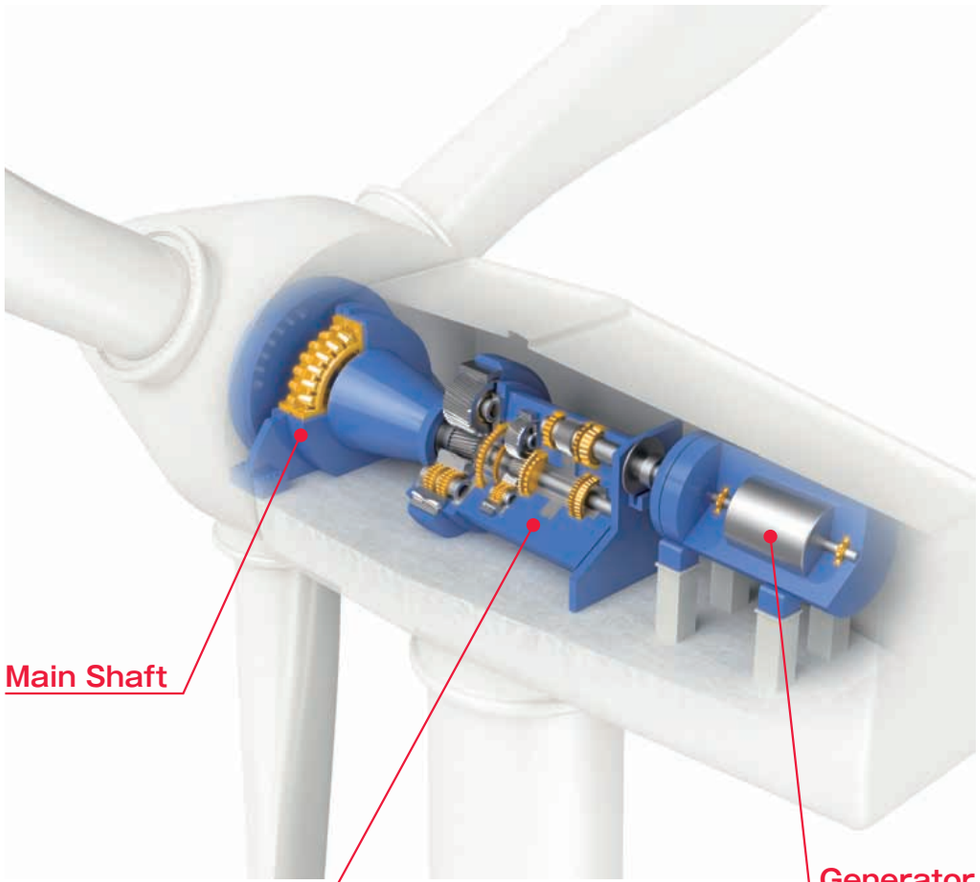
Bearing Numbers	Boundary dimensions (mm)					Mass (kg)
	d	D	B_i	B_e	B	
2SL180-2 UPA	180	480	140	160	215.9	175
2SL200-2 UPA	200	520	160	180	241.3	230
2SL220-2 UPA	220	600	180	200	279.4	330
2SL240-2 UPA	240	620	200	200	279.4	410
2SL260-2 UPA	260	680	218	218	317.5	490
2SL280-2 UPA	280	720	218	218	317.5	525
2SL300-2 UPA	300	780	243	250	342.9	735
2SL320-2 UPA	320	820	258	258	368.3	840
2SL340-2 UPA	340	870	280	272	393.7	1 050
2SL380-3 UPA	380	980	240	308	431.8	1 370
2PSL180-1 UPA	180	460	153	118	160	127
2PSL240-1 UPA	240	600	205	160	225	285

Bearings for Wind Power Industry

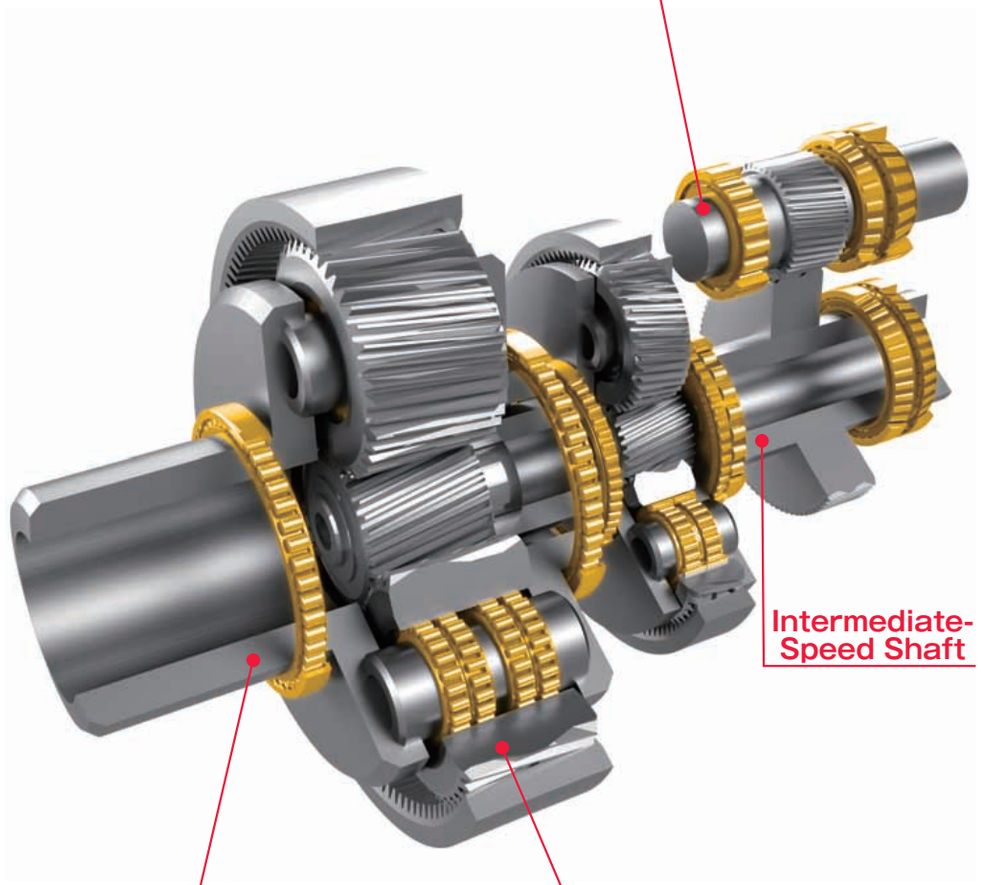
NSK high performance and high quality bearings enable stable operation in the growing wind power industry.

A Product Line that Matches Specific Applications

A Perspective View of A Nacell



A Perspective View of A Gear Box



■A Product Line that Matches Specific Applications

Features of Bearings for the Wind Power Industry

Spherical Roller Bearings-CA Series

CA series bearings are double-row self-aligning spherical roller bearings with a machined-brass cage that have high load capacity, superior durability, and are resistance to wear.
The CA series is especially suitable for applications with heavy load or shock conditions.

■ Application : Main shaft

Full-Complement Cylindrical Roller Bearings NCF Series(Single-Row), NNCF(Double-Row)

Cageless-full-complement cylindrical roller bearings have the maximum possible number of rollers and can sustain much heavier loads than cylindrical roller bearings of the same size with cages.

■ Application : Planetary carrier(NCF),Planetary gear(NNCF)

High Load Capacity Cylindrical Roller Bearings-XM Series

By increasing the number of rollers, NSK has reduced the surface pressure exerted on the contact area between the rollers and rings, thereby increasing load capacity and extending the life of the bearing.

■ Application : Gear Box

High-Load Capacity Tapered Roller Bearings-HR Series

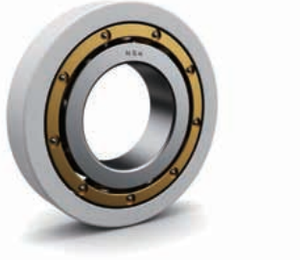
HR Series bearings are tapered roller bearings capable of taking combined heavy radial loads and axial loads in one direction.
The HR series features tapered rollers guided by larger rollers for superior high-load ratings.

■ Application : Gear Box

Four-Point Contact Ball Bearings-QJ Series

The inner ring is split radially into two pieces.
Their design allows one bearing to sustain significant axial loads in either direction-with high axial load capacity.
This type is suitable for carrying pure axial loads or combined loads where the axial load is high.

■ Application : Gear Box intermediate-speed shaft, high-speed shaft



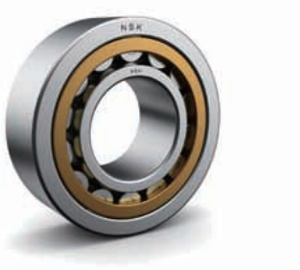
Ceramic-Coated Insulated Bearings

An insulation layer is formed on the outer ring surface.
The boundary dimensions are identical to a standard bearing, therefore enabing easy replacement without any changes.

■ Application : Generator

Super-TF™ Bearings

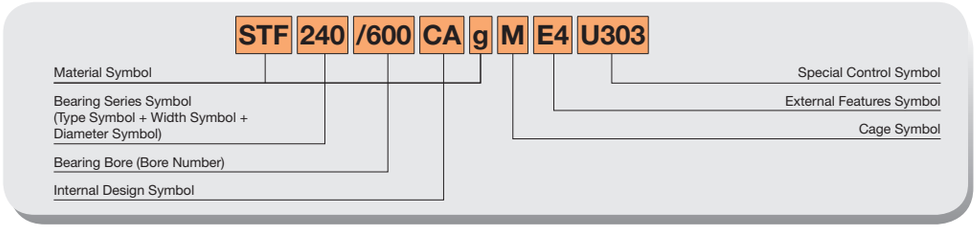
Super-TF bearings were developed with innovative materials and heat treatment technology for increased durability under harsh conditions.
They combine long service life with good resistance to wear and seizure, even under contaminated lubrication, to achieve outstanding cost performance.



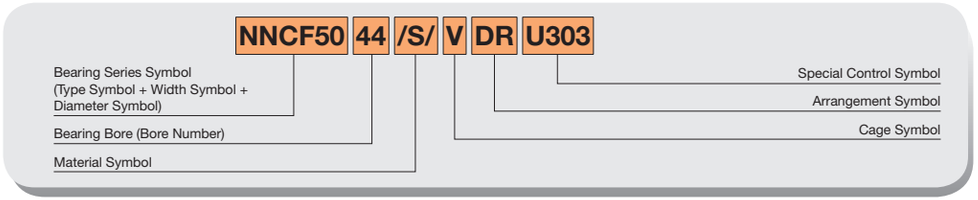
AWS-TF™ Bearings

AWS-TF bearings were developed with a combination of special heat treatment technology and materials. They provide excellent resistance to flaking, including white structure flaking.

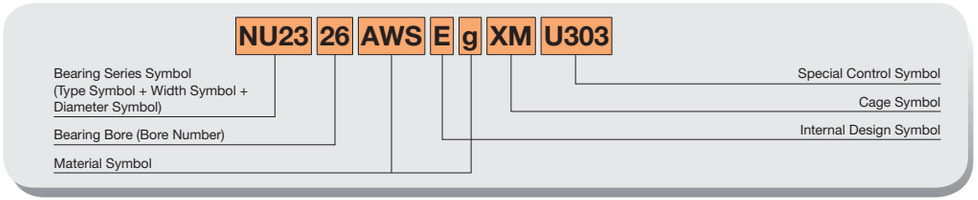
Examples Product Symbol



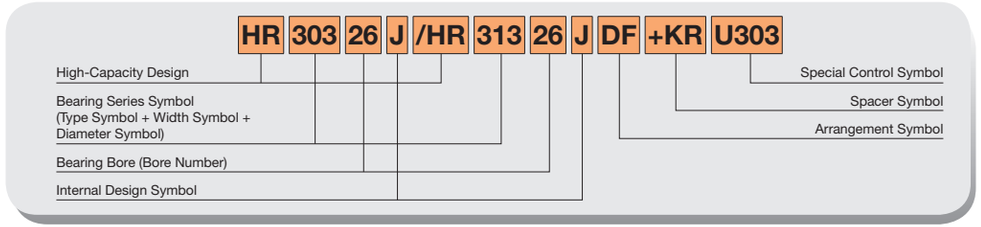
240 : Spherical Roller Bearing Width Series 4 Diameter Series 0
/600 : Bearing Bore 600mm
CA : High-Capacity Design
STF~g : Long-Life Steel
M : Machined Brass Cage
E4 : Lubricating Groove in Outside Surface and Holes in Outer Ring
U303 : Special Process Control for Wind Turbine Bearings



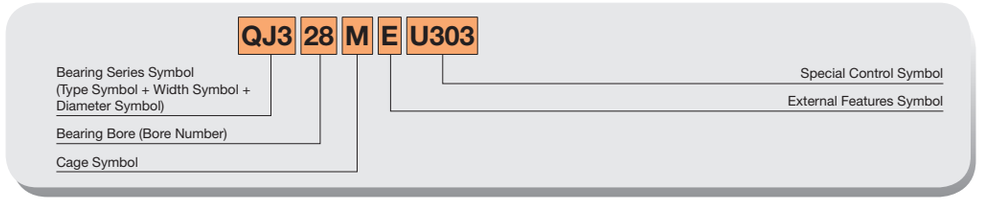
NNCF50 : NNCF Type Full-Complement Cylindrical Roller Bearing Width Series 5 Diameter Series 0
44 : Bearing Bore 220mm
/S/ : Black Oxide Coating
V : Without Cage
DR : Controlled Size Variation Arrangement
U303 : Special Process Control for Wind Turbine Bearings



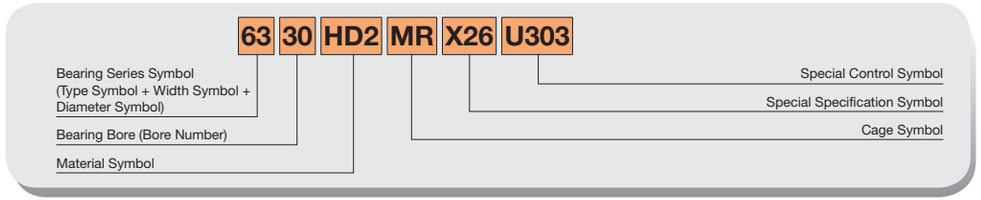
NU23 : NU Type Cylindrical Roller Bearing Width Series 2 Diameter Series 3
26 : Bearing Bore 130mm
E : High Capacity Design
AWS~g : Long Life Steel, Specialized to Prevent White Structure Flaking
XM : High-Capacity Machined Brass Cage
U303 : Special Process Control for Wind Turbine Bearings



HR/HR : High-Capacity Design
303/313 : Tapered Roller Bearing Width Series 0/1 Diameter Series 3
26/26 : Bearing Bore 130mm
J/J : Conform to ISO
DF : Face-to-Face Arrangement
+KR : Bearings with Outer Ring Spacer
U303 : Special Process Control for Wind Turbine Bearings



QJ3 : Four-Point Contact Ball Bearing Diameter Series 3
28 : Bearing Bore 140mm
M : Machined Brass Cage
E : Notch in Outer Ring
U303 : Special Process Control for Wind Turbine Bearings



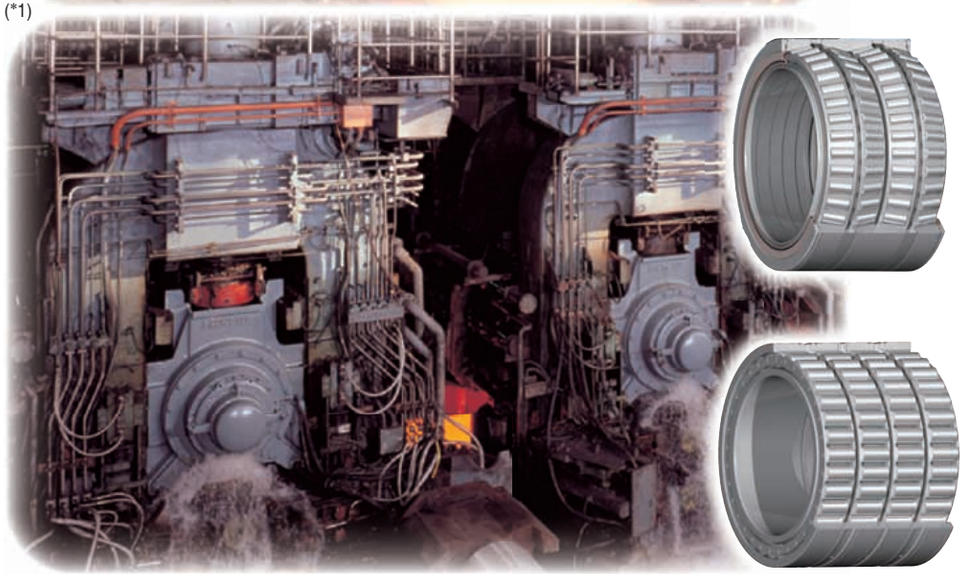
63 : Single-Row Deep Groove Ball Bearing Diameter Series 3
30 : Bearing Bore 150mm
HD2 : Ceramic-Insulated Coating on Outer Ring
MR : Ball Guide Machined Brass Cage
X26 : Dimensional Stabilizing Treatment
U303 : Special Process Control for Wind Turbine Bearings

Bearings for Steel Industry

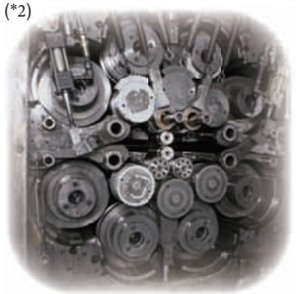
NSK high performance bearings help to maximize uptime and to reduce maintenance costs for steel manufacturers

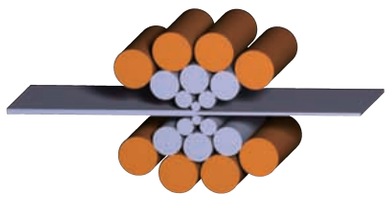
(*1)

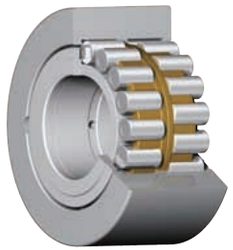
(*1)



(*2)



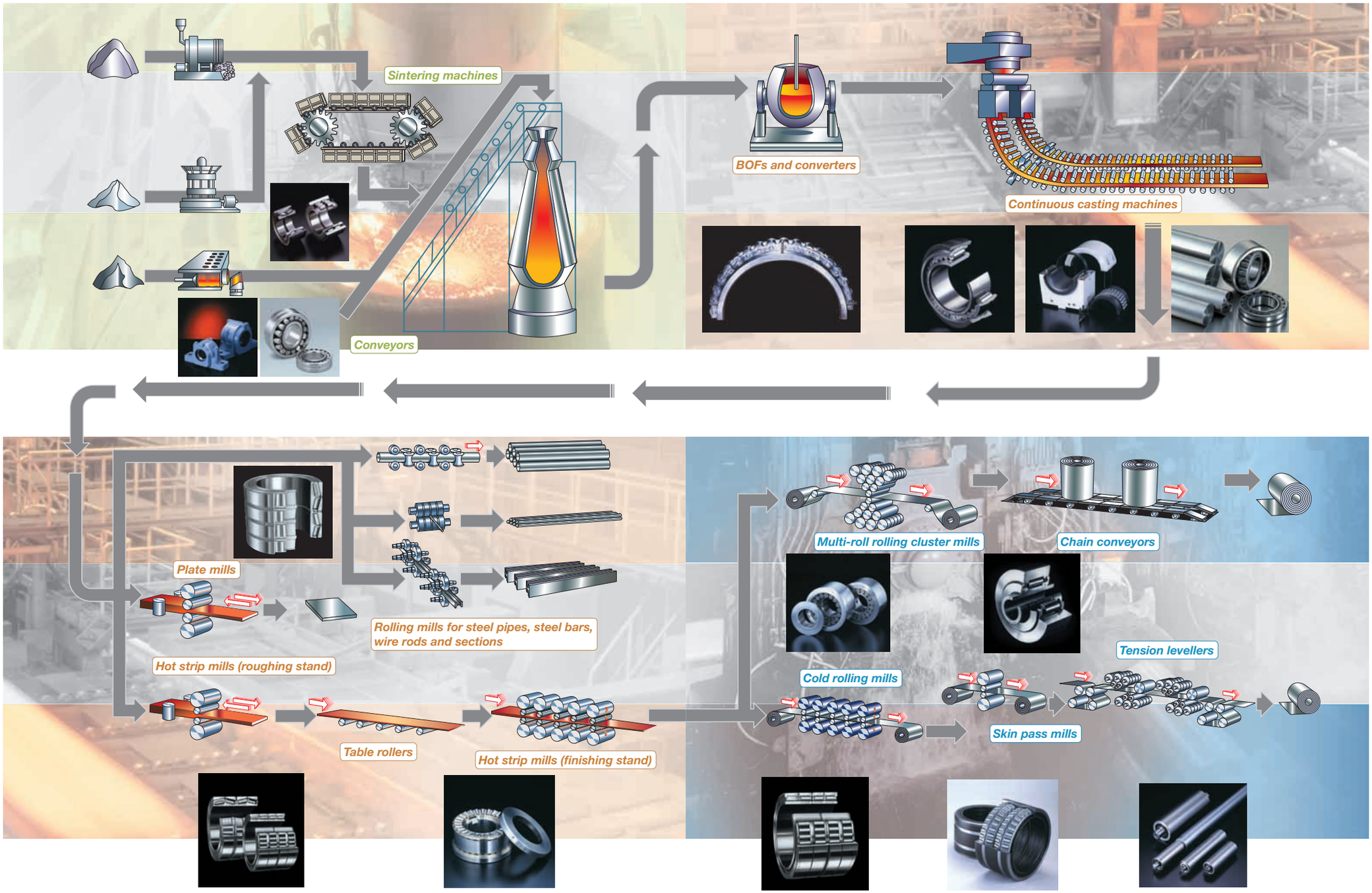




Notes (*1): Photo courtesy of NIPPON STEEL & SUMITOMO METAL CORPORATION KASHIMA WORKS pamphlet.
(*2): Photo courtesy of Nippon Steel & Sumikin Stainless Steel Corporation.

Air Turbine Dental Handpieces
Pumps & Compressors
Agricultural Machinery
Construction Machinery
Mining Machinery
Railway Rolling Stock
Papermaking Machines
Wind Power Industry
Steel Industry
INDUSTRY SOLUTIONS

A complete product line for all steel mill processes delivers improved productivity and lowered maintenance costs, with long life and highly reliable bearings.

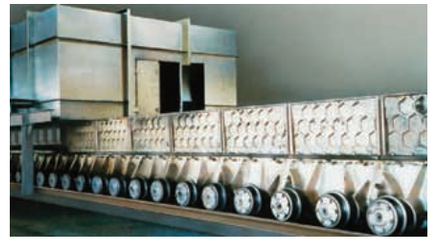


Bearings for Sintering Equipment

Sealed-Clean Bearings for Pallet Wheels / Sealed-Clean Bearings for Inboard Rollers

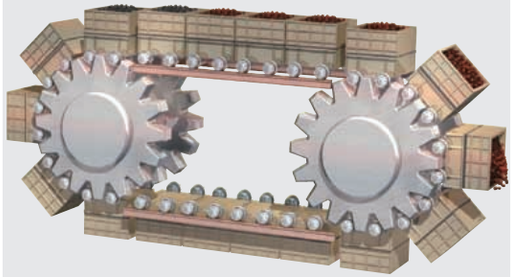
Benefits

❶ Stable machinery operation through higher reliability and longer operating life
❷ Cleaner areas adjacent to equipment
❸ Reduced maintenance costs

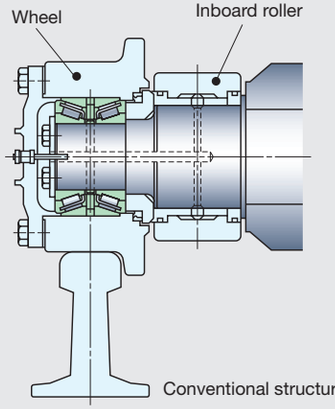


1. Operating conditions

High temperature — Heavy loads — Low speed — Scale (sintered particles)



Sintering equipment



Conventional structure

2. Problems

Typical problems of bearings for sintering equipment

Problem 1

Premature failure of bearings for pallet wheels and bearings for inboard rollers (plain bearings)

Poor lubrication

Unbalanced Load (Inboard bearings)

- Premature wear and flaking
- Seizure damage
- Fracture of ouder rings (Inboard bearings)

Problem 2

Contamination around the equipment, high maintenance costs

Frequent greasing → Leakage of the grease into the surroundings

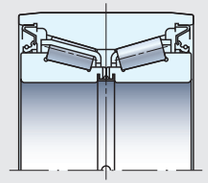
High operational cost for grease

Contamination around the equipment, High usage cost

3. Countermeasures

Features Sealed-Clean Bearings for Pallet Wheels–AR Series

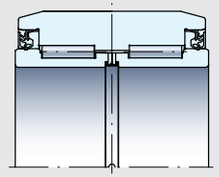
- Optimum crowning of the roller raceway surface enabling resistance to unbalanced load of wheels
- High sealing performance (featuring a special contact seal)
- Packing of grease with excellent heat and pressure resistance
- Easier handling (one-piece design with fastening ring adopted for the inner ring)



Bearing No. Page D100

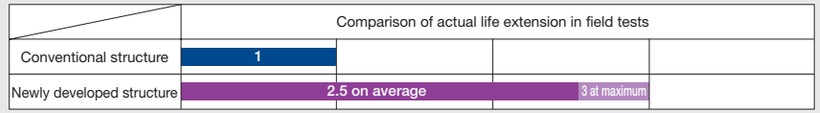
Features Sealed-Clean Bearings for Inboard Rollers–2J, 2M Series

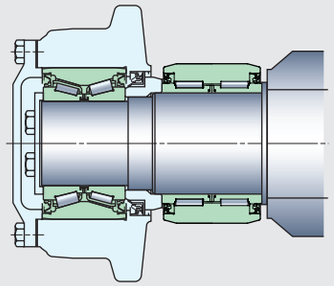
- Higher load capacity (by outer ring thickness design with high strength and full-complement roller type)
- Improvement of axial load capacity
- High sealing performance (featuring a special contact seal)
- Packing of grease with excellent heat and pressure resistance
- Easier handling (one-piece design with fastening ring adopted for the inner ring)



Bearing No. Page D101

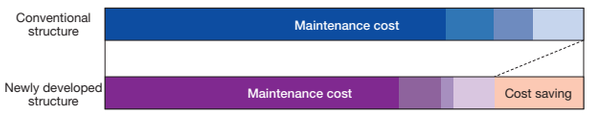
Durability Performance of Bearings in Field Test





Newly developed structure

Estimated effect of maintenance cost reduction

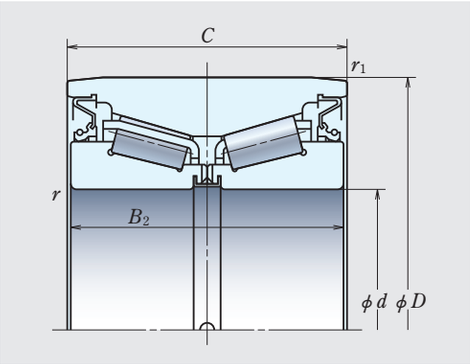


The maintenance cost includes the replacement costs for bearings, seals, and grease and the operational costs associated with the bearing replacement and greasing.

If the bearing life extends 2.5 times on average as a result of using the newly developed structure for bearings for pallet wheels/inboard rollers for pallet dollies, the total maintenance cost reduction effect is estimated to be 25% to 35%.

■Bearings for Sintering Equipment

Sealed-Clean Bearings for Pallet Wheels–AR Series



Bearing Numbers	Boundary Dimensions(mm)						Basic Load Ratings(kN)	
	d	D	B_2	C	r(min)	r_1(min)	C_r	C_{0r}
AR80-24	80	150	67	67	2.5	1	269	390
AR90-25	90	160	74	74	2.5	0.5	240	435
AR90-26	90	160	80	80	2.5	0.5	240	435
AR90-27	90	160	78	78	2.5	0.5	240	435
AR90-32A	90	160	100	100	2.5	—	440	850
AR100-29	100	180	98	100	2.5	1	350	675
AR100-30	100	180	100	100	2.5	1	350	675
AR100-38	100	180	100	100	3	0.5	525	835
AR100-39	100	180	98	100	3	0.5	525	835
AR100-40	100	180	98	100	3	0.5	525	835
AR100-44	100	180	91	91	3	0.5	435	665
AR110-28	110	180	86	86	3	0.5	330	660
AR110-29	110	200	92	100	2.5	1	415	805
AR110-39	110	200	100	100	3	1	570	950
AR110-50A	110	200	90	90	3	0.5	500	780

Remark Other bearings are available. Please contact NSK for additional information.

Sealed-Clean Bearings for Inboard Rollers–2J, 2M Series

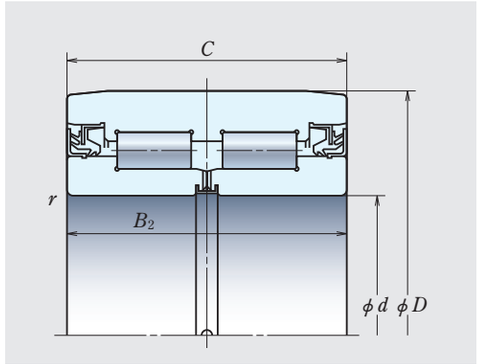


Fig. 1

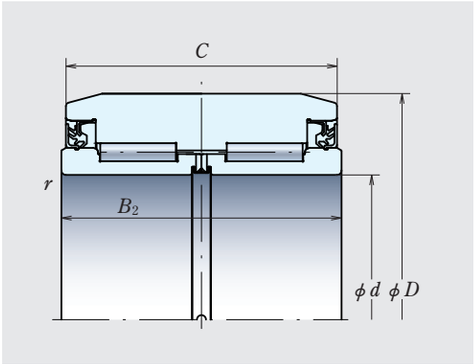


Fig. 2

Bearing Numbers	Boundary Dimensions(mm)					Basic Load Ratings(kN)		Fig.
	d	D	B_2	C	r(min)	C_r	C_{0r}	
2J100-2	100	200	120	119	2.1	315	910	1
2J120-9A	120	210	120	120	2.5	610	1 080	1
2J120-14	120	210	132	132	2.1	530	1 320	1
2M120-17	120	210	132	132	2.1	425	1 390	2
2M140-(5)	140	250	116	110	2	395	1 030	2
2M140-( )	140	250	130	130	4	485	1 460	2
2J140-2	140	250	130	130	4	770	1 420	1
2M150-( )	150	320	120	120	5	615	1 350	2
2M158-3	158	250	140	140	5	570	1 850	2
2J160Z-1	160.11	250	130	130	2.5	670	1 540	1
2M160Z-13	160.11	250	150	150	2.5	595	1 980	2
2J160Z-5	160.11	250	155	150	2.1	610	2 050	1

Remark Other bearings are available. Please contact NSK for additional information.

Bearings for BOFs and Converters

Ultra-Large Split Bearings for BOFs and Converter Trunnions

Benefits

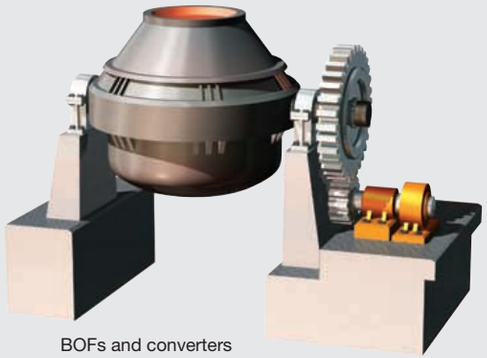
❶ Bearings can be replaced without removing the bull gear, thus reducing maintenance costs
❷ Reduction of maintenance costs by shortening length of time for bearing replacement work
❸ Reduction of production loss, which would affect subsequent processes

1. Operating conditions

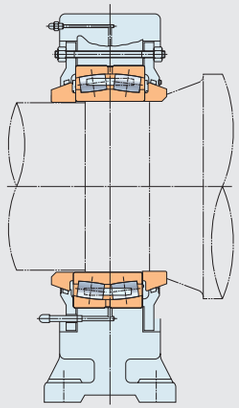
High temperature

Heavy loads

Ultra-low speed and Rocking



BOFs and converters

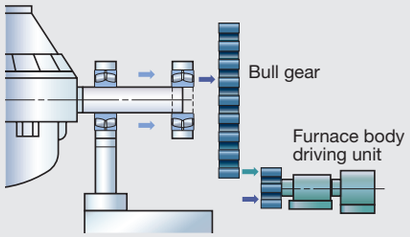


Conventional structure

2. Problems

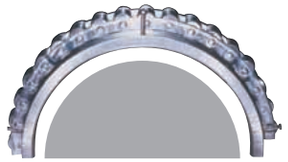
Typical problems of bearings for BOFs and converters

Inboard bearings cannot be replaced without removing the bull gear



Bearing replacement work is time-consuming, requiring high maintenance costs

In addition, sudden bearing replacement due to an unexpected failure causes large production loss in the subsequent processes

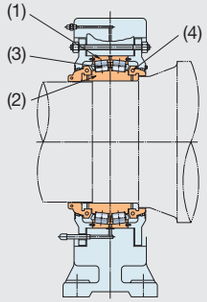


(*1)

3. Countermeasures

Features Ultra-Large Split Bearings for BOFs and Converter Trunnions

- A split design of ultra-large spherical roller bearings: (1) outer ring (2) inner ring (3) roller and cage assembly and (4) fastening ring
- Seal sliding surface integrated by a fastening ring



Newly developed structure

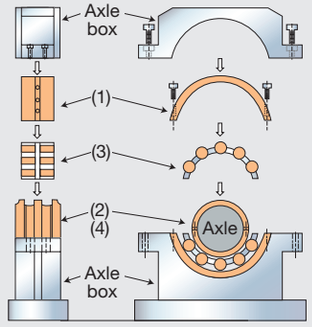
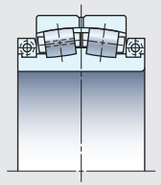
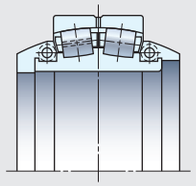


Image of bearing mounting

- Bearing Structure





Bearing No. Pages D104 and D105

Maintenance cost reduction effect

Result of the comparison of time required for bearing replacement work

Bearing type	Comparison of time required for bearing replacement work in field test
Conventional structure (one-piece type)	1
Newly developed structure (split type)	0.65 / 0.35 ← Period shortening

- The bearing replacement period represents the actual result for bearings with bore diameter of 1 200 mm to 1 400 mm.
- In the case above, the bearing with the newly developed structure reduced the time needed for bearing replacement work by approximately 35%, and thereby significantly reduced maintenance cost.

Note (*1): Photo courtesy of NIPPON STEEL & SUMITOMO METAL CORPORATION KASHIMA WORKS pamphlet.

Bearings for BOFs and Converters

Ultra-Large Split Bearings for BOFs and Converter Trunnions

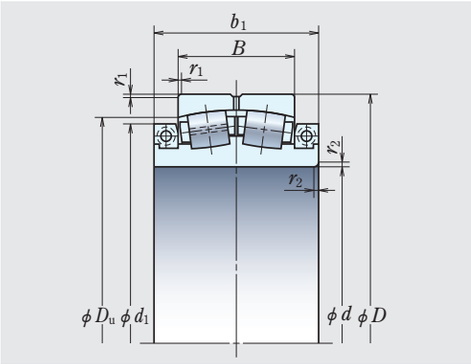


Fig. 1

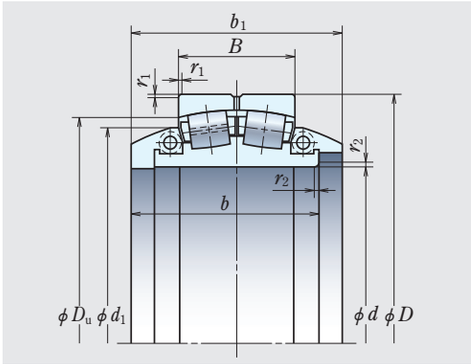


Fig. 2 Clamp Ring with Tangential Seal Surface

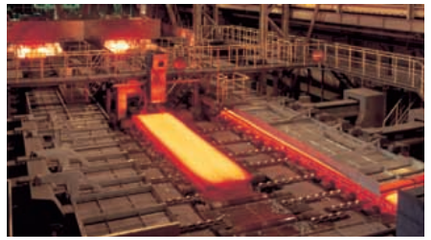
Bearing Numbers	Boundary Dimensions (mm)									Basic Load Ratings (kN)		Fig.
	d	D	B	b	b_1	d_1	D_u	r_1(min)	r_2(min)	C_r	C_{0r}	
750SLPT1051	750	1 000	250	355	—	905	914.4	6	7.5	6 800	18 300	1
SL850-7	850	1 120	272	385	—	1 015	1 025	6	6	8 000	21 600	1
900SLPT1251	900	1 250	285	410	—	1 100	1 142	7.5	19	9 850	24 200	1
950SLPT1451	950	1 400	300	520	600	1 182	1 265	7.5	28	12 300	27 900	2
SL1120-3	1 120	1 580	320	632.5	697.5	1 400	1 445	9.5	30	13 200	32 000	2
∗1200SLPT1751	1 200	1 700	410	780	780	1 470	1 536	9.5	31	17 300	43 500	2∗
1200SLPT1752	1 200	1 700	410	660	730	1 470	1 536	9.5	19	17 300	43 500	2
1320SLPT1851	1 320	1 850	530	815	814	1 600	1 670	12	31	22 500	63 500	2
∗1400SLPT1951	1 400	1 900	530	880	880	1 680	1 710	12	31	22 800	65 000	2∗
∗1400SLPT1953	1 400	1 900	530	810	860	1 680	1 710	12	31	22 800	65 000	2∗

Remarks 1. The shapes of bearings marked ∗ are not exactly the same as shown in Fig. 2.
2. Other bearings are available. Please contact NSK for additional information.

Bearings for Continuous Casting Machines

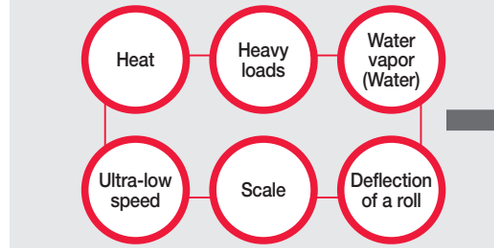
Bearings for Guide Rolls

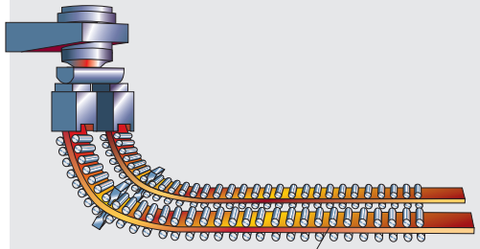
Benefits
❶ Improved bearing durability prevents unexpected accidents
❷ Roll segment is replaced less frequently, thus reducing maintenance costs



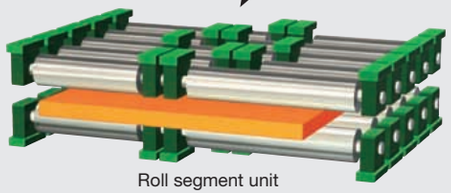
(*1)

1. Operating conditions

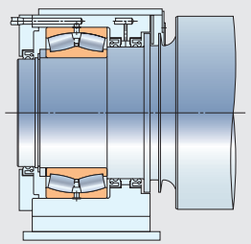




Continuous casting machine



Roll segment unit



Axle box structure

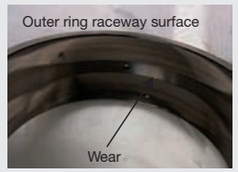
2. Problems

Typical problems of bearings for continuous casting machines

Differential sliding specific to spherical roller bearings

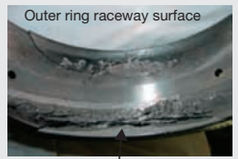
↓

Uneven wear



↓

Flaking



Flaking and crack

↓

Crack

↓

- Expansion of roll gaps (failure of rolls)
- Defective-quality products
- Unexpected production line failure
- High bearing usage cost

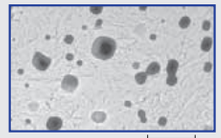
3. Countermeasures

Features SWR™ Bearings (Spherical Roller Bearings) –SWR Series

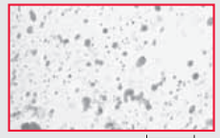
- Improved wear resistance → Three times compared to AISI 52100 bearing steel
- Improved flaking life property → Five times compared to AISI 52100 bearing steel
- Improved toughness of material core (prevention of crack damage) → Five times compared to AISI 52100 bearing steel

Bearing No.	Pages D108 to D115
SWR Bearing	CAT.No.E1242

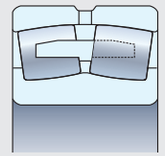
Microstructure (TEM)



SUJ2 1μm



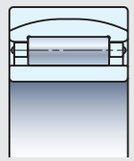
SWR 1μm



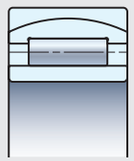
SWR

Features Cylindrical Roller Bearings with Aligning Rings (for free end) –RUB Series

- Adoption of cylindrical roller bearing type to prevent wear problems caused by sliding and addition of self-aligning function
- Smooth relief of roll expansion
- Type: Easy handling cage type, Full-complement type with higher load capacity



RUB(With cage)

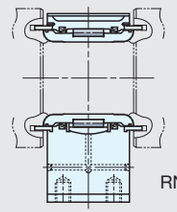


RUB(Full-complement)

Bearing No.	Pages D116 to D123

Features Split Cylindrical Roller Bearings (for segmented rolls) –RNPH/PCR Series

- Adoption of cylindrical roller bearing type to prevent wear problems caused by sliding and addition of self-aligning function
- Full-complement, higher load capacity design
- Multi-functional seal and high rigidity plummer block unit



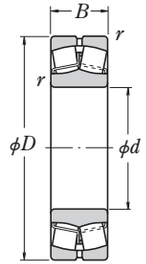
RNPH/PCR

Bearing No.	Pages D124 to D127

Note (*1): Photo courtesy of NIPPON STEEL & SUMITOMO METAL CORPORATION KASHIMA WORKS pamphlet.

Bearings for Continuous Casting Machines

SWR™ Bearings (Spherical Roller Bearings) –SWR Series
Bore Diameter 40 – 100 mm



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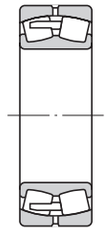
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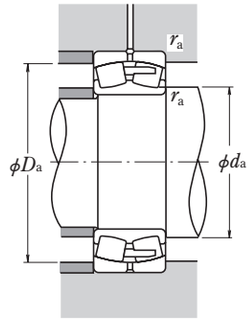


Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

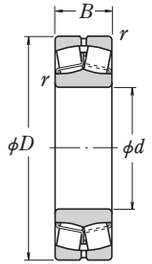
$P_0 = F_r + Y_0 F_a$

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

Boundary Dimensions (mm)				Basic Load Ratings (kN)		Basic Load Ratings {kgf}		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}		d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
40	80	23	1.1	90.5	99.5	9 200	10 100	**22208SWREAE4**	47	49	73	70	1	0.28	3.6	2.4	2.4	0.5
	90	33	1.5	136	153	13 900	15 600	**22308SWRCAME4**	49	—	81	77	1.5	0.38	2.6	1.8	1.7	1.0
50	90	23	1.1	99	119	10 100	12 100	**22210SWREAE4**	57	60	83	81	1	0.24	4.3	2.9	2.8	0.61
55	100	25	1.5	119	144	12 100	14 600	**22211SWREAE4**	64	65	91	89	1.5	0.23	4.3	2.9	2.8	0.81
	120	29	2	142	174	14 500	17 800	**21311SWREAE4**	65	72	110	98	2	0.23	4.4	3.0	2.9	1.58
60	95	26	1.1	98.5	141	10 000	14 400	**23012SWRCE4**	67	68	88	85	1	0.26	3.9	2.6	2.5	0.68
	110	28	1.5	142	174	14 500	17 800	**22212SWREAE4**	69	72	101	98	1.5	0.23	4.4	3.0	2.9	1.1
	110	28	1.5	178	154	18 100	15 700	**22212SWRCAME4**	69	—	101	97	1.5	0.25	4.0	2.7	2.6	1.17
	130	31	2.1	190	244	19 400	24 900	**21312SWREAE4**	72	87	118	117	2	0.22	4.5	3.0	3.0	1.98
	130	46	2.1	246	288	25 100	29 400	**22312SWRCAME4**	72	—	118	111	2	0.36	2.8	1.9	1.9	2.9
65	120	31	1.5	152	190	15 500	19 300	**22213SWRCAME4**	74	—	111	106	1.5	0.26	3.9	2.6	2.6	1.57
	140	48	2.1	265	315	27 000	32 500	**22313SWRCAME4**	77	—	128	117	2	0.35	2.9	1.9	1.9	3.56
70	125	31	1.5	225	232	22 900	23 600	**22214SWREAE4**	79	84	116	111	1.5	0.23	4.3	2.9	2.8	1.58
	125	31	1.5	163	205	16 600	20 900	**22214SWRCAME4**	79	—	116	111	1.5	0.25	4.0	2.7	2.7	1.64
75	130	31	1.5	238	244	24 200	24 900	**22215SWREAE4**	84	87	121	117	1.5	0.22	4.5	3.0	3.0	1.64
80	140	33	2	264	275	27 000	28 000	**22216SWREAE4**	90	94	130	126	2	0.22	4.6	3.1	3.0	2.01
	170	39	2.1	355	375	36 000	38 000	**21316SWREAE4**	92	109	158	146	2	0.23	4.4	3.0	2.9	4.32
	170	58	2.1	390	480	39 500	48 500	**22316SWRCAME4**	92	—	158	145	2	0.35	2.9	2.0	1.9	6.2
85	150	36	2	310	325	320	33 500	**22217SWREAE4**	95	101	140	135	2	0.22	4.6	3.1	3.0	2.54
90	160	40	2	360	395	37 000	40 000	**22218SWREAE4**	100	108	150	142	2	0.24	4.3	2.9	2.8	3.3
	160	52.4	2	340	490	34 500	50 000	**23218SWRCE4**	100	105	150	138	2	0.32	3.2	2.1	2.1	4.51
	190	64	3	665	705	68 000	72 000	**22318SWREAE4**	104	115	176	163	2.5	0.33	3.1	2.1	2.0	8.56
95	170	43	2.1	296	395	30 000	40 000	**22219SWRCAME4**	107	—	158	150	2	0.25	4.1	2.7	2.7	4.19
100	150	37	1.5	212	335	21 600	34 500	**23020SWRCDE4**	109	112	141	136	1.5	0.22	4.6	3.1	3.0	2.31
	150	50	1.5	276	470	28 100	48 000	**24020SWRCE4**	109	110	141	132	1.5	0.30	3.4	2.3	2.2	3.08
	165	65	2	345	535	35 500	54 000	**24120SWRCAME4**	110	113	155	144	2	0.30	3.4	2.3	2.2	4.38
	180	46	2.1	455	490	46 500	50 000	**22220SWREAE4**	112	119	168	160	2	0.24	4.3	2.9	2.8	4.84

Bearings for Continuous Casting Machines

SWR™ Bearings (Spherical Roller Bearings) –SWR Series
Bore Diameter 110 – 140 mm



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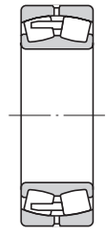
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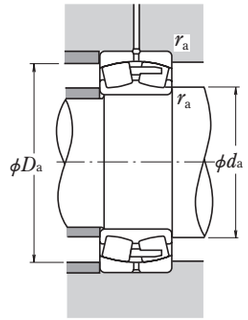


Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

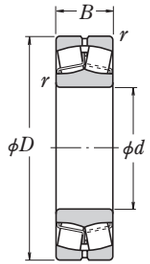
$P_0 = F_r + Y_0 F_a$

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

Boundary Dimensions (mm)				Basic Load Ratings (kN)		{kgf}		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
									d_a		D_a		r_a					
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}		min.	max.	max.	min.	max.	e	Y_2	Y_3	Y_0	approx.
110	170	45	2	293	465	29 900	47 500	**23022SWRCDE4**	120	124	160	153	2	0.24	4.2	2.8	2.8	3.76
	170	45	2	293	465	30 900	47 500	**23022SWRCAME4**	120	—	160	153	2	0.24	4.2	2.8	2.8	3.74
	170	60	2	380	645	38 500	66 000	**24022SWRCE4**	120	121	160	148	2	0.32	3.1	2.1	2.1	4.96
	180	56	2	480	630	49 000	64 000	**23122SWRCAME4**	120	—	170	158	2	0.28	3.5	2.4	2.3	5.67
	180	69	2	460	750	47 000	76 500	**24122SWRCE4**	120	123	170	154	2	0.36	2.8	1.9	1.8	6.84
	200	53	2.1	605	645	61 500	66 000	**22222SWREAE4**	122	129	188	178	2	0.25	4.0	2.7	2.6	6.99
	200	53	2.1	425	585	43 500	59 500	**22222SWRCAME4**	122	—	188	176	2	0.24	4.2	2.8	2.7	7.26
	200	69.8	2.1	645	760	65 000	77 500	**23222SWRCAME4**	122	—	188	170	2	0.34	3.0	2.0	1.9	9.58
	240	80	3	1030	1120	10 500	115 000	**22322SWREAE4**	124	145	226	206	2.5	0.33	3.1	2.1	2.0	17.6
120	180	46	2	315	525	32 000	53 500	**23024SWRCDE4**	130	134	170	163	2	0.22	4.5	3.0	2.9	4.11
	180	46	2	395	525	40 000	53 500	**23024SWRCAME4**	130	—	170	163	2	0.22	4.5	3.0	2.9	4.11
	180	60	2	395	705	40 500	72 000	**24024SWRCE4**	130	131	170	158	2	0.32	3.2	2.1	2.1	5.33
	180	60	2	480	680	49 000	69 000	**24024SWRCAME4**	130	131	170	158	2	0.32	3.2	2.1	2.1	5.33
	200	80	2	575	950	58 500	96 500	**24124SWRCE4**	130	136	190	171	2	0.37	2.7	1.8	1.8	10
	200	80	2	695	905	70 500	92 000	**24124SWRCAME4**	130	—	190	171	2	0.37	2.7	1.8	1.8	9.86
	215	58	2.1	490	690	50 000	70 000	**22224SWRCAME4**	132	—	203	189	2	0.25	4.1	2.7	2.7	9.05
	215	76	2.1	790	970	80 500	99 000	**23224SWRCAME4**	132	—	203	182	2	0.34	2.9	2.0	1.9	12
	260	86	3	845	1 120	80 600	115 000	**22324SWRCAME4**	134	—	246	219	2.5	0.35	2.9	2.0	1.9	22.3
130	200	52	2	400	655	40 500	67 000	**23026SWRCDE4**	140	147	190	180	2	0.23	4.3	2.9	2.9	5.98
	200	69	2	495	865	50 500	88 000	**24026SWRCE4**	140	143	190	175	2	0.31	3.2	2.2	2.1	7.84
	200	69	2	620	865	60 300	88 000	**24026SWRCAME4**	140	—	190	175	2	0.31	3.2	2.2	2.1	7.83
	210	80	2	590	1 010	60 000	103 000	**24126SWRCE4**	140	146	200	180	2	0.35	2.9	1.9	1.9	10.7
	210	80	2	590	1 010	60 000	103 000	**24126SWRCAME4**	140	—	200	180	2	0.37	2.7	1.8	1.8	10.6
	230	64	3	820	940	83 500	96 000	**22226SWREAE4**	144	152	216	204	2.5	0.26	3.8	2.6	2.5	11
	230	64	3	565	815	57 500	83 000	**22226SWRCAME4**	144	—	216	203	2.5	0.26	3.9	2.6	2.6	11.3
	230	80	3	875	1 080	89 500	110 000	**23226SWRCAME4**	144	—	216	196	2.5	0.34	2.9	2.0	1.9	14.3
140	210	53	2	420	715	43 000	73 000	**23028SWRCDE4**	150	157	200	190	2	0.22	4.5	3.0	2.9	6.49
	210	69	2	525	945	53 500	96 500	**24028SWRCE4**	150	154	200	186	2	0.29	3.4	2.3	2.2	8.37
	210	69	2	635	905	64 500	92 500	**24028SWRCAME4**	150	—	200	186	2	0.31	3.2	2.2	2.1	8.32

Bearings for Continuous Casting Machines

SWR™ Bearings (Spherical Roller Bearings) –SWR Series
Bore Diameter 140 – 180 mm



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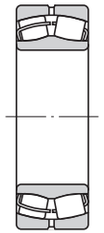
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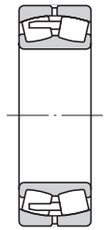
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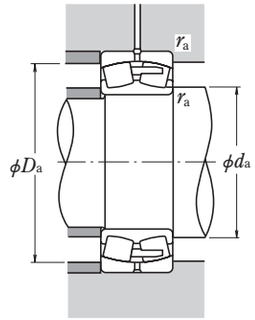


Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

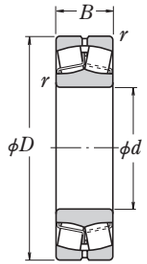
$P_0 = F_r + Y_0 F_a$

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

Boundary Dimensions (mm)				Basic Load Ratings (kN)		{kgf}		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}		d_a min.	d_a max.	D_a max.	D_a min.	r_a max.	e	Y_2	Y_3	Y_0	approx.
140	225	68	2.1	725	945	73 500	96 500	**23128SWRCAME4**	152	—	213	198	2	0.28	3.6	2.4	2.3	10.5
	225	85	2.1	670	1 160	68 500	118 000	**24128SWRCE4**	152	156	213	193	2	0.35	2.9	1.9	1.9	13
	225	85	2.1	835	1 160	85 500	118 000	**24128SWRCAME4**	152	—	213	192	2	0.37	2.7	1.8	1.8	12.9
	250	68	3	645	930	65 500	95 000	**22228SWRCDE4**	154	167	236	219	2.5	0.25	4.0	2.7	2.6	14.5
	250	68	3	835	945	85 500	96 500	**22228SWRCAME4**	154	—	236	221	2.5	0.26	3.9	2.6	2.5	14.2
	250	88	3	835	1 300	85 000	133 000	**23228SWRCAME4**	154	—	236	213	2.5	0.35	2.9	2.0	1.9	18.8
150	225	56	2.1	470	815	48 000	83 000	**23030SWRCDE4**	162	168	213	203	2	0.22	4.6	3.1	3.0	7.9
	225	75	2.1	590	1 090	60 500	111 000	**24030SWRCE4**	162	165	213	198	2	0.30	3.4	2.3	2.2	10.5
	225	75	2.1	740	1 090	75 500	111 000	**24030SWRCAME4**	162	—	213	198	2	0.30	3.4	2.3	2.2	10.4
	250	80	2.1	725	1 180	74 000	121 000	**23130SWRCE4**	162	174	238	218	2	0.30	3.4	2.3	2.2	15.8
	250	100	2.1	890	1 530	91 000	156 000	**24130SWRCE4**	162	169	238	212	2	0.38	2.6	1.8	1.7	19.8
	270	73	3	765	1 120	78 000	114 000	**22230SWRCDE4**	164	179	256	236	2.5	0.26	3.9	2.6	2.5	18.4
	270	96	3	975	1 560	99 500	159 000	**23230SWRCE4**	164	176	256	230	2.5	0.35	2.9	1.9	1.9	24.2
160	240	60	2.1	540	955	55 000	97 500	**23032SWRCDE4**	172	179	228	216	2	0.22	4.5	3.0	2.9	9.66
	240	80	2.1	680	1 260	69 000	128 000	**24032SWRCE4**	172	177	228	212	2	0.30	3.4	2.3	2.2	12.7
	240	80	2.1	845	1 260	86 500	128 000	**24032SWRCAE3**	172	—	228	212	2	0.30	3.4	2.3	2.2	12.3
	270	109	2.1	1 040	1 760	106 000	179 000	**24132SWRCE4**	172	179	258	229	2	0.39	2.6	1.7	1.7	25.4
	290	80	3	910	1 320	93 000	135 000	**22232SWRCDE4**	174	190	276	255	2.5	0.26	3.8	2.6	2.5	23.1
	290	80	3	1 140	1 320	116 000	135 000	**22232SWRCAME4**	174	—	276	255	2.5	0.26	3.8	2.6	2.5	23.1
170	260	67	2.1	640	1 090	65 000	112 000	**23034SWRCDE4**	182	191	248	233	2	0.23	4.3	2.9	2.8	13
	260	90	2.1	825	1 520	84 000	155 000	**24034SWRCE4**	182	188	248	228	2	0.31	3.2	2.2	2.1	17.3
	280	88	2.1	940	1 570	96 000	160 000	**23134SWRCAME4**	182	—	268	245	2	0.29	3.5	2.3	2.3	21.6
	280	109	2.1	1 080	1 860	110 000	190 000	**24134SWRCE4**	182	190	268	239	2	0.37	2.7	1.8	1.8	26.6
	310	86	4	990	1 500	101 000	153 000	**22234SWRCDE4**	188	206	292	270	3	0.26	3.8	2.6	2.5	28.8
	310	110	4	1 200	1 910	122 000	195 000	**23234SWRCE4**	188	201	292	261	3	0.34	2.9	2.0	1.9	36.4
180	280	74	2.1	750	1 270	76 000	129 000	**23036SWRCDE4**	192	202	26	249	2	0.24	4.2	2.8	2.8	17.1
	280	100	2.1	965	1 750	98 500	178 000	**24036SWRCE4**	192	200	268	245	2	0.32	3.1	2.1	2.0	22.7
	280	100	2.1	1 210	1 750	123 000	178 000	**24036SWRCAME4**	192	—	268	245	2	0.32	3.1	2.1	2.0	22.5
	300	96	3	1 320	1 760	134 000	180 000	**23136SWRCAME4**	194	—	286	260	2.5	0.31	3.3	2.2	2.2	27.4
	300	118	3	1 190	2 040	121 000	208 000	**24136SWRCE4**	194	202	286	255	2.5	0.37	2.7	1.8	1.8	33.1
	300	118	3	1 490	2 040	152 000	208 000	**24136SWRCAME4**	194	—	286	255	2.5	0.37	2.7	1.8	1.8	33
	320	86	4	1 020	1 540	104 000	157 000	**22236SWRCDE4**	198	212	302	278	3	0.26	3.9	2.6	2.6	30.2

Bearings for Continuous Casting Machines

SWR™ Bearings (Spherical Roller Bearings) –SWR Series
Bore Diameter 190 – 240 mm



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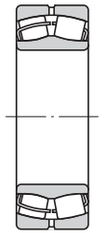
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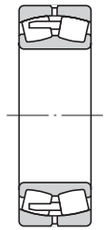
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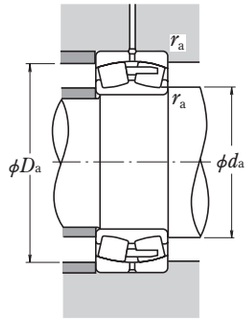


Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

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

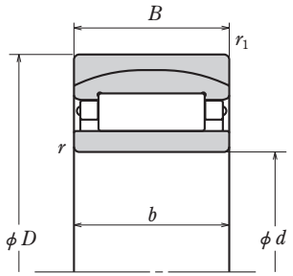
Boundary Dimensions (mm)				Basic Load Ratings (kN)		Basic Load Ratings {kgf}		Bearing Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
									d_a		D_a		r_a					
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}		min.	max.	max.	min.	max.	e	Y_2	Y_3	Y_0	approx.
190	290	75	2.1	970	1 350	99 000	138 000	**23038SWRCAME4**	202	—	278	261	2	0.24	4.2	2.8	2.8	17.6
	290	100	2.1	975	1 840	99 500	188 000	**24038SWRCE4**	202	210	278	253	2	0.31	3.2	3.2	2.1	24
	290	100	2.1	1 220	1 840	124 000	188 000	**24038SWRCAME4**	202	—	278	253	2	0.32	3.1	2.1	2.0	23.8
	320	128	3	1 370	2 330	140 000	238 000	**24138SWRCE4**	204	211	306	269	2.5	0.4	2.5	1.7	1.6	41.5
	320	128	3	1 710	2 330	175 000	238 000	**24138SWRCAME4**	204	—	306	269	2.5	0.38	2.6	1.8	1.7	40.9
	340	92	4	1 140	1 730	116 000	176 000	**22238SWRCAME4**	208	—	322	296	3	0.26	3.8	2.6	2.5	35.5
	340	120	4	1 440	2 350	147 000	240 000	**23238SWRCE4**	208	222	322	288	3	0.35	2.9	1.9	1.9	47.6
200	310	82	2.1	1 180	1 700	120 000	174 000	**23040SWRCAME4**	212	—	298	279	2	0.25	4.0	2.7	2.6	22.6
	310	109	2.1	1 140	2 120	116 000	216 000	**24040SWRCE4**	212	223	298	271	2	0.32	3.1	2.1	2.0	30.4
	310	109	2.1	1 420	2 120	145 000	216 000	**24040SWRCAME4**	212	—	298	271	2	0.33	3.0	2.0	2.0	30.2
	340	140	3	1 570	2 670	160 000	272 000	**24140SWRCE4**	214	226	326	290	2.5	0.39	2.6	1.8	1.7	51.3
	340	140	3	1 960	2 660	199 000	271 000	**24140SWRCAME4**	214	—	326	290	2.5	0.39	2.5	1.7	1.7	50.8
	360	98	4	1 300	2 010	133 000	204 000	**22240SWRCAME4**	218	—	342	315	3	0.26	3.8	2.6	2.5	42.6
220	340	90	3	1 360	1 980	139 000	202 000	**23044SWRCAME4**	234	—	326	302	2.5	0.24	4.1	2.8	2.7	29.7
	340	118	3	1 640	2 490	168 000	265 000	**24044SWRCE4**	234	244	326	296	2.5	0.31	3.2	2.1	2.1	40.5
	340	118	3	1 310	2 490	134 000	254 000	**24044SWRCAME4**	234	—	326	296	2.5	0.32	3.2	2.1	2.1	39
	370	150	4	1 800	3 200	183 000	325 000	**24144SWRCE4**	238	248	352	313	3	0.39	2.6	1.7	1.7	66.7
	370	150	4	1 800	3 200	183 000	325 000	**24144SWRCAME4**	238	—	352	313	3	0.39	2.6	1.7	1.7	64.3
	400	108	4	1 570	2 430	160 000	247 000	**22244SWRCAME4**	238	—	382	348	3	0.27	3.7	2.5	2.4	59
	400	144	4	2 010	3 400	206 000	350 000	**23244SWRCE4**	238	260	382	337	3	0.35	2.9	1.9	1.9	80.4
240	360	118	3	1 730	2 730	176 000	278 000	**24048SWRCAME4**	254	—	346	317	2.5	0.30	3.3	2.2	2.2	42.2
	400	160	4	2 660	3 800	272 000	385 000	**24148SWRCAME4**	258	—	382	341	3	0.38	2.7	1.8	1.8	79.6

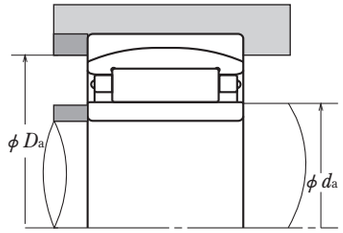
Bearings for Continuous Casting Machines

Cylindrical Roller Bearings with Aligning Rings(for Free End)–RUB Series

Bore Diameter 90 – 240 mm

With Cage





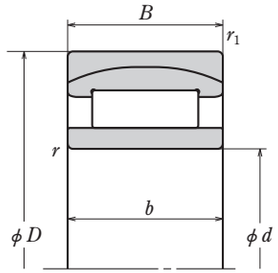
Boundary Dimensions (mm)						Basic Load Ratings (kN)		Bearing Numbers	Abutment and Fillet Dimensions (mm)		
d	D	B	b	r min.	r_1 min.	C_r	C_{0r}		d_a min.	d_a max.	D_a min.
90	160	56	50	1.1	2	220	335	**90RUB1601P**	99	105	143
	170	68	52.4	2	2	270	375	**90RUB1702P**	99	106	153
	190	64	64	3	3	340	490	**90RUB1908P**	103	109	166
100	165	52	52	2	1.1	221	385	**100RUB31AP**	106.5	113	147
	165	58	52	2	1.1	221	385	**100RUB1602P**	106.5	113	147
	180	46	46	2.1	2.1	251	375	**100RUB22P**	111	117	163
	215	73	73	3	1.5	435	595	**100RUB23P**	108	125	190
110	170	75	45	1.1	1.1	191	325	**110RUB1701P**	116.5	121	155
120	180	46	46	2.5	2.5	215	415	**120RUB30P**	132	133	165
	180	76	46	2	2	215	415	**120RUB1801P**	129	133	166
	200	80	80	2	2	370	680	**120RUB41P**	129	136	174
124.96	255	133	66	2.1	5	430	590	**125RUB2502P**	144.96	154	229
130	200	79	52	2	2	261	440	**130RUB2001P**	139	144	184
	230	90	90	3	3	540	930	**130RUB2301P**	143	149	200
140	250	68	68	3	3	480	740	**140RUB22P**	153	161	227
150	250	100	100	2.1	2.1	540	1 040	**150RUB41P**	161	169	219
	270	130	96	3	3	690	1 210	**150RUB2702P**	163	172	236
180	280	100	100	2.1	2.1	635	1 300	**180RUB40P**	191	200	250
	300	136	96	3	3	630	1 250	**180RUB3002P**	193	203	260
	300	158	118	3	3	755	1 460	**180RUB3001P**	193	203	260
	320	140	112	4	4	950	1 690	**180RUB3201P**	196	207	279
200	310	82	82	2.5	2.5	635	1 210	**200RUB30P**	213	222	286
	310	109	109	2.1	2.1	770	1 540	**200RUB40P**	211	222	280
	340	140	140	3	3	1 080	2 200	**200RUB41P**	213	229	295
220	380	120	120	4	4	1 090	1 950	**220RUB3801P**	236	251	341
	400	108	108	4	4	1 040	1 770	**220RUB22E1P**	236	255	358
240	400	150	128	4	4	1 260	2 500	**240RUB4001P**	256	269	362

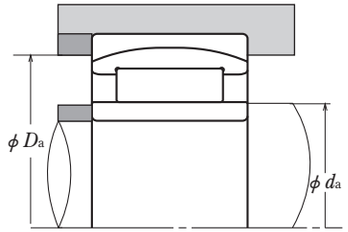
Bearings for Continuous Casting Machines

Cylindrical Roller Bearings with Aligning Rings(for Free End)–RUB Series

Bore Diameter 50 – 110 mm

Full-Complement





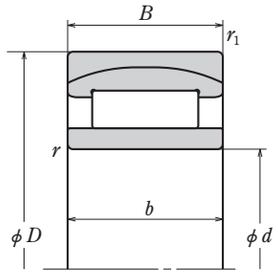
Boundary Dimensions (mm)						Basic Load Ratings (kN)		Bearing Numbers	Abutment and Fillet Dimensions (mm)		
d	D	B	b	r min.	r_1 min.	C_r	C_{0r}		d_a min.	d_a max.	D_a min.
50	90	23	23	1.5	1.5	69.5	104	**50RUB22PV**	57	58	80
	110	40	40	2	2	140	295	**50RUB23PV**	59	70	94
55	90	32	32	1.1	1.1	82	195	**55RUB9001PV**	61.5	62.5	80
	100	25	25	1.5	1.5	88	121	**55RUB22APV**	62	63	90
65	120	31	31	1.5	1.5	131	200	**65RUB22PV**	73	75	107
	140	48	48	2.1	2.1	221	440	**65RUB23PV**	76	85	121
70	125	31	31	1.5	1.5	127	213	**70RUB22APV**	78	85	113
75	130	31	31	1.5	1.5	151	248	**75RUB22APV**	83	85	118
85	150	65	65	2.5	2.5	286	595	**85RUB1501P**	97	98	130
90	150	72	60	1.5	1	262	575	**90RUB1501PV**	95	101	131
	190	64	64	3	1.5	415	780	**90RUB23APV**	98	116	168
100	150	50	50	2	2	230	530	**100RUB40PV**	108	109	134
	150	66	50	2	2	230	530	**100RUB1501PV**	108	109	134
	165	52	52	2	2	272	550	**100RUB31PV**	109	113	147
	180	46	46	2.1	2.1	277	545	**100RUB22APV**	111	123	164
	180	60.3	60.3	2.1	2.1	360	650	**100RUB32PV**	111	116	160
103	180	60	60	2	2	330	790	**103RUB1801PV**	112	132	163
110	170	45	45	2	2	246	565	**110RUB30A1PV**	119	123	155
	170	60	60	2	2	300	735	**110RUB40PV**	119	123	151
	180	56	56	2.5	2.5	335	670	**110RUB31A1PV**	123	124	161
	180	69	69	2	2	385	835	**110RUB41A2PV**	119	123	157
	200	53	53	2.5	2.1	380	625	**110RUB22APV**	121	130	180

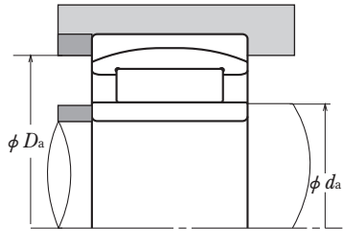
Bearings for Continuous Casting Machines

Cylindrical Roller Bearings with Aligning Rings(for Free End)–RUB Series

Bore Diameter 120 – 160 mm

Full-Complement





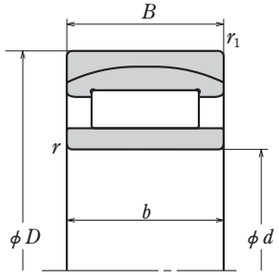
Boundary Dimensions (mm)						Basic Load Ratings (kN)		Bearing Numbers	Abutment and Fillet Dimensions (mm)		
d	D	B	b	r min.	r_1 min.	C_r	C_{0r}		d_a min.	d_a max.	D_a min.
120	180	46	46	2	2	275	625	**120RUB30B2PV**	129	132	165
	180	60	60	2	2	330	790	**120RUB40A2PV**	129	132	163
	180	80	60	2	2	330	790	**120RUB1803PV**	129	132	163
	200	80	80	2.5	2.5	470	1 040	**20RUB41A1PV**	133	137	174
	225	58	58	2.5	2.5	460	690	**120RUB2201APV**	133	138	204
130	200	69	69	2	2	410	955	**130RUB40A1PV**	139	143	180
	210	64	64	2	2	415	865	**130RUB31APV**	139	144	189
	210	80	80	2	2	510	1 130	**130RUB41A2PV**	139	144	184
	230	64	64	3	3	495	840	**130RUB22APV**	143	151	208
	230	80	80	3	3	585	1 090	**130RUB32APV**	143	146	204
140	210	53	53	2	2	365	885	**140RUB30A2PV**	149	155	194
	210	69	69	2	2	420	990	**140RUB40APV**	149	152	190
	225	68	68	2.1	2.1	485	1 000	**140RUB31APV**	151	156	203
	225	85	85	2.1	2.1	575	1 310	**140RUB41A1PV**	151	156	200
	250	68	68	3	3	510	1 110	**140RUB22APV**	153	172	227
	250	88	88	3	3	670	1 500	**140RUB32PV**	153	170	221
150	225	56	56	2.5	2.5	390	840	**150RUB30APV**	163	166	208
	225	75	75	2.1	2.1	485	1 210	**150RUB40A1PV**	161	165	203
	225	92	75	2.1	2.1	465	1 160	**150RUB2201PV**	161	164	203
	250	80	80	2.1	2.1	595	1 290	**150RUB31APV**	161	170	221
	250	100	100	2.1	2.1	710	1 620	**150RUB41APV**	161	170	219
	270	96	96	3	3	815	1 640	**150RUB32APV**	163	174	236
160	240	80	80	2.1	2.1	530	1 330	**160RUB40A1PV**	171	176	217
	240	85	80	2.1	2.1	530	1 330	**160RUB2402PV**	171	176	217
	270	109	109	2.1	2.1	855	1 830	**160RUB41AE2PV**	171	181	237

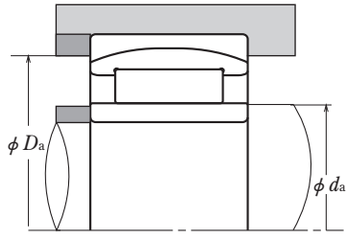
Bearings for Continuous Casting Machines

Cylindrical Roller Bearings with Aligning Rings(for Free End)–RUB Series

Bore Diameter 170 – 240 mm

Full-Complement





Boundary Dimensions (mm)						Basic Load Ratings (kN)		Bearing Numbers	Abutment and Fillet Dimensions (mm)		
d	D	B	b	r min.	r_1 min.	C_r	C_{0r}		d_a min.	d_a max.	D_a min.
170	260	67	67	2.1	2.1	555	1 130	**170RUB30APV**	181	188	239
	260	90	90	2.1	2.1	655	1 580	**170RUB40A1PV**	181	188	233
	310	110	110	4	4	1 060	2 090	**170RUB32APV**	186	195	273
180	280	100	100	2.5	2.5	785	1 870	**180RUB40APV**	193	198	250
	300	118	118	3	3	940	2 120	**180RUB41APV**	193	202	260
	320	112	112	4	4	1 090	2 190	**180RUB32APV**	196	204	279
190	290	100	100	2.1	2.1	850	2 100	**190RUB40A1PV**	201	210	260
	320	104	104	3	3	1 050	2 240	**190RUB31APV**	203	214	286
	340	120	120	4	4	1 210	2 430	**190RUB32APV**	206	218	297
200	310	109	109	2.1	2.1	1 030	2 550	**200RUB40A1PV**	211	219	280
	340	112	112	3	3	1 160	2 470	**200RUB31APV**	213	230	305
	340	140	140	3	3	1 340	3 100	**200RUB41APV**	213	230	295
220	340	90	90	3	3	905	2 020	**220RUB30PV**	233	243	313
	340	118	118	3	3	1 110	2 630	**220RUB40APV**	233	243	308
	340	135	118	3	3	1 010	2 670	**220RUB3401PV**	233	247	308
	370	150	150	4	4	1 510	3 500	**220RUB41APV**	236	248	322
240	400	128	128	4	4	1 540	3 400	**240RUB31APV**	256	271	362

Bearings for Continuous Casting Machines

Split Cylindrical Roller Bearings (for Segmented Rolls)–RNPH Series

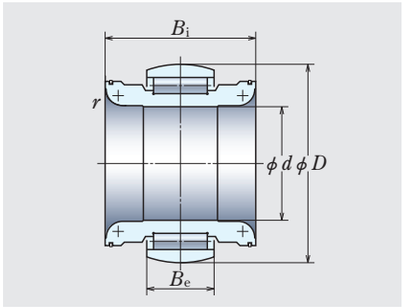


Fig. 1

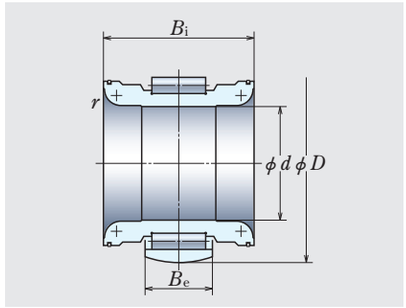
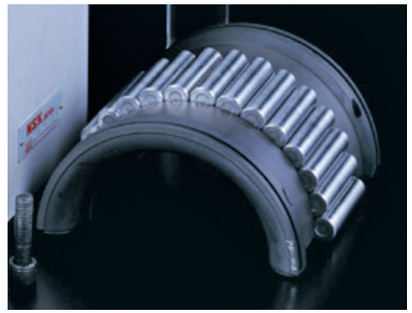


Fig. 2

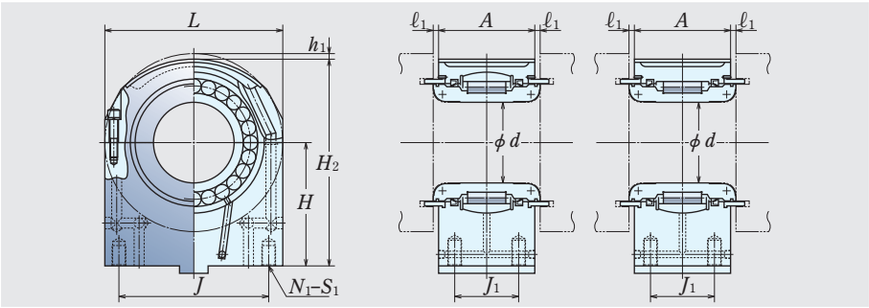


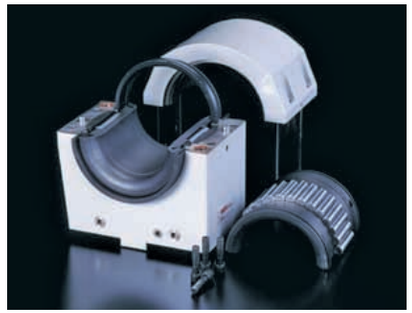
Bearing Numbers	Boundary Dimensions (mm)					Basic Load Ratings (kN)		Roll Diameter (mm)	Fig.
	d	D	B_i	B_e	r	C_r	C_{0r}		
100RNPH1801	100	185	169	74	15	475	950	225	2
110RNPH1801	110	180	137	49	15	272	570	230	2
110RNPH1803	110	185	154	76	20	450	1 070	230	2
110RNPH2001	110	200	179	80	20	535	1 090	250	2
115RNPH2001	115	205	202	98	15	625	1 460	240	2
120RNPH1901	120	195	157	66	20	410	950	250	2
120RNPH2001	120	205	179	80	20	560	1 220	255	2
130RNP2001	130	205	139	60	20	455	1 030	270	1
130RNP2101	130	215	174	75	20	540	1 190	280	1
130RNPH2105	130	215	143	60	20	460	975	250	2
130RNPH2107	130	215	174	75	20	550	1 230	250	2
130RNPH2201	130	225	189	90	20	670	1 460	280	2
130RNPH2202	130	220	186	79	20	555	1 370	280	2
135RNPH2101	135	215	183	84	20	570	1 350	250	2
135RNPH2102	135	210	183	84	20	515	1 350	250	2
140RNPH2102	140	215	162	60	20	415	950	270	2
140RNPH2103	140	215	189	74	2.5	490	1 170	265	2
140RNPH2302	140	235	194	84	20	665	1 530	285	2
140RNP2401	140	245	184	85	20	710	1 510	310	1
145RNPH2201	145	225	179	76	20	560	1 340	280	2
145RNPH2303	145	232	196	84	20	630	1 440	280	2
145RNPH2401	145	240	208	89	20	765	1 780	295	2
150RNPH2303	150	230	199	78	2.5	555	1 340	280	2
150RNPH2401	150	245	159	80	20	680	1 550	280	2
150RNPH2403	150	240	195	84	18	690	1 630	290	2
150RNPH2503	150	250	169	70	20	640	1 500	300	2
150RNPH2505	150	250	208	89	20	780	1 840	295	2
150RNPH2601	150	265	187	98	20	900	1 950	320	2
150RNPH2702	150	275	199	100	20	945	1 970	330	2
155RNPH2401	155	245	199	88	20	740	1 720	300	2
160RNPH2502	160	255	199	90	20	735	1 730	310	2
160RNPH2504	160	255	189	86	20	745	1 780	305	2
160RNPH2601	160	265	200	82	20	745	1 700	320	2
160RNPH2703	160	275	214	100	25	945	2 190	325	2
170RNPH2601	170	265	214	100	20	880	2 050	330	2
180RNPH2901	180	290	214	85	20	880	2 050	335	2

Remark Other bearings are available. Please contact NSK for additional information.

Bearings for Continuous Casting Machines

Plummer Units for Split Cylindrical Roller Bearings-PCR Series





Bearing Numbers	Shaft Diameter(mm)	Boundary Dimensions (mm)									
	d	L	A	H	h_1	H_2	ℓ_1	J	J_1	N_1	S_1
100PCR2201	100	235	152	132	10	234.5	9	165	100	4	M20
110PCR2301	110	230	120	160	10	265	9.5	140	—	2	M30
110PCR2303	110	230	135	180	10	285	10	170	—	2	M30
110PCR2502	110	250	156	150	11.5	263.5	12	—	—	1	M36
115PCR2401	115	245	183	190	10	300	10	150	—	2	M24
120PCR2501	120	250	142	165	11.5	278.5	9	190	90	4	M24
120PCR2502	120	255	162	230	10	347.5	9	205	100	4	M24
130PCR2701	130	265	118	190	11.5	313.5	11	195	65	4	M30
130PCR2801	130	280	156	160	10	290	9.5	200	100	4	M24
130PCR2705	130	270	132	197	9	313	6	220	93	4	3/4-10UNC
130PCR2604	130	265	175	145	10	260	7.5	210	120	4	M16
130PCR2802	130	280	172	180	11.5	308.5	9	220	110	4	M30
130PCR2603	130	265	171	175	12.5	295	8	230	90	4	M20
135PCR2701	135	270	160	160	10	275	12	180	130	4	M20
135PCR2502	135	250	160	160	10	275	12	150	130	4	M20
140PCR2701	140	270	145	180	10	305	9.5	170	—	2	M30
140PCR2601	140	265	174	175	7.5	300	8	230	130	4	M20
140PCR2804	140	285	179	175	12.5	305	8	250	97.5	4	M20
140PCR3101	140	310	166	175	10	320	9.5	220	110	4	M24
145PCR2801	145	280	162	250	10	380	9	220	100	4	M30
145PCR2804	145	280	183	260	10	390	7	220	123	4	M30
145PCR2901	145	295	195	270	10	407.5	7	230	130	4	M30
150PCR2801	150	280	184	175	10	305	8	230	140	4	M20
150PCR280	150	330	144	310	10	440	8	350	260	4	ϕ33
150PCR3004	150	305	180	205.5	14.5	336	8	230	120	4	M24
150PCR3003	150	300	150	180	10	320	10	195	90	4	M30
150PCR2901	150	295	193	310	10	447.5	8	215	126	4	M30
150PCR3203	150	320	168	220	15	365	10	240	90	4	M36
150PCR3301	150	330	182	220	11.5	373.5	9	260	110	4	M36
155PCR3001	155	300	182	260	10	400	9	240	110	4	M30
160PCR3101	160	310	178	185	16.5	323.5	11	150	—	2	M30
160PCR3002	160	305	174	217	12.5	357	8	255	135	4	3/4-10UNC
160PCR3302	160	330	185	225	20	365	8	250	130	4	M24
160PCR3401	160	340	199	200	15.5	347	8	290	130	4	M20
170PCR3301	170	320	194	290.5	10	445.5	10.5	260	340	4	ϕ26
180PCR3301	180	335	150	217.5	10	375	10	240	82	4	M30

Remark Other bearings are available. Please contact NSK for additional information.

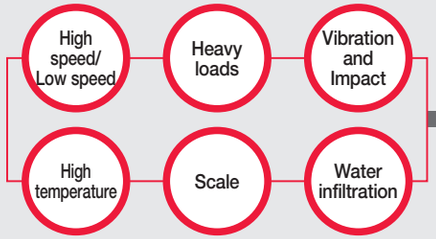
Bearings for Rolling Mills

Four-Row Tapered Roller Bearings for Roll Necks

Benefits

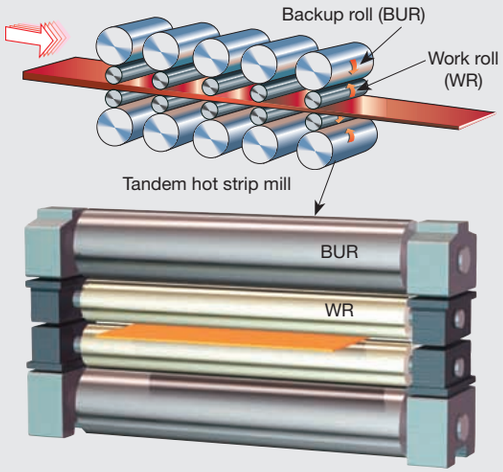
❶ Higher reliability and longer operating life prevent unexpected accidents
❷ Bearing seal requires less cleaning of work environment and reduces grease consumption
❸ Reduced maintenance costs

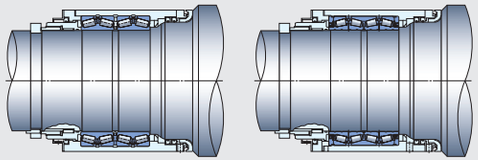
1. Operating conditions



Major target mills:

- Hot strip mills
- Cold rolling mills
- Skin pass mills
- Temper rolling mills

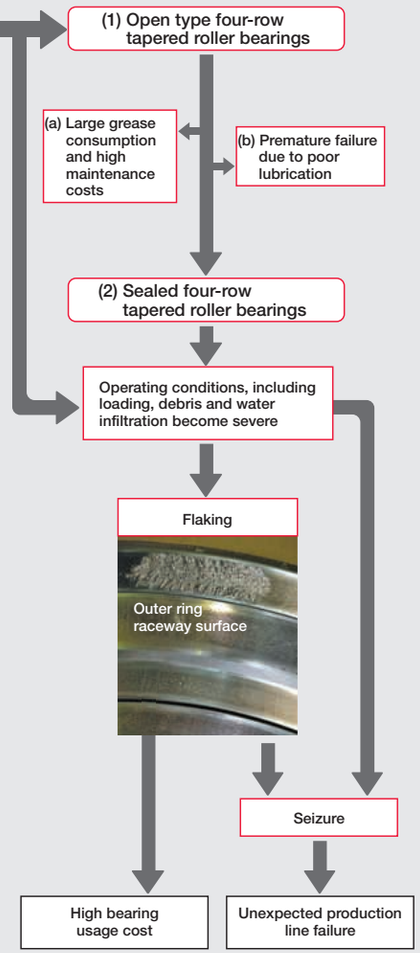


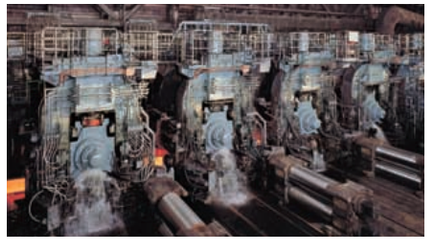


(1) Open type four-row tapered roller bearing
(2) Sealed four-row tapered roller bearing

2. Problems

Typical problems of work roll bearings





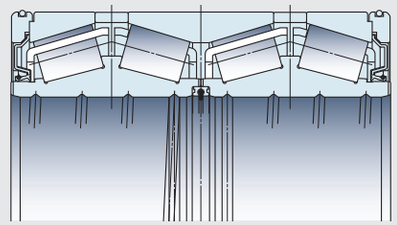
(*1)

3. Countermeasures

■Design measures

Features Extra-Capacity Sealed-Clean™ Four-Row Tapered Roller Bearings–KVS Series

- Higher load capacity: increased by 15%~35% compared to conventional sealed bearings
- Adoption of Super-TF™ steel as standard
- Controlled negative pressure during rolling to prevent water infiltration
- Improved sealing through usage of heat- and wear-resistant sealing materials
- Easier handling of seals

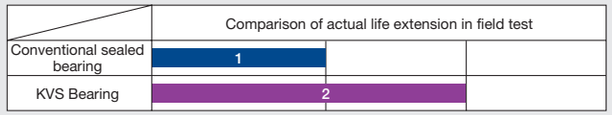


KVS

■Material measures 1

Features Super-TF™ Bearings–STF Series

- Adoption of Super-TF™ material
- Control of the retained austenite reduces concentration of stress resulting from dents caused by infiltration of debris

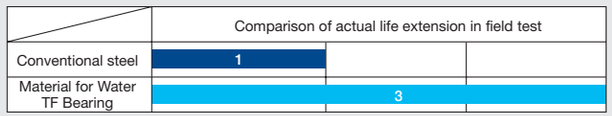


Super-TF™ steel is used as standard for KVS type and KVE.

■Material measures 2

Features Water-TF™ Bearings–WTF Series

- Adoption of super-clean steel with optimum alloy balance controls development and progress of cracks at early flaking stage caused by water infiltration
- Control of the retained austenite reduces concentration of stress resulting from dents caused by infiltration of debris

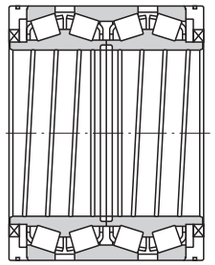


Water-TF™ steel is used as a special purpose bearing series for KVS type and KVE.

Note (*1): Photo courtesy of NIPPON STEEL & SUMITOMO METAL CORPORATION KASHIMA WORKS pamphlet.

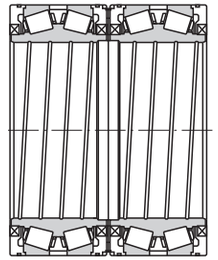
■Bearings for Rolling Mills

Sealed Four-Row Tapered Roller Bearings(STF/WTF Series)
Figures of Typical Four-Row Tapered Roller Bearings



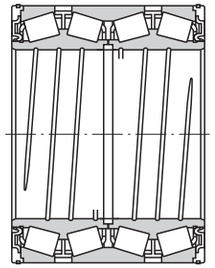
Basic Design of Two Seal Type (KVE) Figure 1

	Variations of Bearing in Figure 1
1-1	Oil holes in cup spacers
1-2	Without intermediate bore seal (for dry rolling)
1-3	Without intermediate bore seal, with holes in cup spacers
1-4	With cone spacer, with intermediate bore seal
1-5	For vertical roll (special cup spacers)



Basic Design of Four Seal Type (KVE) Figure 2

	Variations of Bearing in Figure 2
2-1	Oil holes in cup spacers
2-2	Clearance between cone faces



Basic Design of Two Seal Type (KVS) Figure 3

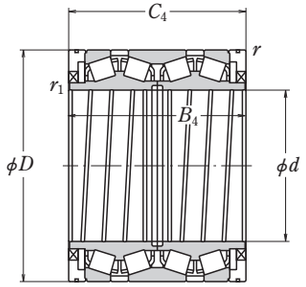
	Variations of Bearing in Figure 3
3-1	Oil holes in cup spacers

Air Turbine Dental Handpieces
Pumps & Compressors
Agricultural Machinery
Construction Machinery
Mining Machinery
Railway Rolling Stock
Papermaking Machines
Wind Power Industry
Steel Industry
INDUSTRY SOLUTIONS

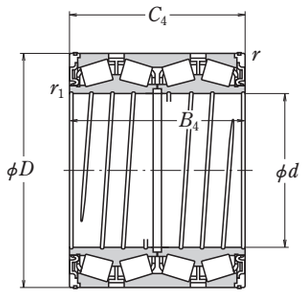
Bearings for Rolling Mills

Sealed Four-Row Tapered Roller Bearings (STF/WTF Series)

Bore Diameter 101.600 – 250 mm



KVE



KVS

Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0F_a$

Where $Y_0 \fallingdotseq Y_3$

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

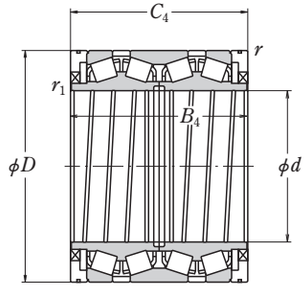
Boundary Dimensions (mm/inch)						Basic Load Ratings (kN)		Basic Load Ratings {kgf}		Bearing Numbers STF Series	Bearing Numbers WTF Series	Figure(1)	Constant	Axial Load Factors		Mass (kg)
d	D	B_4	C_4	r_1 min.	r min.	C_r	C_{0r}	C_r	C_{0r}				e	Y_2	Y_3	approx.
101.600	200.025	320.000	320.000	1.0	3.0	1 450	2 420	148 000	247 000	＊**STF101KVE2051Eg**		1-2	0.36	2.8	1.9	47.8
4.000	7.8750	12.5984	12.5984													
150	210	240	240	1	2.5	990	2 270	101 000	231 000	**STF150KVE2101Eg**		1-1	0.32	3.2	2.1	26.1
170	240	175	175	2.5	2.5	1 020	2 000	103 000	204 000	**STF170KVS2401Eg**		3	0.32	3.2	2.1	23
187.325	269.875	230.000	230.000	2.0	3.3	1 460	3 200	149 000	325 000	＊**STF187KVE2651Eg**		1-1	0.29	3.4	2.3	43.6
7.3750	10.6250	9.0551	9.0551													
215.900	288.925	177.800	177.800	0.8	3.3	1 070	2 350	109 000	239 000	＊**STF215KVS2851Eg**	＊**WTF215KVS2851Eg**	3	0.49	2.1	1.4	38
8.5000	11.3750	7.0000	7.0000													
216.103	330.2	263.525	269.875	1.5	3.3	2 290	4 550	233 000	465 000	＊**STF216KVS3351Eg**	＊**WTF216KVS3351Eg**	3	0.46	2.2	1.5	77
8.5080	13.0000	10.3750	10.6250													
220	295	315	315	1	2.5	1 410	3 450	144 000	350 000	**STF220KVE2902Eg**	**WTF220KVE2902Eg**	2-1	0.40	2.5	1.7	61.2
	295	335	335	1	2.5	1 410	3 450	144 000	350 000	**STF220KVE2901Eg**	**WTF220KVE2901Eg**	2-1	0.40	2.5	1.7	65
	300	270	270	2.5	2.5	1 650	4 000	168 000	410 000	**STF220KVE3001Eg**	**WTF220KVE3001Eg**	1-2	0.41	2.5	1.7	56.5
	320	290	290	1.5	2.5	1 970	4 500	201 000	460 000	**STF220KVE3201Eg**	**WTF220KVE3201Eg**	1	0.33	3.0	2.0	78.7
	330	260	260	4	3	2 330	4 800	237 000	490 000	**STF220KVS3301Eg**	**WTF220KVS3301Eg**	3	0.40	2.5	1.7	76
225	320	230	230	1	2	1 510	3 300	154 000	335 000	**STF225KVE3201Eg**	**WTF225KVE3201Eg**	1	0.41	2.4	1.6	59.9
228.600	400.050	296.875	296.875	3.3	3.3	2 410	4 250	246 000	435 000	＊**STF228KVE4052Eg**	＊**WTF228KVE4052Eg**	1	0.46	2.2	1.5	161
9.0000	15.7500	11.6880	11.6880													
234.950	327.025	196.850	196.850	1.5	3.3	1 550	3 200	158 000	325 000	＊**STF234KVS3251Eg**	＊**WTF234KVS3251Eg**	3	0.46	2.2	1.5	49
9.2500	12.8750	7.7500	7.7500													
240	320	250	250	3	3	1 510	3 700	154 000	375 000	**STF240KVE3202Eg**	**WTF240KVE3202Eg**	1	0.33	3.0	2.0	56.3
	338	248	248	2	3	1 820	4 000	185 000	405 000	**STF240KVE3301Eg**	**WTF240KVE3301Eg**	1	0.43	2.3	1.6	70.6
	338	290	290	2	3	2 120	5 000	216 000	510 000	**STF240KVE3302Eg**	**WTF240KVE3302Eg**	1	0.42	2.4	1.6	82.6
244.475	327.025	193.680	193.680	1.5	3	1 370	3 300	148 000	325 000	＊**STF244KVS3251Eg**	＊**WTF244KVS3251Eg**	3	0.40	2.5	1.7	43
9.6250	12.8750	7.6250	7.6250													
245	345	310	310	2	3	2 700	6 650	275 000	680 000	**STF245KVS3402Eg**	**WTF245KVS3402Eg**	3	0.40	2.5	1.7	85
250	365	270	270	2.5	3	2 210	4 650	225 000	475 000	**STF250KVE3601AEg**	**WTF250KVE3601AEg**	1	0.33	3.0	2.0	96
	365	270	270	2.5	3	2 210	4 650	225 000	475 000	**STF250KVE3601Eg**	**WTF250KVE3601Eg**	1-1	0.33	3.0	2.0	96

Remark The bearings denoted by an asterisk (＊) are inch design.

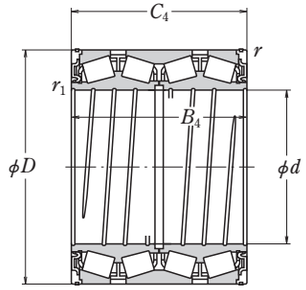
Note (1) Refer to pages D130 and D131.

Sealed Four-Row Tapered Roller Bearings (STF/WTF Series)

Bore Diameter 254.000 – 304.902 mm



KVE



KVS

Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

Where $Y_0 \fallingdotseq Y_3$

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

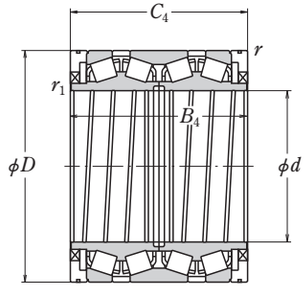
Boundary Dimensions (mm/inch)						Basic Load Ratings (kN)		Basic Load Ratings {kgf}		Bearing Numbers STF Series	Bearing Numbers WTF Series	Figure(1)	Constant	Axial Load Factors		Mass (kg)
d	D	B_4	C_4	r_1 min.	r min.	C_r	C_{0r}	C_r	C_{0r}				e	Y_2	Y_3	approx.
254.000	358.775	269.875	269.875	1.5	3.3	2 420	5 500	247 000	560 000	＊**STF254KVS3552Eg**	＊**WTF254KVS3552Eg**	3	0.40	2.5	1.7	86
10.0000	14.1250	10.6250	10.6250													
260	365	340	340	2.7	4	2 960	7 350	300 000	750 000	**STF260KVS3601Eg**	**WTF260KVS3601Eg**	3	0.40	2.5	1.7	110
	365	340	340	2.5	4	2 960	7 350	300 000	750 000	**STF260KVS3651Eg**	**WTF260KVS3651Eg**	3	0.40	2.5	1.7	110
260.350	422.275	314.325	317.500	6.4	3.3	3 600	7 050	370 000	720 000	＊**STF260KVS4251Eg**	＊**WTF260KVS4251Eg**	3	0.33	3.0	2.0	170
10.2500	16.6250	12.3750	12.5000													
266.700	355.600	230.188	228.600	1.5	3.3	1 960	4 600	200 000	470 000	＊**STF266KVS3551Eg**	＊**WTF266KVS3551Eg**	3	0.35	2.9	1.9	62
10.5000	14.0000	9.0625	9.0000													
276.225	393.700	269.875	269.875	1.5	3.3	2 720	6 100	277 000	620 000	＊**STF276KVS3952Eg**	＊**WTF276KVS3952Eg**	3	0.45	2.2	1.5	105
10.8750	15.5000	10.6251	10.6251													
279.400	393.700	269.875	269.875	1.5	6.4	2 720	6 100	277 000	620 000	＊**STF279KVS3952Eg**	＊**WTF279KVS3952Eg**	3	0.45	2.2	1.5	102
11.0000	15.5000	10.6250	10.6250													
	393.700	270.630	269.875	1.5	6.4	2 290	5 150	233 000	525 000	＊**STF279KVE3951Eg**	＊**WTF279KVE3951Eg**	1	0.41	2.5	1.7	105
	15.5000	10.6547	10.6250													
279.4	393.7	320	320	1.5	6.4	3 100	7 350	315 000	745 000	**STF279KVS3954Eg**	**WTF279KVS3954Eg**	3	0.40	2.5	1.7	120
	410	420	420	1	6.4	3 300	7 400	335 000	755 000	**STF279KVE4101Eg**	**WTF279KVE4101Eg**	2	0.42	2.4	1.6	190
280	380	290	290	1.5	3	2 230	5 350	227 000	545 000	**STF280KVE3801Eg**	**WTF280KVE3801Eg**	1-4	0.37	2.7	1.8	96.2
	395	340	340	1.5	2.5	2 950	7 050	300 000	720 000	**STF280KVE3901Eg**	**WTF280KVE3901Eg**	1	0.40	2.5	1.7	133
	395	340	340	1.5	2.5	2 950	7 050	300 000	720 000	**STF280KVE3902Eg**	**WTF280KVE3902Eg**	1	0.40	2.5	1.7	133
	410	268	268	1.5	6.4	2 330	4 600	237 000	470 000	**STF280KVE4101Eg**	**WTF280KVE4101Eg**	1-4	0.33	3.0	2.0	121
	412	340	340	3	3	3 300	7 400	335 000	755 000	**STF280KVE4102Eg**	**WTF280KVE4102Eg**	1-1	0.42	2.4	1.6	156
290	400	346	346	3	4	3 250	8 400	330 000	855 000	**STF290KVS4001Eg**	**WTF290KVS4001Eg**	3	0.40	2.5	1.7	112
304.648	438.048	280.990	279.400	3.3	3.3	3 100	6 750	315 000	690 000	＊**STF304KVS4351Eg**	＊**WTF304KVS4351Eg**	3	0.45	2.2	1.5	132
11.9940	17.2460	11.6260	11.0000													
	438.048	281.740	279.400	3.3	3.3	2 630	5 600	268 000	570 000	＊**STF304KVE4351Eg**	＊**WTF304KVE4351Eg**	1-2	0.47	2.1	1.4	140
	17.2460	11.0921	11.0000													
304.8	419.100	269.875	269.875	1.5	6.4	2 850	6 550	291 000	665 000	＊**STF304KVS4151Eg**	＊**WTF304KVS4151Eg**	3	0.33	3.0	2.0	111
12.0000	16.5000	10.6250	10.6250													
304.902	412.648	266.700	266.700	1.5	3.3	2 760	6 500	281 000	665 000	＊**STF304KVS4152Eg**	＊**WTF304KVS4152Eg**	3	0.33	3.0	2.0	100
12.0040	16.2460	10.5000	10.5000													

Remark The bearings denoted by an asterisk (＊) are inch design.

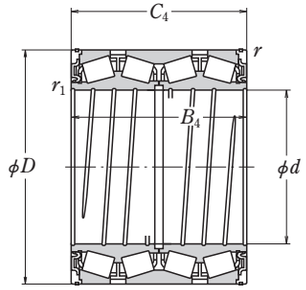
Note (1) Refer to pages D130 and D131.

Sealed Four-Row Tapered Roller Bearings (STF/WTF Series)

Bore Diameter 310 – 482.600 mm



KVE



KVS

Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0F_a$

Where $Y_0 \fallingdotseq Y_3$

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

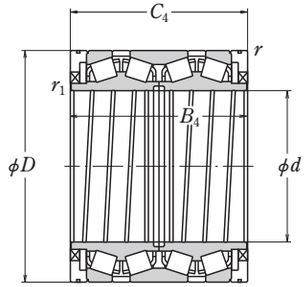
Boundary Dimensions (mm/inch)						Basic Load Ratings (kN)		Basic Load Ratings {kgf}		Bearing Numbers STF Series	Bearing Numbers WTF Series	Figure(1)	Constant	Axial Load Factors		Mass (kg)
d	D	B_4	C_4	r_1 min.	r min.	C_r	C_{0r}	C_r	C_{0r}				e	Y_2	Y_3	approx.
310	430	310	310	3	3	3 350	8 200	345 000	835 000	**STF310KVS4301Eg**	**WTF310KVS4301Eg**	3	0.46	2.2	1.5	140
	430	350	350	2.7	3	3 700	9 550	375 000	970 000	**STF310KVS4302Eg**	**WTF310KVS4302Eg**	3	0.46	2.2	1.5	155
317.500	422.275	269.875	269.875	1.5	3.3	2 740	6 750	279 000	690 000	∗**STF317KVS4251Eg**	∗**WTF317KVS4251Eg**	3	0.34	3.0	2.0	100
12.5000	16.6250	10.6250	10.6250													
	447.675	367.000	367.000	2.5	3.0	3 450	8 100	350 000	825 000	∗**STF317KVE4451Eg**	∗**WTF317KVE4451Eg**	1	0.46	2.2	1.5	184
	17.6250	14.4488	14.4488													
343.052	457.098	254.000	254.000	1.5	3.3	2 430	6 700	289 000	685 000	∗**STF343KVS4551Eg**	∗**WTF343KVS4551Eg**	3	0.45	2.2	1.5	110
13.5060	17.9960	10.0000	10.0000													
	457.098	299.000	299.000	1.5	3.3	2 830	6 950	289 000	705 000	∗**STF343KVE4561Eg**	∗**WTF343KVE4561Eg**	1	0.46	2.2	1.5	137
	17.9960	11.7717	11.7717													
355.600	457.200	252.412	252.412	1.5	3.3	2 650	6 750	270 000	685 000	∗**STF355KVS4551Eg**	∗**WTF355KVS4551Eg**	3	0.32	3.2	2.1	98
14.0000	18.0000	9.9375	9.9375													
395	545	360	360	2.5	5	3 600	9 050	365 000	920 000	**STF395KVE5401Eg**	**WTF395KVE5401Eg**	1-1	0.47	2.1	1.4	255
406.400	546.100	288.925	288.925	1.5	6.4	3 950	9 450	400 000	965 000	∗**STF406KVS5451Eg**	∗**WTF406KVS5451Eg**	3	0.48	2.1	1.4	184
16.0000	21.5000	11.3750	11.3750													
	546.100	346.000	346.000	0.5	6.4	2 560	5 800	261 000	590 000	∗**STF406KVE5454Eg**	∗**WTF406KVE5454Eg**	2-1	0.47	2.1	1.4	231
	21.5000	13.6221	13.6221													
420	590	395	375	2.5	5	3 550	8 200	365 000	835 000	**STF420KVE5901Eg**	**WTF420KVE5901Eg**	1-1	0.80	1.3	0.8	332
440	590	510	510	4	4	5 450	14 300	555 000	1 460 000	**STF440KVE5901Eg**	**WTF440KVE5901Eg**	2-1	0.38	2.7	1.8	396
	620	454	454	4	6	6 500	15 700	665 000	1 600 000	**STF440KVE6201Eg**	**WTF440KVE6201Eg**	1-1	0.33	3.0	2.0	435
450	595	368	368	4	5	5 550	15 000	565 000	1 520 000	**STF450KVS5901Eg**	**WTF450KVS5901Eg**	3	0.33	3.0	2.0	272
457.200	596.900	276.225	279.400	1.5	3.3	4 000	9 850	405 000	1 010 000	∗**STF457KVS5951Eg**	∗**WTF457KVS5951Eg**	3	0.47	2.2	1.4	206
18.0000	23.5000	10.8750	11.0000													
460	590	470	470	2.5	5	4 900	14 100	500 000	1 440 000	**STF460KVE5901Eg**	**WTF460KVE5901Eg**	1-1	0.28	3.6	2.4	322
480	615	435	435	3	5	4 650	12 800	470 000	1 310 000	**STF480KVE6101AEg**	**WTF480KVE6101AEg**	2-2	0.32	3.2	2.1	323
	678	574	574	3	5	8 400	21 500	860 000	2 190 000	**STF480KVE6702Eg**	**WTF480KVE6702Eg**	2-1	0.34	3.0	2.0	662
482.600	615.950	330.200	330.200	4.3	6.4	4 900	13 500	500 000	1 370 000	∗**STF482KVS6151Eg**	∗**WTF482KVS6151Eg**	3	0.33	3.1	2.1	235
19.0000	24.2500	13.0000	13.0000													

Remark The bearings denoted by an asterisk (∗) are inch design.

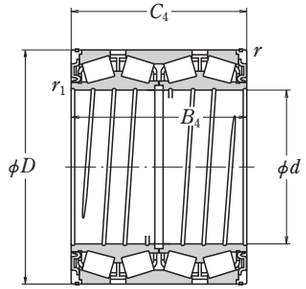
Note (1) Refer to pages D130 and D131.

Bearings for Rolling Mills

Sealed Four-Row Tapered Roller Bearings (STF/WTF Series)
Bore Diameter 482.600 – 825.5 mm



KVE



KVS

Dynamic Equivalent Load

$P = XF_r + YF_a$

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

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$

Where $Y_0 \fallingdotseq Y_3$

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

Boundary Dimensions (mm/inch)						Basic Load Ratings (kN)		Basic Load Ratings {kgf}		Bearing Numbers STF Series	Bearing Numbers WTF Series	Figure(1)	Constant	Axial Load Factors		Mass (kg)
d	D	B_4	C_4	r_1 min.	r min.	C_r	C_{0r}	C_r	C_{0r}				e	Y_2	Y_3	approx.
	615.950 24.2500	330.200 13.0000	330.200 13.0000	4.3	6.4	3 650	9 650	370 000	985 000	＊STF482KVE6152Eg	＊WTF482KVE6152Eg	1	0.37	2.7	1.8	243
	615.950 24.2500	419.100 16.5000	402.050 15.8287	2.3	6.4	4 700	13 600	480 000	1 380 000	＊STF482KVE6155Eg	＊WTF482KVE6155Eg	1	0.38	2.7	1.8	302
	647.700 25.5000	417.512 16.4375	417.512 16.4375	3.3	6.4	5 500	13 800	560 000	1 410 000	＊STF482KVE6453Eg	＊WTF482KVE6453Eg	1-5	0.37	2.7	1.8	392
488.950 **19.2500**	622.300 24.5000	365.125 14.3750	365.125 14.3750	3.8	6.4	3 450	8 950	350 000	915 000	＊STF488KVE6251Eg	＊WTF488KVE6251Eg	2	0.29	3.5	2.3	272
490	625	435	435	3	5	4 550	12 500	465 000	1 280 000	STF490KVE6201AEg	WTF490KVE6201AEg	2-2	0.32	3.2	2.1	329
509.948 **20.0767**	654.924 25.7844	377.000 14.8425	379.000 14.9213	1.5	6.4	4 800	13 000	490 000	1 330 000	＊STF509KVE6554Eg	＊WTF509KVE6554Eg	1	0.41	2.4	1.6	321
520	735	535	535	5	6	8 800	22 700	900 000	2 310 000	STF520KVE7301Eg	WTF520KVE7301Eg	1-1	0.33	3.0	2.0	726
558.800 **22.0000**	736.600 29.0000	540.000 21.2598	540.000 21.2598	3.3	6.4	8 950	25 300	910 000	2 580 000	＊STF558KVE7351Eg	＊WTF558KVE7351Eg	1-3	0.35	2.9	1.9	625
595.312 **23.4375**	844.550 33.2500	615.950 24.2500	615.950 24.2500	1.5	6.4	12 600	33 000	1 290 000	3 350 000	＊STF595KVE8451Eg	＊WTF595KVE8451Eg	1	0.33	3.0	2.0	1 110
	844.550 33.2500	615.950 24.2500	615.950 24.2500	3.3	6.4	10 900	27 200	1 110 000	2 780 000	＊STF595KVE8452Eg	＊WTF595KVE8452Eg	4	0.35	2.9	1.9	1 110
609.600 **24.0000**	787.400 31.0000	361.950 14.2500	361.950 14.2500	1.5	6.4	5 450	14 400	555 000	1 470 000	＊STF609KVE7851Eg	＊WTF609KVE7851Eg	1	0.42	2.4	1.6	452
711.200 **28.0000**	914.400 36.0000	387.350 15.2500	317.500 12.5000	3.3	6.4	6 400	19 300	655 000	1 970 000	＊STF711KVE9152AEg	＊WTF711KVE9152AEg	1	0.38	2.6	1.8	585
	914.400 36.0000	410.000 16.1417	410.000 16.1417	3.3	6.4	7 000	20 100	715 000	2 050 000	＊STF711KVE9153Eg	＊WTF711KVE9153Eg	1-1	0.44	2.3	1.5	681
	914.400 36.0000	425.450 16.7500	387.350 15.2500	8.0	6.4	6 400	19 300	655 000	1 970 000	＊STF711KVE9155Eg	＊WTF711KVE9155Eg	1	0.38	2.6	1.8	675
785	1 015	700	700	4	6	13 500	41 000	1 380 000	4 150 000	STF785KVE1001Eg	WTF785KVE1001Eg	2-1	0.40	2.5	1.7	1 460
825.5	1 160	565	565	5	6	13 900	33 500	1 420 000	3 400 000	STF825KVE1101Eg	WTF825KVE1101Eg	1	0.40	2.5	1.7	1 890

Remark The bearings denoted by an asterisk (＊) are inch design.

Note (1) Refer to pages D130 and D131.

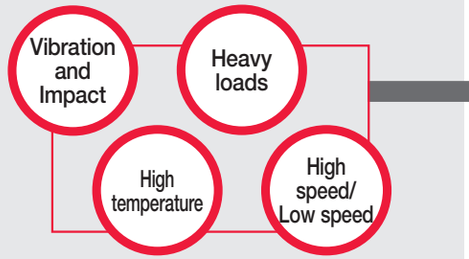
Bearings for Rolling Mills

Four-Row Cylindrical Roller Bearings for Roll Necks

Benefits

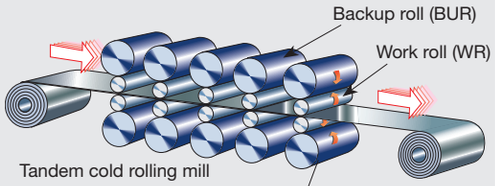
❶ Higher reliability and longer operating life prevent unexpected accidents
❷ Reduced maintenance costs
❸ Smoother rolling of bearings for backup rolls improves plate making precision

1. Operating conditions

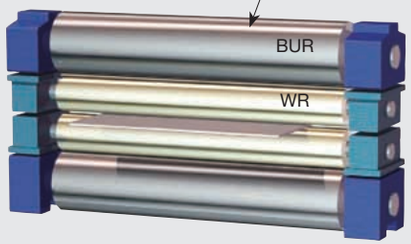


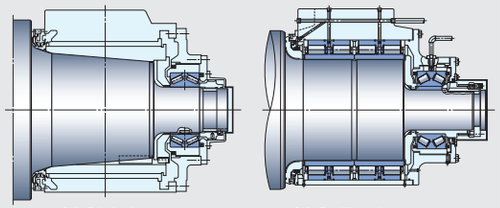
Major target mills:

- Plate mills
- Hot strip mills
- Cold rolling mills
- Skin pass mills
- Temper rolling mills
- Bar mills
- Rod mills
- Section mills



Tandem cold rolling mill

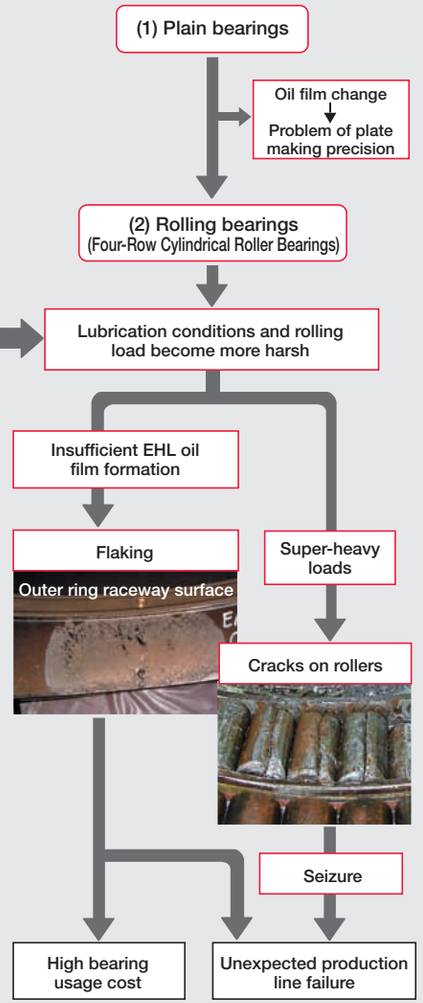


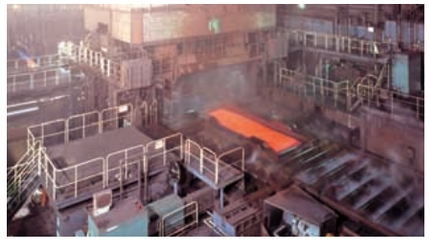


(1) Plain bearing (2) Rolling bearing

2. Problems

Typical problems of backup roll bearings



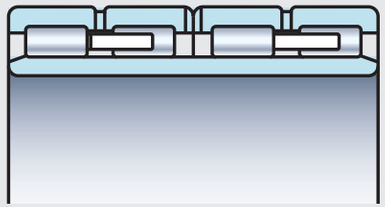


(*1)

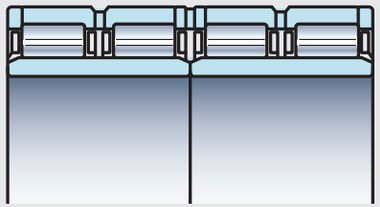
3. Countermeasures

Features Super-TF™ Four-Row Cylindrical Roller Bearings–STF-RV Series

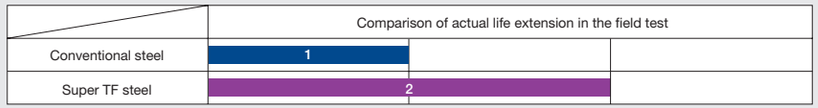
- Longer life Super-TF steel, resulting in longer durability, even under boundary-lubrication with insufficient EHL oil film formation
- Higher load capacity
- Higher rotational accuracy



RV (Brass cage)



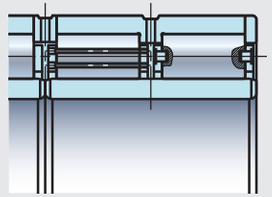
RV (Pin cage)



Features Super-TF™ Four-Row Cylindrical Roller Bearings–STF-RV Series Stud-type

Target: Bearings for backup rolls of plate mills

- Adoption of solid type rollers associated with the development of a stud-type cage
- Higher load capacity
- Adoption of long-life Super-TF steel
- Higher rotational accuracy



Bearing No.	Pages D144 to D165
Instructions Manual	CAT.No.E9001 (Roll Neck Bearing Manual)
Super-TF Material	Pages A258 to A261

Note (*1): Photo courtesy of NIPPON STEEL & SUMITOMO METAL CORPORATION KASHIMA WORKS pamphlet.

Four-Row Cylindrical Roller Bearings
Figures of Typical Four-Row Cylindrical Roller Bearings

Cylindrical Bore

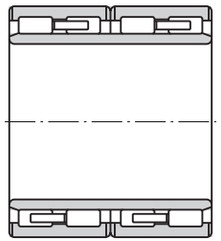


Figure 1

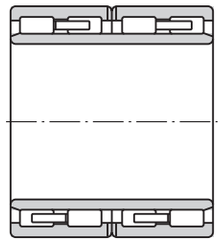


Figure 2

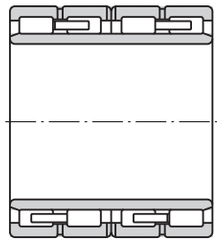


Figure 3

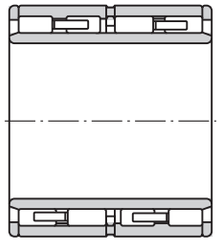


Figure 4

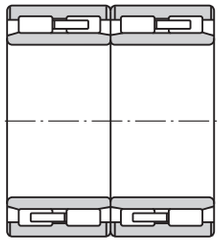


Figure 5

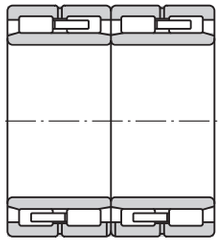


Figure 6

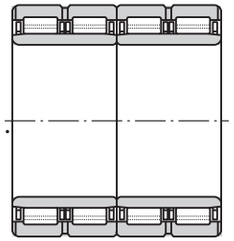


Figure 7

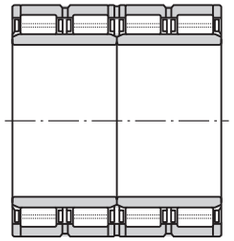


Figure 8

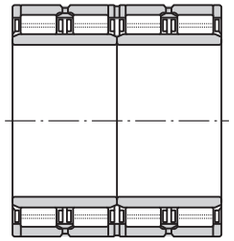


Figure 9

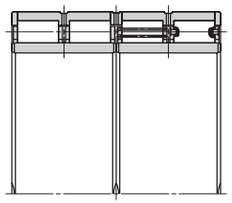


Figure 8SP

Tapered Bore

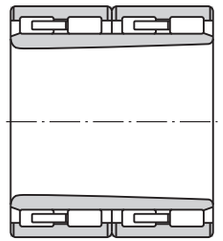


Figure 10

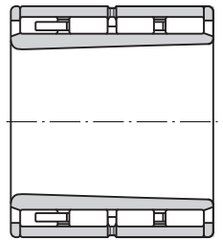


Figure 11

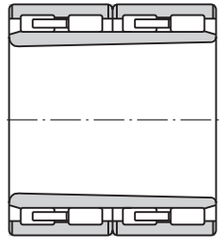


Figure 12

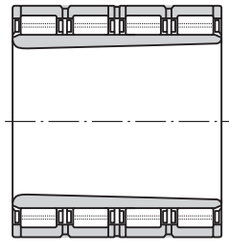
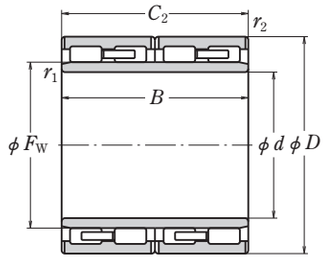
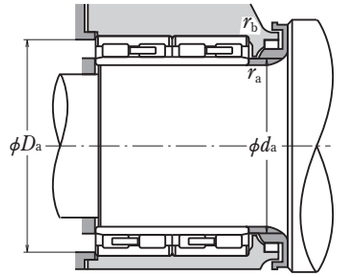


Figure 13

Four-Row Cylindrical Roller Bearings
Bore Diameter 100 – 160 mm



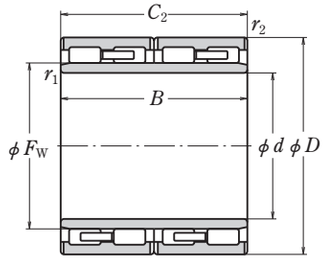


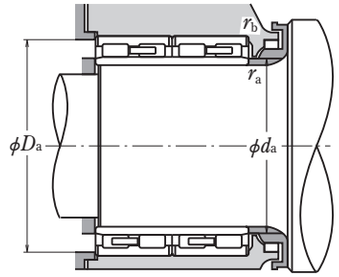
Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
100	140	104	104	111	1.5	1.1	400	820	**HTF100RV1401g**	3	110	130	1.5	1	4.8
110	160	120	120	124	1.1	1.1	560	1 080	**HTF110RV1601g**	3	119	150	1	1	7.9
	170	120	120	127	2	2	615	1 100	**HTF110RV1701g**	1	122	157	2	2	9.9
120	165	87	87	134.5	1.1	1.1	365	725	**HTF120RV1601g**	1	130	155	1	1	5.4
	180	105	105	136	2	2	530	880	**HTF120RV1801g**	1	132	167	2	2	8.9
	215	174	174	147	2.1	2.1	1 060	1 600	**HTF120RV2101g**	1	134	199	2	2	26.6
127	174.625	150.812	150.812	139.5	1.5	2	735	1 580	**HTF127RV1722g**	1	138	163	1.5	1.5	10.5
	203.2	127	127	147.5	2	1.5	705	1 110	**HTF127RV2001g**	1	139	190	2	2	15.4
130	200	125	125	149	2	2	700	1 190	**STF130RV2001g**	1	142	187	2	2	14
	200	104	104	149	2	2	570	950	**STF130RV2003g**	1	142	187	2	2	11.7
140	210	116	116	160	2	2	640	1 130	**STF140RV2101g**	1	152	196	2	2	13.9
145	210	155	155	166	1.5	1.5	925	1 920	**STF145RV2101g**	1	157	197	1.5	1.5	17.8
	225	156	156	169	2	2	975	1 820	**STF145RV2201g**	1	158	211	2	2	23
150	220	150	150	168	2	2	900	1 700	**STF150RV2201g**	1	163	206	2	2	20
	225	150	150	168.5	1.5	2.1	970	1 810	**STF150RV2203g**	1	162	209	1.5	2	20.8
	225	136	136	168.776	2.1	2.1	820	1 460	**STF150RV2204g**	1	165	209	2	2	18.6
	230	130	130	174	2.1	2.1	845	1 520	**STF150RV2301g**	1	165	214	2	2	19.6
	230	156	156	174	2	2	965	1 810	**STF150RV2302g**	1	163	216	2	2	23.6
159.99	220	180	180	176	2	2	1 050	2 410	**STF159RV2201g**	2	173	206	2	2	20.6
160	230	130	130	178	2	2	780	1 340	**STF160RV2301g**	1	173	216	2	2	16.4
	230	168	168	179	2	2	900	2 050	**STF160RV2307g**	1	173	216	2	2	23.0
	230	168	168	180	2	2	1 040	2 200	**STF160RV2302g**	1	173	216	2	2	22.7
	230	180	180	178	2	2	1 080	2 280	**STF160RV2303g**	2	173	216	2	2	24.2
	240	120	120	183	2.1	2.1	745	1 320	**STF160RV2401g**	1	175	224	2	2	18.8
	240	170	170	183	2	2	1 080	2 050	**STF160RV2402g**	1	173	226	2	2	26.6
	240	145	145	180.016	2.1	2.1	920	1 600	**STF160RV2403g**	1	175	224	2	2	22.3

Note ([1]) Refer to pages D142 and D143.

Bearings for Rolling Mills

Four-Row Cylindrical Roller Bearings
Bore Diameter 165.1 – 200 mm



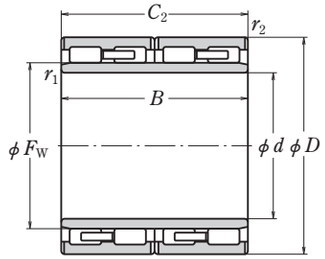


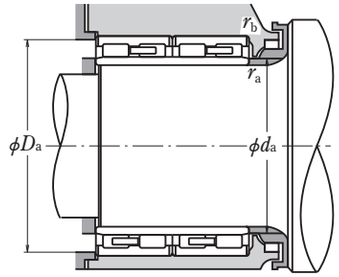
Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
165.1	225.45	168.3	168.3	180.975	1.5	2.5	1 010	2 220	**STF165RV2221g**	5	177	209	1.5	2	19.4
170	230	120	120	187	2	2	755	1 610	**STF170RV2301g**	1	183	216	2	2	14
	240	160	160	190	2	2	1 000	2 130	**STF170RV2402g**	1	183	226	2	2	22.8
	250	168	168	192	2.1	2.1	1 210	2 320	**STF170RV2501g**	1	185	234	2	2	27.4
	250	170	170	192	2.1	2.1	1 210	2 320	**STF170RV2502g**	1	185	234	2	2	27.7
	255	180	180	193	2.1	2.1	1 310	2 500	**STF170RV2503g**	1	185	239	2	2	31.5
	260	150	150	195	2.1	2.1	1 030	1 840	**STF170RV2602g**	1	185	244	2	2	28.2
180	250	156	156	200	2	2	1 020	2 230	**STF180RV2501g**	1	193	236	2	2	23.4
	260	168	168	202	2.1	2.1	1 150	2 300	**STF180RV2601g**	1	195	244	2	2	29.2
	265	180	180	204	2.1	2.1	1 340	2 690	**STF180RV2602g**	1	195	248	2	2	33.7
	265	180	180	203	2.1	2.1	1 230	2 420	**STF180RV2603g**	1	195	248	2	2	33.4
	280	180	180	205.085	2.1	2.1	1 410	2 490	**STF180RV2802g**	3	195	263	2	2	40.9
190	260	168	168	212	2	2	1 140	2 600	**STF190RV2601g**	1	203	245	2	2	26.6
	270	200	200	212	2.1	2.1	1 470	3 100	**STF190RV2701g**	1	206	253	2	2	36
	270	170	170	213	2.1	2.1	1 290	2 610	**STF190RV2702g**	1	206	253	2	2	30.4
	270	170	170	212	2	2	1 290	2 610	**STF190RV2703g**	1	203	255	2	2	30.6
	280	200	200	214	2.1	2.1	1 480	2 920	**STF190RV2801g**	1	206	263	2	2	41.3
200	250	200	200	215	1	1	900	2 500	**STF200RV2521g**	SP	210	240	1	1	22.3
	270	170	170	222	2.1	2.1	1 120	2 590	**STF200RV2702g**	1	216	253	2	2	27.9
	270	200	200	222.25	2.1	2.1	1 330	3 250	**STF200RV2703g**	SP	216	253	2	2	34.4
	280	200	200	224	2.1	2.1	1 410	3 200	**STF200RV2801g**	1	216	263	2	2	38.3
	280	200	200	222	2.1	2.1	1 410	3 200	**STF200RV2802g**	1	216	263	2	2	38.6
	280	190	190	223	2.1	2.1	1 350	3 050	**STF200RV2803g**	1	216	263	2	2	36.4
	280	170	170	223	2.1	2.1	1 150	2 460	**STF200RV2804g**	1	216	263	2	2	32.3
	280	200	200	222	2.1	2.1	1 500	3 200	**STF200RV2808g**	1	216	263	2	2	37.8
	290	192	192	226	2.1	2.1	1 420	3 000	**STF200RV2901g**	1	216	273	2	2	42.3
	310	230	230	229	2.1	2.1	1 840	3 500	**STF200RV3102g**	1	216	293	2	2	63.7
	320	216	216	231	3	3	2 120	3 900	**STF200RV3231g**	4	218	300	4	4	69.9

Notes ([1]) Refer to pages D142 and D143.
The letter "SP" indicates special design.
Please consult with NSK for detailed specification.

Bearings for Rolling Mills

Four-Row Cylindrical Roller Bearings
Bore Diameter 210 – 260 mm

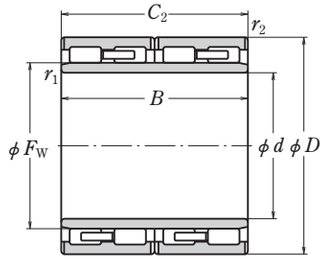


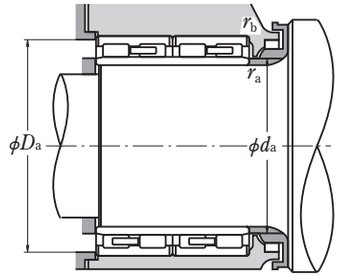


Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
210	290	192	192	236	2.1	2.1	1 400	3 350	**STF210RV2901g**	1	226	273	2	2	39
	300	210	210	234	2	2	1 750	3 600	**STF210RV3001g**	1	224	285	2	2	47.4
219.954	310	183	183	244.5	1.5	1	1 480	3 150	**STF219RV3131g**	4	233	298	1.5	1	45.3
220	310	192	192	247	2.1	2.1	1 540	3 450	**STF220RV3101g**	1	236	293	2	2	46.1
	310	225	225	245	2.1	2.1	1 740	3 900	**STF220RV3102g**	1	236	293	2	2	52.9
	310	192	192	246	2.1	2.1	1 540	3 450	**STF220RV3103g**	1	236	293	2	2	46.2
	310	192	192	246	2.1	2.1	1 660	3 550	**STF220RV3106g**	1	236	293	2	2	46.0
	310	225	225	244	2.1	2.1	1 900	4 100	**STF220RV3107g**	1	236	293	2	2	53.0
	320	210	210	248	2.1	2.1	1 790	3 650	**STF220RV3201g**	1	236	302	2	2	56
	320	210	210	249	2.1	2.1	1 850	3 600	**STF220RV3202g**	1	236	302	2	2	54.9
	320	210	210	246	2.1	2.1	1 900	3 750	**STF220RV3203g**	SP	236	302	2	2	57
222.25	320.675	241.3	241.3	251	2.1	2.1	1 990	4 350	**STF222RV3201g**	2	238	303	2	2	65
230	330	206	206	260	2.1	2.1	1 760	3 900	**STF230RV3301g**	1	246	312	2	2	58.2
	330	206	206	258	2.1	2.1	1 870	3 950	**STF230RV3302g**	1	246	312	2	2	57.3
	340	260	260	261	3	3	2 390	5 100	**STF230RV3401g**	1	248	320	2.5	2.5	81
	365	250	250	266	3	3	2 310	4 300	**STF230RV3601g**	5	248	344	2.5	2.5	98.3
240	330	220	220	270	3	3	1 770	4 400	**STF240RV3301g**	1	259	310	2.5	2.5	57.7
	330	220	220	264	3	3	1 840	4 100	**STF240RV3304g**	3	259	310	2.5	2.5	55.1
	340	220	220	268	3	3	1 890	3 900	**STF240RV3403g**	1	259	320	2.5	2.5	61.7
	360	220	220	272	3	3	2 250	4 350	**STF240RV3601g**	2	259	340	2.5	2.5	77.8
250	340	230	230	276	4	4	2 030	4 750	**STF250RV3401g**	1	272	317	3	3	60.3
	350	220	220	278	3	3	1 930	4 200	**STF250RV3501g**	1	269	330	2.5	2.5	64.8
259.948	368	218	218	290	2.1	1.1	2 010	4 350	**STF259RV3631g**	4	277	354	2	1	76.7
260	355	260	260	286	2.1	2.1	2 090	5 000	**STF260RV3521g**	5	277	337	2	2	74.5
	370	220	220	292	3	3	2 050	4 450	**STF260RV3701g**	1	279	349	2.5	2.5	76
	370	220	220	290	3	3	2 220	4 450	**STF260RV3704g**	1	279	349	2.5	2.5	73.5
	370	260	260	290	3	3	2 720	5 950	**STF260RV3721g**	1	279	349	2.5	2.5	89.3
	380	280	280	294	3	3	2 820	6 250	**STF260RV3801g**	1	279	359	2.5	2.5	107
	400	290	290	296	4	4	3 250	6 350	**STF260RV4001g**	1	282	376	3	3	133

Notes ([1]) Refer to pages D142 and D143.
The letter "SP" indicates special design.
Please consult with NSK for detailed specification.

Four-Row Cylindrical Roller Bearings
Bore Diameter 270 – 330 mm

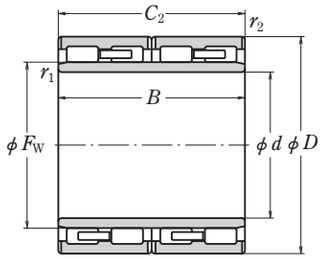


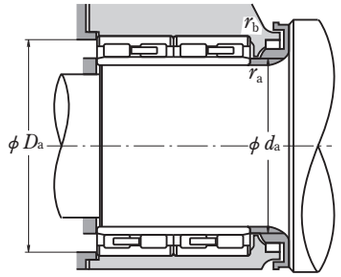


Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
270	380	230	230	298	2.1	2.1	2 330	5 050	**STF270RV3801g**	1	287	361	2	2	83
280	390	220	220	312	3	3	2 120	4 800	**STF280RV3901g**	1	299	369	2.5	2.5	80.9
	390	240	240	312	3	3	2 360	5 500	**STF280RV3902g**	1	299	369	2.5	2.5	88.5
	390	275	275	308	3	1.1	2 860	6 450	**STF280RV3903g**	1	299	375	2.5	1	100
	390	220	220	312	3	3	2 280	5 100	**STF280RV3907Ag**	1	299	369	2.5	2.5	81.6
	390	275	275	308	Spec.	1.1	2 860	6 450	**STF280RV3911Ag**	SP	298	375	2	1	99.5
	390	275	275	308	Spec.	3	2 860	6 450	**STF280RV3921Ag**	6	298	369	2	2.5	99.2
	400	285	285	316	3	3	3 000	6 950	**STF280RV4021g**	5	299	379	2.5	2.5	117
290	390	234	234	320	3	3	2 270	5 600	**STF290RV3901g**	1	310	369	2.5	2.5	79.7
	410	240	240	320	3	3	2 570	5 450	**STF290RV4101g**	1	310	389	2.5	2.5	99
	410	240	240	321	3	3	2 600	5 250	**STF290RV4102g**	1	310	389	2.5	2.5	97.1
	420	300	300	327	3	3	3 300	7 500	**STF290RV4201g**	1	310	398	2.5	2.5	138
300	400	300	300	328	2	2	2 720	6 900	**STF300RV4021g**	5	316	383	2	2	103
	420	240	240	332	3	3	2 670	5 750	**STF300RV4201g**	1	320	398	2.5	2.5	101
	420	300	300	332	3	3	3 200	7 200	**STF300RV4204Ag**	3	320	398	2.5	2.5	127
	420	300	300	332	Spec.	1.5	3 550	8 350	**STF300RV4216g**	SP	319	403	2	1.5	132
	420	300	300	332	2	2	3 200	7 200	**STF300RV4221g**	5	316	402	2	2	128
310	420	300	300	338	3	3	3 300	8 050	**STF310RV4201g**	1	330	398	2.5	2.5	119
	430	240	240	344.5	3	3	2 610	5 950	**STF310RV4301g**	1	330	408	2.5	2.5	107
320	440	240	240	351	4	4	2 490	5 350	**STF320RV4401g**	1	343	415	3	3	104
	450	240	240	358	3	3	2 760	6 150	**STF320RV4501g**	1	340	428	2.5	2.5	120
	450	240	240	355	3	3	2 710	5 750	**STF320RV4502g**	1	340	428	2.5	2.5	117
	460	340	340	360	3	3	3 850	8 700	**STF320RV4601g**	3	340	438	2.5	2.5	184
	460	240	240	364	3	3	2 820	6 100	**STF320RV4621g**	5	340	438	2.5	2.5	131
	480	350	350	364	4	1.5	4 850	10 500	**STF320RV4811g**	8	343	462	3	1.5	232
330	430	230	230	358	3	3	2 340	5 850	**STF330RV4301g**	1	350	408	2.5	2.5	86.3
	440	200	200	360	3	3	2 160	4 750	**STF330RV4401g**	3	350	418	2.5	2.5	83.8
	460	340	340	365	4	4	3 550	8 650	**STF330RV4601g**	1	353	435	3	3	174
	460	340	340	365	4	2.5	4 150	9 750	**STF330RV4611g**	SP	353	439	3	2	172

Notes ([1]) Refer to pages D142 and D143.
The letter "SP" indicates special design.
Please consult with NSK for detailed specification.

Four-Row Cylindrical Roller Bearings
Bore Diameter 340 – 400 mm

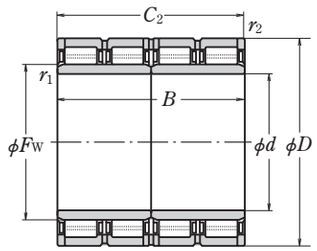


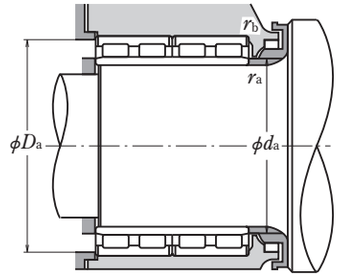


Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
340	450	250	250	371	3	3	2 720	6 750	**STF340RV4501g**	1	361	428	2.5	2.5	108
	450	250	250	368	3	3	2 720	6 750	**STF340RV4502g**	3	361	428	2.5	2.5	108
	480	350	350	378	4	4	4 050	9 400	**STF340RV4801g**	1	364	454	3	3	198
	480	350	350	378	Spec.	1.5	4 600	11 100	**STF340RV4812Eg**	1	355	462	2.9	1.5	208
	490	300	300	379	5	5	3 750	8 200	**STF340RV4901g**	1	368	460	4	4	186
345	480	350	350	376	3	3	4 400	10 300	**STF345RV4821g**	6	366	457	2.5	2.5	190
350	500	380	380	389	5	5	4 850	11 100	**STF350RV5021g**	6	378	470	4	4	237
360	480	290	290	394	3	3	3 250	8 300	**STF360RV4801g**	1	381	457	2.5	2.5	146
	500	250	250	394	3	3	3 450	7 250	**STF360RV5022g**	5	381	477	2.5	2.5	146
	510	370	370	400	4	4	4 500	10 100	**STF360RV5101g**	1	384	484	3	3	234
370	480	250	250	401	3	3	2 830	7 350	**STF370RV4801g**	1	391	457	2.5	2.5	116
	520	380	380	409	4	2	6 000	14 400	**STF370RV5211g**	SP	394	500	3	2	263
	520	380	380	409	Spec.	1.5	5 600	13 300	**STF370RV5212g**	SP	393	501	3	1.5	252
	540	400	400	415	4	4	5 250	12 000	**STF370RV5401g**	1	394	513	3	3	311
380	500	290	290	414	3	3	3 350	8 800	**STF380RV5001g**	1	401	477	2.5	2.5	153
	520	290	290	418	4	4	3 750	8 850	**STF380RV5201g**	1	404	493	3	3	181
	520	280	280	417	4	4	3 650	8 450	**STF380RV5202g**	1	404	493	3	3	174
	540	340	340	424	5	5	4 700	10 900	**STF380RV5431g**	4	408	509	4	4	259
	540	400	400	424	5	5	5 050	12 000	**STF380RV5401g**	3	408	509	4	4	280
	540	400	400	422	5	2	6 000	14 400	**STF380RV5411g**	8	408	520	4	2	305
	540	400	400	424	5	2	5 750	13 800	**STF380RV5412g**	SP	408	520	4	2	294
390	510	290	290	424	3	3	3 400	9 000	**STF390RV5101g**	1	412	487	2.5	2.5	156
	550	400	400	434	5	5	5 150	12 400	**STF390RV5521g**	6	419	519	4	4	303
400	520	250	250	432	4	4	3 000	7 700	**STF400RV5202g**	3	425	493	3	3	136
	550	300	300	441	4	4	4 150	9 750	**STF400RV5501g**	1	425	523	3	3	212
	560	400	400	446	5	5	5 650	13 600	**STF400RV5612g**	8	429	529	4	4	308
	560	410	410	445	5	2	6 550	16 500	**STF400RV5613g**	8M	429	539	4	2	315
	560	400	400	446	5	5	4 750	11 300	**STF400RV5621g**	6	429	529	4	4	304
	560	410	410	445	5	2	6 550	16 500	**STF400RV5611g**	8	429	539	4	2	315

Notes ([1]) Refer to pages D142 and D143.
The letter "M" indicates bearing for oil mist lubrication.
The letter "SP" indicates special design.
Please consult with NSK for detailed specification.

Four-Row Cylindrical Roller Bearings
Bore Diameter 406.4 – 500 mm



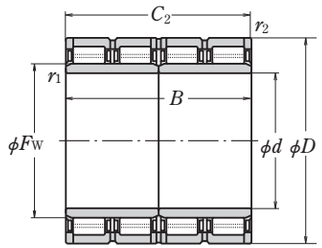


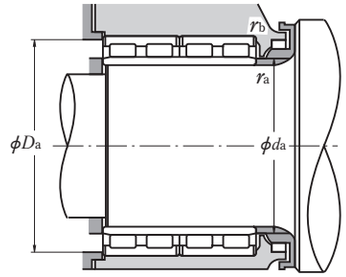
Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
406.4	609.6	304.8	304.8	460	5	5	4 650	9 150	**STF406RV6001g**	1	435	577	4	4	307
410	600	440	440	460	5	5	7 350	16 600	**STF410RV6011g**	8	439	568	4	4	438
420	560	280	280	457	4	4	3 800	9 250	**STF420RV5601g**	1	445	533	3	3	190
	560	400	400	458	4	4	4 950	13 000	**STF420RV5602g**	6	445	533	3	3	270
	600	440	440	470	5	2	7 100	17 200	**STF420RV6011g**	8	449	579	4	4	419
	600	440	440	465	5	5	7 300	17 200	**STF420RV6012g**	8	449	568	4	4	402
430	591	420	420	476	4	4	6 350	16 100	**STF430RV5911g**	8	455	563	3	3	347
	591	420	420	476	4	4	5 200	13 400	**STF430RV5921g**	5	455	563	3	3	347
440	620	450	450	487	5	5	7 350	17 800	**STF440RV6213g**	8	470	588	4	4	430
	620	450	450	487	Spec.	3	8 100	19 700	**STF440RV6215g**	8	466	594	3	2.5	433
	620	450	450	490	4	4	7 450	19 000	**STF440RV6221g**	5	466	591	3	3	430
450	630	450	450	500	4	4	6 950	17 500	**STF450RV6321g**	5	476	601	3	3	440
460	620	400	400	506	4	4	5 500	14 700	**STF460RV6201g**	1	486	591	3	3	347
	620	400	400	502	4	4	6 400	16 600	**STF460RV6211g**	8	486	591	3	3	358
	620	460	460	502	4	4	7 100	19 100	**STF460RV6212g**	8M	486	591	3	3	412
	650	470	470	509	6	3	8 400	20 900	**STF460RV6511g**	8	496	624	5	2.5	514
	650	470	470	509	4	3	8 600	21 200	**STF460RV6513g**	8	486	624	3	2.5	501
	670	500	500	522	6	6	8 900	22 700	**STF460RV6721g**	7	496	631	5	5	596
470	660	470	470	519	4	4	8 450	20 800	**STF470RV6611g**	8	496	631	3	3	505
480	680	420	420	528	Spec.	3	8 350	19 000	**STF480RV6814g**	8	508	653	3.5	2.5	490
	680	500	500	532	4	3	9 400	23 500	**STF480RV6815g**	8	506	653	3	2.5	586
	680	500	500	534	5	5	9 000	23 100	**STF480RV6801g**	7	510	646	4	4	610
	680	500	500	534	5	5	9 000	23 100	**STF480RV6811g**	8	510	646	4	4	610
	700	400	400	538	6	6	7 650	17 400	**STF480RV7031g**	9	517	660	5	5	538
500	670	450	450	540	Spec.	4	7 750	20 000	**STF500RV6713g**	8	529	640	3.5	3	446
	670	450	450	540	5	5	8 300	22 300	**STF500RV6712Eg**	SP	531	637	4	4	464
	680	420	405	550	5	5	6 700	17 600	**STF500RV6812g**	8	531	646	4	4	451

Notes ([1]) Refer to pages D142 and D143.
The letter "M" indicates bearing for oil mist lubrication.
The letter "SP" indicates special design.
Please consult with NSK for detailed specification.

Bearings for Rolling Mills

Four-Row Cylindrical Roller Bearings
Bore Diameter 500 – 610 mm

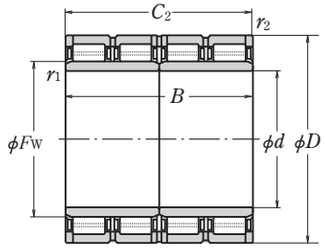


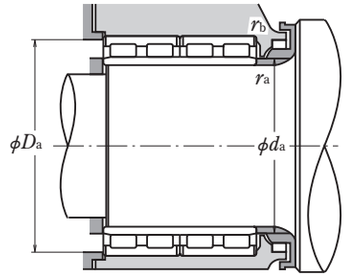


Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
500	690	510	510	550	5	5	8 850	23 900	**STF500RV6913g**	8M	531	656	4	4	480
	690	510	510	552	5	5	9 000	24 600	**STF500RV6921g**	7	531	656	4	4	580
	700	515	515	554	5	5	9 100	23 800	**STF500RV7021g**	7	531	666	4	4	622
	710	480	480	558	5	5	8 500	21 200	**STF500RV7111g**	8	531	676	4	4	632
	720	530	530	560	6	6	9 950	25 300	**STF500RV7211g**	8	537	680	5	5	782
	720	530	530	568	6	6	10 100	25 900	**STF500RV7214g**	8M	537	680	5	5	722
510	670	320	320	554	5	5	4 950	12 700	**STF510RV6701g**	1	541	637	4	4	298
	680	500	500	560	5	5	8 950	25 700	**STF510RV6811g**	8	541	646	4	4	514
520	735	535	535	574.5	5	5	10 400	26 300	**STF520RV7331g**	9	551	700	4	4	750
	735	535	535	574.5	5	5	10 800	27 500	**STF520RV7311g**	8M	551	700	4	4	733
530	780	570	570	601	6	6	11 800	29 200	**STF530RV7811g**	8M	568	738	5	5	960
	780	570	570	595	6	6	11 800	29 200	**STF530RV7813g**	8	568	738	5	5	960
536.176	762.03	558.8	558.8	600	5	5	10 800	28 800	**STF536RV7631g**	9	568	727	4	4	849
	762.03	558.8	558.8	598	Spec.	4	11 600	30 000	**STF536RV7612Eg**	SP	568	731	5.8	3	849
550	740	510	510	602	5	5	9 150	25 700	**STF550RV7411Ag**	8M	582	705	4	4	648
	740	510	510	600	Spec.	2	10 100	27 600	**STF550RV7413g**	8	580	716	3.5	2	632
560	800	600	600	620	6	6	12 400	31 500	**STF560RV8011g**	8	598	758	5	5	1 020
	820	600	600	625	Spec.	6	14 100	34 000	**STF560RV8211g**	8	595	778	4.5	5	1 100
570	815	594	594	628	6	6	13 200	32 000	**STF570RV8113g**	8	608	773	5	5	1 010
	815	594	594	628	6	6	13 700	33 500	**STF570RV8111g**	8	608	773	5	5	960
571.1	812.97	594	594	636	6	5	13 200	34 500	**STF571RV8111g**	8	610	777	5	4	947
600	820	575	575	660	Spec.	3	12 900	35 500	**STF600RV8212Eg**	SP	629	790	5.5	2.5	931
	850	600	600	664	5	5	14 600	37 500	**STF600RV8511g**	8M	633	813	4	4	1 110
	870	640	640	682	7.5	4	15 700	40 000	**STF600RV8711g**	8M	645	836	6	3	1 320
	870	640	640	672	7.5	4	15 700	40 000	**STF600RV8713g**	8	645	836	6	3	1 320
	870	640	640	669	5	5	15 700	40 000	**STF600RV8714g**	8M	633	833	4	4	1 310
610	850	570	570	670	6	5	12 600	33 000	**STF610RV8511g**	8	649	813	5	4	1 040
	870	660	660	680	6	6	15 400	41 500	**STF610RV8711g**	8	649	827	5	5	1 330

Notes ([1]) Refer to pages D142 and D143.
The letter "M" indicates bearing for oil mist lubrication.
The letter "SP" indicates special design.
Please consult with NSK for detailed specification.

Four-Row Cylindrical Roller Bearings
Bore Diameter 628 – 750 mm

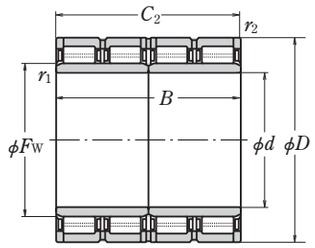


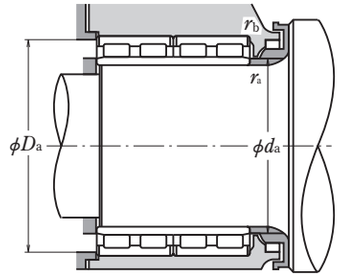


Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
628	922	600	600	702	6	5	15 600	37 000	**STF628RV9211g**	8	668	883	5	4	1 390
634.5	901.87	674	674	705	7.5	4	16 200	43 500	**STF634RV9031g**	9	680	868	6	3	1 440
	901.87	674	674	705	5	4	17 000	44 500	**STF634RV9011g**	8M	668	868	4	3	1 410
640	870	610	610	697	6	3	14 200	40 000	**STF640RV8711g**	8M	680	839	5	2.5	1 100
	880	600	600	700	6	6	14 200	38 000	**STF640RV8812g**	8	680	836	5	5	1 110
650	900	650	650	710	Spec.	5	16 000	42 000	**STF650RV9011g**	8	688	862	4.5	4	1 280
	920	670	670	723	7.5	7.5	16 200	44 000	**STF650RV9212g**	8	696	870	6	6	1 470
	920	690	690	723	7.5	7.5	16 600	45 000	**STF650RV9211g**	8	696	870	6	6	1 520
660	930	660	660	728	6	6	17 000	44 000	**STF660RV9311g**	8	700	885	5	5	1 440
680	980	640	640	760	Spec.	4	17 500	43 500	**STF680RV9811g**	8	727	944	6	3	1 630
690	960	670	670	760	7.5	7.5	17 400	47 000	**STF690RV9611g**	8	737	909	6	6	1 520
	980	715	715	767.5	7.5	7.5	17 900	48 000	**STF690RV9831g**	9	737	929	6	6	1 790
	980	750	750	766	7.5	7.5	19 200	53 000	**STF690RV9832g**	9M	737	929	6	6	1 880
	980	750	750	766	7.5	7.5	19 200	53 000	**STF690RV9812g**	8	737	929	6	6	1 880
	980	750	750	766	7.5	7.5	19 200	53 000	**STF690RV9813g**	8M	737	929	6	6	1 860
700	930	620	620	763	6	6	12 900	38 000	**STF700RV9311g**	8	741	885	5	5	1 200
	930	620	620	763	6	6	14 800	43 000	**STF700RV9313g**	8	741	885	5	5	1 180
	980	700	700	774	6	6	18 000	48 500	**STF700RV9813g**	8	741	934	5	5	1 680
	980	700	700	774	6	6	17 800	49 000	**STF700RV9821g**	7	741	934	5	5	1 720
710	1000	715	715	787.5	7.5	7.5	18 700	50 500	**STF710RV1011g**	8	757	948	6	6	1 840
725	1000	700	700	796	6	6	18 200	51 000	**STF725RV1011g**	8	767	954	5	5	1 670
	1000	700	700	790	Spec.	4	19 000	51 500	**STF725RV1012g**	8	763	964	4.5	3	1 700
	1000	700	700	796	6	6	17 700	49 500	**STF725RV1021g**	7	767	954	5	5	1 670
730	960	620	620	790	6	3	15 000	44 500	**STF730RV9611g**	8	772	928	5	2.5	1 250
	1030	750	750	809	6	6	20 700	56 500	**STF730RV1011g**	8	772	983	5	5	2 050
750	1000	670	670	813	6	6	16 800	49 500	**STF750RV1011g**	8	792	954	5	5	1 520
	1000	670	670	813	Spec.	3	17 500	50 000	**STF750RV1013g**	8	798	967	6	2.5	1 490

Notes ([1]) Refer to pages D142 and D143.
The letter "M" indicates bearing for oil mist lubrication.

Four-Row Cylindrical Roller Bearings
Bore Diameter 755 – 850 mm

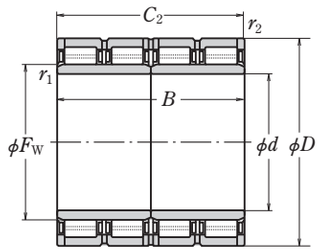


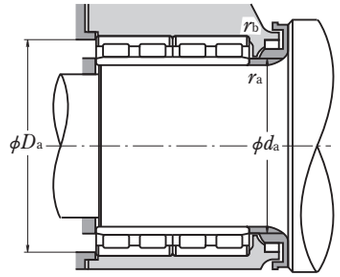


Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
755	1 070	750	750	837	7.5	7.5	21 700	58 500	**STF755RV1011g**	8	803	1 017	6	6	2 230
760	1 030	750	750	834	7.5	7.5	18 200	53 500	**STF760RV1031g**	9	808	978	6	6	1 880
	1 030	750	750	828	7.5	7.5	20 800	60 000	**STF760RV1012g**	8M	808	978	6	6	1 850
	1 080	805	790	845	6	6	22 200	61 000	**STF760RV1032Ag**	9M	802	1 032	5	5	2 430
761.425	1 079.602	787.4	787.4	846	Spec.	7.5	23 900	65 500	**STF761RV1012g**	8	807	1 026	5.5	6	2 390
	1 079.602	787.4	787.4	845	7.5	7.5	22 200	61 000	**STF761RV1032g**	9	810	1 026	6	6	2 390
770	1 075	770	770	847	7.5	7.5	23 100	63 500	**STF770RV1011g**	8M	819	1 022	6	6	2 220
780	1 070	780	780	853	6	6	22 800	64 500	**STF780RV1013g**	8	823	1 023	5	5	2 140
800	1 080	700	700	878	6	3	19 100	56 000	**STF800RV1013g**	8	843	1 045	5	2.5	1 920
	1 080	700	700	878	6	3	19 600	58 000	**STF800RV1011g**	8	843	1 045	5	2.5	1 910
	1 080	750	750	880	6	6	19 200	56 500	**STF800RV1012g**	8	843	1 032	5	5	2 050
	1 080	750	750	880	6	6	18 700	56 500	**STF800RV1032g**	9	843	1 032	5	5	2 050
820	1 100	745	720	892	6	3	19 700	58 500	**STF820RV1132g**	SP	863	1 065	5	2.5	2 000
	1 100	745	720	892	6	6	20 100	59 000	**STF820RV1119g**	8M	863	1 052	5	5	1 990
	1 130	650	650	891	Spec.	6	20 300	53 000	**STF820RV11112g**	8	867	1 081	5.5	5	2 000
	1 130	800	800	903	7.5	7.5	22 900	66 500	**STF820RV1117g**	8M	870	1 076	6	6	2 510
	1 130	825	800	903	7.5	7.5	22 900	66 500	**STF820RV1134g**	SP	870	1 076	6	6	2 530
	1 160	840	840	911	7.5	7.5	25 600	72 000	**STF820RV1111Ag**	8	870	1 105	6	6	2 900
840	1 160	840	840	920	2	7.5	24 900	71 000	**STF840RV1111g**	8M	866	1 105	2	6	2 790
850	1 150	840	840	928	7.5	4	23 300	68 500	**STF850RV1114g**	8	900	1 111	6	3	2 610
	1 150	840	840	928	7.5	8	25 600	77 500	**STF850RV1115g**	8	900	1 093	6	6.5	2 600
	1 180	650	650	945	7.5	7.5	19 600	53 000	**STF850RV1133g**	9	900	1 125	6	6	2 260
	1 180	850	850	940	7.5	7.5	24 600	72 000	**STF850RV1111g**	8M	900	1 125	6	6	2 850
	1 180	875	850	940	7.5	7.5	24 600	72 000	**STF850RV1112Ag**	8M	900	1 125	6	6	2 880

Notes ([1]) Refer to pages D142 and D143.
The letter "M" indicates bearing for oil mist lubrication.
The letter "SP" indicates special design.
Please consult with NSK for detailed specification.

Four-Row Cylindrical Roller Bearings
Bore Diameter 860 – 1348.95 mm

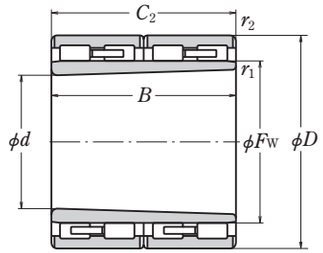


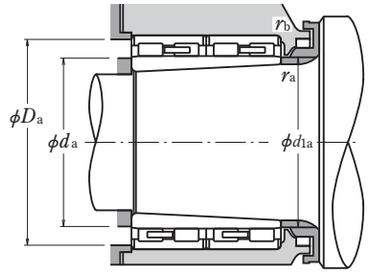


Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)				Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	D_a	r_a max.	r_b max.	approx.
860	1 130	670	670	934	6	6	18 400	56 500	**STF860RV1132g**	9	904	1 081	5	5	1 780
	1 160	735	710	940	7.5	4	20 400	60 000	**STF860RV1133g**	9	910	1 121	6	3	2 200
865	1 180	750	750	945.3	Spec.	7.5	23 800	67 000	**STF865RV1111g**	8	915	1 125	6	6	2 480
870	1 145	705	685	940	9.5	6	20 500	61 000	**STF870RV1111g**	8	929	1 096	8	5	1 970
880	1 230	850	850	970	7.5	7.5	29 100	81 000	**STF880RV1211g**	8	931	1 174	6	6	3 240
900	1 220	810	800	981	7.5	6	25 900	74 500	**STF900RV1216g**	8	951	1 170	6	5	2 790
	1 220	840	840	989	7.5	4	26 800	80 000	**STF900RV1212g**	8	951	1 179	6	3	2 950
	1 230	895	870	985	7.7	7.5	25 800	76 000	**STF900RV1211g**	8M	951	1 174	6	6	3 200
	1 280	930	930	1 000	7.5	7.5	32 000	89 500	**STF900RV1213g**	8	951	1 223	6	6	3 990
	1 280	930	930	1 000	7.5	7.5	33 000	93 000	**STF900RV1217g**	8	951	1 223	6	6	4 010
920	1 280	865	865	1 015	7.5	7.5	28 000	80 000	**STF920RV1211Ag**	8M	972	1 223	6	6	3 510
950	1 330	950	950	1 053	Spec.	9	33 500	97 000	**STF950RV1314g**	8	1 008	1 266	7.5	7.5	4 240
	1 360	1 000	1 000	1 075	9.5	5	37 500	108 000	**STF950RV1311g**	8	1 010	1 313	8	4	4 910
1 120	1 580	1 150	1 150	1 255	9.5	9.5	43 500	134 500	**STF1120RV1511g**	8	1 184	1 509	8	8	7 400
1 270	1 602	850	850	1 350	7.5	7.5	32 000	103 000	**STF1270RV1612g**	SP	1 329	1 538	6	6	4 130
1 300	1 655	890	880	1 391	7.5	7.5	34 000	110 500	**STF1300RV1612g**	SP	1 359	1 590	6	6	4 710
1 348.95	1 745	1 010	1 000	1 466	11.4	7.5	42 500	134 000	**STF1348RV1711g**	SP	1 423	1 678	9.5	6	6 240

Notes ([1]) Refer to pages D142 and D143.
The letter "M" indicates bearing for oil mist lubrication.
The letter "SP" indicates special design.
Please consult with NSK for detailed specification.

Four-Row Cylindrical Roller Bearings
Bore Diameter 110.417 – 633.333 mm





Boundary Dimensions (mm)							Basic Load Ratings (kN)		Bearing Numbers	Figure[1]	Abutment and Fillet Dimensions (mm)					Mass (kg)
d	D	B	C_2	F_w	r_1 min.	r_2 min.	C_r	C_{0r}			d_a	d_{1a}	D_a	r_a max.	r_b max.	approx.
110.417	180	115	115	136	1	1	490	840	**STF120RVK1801g**	10	118	128	171	1	1	10
151.5	230	168	168	180	1	1	1 040	2 170	**STF165RVK2331g**	11	160	174	220	1	1	23.5
179.75	260	175	168	212	1.1	2	1 140	2 600	**STF193RVK2602g**	10	190	205	245	1	2	25.1
180	260	175	168	212	1.1	2	1 140	2 600	**STF194RVK2602g**	10	191	206	245	1	2	25
181.5	260	168	168	209	1	2	1 140	2 600	**STF195RVK2602g**	10	191	205	245	1	2	24.2
235.367	360	268	268	278	1.5	1.5	2 770	6 000	**STF257RVK3631g**	11	249	272	344	1.5	1.5	92.9
266.25	400	285	285	312	2	2	3 200	7 500	**STF290RVK4031g**	11	281	305	383	2	2	118
356.667	550	400	400	434	5	5	5 450	13 300	**STF390RVK5531g**	12	385	419	519	4	4	328
	550	400	400	431.9	3	2.5	5 450	13 300	**STF390RVK5532g**	12	378	412	527	2.5	2	328
412.335	650	488	488	494.5	3	4	8 900	21 100	**STF453RVK6521g**	SP	434	476	621	2.5	3	603
485	740	540	540	580	5	5	10 100	26 800	**STF530RVK7431g**	13	516	561	705	4	4	823
633.333	960	680	680	745.8	7.5	7.5	18 100	47 000	**STF690RVK9632g**	13	679	737	909	6	6	1 720

Notes ([1]) Refer to pages D142 and D143.
The letter "SP" indicates special design.
Please consult with NSK for detailed specification.

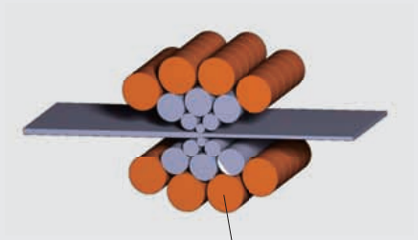
Backing Bearings for Multi-Roll Rolling Cluster Mills

Benefits

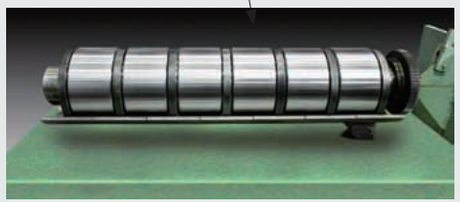
❶ Higher rellabillity and longer operating life prevent unexpected accident
❷ Reduce maintenance cost
❸ Somoother rolling of backing bearing's roll Improves plate making precision.

1. Operating conditions

Impact Load
Heavy Load
Low viscosity Oil Lubrication



E.g. Sendzimir Mill



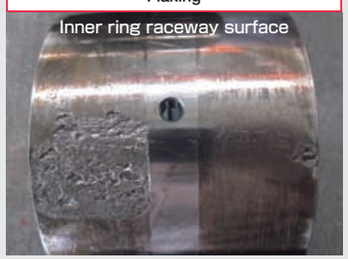
Backing bearings of a roll assemble unit

Backing bearings

2. Problems

Typical damage of backing bearings

Impact Load
Heavy Load
Low viscosity Oil Lubrication
→ Harsh Lubrication conditions
→ Load become more harsh
→ Insuffcient EHL Oil film formation
→ Fatigue of raceway
→ Fatigue of outer ring outside surface
→ Re-grinding (Outer-ring)
→ Flaking



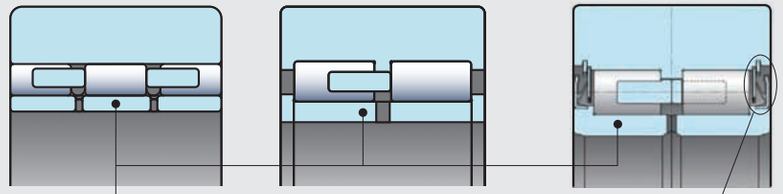
→ High bearing usage cost

(*1)

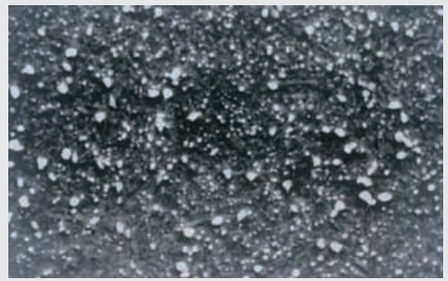
3. Countermeasures

Features Super-TF™ Backing Bearings–STF Series

- Optimal bearing specifications (Improvement of outer-ring's strength, outer and inner ring materials)
- Longer life Super TF steel, resulting in longer durability, even under boundary lubrication with sufficient EHL oil film formation.
- High rotational accuracy
- Sealed Type(2U):Keeping optimal internal pressure in bearings resulting sufficient lubrication under oil mist and oil-air lubrications.



Adoption of Super-TF Material



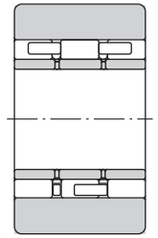
Distribution of carbides and carbonitrides in a Super-TF bearing. (X4000 magnification)

Bearing No. Pages D170 to D173
Super-TF Material Pages A258 to A261

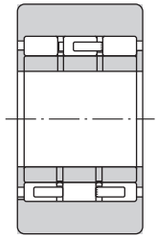
Note (*1): Photo courtesy of Nippon Steel & Sumikin Stainless Steel Corporation.

Backing Bearings for Multi-Roll Rolling Cluster Mills

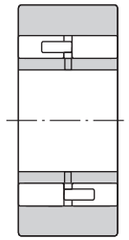
Figures of Typical Backing Bearings for Multi-Roll Rolling Mills



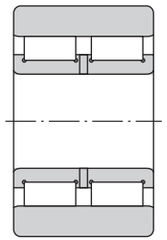
3PL
Figure 1



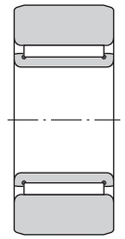
3U
Figure 2



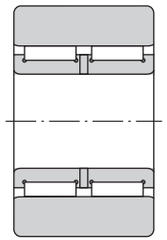
2PL
Figure 3



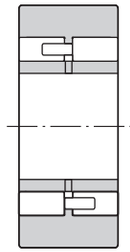
2L
Figure 4



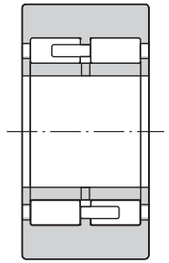
S
Figure 5



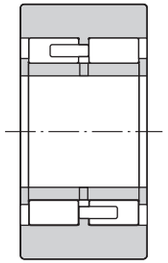
2S
Figure 6



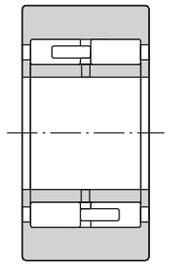
2U
Figure 7



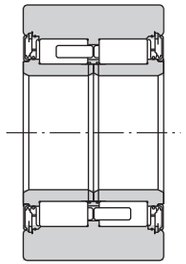
2U
Figure 8



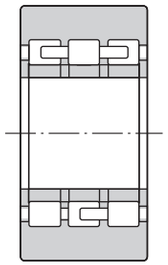
2U
Figure 9



2U
Figure 10

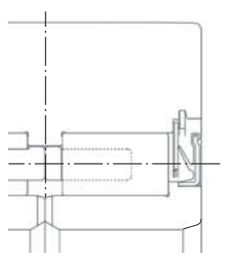


2U(Sealed Types)
Figure 11

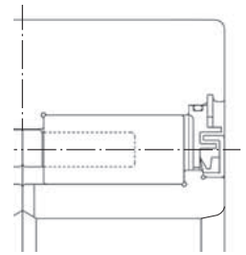


3U
Figure 12

(Example) Figure11 of Sealed 2U type bearings



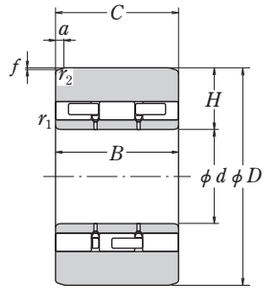
2U180-7



2U130-36, 2U130-16B

■Backing Bearings for Multi-Roll Rolling Cluster Mills

Bore Diameter 31.75 – 120 mm



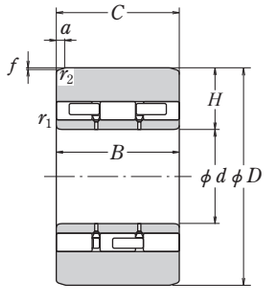
Boundary Dimensions (mm)						Basic Load Ratings (kN)		Permissible Radial Load Pu (kN) approx.	Bearing Numbers	Figure(2)	Outer Ring Edge Bevel (mm)		Radial Thickness When Delivered (mm)		Mass (kg) approx.
d	D	B	C	r_1 min.	r_2	C_r	C_{0r}(1)				a	f	H		
31.75	76.2	46.23	45.85	1	0.8	94.5	174	91.8	**2S31Z-5**	6	—	—	22.2	0 to +0.010	1.3
50	120	80	80	1.5	1.5	257	385	147	**2U50-4**	9	6.5	0.042	34.976	±0.010	5.2
									***2U50-4g3**						
	120	85	85	1	1.5	305	435	113	**2U50-6**	9	6.5	0.042	34.984	±0.010	5.3
									***2U50-6g3**						
55	120	26	26	1.6	1.6	74.5	142	90.2	**S55-2**	5	—	—	32.5	-0.025 to -0.010	1.7
									***S55-2g5**						
	120	52.2	52	1.6	1.6	159	375	185	**S55-1**	5	7	0.041	32.485	-0.010 to +0.005	3.4
									S55-1g5						
	120	52.2	52	1	1	186	298	115	**2L55-1**	4	5	0.036	32.5	0 to +0.010	3.2
60	160	95	95	1.1	1.5	400	590	290	**2U60-4**	9	6.5	0.042	49.984	±0.010	11.5
62	155	90	90	1.5	1	355	530	247	**2U62-1**	10	6	0.036	46.484	±0.010	9.9
	155	110	110	1.5	1	405	620	297	**3U62-1**	2	6	0.036	46.484	±0.010	12.1
70	160	90	90	1.1	1	410	745	303	**3PL70-1**	1	6	0.035	45	-0.048 to -0.018	10.7
90	220	95	95	1.1	2	590	880	347	**2U90-18**	8	6	0.105	64.982	±0.010	20.8
									***STF2U90-18g4**						
	220.02	96	94	1.5	1.5	520	730	333	**2U90-13**	8	8	0.047	65	-0.010 to 0	20.5
	220	120	119	1	3	685	1 020	411	**2U90-11**	8	21	0.086	65	-0.015 to 0	26.0
	220	122	119	1	3	685	1 020	410	**2U90-17**	8SP	21	0.086	65	-0.015 to 0	27.0
	220	120	120	1	2	675	1 260	494	**3U90-1**	2	6	0.105	64.98	0 to +0.010	27.2
	220	130	130	1	2	680	1 090	499	**3U90-4**	2SP	6	0.105	64.982	±0.010	28.7
	230	100	100	2.5	2	645	990	322	**2U90-9**	10SP	12	0.07	69.98	±0.010	24.4
100	225	80	80	2	1.5	535	925	366	**2PL100-3**	3	7.6	0.045	62.47	0 to +0.010	18.4
	225	120	119	2	3	550	1 000	586	**2U100-14**	8	12	0.07	62.5	±0.010	27.2
									***2U100-14g3**						
	225	120	120	2	2	715	1 350	542	**3PL100-1A**	1	8	0.093	62.47	0 to +0.010	27.5
100	260	130	130	2	2	950	1 580	617	**2U100-15**	10SP	12	0.07	79.97	±0.010	41.5
110	280	165	165	2.5	2	1 120	1 880	818	**3U110-4**	2	12	0.072	84.965	±0.010	60.2
115	260	140	140	1.1	2	940	1 660	613	**3U115-3**	2	12	0.209	72.47	±0.010	42.1
120	280	165	165	2.5	2	1 190	2 060	802	**2U120-15**	9	12	0.072	79.965	±0.010	58.0
	300	160	160	2	2	1 180	1 960	847	**3U120-4**	2SP	12	0.07	89.966	±0.010	66.7
	350	165	165	2.5	2	1 370	2 220	1 140	**2U120-14**	9	12	0.072	114.965	±0.010	98.5

Notes (1)Cr and Cor of basic load ratings is not the limiting load. Cor is for reference.
(2)Refer to pages D168 and D169.
The letter "SP" indicate a special design.

Remarks Outer rings are used for back-up roll , it must be use less than permissible radial Load(Pu)
Bearings marked * are special material design.
Bearing number of "STF" is adopted Super-TF™ material.
Please consult with NSK for selection and usage of bearings.

Backing Bearings for Multi-Roll Rolling Cluster Mills

Bore Diameter 130 – 180 mm



Boundary Dimensions (mm)						Basic Load Ratings (kN)		Permissible Radial Load Pu (kN)	Bearing Numbers	Figure(2)	Outer Ring Edge Bevel (mm)		Radial Thickness When Delivered (mm)		Mass (kg)
d	D	B	C	r_1 min.	r_2	C_r	C_{0r}(1)	approx.			a	f	H		approx.
130	300	132	129	2	4	1 040	1 580	590	**2U130-32**	8SP	28.2	0.082	85	-0.015 to 0	52.3
									∗2U130-32g2						
									∗STF2U130-32g3						
	300.02	150	149	2	4	1 100	1 850	732	**2U130-34**	9SP	25	0.145	85.01	-0.015 to 0	60.9
	300	160	159.5	2	1.1	1 470	2 670	799	**3PL130-2C**	1	9	0.209	84.95	0 to +0.010	66.6
									∗3PL130-2Cg2						
	300	172.64	172.64	2	4	1 580	2 930	862	**3PL130-1C**	1	10	0.131	84.95	0 to +0.010	71.8
	300	172.64	172.64	2	4	1 580	2 930	862	**3PL130-1F**	1SP	10	0.131	84.95	0 to +0.010	72
									∗3PL130-1Fg2						
									∗STF3PL130-1Fg3						
	300.02	172.64	172.64	2	3	1 580	2 930	862	**3PL130-1Y**	1	25.4	0.148	84.965	-0.010 to 0	72.1
	300	172.64	172.64	2	4	1 580	2 930	862	**3PL130-7B**	1	25	0.087	84.95	0 to +0.010	72
	300	172.644	172.644	2	4	1 370	2 440	854	**2U130-26**	9	12.7	0.2	84.955	±0.010	69.1
	300	172.644	172.644	3	4	1 240	2 150	808	**2U130-36**	11	25	0.15	84.955	±0.010	68.8
									∗2U130-36g2						
	300	172.64	170	2	2	1 240	2 150	800	**2U130-16B**	11	30	0.05	84.95	0 to +0.030	71.2
	300	172.64	171.6	2	4	1 320	2 300	866	**3U130-2**	12	10	0.131	84.95	0 to +0.010	69.4
	350	175	175	2.5	2	1 450	2 410	1 230	**2U130-29B**	9	12	0.10	109.965	±0.010	102
179.984	406.4	224	220.66	3	3.3	1 950	3 550	1 460	**2U179Z-3**	11	15.9	0.093	113.205	-0.015 to 0	168
	406.43	224.25	220	3	4	2 250	4 250	1 570	**2U179Z-14**	11	60	0.175	113.181	±0.015	161
									∗STF2U179Z-14gA5						
180	406.42	171.04	171.04	2.1	4	2 060	3 800	1 220	**3PL180-3B**	1	25	0.145	113.155	-0.010 to 0	129
	406.42	171.04	171.04	2.1	4	2 060	3 800	1 220	**3PL180-3E**	1	25	0.145	113.155	±0.005	129
	406.42	171.04	171.04	0.6	1	1 900	3 300	1 150	**2U180-3**	9	25	0.145	113.16	-0.010 to 0	125
									∗STF2U180-3g3						
	406.42	171.04	170	2	3	1 650	2 850	1 220	**2U180-5**	8	25	0.145	113.2	-0.015 to 0	124
	406.42	171.04	170	2	3	1 650	2 850	1 220	**2U180-5A**	8	36.5	0.212	113.2	-0.015 to 0	124
	406.42	171.04	171.04	3	4	1 560	2 660	1 150	**2U180-7**	8	25	0.25	113.155	±0.010	123
									∗STF2U180-7g3						
	406.42	176	170	2	3	1 650	2 850	1 220	**2U180-8**	8	25	0.145	113.2	-0.015 to 0	128
	406.4	217	217	2.1	1.5	2 550	5 000	1 560	**3PL180-1B**	1	10	0.058	113.16	-0.012 to 0	164
									∗3PL180-1Bg2						
	406.4	224	220	2.1	1.5	2 050	3 750	1 580	**3U180-2**	12	10	0.058	113.16	-0.012 to 0	162
									∗3U180-2g2						
	406.4	224	220	2.1	1.5	2 050	3 750	1 580	**3U180-3**	12	10	0.058	113.205	-0.015 to 0	162
	406.42	224	224	2.1	1.5	2 610	5 150	1 610	**3PL180-2A**	1	10	0.058	113.155	-0.012 to 0	169
									∗3PL180-2Ag2						
	406.42	224	224	0.6	1	2 360	4 400	1 510	**2U180-4**	9	25	0.145	113.16	-0.010 to 0	164
									∗STF2U180-4g3						

Notes (1) Cr and Cor of basic load ratings is not the limiting load. Cor is for reference.
(2) Refer to pages D168 and D169.
The letter "SP" indicate a special design.

Remarks Outer rings are used for back-up roll , it must be use less than permissible radial Load(Pu)
Bearings marked ∗ are special material design.
Bearing number of "STF" is adopted Super-TF™ material.
Please consult with NSK for selection and usage of bearings.