



ROLLING MILL BEARINGS

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1. Type and code of rolling mill bearings

1.1 Type of rolling mill bearings

Rolling mill bearings mainly refer to bearings for mill rolls, locating bearings for mill rolls, screw-down bearings. As for the rolling bearings which are applied in transmission devices, transport rolls, auxiliary equipment of rolling mills, they also belong to the category of rolling mill bearings. The main types of rolling mill bearings are shown in Figure1:

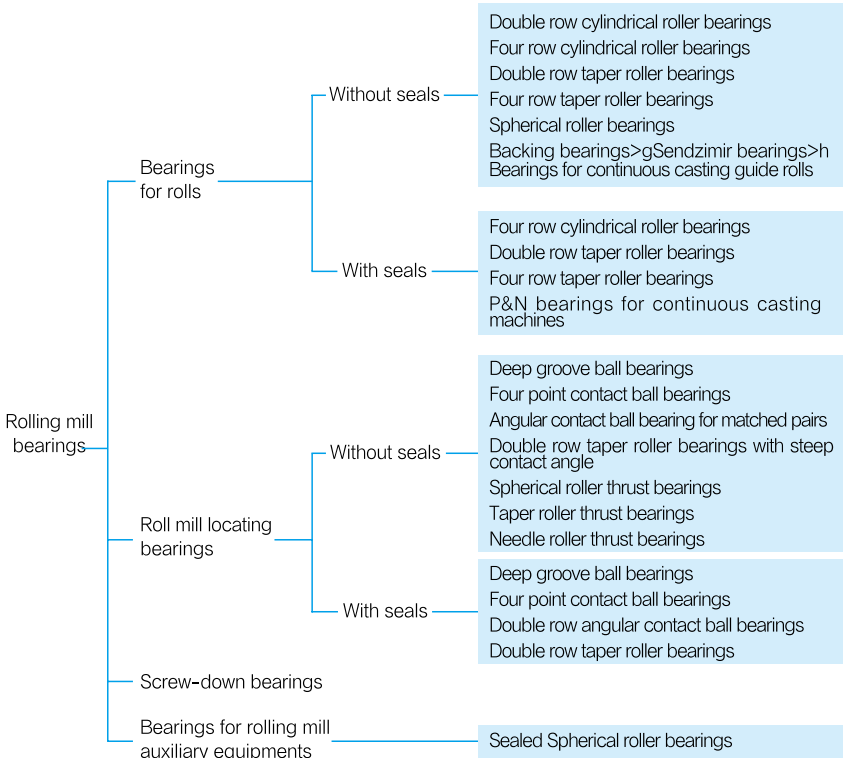


Figure1 Main types of rolling mill bearings

1.2 Code of rolling mill bearings

According to the regulations of standard GB/T272 and JB/T2974, the rolling mill bearings, in accordance with national standard GB/T273.1 GB/T273.2 GB/T273.3 dimension standard, are symbolized by internationally accepted alphanumeric code, see following:

Prefix code + Basic code + Suffix code

1.2.1 Prefix code is marked by letter, see table1 for detail and definition.

1.2.2 Basic code indicates type, structure and dimension of the bearings, consisting of:

Type code

+

Dimension code

+

Bore diameter code

Table1 Prefix code and definition

Code	Definition	Illustration
L	Separable bearings separable inner ring or outer ring	LFC 3652168
R	Bearings without separable inner ring or outer ring >gNeedle roller bearings only suitable for NA type>h	RFCD 5678275 (RNA 6916)
WS	Shaft washer for cylindrical roller thrust bearings	WS 81120
GS	Housing washer for cylindrical roller thrust bearings	GS 81124
KOW-	Thrust bearings without shaft washer	KOW-51132
KIW-	Thrust bearings without housing washer	KIW-51140
LR	Bearings with separable inner ring or outer ring and roller assembly	
K	Roller and cage assembly	K 81120

1.2.2.1 See table 2 for type code.

Table 2 Relationships of type and code

Code	Type of bearing
0	Double row angular contact ball bearings
1	Self-aligning ball bearings
2	Spherical roller bearings
2	Spherical roller thrust bearings
3	Taper roller bearings
4	Double row deep groove ball bearings
5	Thrust ball bearings
6	Deep groove ball bearings
7	Angular contact ball bearings
8	Cylindrical roller thrust bearings
N	Single row cylindrical roller bearings
NN	Double row or multi-row cylindrical roller bearings
QJ	Four point contact ball bearings

Note: When letters or numbers are prefixed or suffixed to the code in the table, it means different structure of the bearings.

Table 3 Dimension and code of radial bearings and thrust bearings

Diameter series code	Radial bearing width series code								Thrust bearing height series code			
	8	0	1	2	3	4	5	6	7	9	1	2
	Dimension series code											
7	-	-	17	-	37	-	-	-	-	-	-	-
8	-	08	18	28	38	48	58	68	-	-	-	-
9	-	09	19	29	39	49	59	69	-	-	-	-
0	-	00	10	20	30	40	50	60	70	90	10	-
1	-	01	11	21	31	41	51	61	71	91	11	-
2	82	02	12	22	32	42	52	62	72	92	12	22
3	83	03	13	23	33	-	-	-	73	93	13	23
4	-	04	-	24	-	-	-	-	74	94	14	24
5	-	-	-	-	-	-	-	-	-	95	-	-

1.2.2.3 Bore diameter code denotes nominal bore diameter of bearing:

When the nominal bore diameter is within 20 ~ 480mm, it's designated by the quotient of nominal diameter in mm divided by 5, if the quotient is a single digit, add "0" before it;

Example: 24038CA (d = 190mm) 22308CC (d = 40mm)

When the nominal bore diameter equal to or greater than 500mm, it's designated by the value of nominal bore diameter in mm and use "/" to separate with the front code.

Example: 230/530CAW33 (d = 530mm)

1.2.3 Suffix code

When it is required to make modification on the bearing structure, materials, tolerance classes, technical details etc, it's designated by suffix code composed of letter (or number). There are 8 groups as follows:

- (1) Group 1 suffix code means changed internal structure, see table 4 for details.
- (2) Group 2 suffix code means altered sealing, anti-dust and ring shape, see table 5 for details.
- (3) Group 3 suffix code denotes cage and cage material, see table 6 for details.
- (4) Group 4 suffix code means changed bearing material, see table 7 for details.
- (5) Group 5 suffix code means tolerance class, see table 8 for details.
- (6) Group 6 suffix code denotes clearance, see table 9 for details.
- (7) Group 7 suffix code denotes configuration, see table 10 for details.
- (8) Group 8 suffix code shows special requirement for vibration, noise, friction torque, temperature, rication etc., refer to table 11.

Table 4 Internal structure code and definition

Code	Definition	Illustration
A B C D E	1) Shows internal structure change 2) Means standard design, the definition varies from different type and structure	B ① Angular contact ball bearings nominal contact angle $\alpha = 40^\circ$ 7240B ② Taper roller bearings contact angle increases 32340B C ① Angular contact ball bearings nominal contact angle $\alpha = 15^\circ$ 7240C ② Spherical roller bearings C type 23156C CA type 23024CAW33 CC type 22240CC E Enhanced NU 2334E 23048ECAW33
AC	Angular contact ball bearings nominal contact angle $\alpha = 25^\circ$	7256AC
D	Split bearings	240/850D/W33 NU6/1200D
A	1) Double row angular contact ball bearings without filling slot or deep groove ball bearings	3248A
	2) Deep groove ball bearings without flange on rings	
C	Spherical roller bearings of improved design, flangeless inner ring, non-integral guide ring, press cage, symmetrical roller, enhanced	231/500C
CA	C type spherical roller bearings, inner ring with retaining flange, non-integral guide ring, solid cage	23048CAW33
CC	C type spherical roller bearings, roller guiding type improves	22324CC
CAB	CA type spherical roller bearings, pin-type cage	
CABC	CA type spherical roller bearings, roller guiding type improves	
CAC	CA type spherical roller bearings, roller guiding type improves	22252CACK

Note: Enhanced type: improved internal structure and increased bearing load capacity.

Table 5 Code and definition of seals, anti-dust and ring shape change

Code	Definition	Illustration
K	Tapered bore 1:12 (outside spherical surface ball bearings excluded)	23064K
K30	Tapered bore 1:30	240/500K30
R	Outer ring with flange (flanged outer ring)(unsuitable for radial ball bearings with bore diameter less than 10mm)	30256R
N	Outer ring with annular groove	6022N
NR	Outer ring with retaining groove and snap ring	6022NR
-RS	Skeleton rubber seal at one side of bearing (contact type)	6022-RS
-2RS	Skeleton rubber seal at both sides of bearing (contact type)	6022-2RS
-RZ	Skeleton rubber seal at one side of bearing (non-contact type)	6022-RZ
-2RZ	Skeleton rubber seal at both sides of bearing (non-contact type)	6022-2RZ
-Z	Shield at one side of bearing	6022-Z
-2Z	Shield at both sides of bearing	6022-2Z
-RSZ	Bearings with skeleton rubber seal at one side (contact type), shield at the other side	6022-RSZ
-RZZ	Bearings with skeleton rubber seal at one side (non-contact type), shield at the other side	6022-RZZ
-ZN	Bearings with shield at one side, annular groove in outer ring on the other side	6022-ZN
-ZNR	Bearings with shield at one side, annular groove and snap ring in outer ring on the other side	6022-ZNR
-ZNB	Bearings with shield and annular groove on the same side	6022-ZNB
-2ZN	Bearings with shield at two sides, annular groove in outer ring	6022-2ZN
U	Thrust ball bearings with spherical washer	53256U
-FS	Bearings with felt ring seal on one side	6203-FS
-2FS	Bearings with felt ring seal on both sides	6203-2FS
-LS	Bearings with skeleton rubber seal on one side (contact type, bearing ring without groove)	
-2LS	Bearings with skeleton rubber seal on two sides (contact type, bearing ring without groove)	NNF5044-2LSN2V

Code	Definition	Illustration
PP	Bearings with soft rubber seal on two sides	NATR8PP
-2K	Double tapered bore 1:12	QF2308-2K
D	1) Double row angular contact ball bearings, double inner rings, contact angle $\alpha = 40^\circ$	4030D
	2) Double row taper roller bearings, without cone spacer, bearing ring side without grinding	352930X2D
DC	Double row angular contact ball bearings, double inner rings	3924-2KDC
D1	Double row taper roller bearings, without cone spacer, bearing ring side grinding	351084X2D1
DH	Single direction thrust bearings with two housing washers	
DS	Single direction thrust bearings with two shaft washers	
N1	Outer ring with a locating slot	
N2	Outer ring with two or more symmetrical locating slots	
N4	N+N2, locating slot and snap ring on different sides	
N6	N+N2, locating slot and snap ring on the same side	
P	Spherical roller bearings with two-piece outer ring	
PR	Spherical roller bearings with two-piece outer ring and spacer	
S	Spherical surface outer ring (outside spherical surface bearings excluded)	
WB	Extended inner ring bearings (extended ring on both side); WB1—extended ring on one side	
WC	Extended outer ring bearings	
SC	Radial bearings with cover	
X	Idle wheel needle roller bearings with spherical surface outer ring	KR30X
Y	Assembly needle roller bearings with shield	NK25Y
ZH	Thrust bearings, housing washer with shield	
ZS	Thrust bearings, shaft washer with shield	

Note: 1. Seals code and shield code, as well as annular groove code, can be combined in many ways.
2. The code of -LS and -2LS is mostly used for roller bearings.

Table 6 Symbol of cage structure and materials

No.	Type of bearing	Structure and material of cage
1	Deep groove ball bearings	1. When bearing outside diameter $D \leq 400\text{mm}$, adopt steel plate (strip) or brass plate(strip) press cage 2. When outside diameter $D > 400\text{mm}$, adopt brass solid cage
2	Self-aligning ball bearings	1. When outside diameter $D \leq 200\text{mm}$, adopt steel plate (strip) press cage 2. When outside diameter $D > 200\text{mm}$, adopt brass solid cage
3	Cylindrical roller bearings	1. Cylindrical roller bearings: when outside diameter $D \leq 400\text{mm}$, adopt steel plate (strip) press cage; outside diameter $D > 400\text{mm}$, adopt steel solid cage 2. Double row cylindrical roller bearings adopt brass solid cage
4	Spherical roller bearings	1. Symmetrical spherical roller bearings (with non-integral guide ring), adopt steel plate (strip) press cage. 2. Other spherical roller bearings adopt brass solid cage.
5	Needle roller bearings	Adopt steel plate or duralumin press cage
	Long cylindrical roller bearings	Adopt steel plate (strip) press cage
6	Angular contact ball bearings	1. Separable angular contact ball bearings adopt phenol laminated tube solid cage
		2. Two-piece inner rings or two-piece outer rings(three point、four point contact) ball bearings adopt aluminum solid cage
		3. Angular contact ball bearings and variants:
		1) When bearing outside diameter $D \leq 250\text{mm}$, contact angle $\alpha = 15^\circ$ or 25° adopt phenol aldehyde laminated tube solid cage, $\alpha = 40^\circ$ adopt steel plate press cage 2) When bearing outside diameter $D > 250\text{mm}$, adopt brass or hard aluminum solid cage. 3) Bearings with P5、P4、P2 adopt phenol aldehyde laminated tube solid cage, angular ball bearings with lock in the inner ring and variant adopt phenol aldehyde laminated tube solid cage
		4. Double row angular contact ball bearings adopt brass solid cage

No.	Type of bearing	Structure and material of cage
7	Taper roller bearings	1. When bearing outside diameter $D \leq 650\text{mm}$, adopt steel plate (strip) press cage 2. When bearing outside diameter $D > 650\text{mm}$, adopt pin-type steel cage
8	Thrust ball bearings	1. When bearing outside diameter $D \leq 250\text{mm}$, adopt steel plate (strip) press cage 2. When bearing outside diameter $D > 250\text{mm}$, adopt solid cage
9	Thrust roller bearings	1. Cylindrical roller thrust bearings adopt solid cage 2. Spherical roller thrust bearings adopt solid cage 3. Taper roller thrust bearings adopt press cage 4. Needle roller thrust bearings adopt press cage

When structure and material of bearing cage are different from table 6, use the following suffix code:

a. Cage material code:

F1 -- carbon Steel

F2 -- graphite Steel

F3 -- nodular cast iron

F4 -- powder metallurgy

Q1 -- aluminum iron manganese bronze

Q2 -- ferrosilicon zinc bronze

Q3 -- silicon nickel bronze

Q4 -- aluminum Bronze

J -- steel press cage, additional number shows materials change

L1 -- LY11CZ aluminum alloy cage

L2 -- LY12CZ aluminum alloy cage

M -- brass solid cage

TH -- glass fiber reinforced phenolic resin cage (window-type)

TN1 -- nylon Cage

TN2 -- polysulfone cage

TN3 -- polyimide cage

TN4 -- polycarbonate cage

TN5 -- polyformaldehyde cage

T -- adopt phenol aldehyde laminated tube solid cage

Y -- brass press cage, additional number shows materials change

SZ -- cage made of spring wire or spring

b. Code of cage structure and surface treatment:

A -- outer ring guide

B -- inner ring guide

C -- coated cage (C1 silver coating)

D -- carbonitriding cage (for large sized bearings)

D1 -- carburized cage

D2 -- nitriding cage

E -- phosphatizing cage

H -- self-lock pocket cage

P -- window-type cage with pull or punch hole guided by inner or outer ring

R -- riveted cage (for large sized bearings)

S -- guide surface with lubrication groove

W -- welded cage

Note: Code of this group can only be combined with group a.

For example:

MPS --brass solid cage with pull or punch hole (window-type cage) guided
by outer ring or inner ring, guide surface with lubrication groove

JA -- steel press cage, guided by outer ring

FE -- steel solid cage treated with phosphatizing

c. V—Full complement rolling elements (without cage)

For example:

NCF1872V -- Single row full complement cylindrical roller bearings

Table 7 Code and definition of variant material of bearing parts

Suffix	Definition	Illustration
/HE	Rings, rolling elements and cages or rings and elements made of electroslag remelting bearing steel (Arms steel) ZGCr15	61936/HE
/HA	Rings, rolling elements and cages or rings and elements made of vacuum smelting bearing steel	61948/HA
/HU	Rings, rolling elements and cages or rings and elements made of non-hardened quench stainless steel 1Cr18Ni9Ti	61984/HU
/HV	Rings, rolling elements and cages or rings and elements made of quench hardened stainless steel /HV-9Cr18; /HV1-9Cr18Mo	QJ1034/HV
/HN	Rings and rolling elements are made of /HN-Cr4Mo4V; /HN1-r14Mo4; /HN2-Cr15Mo4V; /HN3-W18Cr4V	NU2336/HN
/HC	Rings and rolling elements or only rings are made of carburized steel /HC-20Cr2Ni4A; /HC1-20Cr2Mn2MoA; /HC2-15Mn	
/HP	Rings and rolling elements are made of Beryllium bronze or other antimagnetic material, additional number shows materials change	
/HQ	Rings and rolling elements are made of unusual material /HQ- plastics; /HQ1-ceramal	
/HG	Rings and rolling elements or only rings are made of other bearing steel /HG-5CrMnMo; /HG1-55SiMoVA	

Table 8 Code and definition of bearing tolerance

Code	Definition	Illustration
/P0	Tolerance class is based on standard class 0, omit in code	61934
/P6	Tolerance class is based on standard class 6	FC3652168/P6
/P6X	Tolerance class is based on standard class 6X	32048/P6X
/P5	Tolerance class is based on standard class 5	FC4054170/P5
/P4	Tolerance class is based on standard class 4	MCBB0011/P4
/P2	Tolerance class is based on standard class 2	61934/P2
/SP	Dimensional accuracy equivalent to class P5, running accuracy equivalent to class P4	NU1048/SP
/UP	Dimensional accuracy equivalent to class P4, running accuracy over class P4	NU252/UP

Table 9 Code and definition of bearing clearance

Code	Definition	Illustration
/C1	Clearance in accordance with standard group 1, clearance less than group 2	NNU4972K/C1
/C2	Clearance in accordance with standard group 2, clearance less than basic group 0	61930/C2
--	Clearance in accordance with standard group 0 (basic group), without mark for foreign brand bearings	61930
/C3	Clearance in accordance with standard group 3, clearance larger than basic group 0	24036/W33C3
/C4	Clearance in accordance with standard group 4, clearance larger than group 3	FCD5678275/C4
/C5	Clearance in accordance with standard group 5, clearance larger than group 4	NNU4972K/C5
/CN	Group 0 (basic group) clearance, /CN combined with H、M or L, means clearance range halve; Combined with P, means clearance range offset, for example: /CNH : group 0 clearance halve, located in the upper half /CNM : group 0 clearance halve, located in the middle /CNL : group 0 clearance halve, located in the lower half /CNP : clearance range in the upper half of group 0 and lower half of group 3	--
/C9	Bearing clearance is different from current standard	6224/C9

Note: ① When bearing clearance is standardized as group 0 (basic group), it's omitted in the bearing code.

② When it's necessary to represent tolerance class code and clearance code simultaneously, simply use tolerance class code plus clearance group number to denote (Excluding group 0) combination means.

Example: /P63, means bearing tolerance class P6, radial clearance group 3.

/P52, means bearing tolerance class P5, radial clearance group 2.

Table 10 Code and definition of bearing configuration

Code	Definition	Illustration
D	Two sets of bearings assembly	
T	Three sets of bearings assembly	
Q	Four sets of bearings assembly	
P	Five sets of bearings assembly	
S	Six sets of bearings assembly	
B	Back-to-back arrangement	
F	Face-to-face arrangement	
T	Tandem arrangement	
BT	Back-to-back and tandem arrangement	
FT	Face-to-face and tandem arrangement	
BC	Paired tandem back-to-back arrangement	
FC	Paired tandem face-to-face arrangement	
/DB	Back-to-back arrangement in pairs	7032AC/DB
/DF	Face-to-face arrangement in pairs	32240/DF
/DT	Tandem arrangement in pairs	7038AC/DT
/TBT	Three sets of bearings, one set back-to-back arrangement with two sets in tandem arrangement	
/TFT	Three sets of bearings, one set face-to-face arrangement with two sets in tandem arrangement	
/TT	Three sets of bearings, tandem arrangement	
/QBC	Four sets of bearings, paired tandem in back-to-back arrangement	
/QFC	Four sets of bearings, paired tandem in face-to-face arrangement	
/QT	Four sets of bearings, tandem arrangement	
/QBT	Four sets of bearings, one set back-to-back arrangement with three sets in tandem arrangement	
/QFT	Four sets of bearings, one set face-to-face arrangement with three sets in tandem arrangement	

Note:

(a) Code of axial clearance, preload and axial load distribution the following letters added after the configuring code means:

GA -- light preload

GB -- medium preload

GC -- heavy preload

G -- special preload, additional number shows preload size

CA -- small axial clearance

CB -- axial clearance larger than CA

CC -- axial clearance larger than CB

The above is suitable for deep groove ball bearings and angular contact ball bearings, in the case of angular bearings, the "G" can be omitted.

CG -- axial clearance is zero, suitable for taper roller bearings

R -- equably distributed load

(b) Illustration:

7028AC/DBA -- angular contact ball bearings 7028AC with contact angle $\alpha = 25^\circ$, paired back-to-back arrangement, light preload.

6024/DFGA -- deep groove ball bearings 6024, paired face-to-face arrangement after ring side grinding, light preload.

7028AC/TFT -- angular contact ball bearings 7028AC with contact angle $\alpha = 25^\circ$, three sets of arrangement, two sets tandem arrangement and one set face-to-face arrangement.

7028AC/QBT -- angular contact ball bearings 7028AC with contact angle $\alpha = 25^\circ$, four sets of arrangement, three sets tandem arrangement and one set back-to-back arrangement.

7028C/PT -- angular contact ball bearings 7028C with contact angle $\alpha = 15^\circ$, five sets in tandem arrangement.

Table 11 Other suffix code and definition

Code	Definition	Illustration
/Z	Bearing vibration acceleration level group, additional number shows different extreme value Z1-- acceleration level extreme value in accordance with group Z1 Z2-- acceleration level extreme value in accordance with group Z2 Z3-- acceleration level extreme value in accordance with group Z3	NU324/Z1 NU317/Z2
/V	Bearing vibration speed group, additional number shows different extreme value V1-- Vibration speed extreme value in accordance with group V1 V2-- Vibration speed extreme value in accordance with group V2 V3-- Vibration speed extreme value in accordance with group V3	NU317/V1
/ZC	Noise if specified, additional number shows different extreme value	
/T	Suffix numbers mean starting torque	
/RT	Suffix numbers mean running torque	
/S0	The operating temperature of bearing ring is up to 150°C after treatment of tempering	NNU4938/S0
/S1	The operating temperature of bearing ring is up to 200°C after treatment of tempering	NU240M/S1
/S2	The operating temperature of bearing ring is up to 250°C after treatment of tempering	NN4938/S2
/S3	The operating temperature of bearing ring is up to 300°C after treatment of tempering	QJ1038/S3
/S4	The operating temperature of bearing ring is up to 350°C after treatment of tempering	QJ1048/S4
/W20	With three lubrication holes in bearing outer ring	

Table 11 Other suffix code and definition

Code	Definition	Illustration
/W26	With three lubrication holes in bearing outer ring	
/W33	With lubrication groove and three lubrication holes in bearing outer ring	NNU4972W33
/W33X	With lubrication groove and six lubrication holes in bearing outer ring	
/HT	Bearings filled with special high temperature lubrication grease, additional letter shows filling amount	97833-2LS/HTA
/LHT	Bearings filled with special high or low temperature lubrication grease, additional letter shows the same as HT	
/Y	When bearings code includes Y and another letter or plus a number show the change of non-standard series	
/YA	Bearing structure change (comprehensive expression) YA1-- Bearing outer ring outside surface is different from the standard design YA2-- Bearing inner ring bore is different from the standard design YA3-- Bearing ring side surface is different from the standard design YA4-- Bearing ring raceway is different from the standard design YA5-- Bearing rolling element is different from the standard design	
/YB	Technical conditions change (comprehensive expression) YB1-- Bearing ring surface with coating surface YB2-- Bearing dimension and tolerance requirement change YB3-- Bearing ring surface roughness changes YB4-- Heat treatment requirements(such as hardness) change	

Note: When the code of bearings includes Y and another letter or plus suffix number, customers should check the drawings or additional technical condition to know the specific change, can also consult to FV .

1.2.4 Illustration of bearing code:

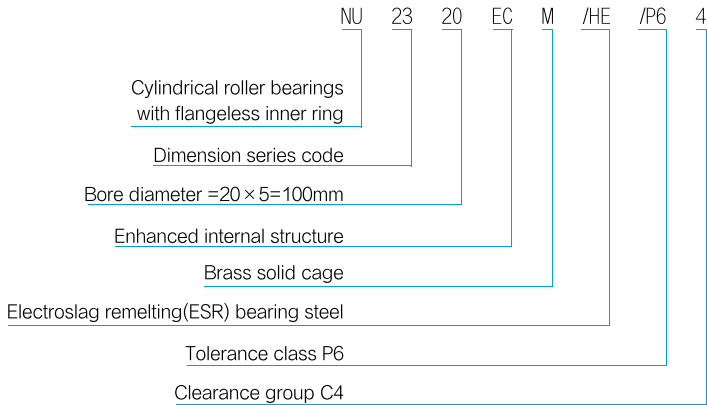


Figure 4 Illustration of bearing code

1.3 Code of non-standard bearings

For Stanley non -standard rolling mill bearings, the code is set by letter plus sequence number. Letter denotes the bearing type. See table 12 for the correlations between the letters and bearing type.

Table 12 Correlations between letter and bearing type

Initial letters of bearing type	Stanley non-standard bearings type
IFTB	Inch four row taper roller bearings
SFTB	Sealed inch four row taper roller bearings
FTWS	Four row taper roller bearings without spacer rings
IDTB	Inch double row taper roller bearings
DTSA	Double row taper roller bearings with steep contact angle
IDTT	Inch double row taper roller bearings with tapered bore
MCBB	Backing bearings
TRTB	Taper roller thrust bearings
SLCB	P&N bearings
SCRB	Split cylindrical roller bearings
SSRB	Split spherical roller bearings
HZB、HZBB	Slewing ball bearings
HZR	Slewing roller bearings

Note: HZBB means change of dimension series of slewing ball bearings HZB series.

2. Selection of rolling mill bearing dimension (including calculation of bearing life)

2.1 Selection guideline of rolling mill bearings

Rolling mill bearings have the following characteristics based on the working conditions:

- ① The limited bearing assembly space, especially outside diameter limited by roller diameter, makes it impossible to design large bearing diameter. Outside diameter must be within the minimum wall thickness range of the bearing box.
- ② The high radial load requires rolling mill bearings to bear strong rolling force.
- ③ Rolling mill bearings have strong impact load and the load reaches the peak when the rolling mill begins to bite steel and throw steel.
- ④ The bearings will bear large axial load, axial load of bar and shape rolling mill mainly comes from the rolling force and the asymmetric force, axial load of plate and strip rolling mill mainly comes from bending force, and gap between bracket and roller seat, and friction force from crossing angle between work roll and support roller.
- ⑤ The bearings have to meet the demands of high rolling speed.
- ⑥ As rolling mill frequently changed mill rolls, the bearings must be simple and convenient in mounting and dismounting.
- ⑦ Easy lubrication system ensures full lubrication and avoids lubrication oil shortage.
- ⑧ Reliable sealing and good performance prevent outside impurities and lubrication oil leakage, easy to fit and disassembly, not damaged easily.

In terms of limited assembly space and limited radial dimension, four row cylindrical roller bearings and four row taper roller bearings can choose outside diameter which meet roll diameter at maximum grinding according to diameter of roll neck. However, in respect of bearing load capacity, four row cylindrical roller bearings have higher radial load capacity than four row taper roller bearings of the same dimension. But four row cylindrical roller bearings cannot bear axial load, bearings which can bear axial load must be mounted in the rolls to bring advantage of four row cylindrical roller bearings into full play, and it's necessary to increase the length of roll and weight of the equipment at the same time. Four row taper roller bearings bear axial load as well as radial load, so the installation is relatively simple. When internal gap

exists, four row taper roller bearings may cause two row rollers off-load under axial load, which reduces the load carrying capacity. In this case, four row cylindrical roller bearings are superior to four row taper roller bearings.

In selecting structure of rolling bearings, in addition to considering the load carrying capacity of bearing, the permissible rolling speed of bearing is also very important. In respect of permissible maximum speed, under the same lubrication and cooling conditions, four row cylindrical roller bearings and four row taper roller bearings both allow high rotational speed. But when rolling speed exceeds 30 m/s, four row cylindrical roller bearings are better than four row taper roller bearings in performance of high speed. This is because when taper roller bearings rotate in high speed, axial load makes spherical surface firmly press on the ribs, which results in sliding friction, causes the bearing temperature to rise and limits the rolling speed. In addition, high rolling speed requires high bearing accuracy. The cage of four row taper roller bearing is impossible to be processed as accurate as cage of four row cylindrical roller bearings. The accuracy makes the friction between ring, roller and cage decrease under centrifugal force. When selecting bearings for mill roll, high speed wire rod mill generally adopts single row or double row cylindrical roller bearings in combination with paired angular contact ball bearings, which makes full use of the advantage of the two types of bearings.

To achieve quick roll-changing of rolling mill, the bearings should be fast and convenient in mounting and dismounting. For four row taper roller bearings, only loose fit between the bore diameter and the roll journal ensure fast mounting and dismounting. But the loose fit will lead to wear of roll neck in medium speed and high speed. Even lubrication spiral groove is mounted in the bore diameter of inner ring, it is impossible to control the wear within limiting value. While four row cylindrical roller bearings, due to their separable structure, the outer ring, roller and cage assembly can be separated with the inner ring, and inner ring is mounted in the roll journal in a tight fit, so the bearing box and roll are separable and interchangeable. When the rolling mill transforms process, free combination of the roll and bearing box is available, which achieves roll changing quickly and avoids wear of the inner ring and the roll neck, it's especially suitable for high speed rolling.

When four row taper roller bearings need adopt tight fit, it's advisable to apply tapered bore coordination method. The bearings are mounted tightly in the roll journal by method of hydraulic fastening and hydraulic dismantle,

which makes it convenient to mount and dismount. But It's not easy to make the tapered bore and roll cone journal to meet the required standard. At the same time, by fitting the bearing tapered bore to the cone journal tightly, even if the radial interference is assured, radial clearance of bearing each row will differ from the deformation due to different inner ring wall thickness in every section, which causes unbalanced load, that's why taper roller bearings with tapered bore are not widely used.

Locating bearings for mill roll are mainly used to bear the axial load from roll. When the inner ring or outer ring is clearance fit, snap ring groove can be used to prevent relative sliding of bearings. In respect of load carrying capacity, single row deep groove ball bearings have the lowest axial load capacity, four point contact ball bearings and double row angular contact ball bearings have the same load carrying capacity, but the installation width of four point contact ball bearings is about less than half of the width of double row angular contact ball bearings. Basically double row angular contact ball bearings are no longer applied in rolling mill locating bearings. Double row taper roller bearings with steep contact angle have larger axial load capacity than four point contact ball bearings, taper roller thrust bearings have larger axial load capacity than double row taper roller bearings with steep contact angle. While they need to adjust the axial clearance in advance or preload before mounting in the roll, which ensures its performance. In addition, the rolling speed of the bearings decreases as the axial load increases, so it's advisable to take account of both load carrying capacity and speed when selecting bearings.

In recent years, sealed bearings for rolling mill have been gradually recognized in the steel mill industry, though it's limited in installation space and even more limited in the space of the two lips. The seals mainly function as waterproof, as auxiliary seals to the rolling mill bearings. Though they are not substitute for conventional seals, they are efficient in improving the working environment and extending bearing life. Especially the bearings for hot rolling mill, have demonstrated unique performance and been widely used.

In summary, we provide the guideline in selecting rolling mill bearings. Blooming mill and cogging mill choose four row cylindrical roller bearings in radial, double direction taper roller thrust bearings in axial location, deep groove ball bearings on the transmission side. High speed wire rod mill choose four row cylindrical roller bearings in radial, four point contact ball bearings in axial location, deep groove ball bearings in the transmission side.

Hot rolling mill work roll choose four row cylindrical roller bearings in radial, deep groove ball bearings in axial location. Cold mill work roll uses taper roller bearings. Edger unit selects four row taper roller bearings. Beam rail rolling mill uses four row cylindrical roller bearings in radial, double direction taper roller thrust bearings in axial location. Technology research center of **Stanley** rolling mill bearings can provide more detailed information in selecting the best solution of combined bearings.

2.2 Principal dimensions of rolling mill bearings

The nominal dimension and the minimum chamfer dimension of **Stanley** rolling mill bearings are listed in the catalogue, in accordance with ISO standard and national standard (GB/T273.1、GB/T273.2、GB/T273.3), inch series bearings and non-standard bearings are in line with international standard.

2.3 The dimension selection of rolling mill bearings

The dimension selection of rolling mill bearings is on the premise that if the expected bearing life can be achieved, and the life depends on the ratio of rated dynamic load and the actual load. Therefore, this section will introduce in detail the load rating of rolling mill bearings, calculation of equivalent load and bearing life.

2.3.1 Load rating of rolling mill bearings

2.3.1.1 Basic dynamic load rating C

Definition: Basic dynamic load rating C is defined in the assumption that an bearing can bear a certain load of constant amount and direction (for radial bearings it's pure radial load, for thrust bearings it's pure axial load), the bearing life rating is 1 million revolutions (10^6 rev.).

The dynamic load rating C is an important technical data in calculating the theoretical service life of a bearing. Please check the dimension table in this catalogue for dynamic load rating of rolling mill bearings (radial bearings Cr, thrust bearings Ca).

2.3.1.2 Basic static load rating Co

Definition: At the contact point of maximum load rolling element and the raceway, the static load which conforms to the following calculation of contact stress is called basic static load rating.

Self-aligning ball bearings	4600MPa	(469 kg/mm)
Roller bearings	4000MPa	(408 kg/mm)
Other type bearings	4200MPa	(428 kg/mm)

At the contact point, the total amount of permanent deformation of rolling elements and that of raceway is about 0.0001 times of the rolling elements' diameter.

Basic static load rating C_0 is an important parameter to represent plastic deformation resistance of the bearing working surface. The mill bearing static load ratings (C_{0r} for radial bearings, C_{0a} for thrust bearings) are listed in the dimension table in this catalogue.

2.3.2 Calculation of equivalent bearing load

In addition to actual bearing load, bearings often bear radial load and axial load, which is converted into equal load, i.e. equivalent load.

2.3.2.1 Calculation of equivalent dynamic load

$$P = XFr + YFa \quad (\text{Formula 1})$$

In the formula:

P — equivalent dynamic load KN (P_r for radial bearings, P_a for thrust bearings)

Fr — actual radial load KN

Fa — actual axial load KN

X — radial factor of bearing dynamic load

Y — axial factor of bearing dynamic load

When radial bearings under pure radial load, $P_r = Fr$

When thrust bearings under pure axial load, $P_a = Fa$

If fluctuating load (as Figure 5) remains constant in a given revolutions, its mean equivalent load is calculated as follows:

$$P_m = [(F_1^3 U_1 + F_2^3 U_2 + F_3^3 U_3 + \dots) / U]^{1/3} \quad (\text{Formula 2})$$

In the formula:

P_m — mean equivalent load KN

F_1, F_2 — constant load at revolution of $U_1, U_2 \dots$ KN

U — total revolution at $F_1, F_2 \dots$ rev/min

$$U_1 + U_2 + \dots = U$$

When bearing speed and direction remain constant, and load varies within $F_{\min} \sim F_{\max}$ (as Figure 6), its mean equivalent load is calculated as follows:

$$P_m = (F_{\min} + 2F_{\max}) / 3 \quad (\text{Formula 3})$$

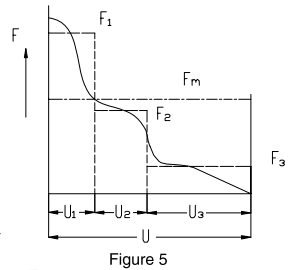


Figure 5

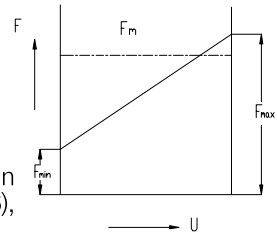


Figure 6

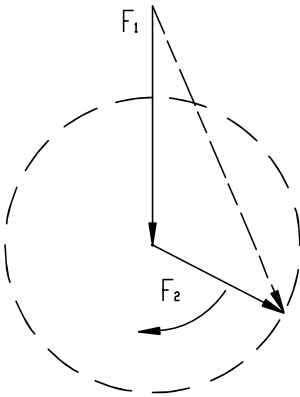


Figure 7

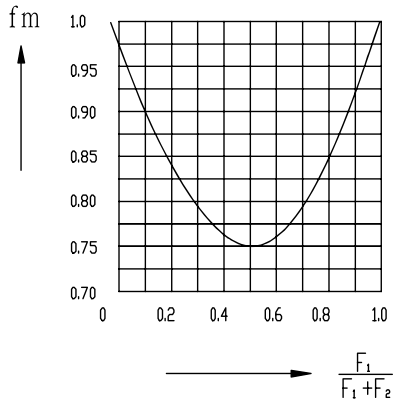


Figure 8

When the load is formed by F_1 and F_2 , F_1 is constant in dimension and direction, F_2 is rotating constant load (as Figure 7), the mean equivalent load is calculated as follows:

$$P_m = f_m (F_1 + F_2) \quad (\text{Formula 4})$$

Check the curve (Figure 8) for f_m value.

2.3.2.2 Calculation of equivalent static load

Equivalent static load can be calculated as follows:

$$P_o = X_0 F_r + Y_0 F_a \quad (\text{Formula 5})$$

In the formula:

P_o --- equivalent static load KN (P_{or} for radial bearings, P_{oa} for thrust bearings)

F_r --- actual radial load KN

F_a --- actual axial load KN

X_0 --- radial factor of bearing static load

Y_0 --- axial factor of bearing static load

Use the following formula to check if static load rating conforms to requirement:

$$S_0 = C_0 / P_o \quad (\text{Formula 6})$$

S_0 --- safety factor, for its recommended value see table 13.

Table 13 Safety factor S_0 of bearings with static load

Rotation condition	Load condition	S_0 recommended value	Application condition	S_0 recommended value
Bearings with continuous rotation	Ordinary load Impact load	1--2 2--3	High precision rotation vibration impact	1.5--2.5 1.2--2.5
Bearings without frequent rotation and swinging	Impact load and uneven load	1--1.5	A certain amount of deformation is allowed, not affect normal operation	0.3--1.0

For spherical roller thrust bearings $S_0 \geq 4$.

2.3.2.3 Impact load factor

Under the working conditions such as bearings for rolling mill roll neck, crusher bearings, bearings for vibration machinery, the instantaneous peak load of the bearings may exceed nominal value by several times, in this case, the calculated equivalent load P_r (or P_a)should be multiplied by an impact factor to ensure reliable operation, see table 14.

Table 14 Recommended value of impact load factor

Load type	Impact factor	Illustration
Without impact or slight impact	1.0--1.2	Motor, steam turbine, ventilator, pump
Medium impact	1.2--1.8	Vehicles, machine tools, cranes, metallurgical equipment, internal combustion engine
Strong impact	1.8--3.0	Crusher, rolling mill, oil drilling machine, vibrating screen

2.3.2.4 Minimum load

When bearings operate free of load, there may be harmful sliding friction which will damage the bearings, therefore it's required to impose a minimum load on the bearings to ensure pure rolling motion.

For roller bearings, minimum load is about $0.02C_r$ (C_a);

For ball bearings, minimum load is about $0.01C_r$ (C_a).

2.3.3 Calculation of service life of rolling mill bearings

2.3.3.1 Definition of mill bearing fatigue failure (spall)

During the operation of bearings with load, in the surface of the roller or bearing ring, if there's a metal fatigue flaking with an area equal to or greater than 0.5mm^2 for ball bearings, equal to or greater than 1mm^2 for roller bearings, depth equal to or greater than 0.05mm , known as fatigue failure of rolling bearings.

2.3.3.2 Definition of mill bearing fatigue life (narrow-life)

When bearings operate with load, metal fatigue flaking will occur in the inner ring, outer ring or the rolling surface due to constant load. The total rotation revolutions before that happens is defined as bearing fatigue life (narrow-life).

2.3.3.3 The basic life rating of rolling mill bearings

With basic radial dynamic load rating and basic axial dynamic load rating, a group of same type bearings operate under the same condition one by one, 90% of the bearings don't appear metal matrix spall from rolling fatigue. The total rotation revolutions or total running time of them in a certain speed is called the basic life rating, i.e. bearing life for short, expressed in L_{10} (million revolutions) or L_{10h} (hours).

2.3.3.4 Recommended value for required bearing life of various machines

Generally bearing selection should be based on the type of machinery, working conditions and reliability requirements to determine a proper life in advance. Normally mechanical overhaul period is a reference.

The recommended bearing service life is shown in table 15.

Table15 Recommended bearing life

Condition	Machine	Necessary life L _{10h} (h)
Short time or intermittent operation	Household appliances, power tools, agricultural machinery, winches	4 000—8 000
Infrequent but reliable operation	Household air-conditioner motors, construction machinery,belt conveyor, elevator	8 000—12 000
Not continuous, but long time operation	Rolling mill roll neck, small motor, crane	8 000—12 000
	General motors, general gear device	12 000—20 000
	Machine tools, vibrating screen, crusher	20 000—30 000
	Compressors, pumps, major gear device	40 000—60 000
Over 8 hours per day or continuous operation	Escalator	12 000—20 000
	Centrifuge, air conditioning, fans, woodworking machinery, railway vehicles axles	20 000—30 000
	Large motor, mine hoist, railway vehicle main motor, motorcycles axle	40 000—60 000
	Paper machinery	100 000—200 000
24 hours continuous trouble-free operation	Water facilities, power stations, mining drainage	100 000—200 000

2.3.3.5 Calculation of basic life rating

2.3.3.5.1 Formula of calculation of basic life rating

$$L_{10} = (C/P)^{\epsilon} \quad (\text{Formula 7})$$

L_{10} -- basic life rating in millions of revolutions

C -- basic dynamic load rating KN

(C_r for radial bearings, C_a for thrust bearings)

P -- equivalent load KN (P_r for radial bearings, P_a for thrust bearings)

ϵ -- life exponent, for ball bearings $\epsilon = 3$, for roller bearings $\epsilon = 10/3$

Conversion to hours

$$L_{10h} = 16666(C/P)^{\epsilon/n} \quad (\text{Formula 8})$$

L_{10h} -- basic life rating in hours

n -- rotating speed, rev/min

Consideration must be given that high bearing load will produce a harmful plastic deformation between the rolling elements and raceway. When users select P_r for radial bearings, P_a for thrust bearing which exceeds $0.5C$ or C_o , the calculation formula of fatigue life rating don't apply. In this case, please refer to **Stanley** for bearing life calculation method and the application of the formula.

2.3.3.5.2 Modification formula of calculated bearing life

In practical work, bearing life will be influenced by many factors such as bearing reliability, bearing material, working temperature, lubricant type, sealed effect, load type, mounting precision etc., so it is necessary to introduce various adjusted factor to make the calculated life closer to actual life.

$$L_{na} = a_1 \cdot a_2 \cdot a_3 \cdot L_{10} \quad (\text{Formula 9})$$

In the formula:

L_{na} -- adjusted life rating in millions of revolutions

a_1 -- life adjusted factor for reliability in table 16.

a_2 -- life adjusted factor for special material

a_3 -- life adjusted factor for special working conditions

Table 16 Adjusted factor for reliability a_1

Reliability (%)	L_{na}	a_1
90	L_{10a}	1.00
95	L_{5a}	0.62
96	L_{4a}	0.53
97	L_{3a}	0.44
98	L_{2a}	0.33
99	L_{1a}	0.21

When adopting common material, take account of the value $a_2 \leq 1$, but when adopting high quality steel such as vacuum degassing of steel or even electroslag remelting steel, the value $a_2 > 1$ is advisable, (If lubrication condition is poor, don't choose the value of $a_2 > 1$)

Under normal lubrication condition, take account of the value $a_3 \leq 1$, only when the lubrication conditions are favorable, $a_3 \geq 1$ can be chosen. While under poor conditions, such as the lubricant viscosity is not enough (ball bearings $< 13\text{mm}^2/\text{s}$, roller bearings $< 20\text{mm}^2/\text{s}$); speed is very low (RPM times center diameter of rolling element $< 10^4$); the lubricant is contaminated, the smaller a_3 value is preferable.

2.3.3.5.3 Modification of bearing life for operating temperature

In addition to the above modification factor, some other parameters will affect bearing life, such as the operating temperature. When the temperature increases, the load carrying capacity will decrease. Different operating temperature causes different reduction of load carrying capacity. The load carrying capacity can be modified by the calculation: dynamic load rating C multiply by factor in table 17.

Table 17 Temperature factor

Operating temperature ($^{\circ}\text{C}$)	150	200	250	300
Temperature factor	1.00	0.90	0.75	0.60

2.3.3.5.4 Influence of bearing parts' hardness on its service life

Bearing load rating C is defined within hardness of HRC57 – 62 for bearing ring and rolling elements. When actual hardness is below this range, the actual load carrying capacity will decrease. The load carrying capacity can be modified by the calculation: dynamic load rating C multiply by factor in table 18.

Table18 Hardness factor

Hardness value (HRC)	60	58	56	54	52	50	48	45	40
Hardness factor	1.00	1.00	0.93	0.84	0.75	0.63	0.52	0.43	0.31

3. Speed ratings of rolling mill bearings

Speed ratings of bearings relate to factors such as bearing type, dimension, load, lubrication, tolerance class, clearance, cage, ambient temperature and cooling condition etc. The speed ratings in the dimension table are defined respectively under the condition of grease lubrication and oil lubrication with the following conditions:

- 1) Tolerance class P0;
- 2) Radial bearings bear radial load only while thrust bearings bear axial load only;
- 3) $P_r \leq 0.1C_r$ (or $P_a \leq 0.1C_a$)
(C_r is basic dynamic load rating of bearings);
- 4) Rigid bearing housing and shaft;
- 5) Lubrication and cooling condition are normal;
- 6) Working under normal temperature.

When the actual working conditions do not meet above requirements, the bearing speed ratings should be revised as the following formula:

$$n_{\text{perm}} = n \times f_1 \times f_2 \cdots \cdots \quad (\text{Formula 10})$$

In the formula:

n_{perm} -- permissible rotating speed, rev/min

n -- speed ratings listed in the bearing dimension table, rev/min

f_1 -- speed ratings revision factor of bearing load, see Figure 9

f_2 -- speed ratings revision factor of composed load, see Figure 10

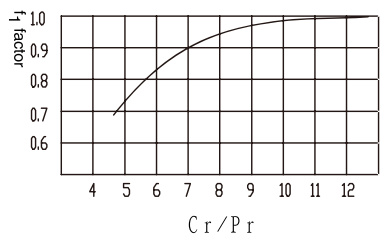


Figure 9 Speed ratings revision factor of bearing load

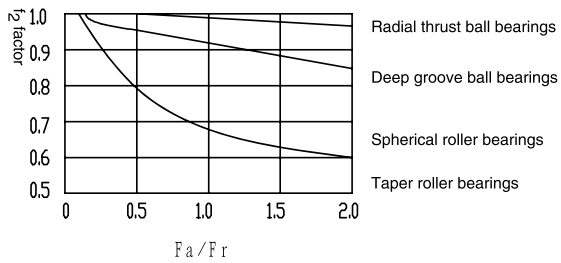


Figure 10 Speed ratings revision factor of composed load

4. Precision and tolerance of rolling mill bearings

4.1 Precision of rolling mill bearings

As widely used general parts in rolling mill industry, the bearing precision and tolerance, as well as the dimension are listed in ISO standard and are widely used all around the world .

Precision class of rolling mill bearings is generally divided into ordinary class P0, senior class P6, precise class P5, super precise class P4 level, most precise class P2. Table 19 shows precision class symbol and the correlations of domestic and overseas bearings. There's no precision class marked on bearings of ordinary precision class, it's the same at home and abroad.

Table 19 Precision class of the bearings

Standard		Precision class					Bearing type
Japanese industrial standard	JIS B 1514	Class 0 Class 6X	Class 6	Class 5	Class 4	Class 2	All
	ISO 492	Normal class Class 6X	Class 6	Class 5	Class 4	Class 2	Radial bearings
International standard	ISO 199	Normal class	Class 6	Class 5	Class 4	—	Thrust ball bearings
	ISO 578	Class 4	—	Class 3	Class 0	Class 00	Inch taper roller bearings
	ISO 1224	—	—	Class 5A	Class 4A	—	Precision instrument bearings
Germany industry norm	DIN 620	P0	P6	P5	P4	P2	All

Table 19 Precision class of the bearings

Standard		Precision class					Bearing type
American standard (ANSI) American bearing industrial association standard (AFBMA)	ANSI/ AFBMA Std.20	ABEC—1 RBEC—1	ABEC—3 RBEC—3	ABEC—5 RBEC—5	ABEC—7	ABEC—9	Radial bearings (taper bearings excluded)
	ANSI/ AFBMA Std.19.1	Class K	Class N	Class C	Class B	Class A	Metric taper roller bearings
	ANSI B 3.19 AFBMA Std.19	Class 4	Class 2	Class 3	Class 0	Class 00	Inch taper roller bearings
	ANSI/ AFBMA Std.12.1	—	Class 3P	Class 5P Class 5T	Class 7P Class 7T	Class 9P	Metric Precision instrument bearings
	ANSI/ AFBMA Std.12.2	—	Class 3P	Class 5P Class 5T	Class 7P Class 7T	Class 9P	Inch precision instrument bearings
British (RHP)		EP1	—	EP5	EP7	EP9	All
Germany (FAG)		P0	P6(CLN)	P5	P4	P2	All
Sweden (SKF)		P0	P6(P6X)	P5	P4	—	All
China (Old)	GB/T272—1988	G	E(EX)	D	C	B	All
China (New)	GB/T272—1993	P0	P6	P5	P4	P2	All

Note: Chinese precision symbols of rolling mill bearings GB/T272-1993 conform to ISO standards.

Bearing precision mainly refers to dimension tolerance of form and position of bearing parts (rings and rolling elements) after processing (referred to as dimension precision), and rotation precision of finished bearings (referred to as motion accuracy). Dimension precision is the main precision in the fitting of bearing, shaft, housing and bore, motion accuracy is directly related to the precision of the machine.

4.2 Tolerance of rolling mill bearings

The tolerance of **Stanley** rolling mill bearings conforms to ISO standards and Chinese GB/T307.1、GB/T307.4 standards as well as internationally accepted standards.

The basic concept of bearing tolerance, the name, symbols and definition of dimension, dimension precision and rotation precision are unified among major bearing manufacturers all around the world as follows:

d	Nominal bore diameter of the bearing
d1	Basic diameter of the basic tapered bore on the theoretical big end
Δds	Single bore diameter deviation
Δdmp	Average bore diameter deviation in single plane (for the basic tapered bore, Δdmp refers to the theoretical small end of the bore only)
$\Delta d1mp$	Average bore diameter deviation of basic tapered bore in a single plane on the theoretical big end
Vdsp	Bore diameter variation amount of single radial plane
Vdmp	Average bore diameter variation (only suitable for the basic cylindrical bore)
α	Inner ring bore steep angle (nominal semi-tapered angle)
D	Nominal outside diameter of the bearings
D1	Nominal outside diameter of the outer ring flange
ΔDs	Single outside diameter deviation
ΔDmp	Average outside diameter deviation in a single plane
$\Delta D1s$	Single outside diameter deviation of outer ring flange
VDsp	Outside diameter variation in a single radial plane
VDmp	Average outside diameter variation
B	Nominal width of inner ring
ΔBs	Single width deviation of inner ring
VBs	Width variation of inner ring
C	Nominal width of outer ring
C1	Nominal width of the outer ring flange
ΔCs	Single width deviation of outer ring

$\Delta C1s$	Single width deviation of outer ring flange
VCs	Width variation of outer ring
VC1s	Width variation of outer ring flange
Kia	Radial runout of assembled bearing inner ring
Kea	Radial runout of assembled bearing outer ring
Sd	Runout of inner ring reference face (back) to bore
S_D	Tilt variation of outer diameter surface generatrix to base surface (back)
S_{D1}	Tilt variation of outer diameter surface generatrix to flange back
Sia	Runout of assembled bearing inner ring face (back) to raceway
Sea	Runout of assembled bearing outer ring face (back) to raceway
Sea1	Runout of assembled bearing flange back to raceway
Si	Variation of shaft washer raceway to base thickness (for thrust bearings)
Se	Variation of housing washer raceway to base thickness (for thrust bearings)
ΔTs	Actual width deviation of taper roller bearings
T1	Nominal width of bearings composed of taper roller bearing inner units assembly and standard outer ring
$\Delta T1s$	T1 actual deviation
T2	Nominal width of bearings composed of taper roller bearing outer ring and standard inner units assembly
$\Delta T2s$	T2 actual deviation

4.3 Tolerance table of rolling mill bearings

Tolerance of radial bearings (except taper roller bearings) is listed in table 20 ~ 23, tolerance of taper roller bearings listed in table 24 ~ 28、 table 31 ~ 34, tolerance of inner ring with tapered bore is shown in table 29 ~ 30, tolerance of thrust bearings is shown in table 35 ~ 38, chamfer dimension is listed in 39 ~ 41.

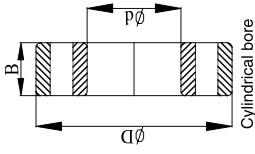
Table 20 Tolerances for metric radial bearings (except taper roller bearings) (GB/T307.1-2005)

Inner ring (bore diameter)												Unit: μm									
Nominal bore diameter d (mm)		Average bore diameter deviation in a single plane Δd_{mp}						Bore diameter variation in a single plane Vdp										Average bore diameter variation in a plane Vdmp			
								Diameter series 7, 8, 9			Diameter series 0, 1			Diameter series 2, 3, 4							
		Class 0		Class 6		Class 5		Class 0	Class 6	Class 5	Class 0	Class 6	Class 5	Class 0	Class 6	Class 5	Class 0				Class 6
over	incl.	high	low	high	low	high	low	max			max			max							max
50	80	0	-15	0	-12	0	-9	19	15	9	19	15	7	11	9	7	11	9	11	9	5
80	120	0	-20	0	-15	0	-10	25	19	10	25	19	8	15	11	8	15	11	15	11	5
120	150	0	-25	0	-18	0	-13	31	23	13	31	23	10	19	14	10	19	14	19	14	7
150	180	0	-25	0	-18	0	-13	31	23	13	31	23	10	19	14	10	19	14	19	14	7
180	250	0	-30	0	-22	0	-15	38	28	15	38	28	12	23	17	12	23	17	23	17	8
250	315	0	-35	0	-25	0	-18	44	31	18	44	31	14	26	19	14	26	19	26	19	9
315	400	0	-40	0	-30	0	-23	50	38	23	50	38	18	30	23	18	30	23	30	23	12
400	500	0	-45	0	-35	0	-28	56	44	28	56	44	21	34	26	21	34	26	34	26	14
500	630	0	-50	0	-40	0	-35	63	50	35	63	50	26	38	30	26	38	30	38	30	18
630	800	0	-75	0	-50	0	-45	94	63	45	94	63	34	56	38	34	56	38	56	38	23
800	1000	0	-100	0	-60	0	-60	125	75	60	125	75	45	75	45	45	75	45	75	45	30
1000	1250	0	-125	0	-75	0	-75	156	94	75	156	94	56	94	56	56	94	56	94	56	38
1250	1600	0	-160	-	-	-	-	200	-	-	200	-	-	120	-	-	120	-	120	-	-
1600	2000	0	-200	-	-	-	-	250	-	-	250	-	-	150	-	-	150	-	150	-	-

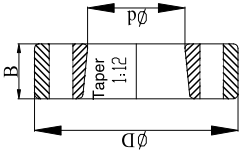
Table 21 Tolerances for metric radial bearings (except taper roller bearings) (GB/T307.1-2005)

Inner ring (rotation precision and width)																		Unit: μ
Nominal bore diameter d (mm)		Radial runout K_{ia}			Lateral runout S_{ia}		Axial runout S_{ia}		Single width deviation of single bearing ΔB_s						Width variation VBs			
		Class 0	Class 6	Class 5	max	max	Class 5	max	high	low	high	low	high	low	Class 0	Class 6	Class 5	
over	incl.	max			max		max		high	low	high	low	high	low	max			
50	80	20	10	5	8		8		0	-150	0	-150	0	-150	25	25	6	
80	120	25	13	6	9		9		0	-200	0	-200	0	-200	25	25	7	
120	150	30	18	8	10		10		0	-250	0	-250	0	-250	30	30	8	
150	180	30	18	8	10		10		0	-250	0	-250	0	-250	30	30	8	
180	250	40	20	10	11		13		0	-300	0	-300	0	-300	30	30	10	
250	315	50	25	13	13		15		0	-350	0	-350	0	-350	35	35	13	
315	400	60	30	15	15		20		0	-400	0	-400	0	-400	40	40	15	
400	500	65	35	20	18		25		0	-450	0	-450	0	-450	50	45	18	
500	630	70	40	25	25		30		0	-500	0	-500	0	-500	60	50	20	
630	800	80	50	30	30		35		0	-750	0	-750	0	-750	70	60	23	
800	1000	90	60	40	40		45		0	-1000	0	-1000	0	-1000	80	60	35	
1000	1250	100	70	50	50		60		0	-1250	0	-1250	0	-1250	100	60	45	
1250	1600	120	-	-	-		-		0	-1600	-	-	-	-	120	-	-	
1600	2000	140	-	-	-		-		0	-2000	-	-	-	-	140	-	-	

Note: 1) Axial runout S_{ia} value: suitable for deep groove ball bearings and angular contact ball bearings.



Cylindrical bore



Tapered bore

- d: Bearing nominal bore diameter
- D: Bearing nominal outside diameter
- B: Bearing nominal width

Figure 11 Illustration of radial bearings (taper roller bearings excluded)

Table 22 Tolerances for metric radial bearings (except taper roller bearings) (GB/T307.1-2005)

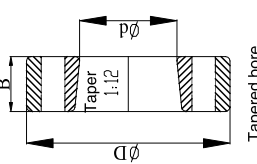
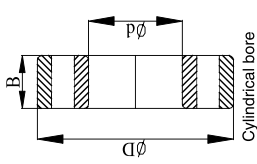
Nominal outside diameter D (mm)		Outer ring (outside diameter)												Unit: μ m					
		Deviation of outside diameter in single plane VDp																	
		Deviation of average outside diameter in single plane Δ Dmp						Open-type bearing				Sealed bearing			Deviation of average outside diameter in plane VDmp				
								Diameter series7, 8, 9		Diameter series0, 1		Diameter series2, 3, 4					0, 1, 2, 3, 4		
		Class 0	Class 6	Class 5	Class 0	Class 6	Class 5	Class 0	Class 6	Class 5	Class 0	Class 6	Class 5		Class 0	Class 6			
over	incl.	high	low	high	low	high	low	max		max		max		max					
50	80	0	-13	0	-11	0	-9	16	14	9	13	11	7	10	8	7	10	8	5
80	120	0	-15	0	-13	0	-10	19	16	10	19	16	8	11	10	8	26	20	11
120	150	0	-18	0	-15	0	-11	23	19	11	23	19	8	14	11	8	30	25	14
150	180	0	-25	0	-18	0	-13	31	23	13	31	23	10	19	14	10	38	30	19
180	250	0	-30	0	-20	0	-15	38	25	15	38	25	11	23	15	11	-	23	15
250	315	0	-35	0	-25	0	-18	44	31	18	44	31	14	26	19	14	-	26	19
315	400	0	-40	0	-28	0	-20	50	35	20	50	35	15	30	21	15	-	30	21
400	500	0	-45	0	-33	0	-23	56	41	23	56	41	17	34	25	17	-	34	25
500	630	0	-50	0	-38	0	-28	63	48	28	63	48	21	38	29	21	-	38	29
630	800	0	-75	0	-45	0	-35	94	56	35	94	56	26	55	34	26	-	55	34
800	1000	0	-100	0	-60	0	-50	125	75	50	125	75	38	75	45	38	-	75	45
1000	1250	0	-125	0	-75	0	-63	156	94	63	156	94	47	94	56	47	-	94	56
1250	1600	0	-160	0	-90	0	-80	200	113	80	200	113	60	120	68	60	-	120	68
1600	2000	0	-200	0	-120	-	-	250	150	-	250	150	-	150	90	-	-	150	90
2000	2500	0	-250	-	-	-	-	313	-	-	313	-	-	188	-	-	-	188	-

Note: 1) VDP (Class 0 and 6) value, VDmp (Class 0 and 6) value: being suitable for structure without snap rings.

Table 23 Tolerances for metric radial bearings (except taper roller bearings) (GB/T307.1-2005)

Outer ring (rotation precision and width)											Unit: μm		
Nominal outside diameter D (mm)		Radial runout K α			Tilt variation of outside diameter surface S ϕ		Axial runout Sea		Single width deviation Δ Cs		Width variation VCs		
		Class 0	Class 6	Class 5	Class 5	max	Class 5	max	Class 5	high	low	Class 0, 6	Class 5
over	incl.	max				max	max	max				max	
50	80	25	13	8		8		10				Values are identical to those for inner ring of same bearing, same class (VBs).	
80	120	35	18	10		9		11					
120	150	40	20	11		10		13					
150	180	45	23	13		10		14					
180	250	50	25	15		11		15					
250	315	60	30	18		13		18					
315	400	70	35	20		13		20					
400	500	80	40	23		15		23					
500	630	100	50	25		18		25					
630	800	120	60	30		20		30					
800	1000	140	75	40		23		40					
1000	1250	160	85	45		30		45					
1250	1600	190	95	60		45		60					
1600	2000	220	110	-		-		-					
2000	2500	250	-	-		-		-					

Note: 1) Axial runout Sea value: suitable for deep groove ball bearings and angular contact ball bearings.



Tapered bore

d: Bearing nominal bore diameter
D: Bearing nominal outside diameter
B: Bearing nominal width

Figure 11 Illustration of radial bearings (taper roller bearings excluded)

Table 24 Tolerances for metric taper roller bearings
(basic cylindrical bore)(GB/T307.1-2005)

Inner ring												
Nominal bore diameter d (mm)		Deviation of average bore diameter in single plane Δdmp				Deviation of bore diameter in single plane Vdp			Deviation of average bore diameter in plane Vdmp			
		Class0, 6X		Class6, 5		Class0, 6X	Class6	Class5	Class0, 6X	Class6	Class5	
over	incl.	high	low	high	low	max			max			
80	120	0	-20	0	-15	20	15	11	15	11	8	
120	180	0	-25	0	-18	25	18	14	19	14	9	
180	250	0	-30	0	-22	30	22	17	23	16	11	
250	315	0	-35	0	-25	35	25	19	26	19	13	
315	400	0	-40	0	-30	40	30	23	30	23	15	
400	500	0	-45	0	-35	45	35	26	34	26	18	
500	630	0	-50	0	-40	50	40	30	38	30	20	
630	800	0	-75	0	-50	75	50	38	56	38	25	
800	1000	0	-100	0	-60	100	60	45	75	45	30	
1000	1250	0	-125	0	-75	125	75	56	94	56	38	
1250	1600	0	-160	-	-	160	-	-	120	-	-	
1600	2000	0	-200	-	-	200	-	-	150	-	-	

Unit: μm

	Radial runout Kia			Lateral runout Sd	Deviation of single width of inner ring ΔBs								Nominal bore diameter d (mm)	
	Class0, 6X	Class 6	Class 5	Class 5	Class0		Class6X		Class6		Class5			
	max			max	high	low	high	low	high	low	high	low	over	incl.
	30	13	8	9	0	-200	0	-50	0	-200	0	-400	80	120
	35	18	11	10	0	-250	0	-50	0	-250	0	-500	120	180
	50	20	13	11	0	-300	0	-50	0	-300	0	-600	180	250
	60	30	13	13	0	-350	0	-50	0	-350	0	-700	250	315
	70	35	15	15	0	-400	0	-50	0	-400	0	-800	315	400
	80	40	18	17	0	-450	-	-	0	-450	0	-900	400	500
	90	50	20	20	0	-500	-	-	0	-500	0	-1000	500	630
	105	60	20	23	0	-750	-	-	0	-750	0	-1500	630	800
	120	75	23	30	0	-1000	-	-	0	-1000	0	-2000	800	1000
	120	85	28	30	0	-1250	-	-	0	-1250	0	-2500	1000	1250
	120	-	-	-	0	-1600	-	-	-	-	-	-	1250	1600
	140	-	-	-	0	-2000	-	-	-	-	-	-	1600	2000

Table 25 Tolerances for metric taper roller bearings
(basic cylindrical bore)(GB/T307.1-2005)

Outer ring												
Nominal outside diameter D (mm)		Deviation of average outside diameter in single plane ΔDmp				Variation of outside diameter in single plane VDp			Variation of average outside diameter in plane VDmp			
		Class0, 6X		Class6 , 5		Class0, 6X	Class6	Class5	Class0, 6X	Class6	Class5	
over	incl.	high	low	high	low	max			max			
80	120	0	-18	0	-13	18	13	10	14	10	7	
120	150	0	-20	0	-15	20	15	11	15	11	8	
150	180	0	-25	0	-18	25	18	14	19	14	9	
180	250	0	-30	0	-20	30	20	15	23	15	10	
250	315	0	-35	0	-25	35	25	19	26	19	13	
315	400	0	-40	0	-28	40	28	22	30	21	14	
400	500	0	-45	0	-33	45	33	25	34	25	17	
500	630	0	-50	0	-38	50	38	29	38	29	19	
630	800	0	-75	0	-45	75	45	34	56	34	23	
800	1000	0	-100	0	-60	100	60	45	75	45	30	
1000	1250	0	-125	0	-75	125	75	56	94	56	38	
1250	1600	0	-160	0	-90	160	90	71	120	68	48	
1600	2000	0	-200	0	-120	200	120	90	150	90	60	

Unit: μm

Radial runout Kea				Deviation of plane inclination of outside diameter S_D	Deviation of single width of outer ring ΔC_s				Nominal outside diameter D (mm)	
	Class0, 6X	Class6	Class5	Class5	Class6X		Class0, 6, 5			
	max			max	high	low	high	low	over	incl.
	35	18	10	9	0	−100	Values are identical to those for inner ring of same bearing, same class(ΔB_s).		80	120
	40	20	11	10	0	−100			120	150
	45	23	13	10	0	−100			150	180
	50	25	15	11	0	−100			180	250
	60	30	18	13	0	−100			250	315
	70	35	20	13	0	−100			315	400
	80	40	23	15	0	−100			400	500
	100	50	25	18	0	−100			500	630
	120	60	30	20	−	−			630	800
	140	75	35	23	−	−			800	1000
	165	85	40	27	−	−			1000	1250
	190	95	40	35	−	−			1250	1600
	220	115	45	40	−	−		1600	2000	

Table 26 Tolerances for metric taper roller bearings
(basic cylindrical bore)(GB/T307.1-2005)

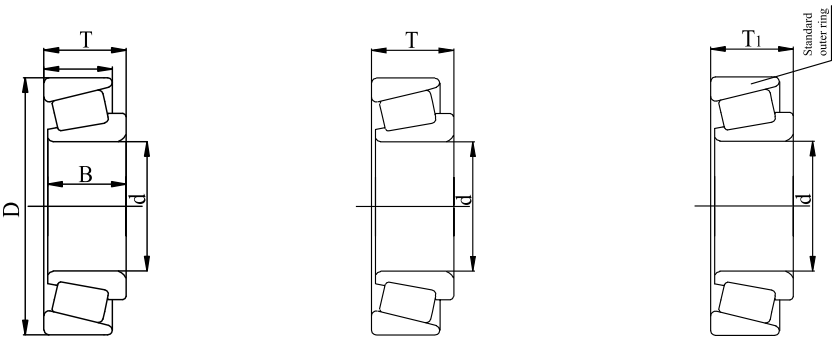
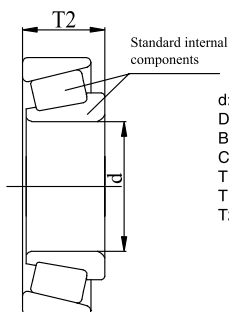


Figure 12 Illustration of metric taper roller bearings

Assembly width and effective width

Nominal bore diameter d (mm)		Deviation of assembly width Δ Ts						Deviation of effective width of internal components Δ T1s						
		Class0		Class6X		Class5		Class0		Class6X		Class5		
over	incl.	high	low	high	low	high	low	high	low	high	low	high	low	
50	80	+200	0	+100	0	+200	-200	+100	0	+50	0	+100	-100	
80	120	+200	-200	+100	0	+200	-200	+100	-100	+50	0	+100	-100	
120	180	+350	-250	+150	0	+350	-250	+150	-150	+50	0	+150	-150	
180	250	+350	-250	+150	0	+350	-250	+150	-150	+50	0	+150	-150	
250	315	+350	-250	+200	0	+350	-250	+150	-150	+100	0	+150	-150	
315	400	+400	-400	+200	0	+400	-400	+200	-200	+100	0	+200	-200	
400	500	+450	-450	+200	0	+450	-450	+225	-225	+100	0	+225	-225	
500	630	+500	-500	-	0	+500	-500	-	-	-	0	-	-	
630	800	+600	-600	-	0	+600	-600	-	-	-	0	-	-	
800	1000	+750	-750	-	0	+750	-750	-	-	-	0	-	-	
1000	1250	+900	-900	-	0	+750	-750	-	-	-	0	-	-	
1250	1600	+1050	-1050	-	0	+900	-900	-	-	-	0	-	-	



- d: Bearing nominal bore diameter
 D: Bearing nominal outside diameter
 B: Nominal width of inner ring
 C: Nominal width of outer ring
 T: Bearing nominal width (Assembly width)
 T1: Nominal effective width of internal components
 T2: Nominal effective width of outer ring

Unit: μm

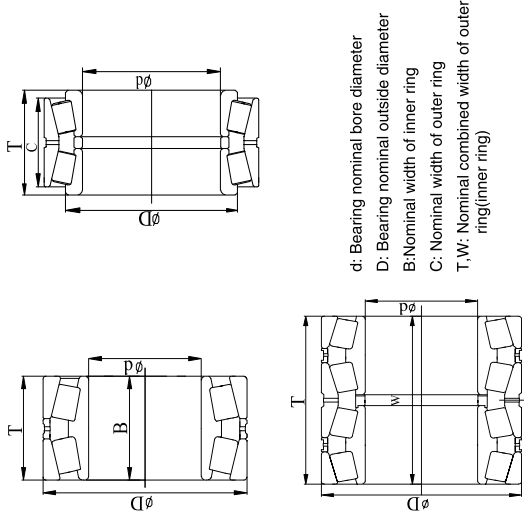
Deviation of effective width of external components $\Delta T2s$							Nominal bore diameter d (mm)	
Class0		Class6X		Class5				
high	low	high	low	high	low	over	incl.	
+100	0	+50	0	+100	-100	50	80	
+100	-100	+50	0	+100	-100	80	120	
+200	-100	+100	0	+200	-100	120	180	
+200	-100	+100	0	+200	-100	180	250	
+200	-100	+100	0	+200	-100	250	315	
+200	-200	+100	0	+200	-200	315	400	
+225	-225	+100	0	+225	-225	400	500	
-	-	-	0	-	-	500	630	
-	-	-	0	-	-	630	800	
-	-	-	0	-	-	800	1000	
-	-	-	0	-	-	1000	1250	
-	-	-	0	-	-	1250	1600	

Table 27 Tolerances for metric double row and four row taper roller bearings (Class 0)

Width of inner ring, width of outer ring and assembly width										Unit: μ m		
Nominal bore diameter d (mm)		Deviation of average bore diameter in single plane Δ dmp		Variation of bore diameter in single plane Vdp	Variation of average bore diameter in plane Vdmp	Radial runout Kia	Deviation of single width for inner ring and outer ring Δ Bs, Δ Cs		Deviation of assembly width			
									Double row bearings Δ Ts	Four row bearings Δ Ts, Δ Ws		
over	incl.	high	low	max	max	max	high	low	high	low	high	low
80	120	0	-20	20	15	30	0	-200	+400	-400	+500	-500
120	180	0	-25	25	17	35	0	-250	+500	-500	+600	-600
180	250	0	-30	30	23	50	0	-300	+600	-600	+750	-750
250	315	0	-35	35	26	60	0	-350	+700	-700	+900	-900
315	400	0	-40	40	30	70	0	-400	+800	-800	+1000	-1000
400	500	0	-45	45	34	80	0	-450	+900	-900	+1200	-1200
500	630	0	-50	50	38	90	0	-500	+1000	-1000	+1200	-1200
630	800	0	-75	75	56	105	0	-750	+1500	-1500	-	-
800	1000	0	-100	100	75	120	-	-	+1500	-1500	-	-

Table 28 Tolerances for metric double row and four row taper roller bearings (class 0)

Outer ring					Unit: μm	
Nominal outside diameter D (mm)		Deviation of average outside diameter in single plane ΔDmp		Variation of outside diameter in single plane VDp	Variation of average outside diameter in plane VDmp	Radial runout Kea
over	incl.	high	low	max	max	max
80	120	0	-18	18	14	35
120	150	0	-20	20	15	40
150	180	0	-25	25	19	45
180	250	0	-30	30	23	50
250	315	0	-35	35	26	60
315	400	0	-40	40	30	70
400	500	0	-45	45	34	80
500	630	0	-50	50	38	100
630	800	0	-75	75	56	120
800	1000	0	-100	100	75	140



d: Bearing nominal bore diameter
D: Bearing nominal outside diameter
B: Nominal width of inner ring
C: Nominal width of outer ring
T, W: Nominal combined width of outer ring(inner ring)

Figure 13 Illustration of metric double row and four row taper roller bearings

Table 29 Tolerances for tapered bore , taper 1:12 (Class 0, 6, 5)

Nominal bore diameter d (mm)		Δdmp						Vdp			
		Class0		Class6		Class5		Class0	Class6	Class5	
over	incl.	high	low	high	low	high	low	max			
50	80	+46	0	+30	0	+19	0	19	19	19	
80	120	+54	0	+31	0	+22	0	22	25	22	
120	180	+63	0	+32	0	+25	0	40	31	25	
180	250	+72	0	+33	0	+29	0	46	38	29	
250	315	+81	0	+34	0	+32	0	52	44	32	
315	400	+89	0	+35	0	+36	0	57	50	36	
400	500	+97	0	+36	0	+40	0	63	56	—	
500	630	+110	0	+37	0	+44	0	70	70	—	
630	800	+125	0	+38	0	+50	0	—	—	—	
800	1000	+140	0	+39	0	+56	0	—	—	—	
1000	1250	+165	0	+40	0	+66	0	—	—	—	
1250	1600	+195	0	+41	0	+78	0	—	—	—	
1600	2000	—	0	+42	0	+92	0	—	—	—	

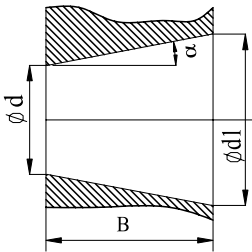


Figure 14 Theoretical tapered bore

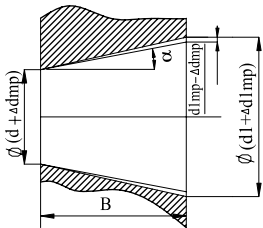


Figure 15 Tapered bore with average inner ring deviation in single plane

Unit: μm

$\Delta d1\text{mp} - \Delta d\text{mp}$							Nominal bore diameter d (mm)	
Class0		Class6		Class5				
	high	low	high	low	high	low	over	incl.
	+30	0	+30	0	+19	0	50	80
	+35	0	+35	0	+22	0	80	120
	+40	0	+40	0	+25	0	120	180
	+46	0	+46	0	+29	0	180	250
	+52	0	+52	0	+32	0	250	315
	+57	0	+57	0	+36	0	315	400
	+63	0	+63	0	+40	0	400	500
	+70	0	+70	0	+44	0	500	630
	+80	0	+80	0	+50	0	630	800
	+90	0	+90	0	+56	0	800	1000
	+105	0	+105	0	+66	0	1000	1250
	+125	0	+125	0	+78	0	1250	1600
	—	0	+150	0	+92	0	1600	2000

Remark: 1) Being suitable for any single radial plane of tapered bore;
 2) Being suitable for inner ring of radial bearing for tapered bore with taper 1:12;
 3) Definition of symbol:
 $d1$ -- Basic diameter of theoretical big end of tapered bore $d1 = d + 1/12 B$;
 $\Delta d\text{mp}$ -- Deviation of average bore diameter in single plane of theoretical small end of tapered bore;
 $\Delta d1\text{mp}$ -- Deviation of average bore diameter in single plane of theoretical big end of tapered bore;
 Vdp -- Deviation of bore diameter in single plane;
 B -- Nominal width of inner ring;
 α -- $1/2$ of tapered bore nominal taper;
 $\alpha = 2^\circ 23' 9.4'' = 2.38594^\circ = 0.041643\text{rad}$

Table 30 Tolerances for tapered bore , taper 1:30 (Class 0)

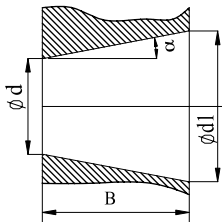


Figure 14 Theoretical tapered bore

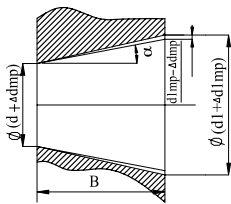


Figure 15 Tapered bore with average inner ring deviation in single plane

Unit: μm

Nominal bore diameter d (mm)		Δ dmp		Vdp	Δ d1mp- Δ dmp	
		Class0				
over	incl.	high	low	max	high	low
50	80	+15	0	19	+30	0
80	120	+20	0	22	+35	0
120	180	+25	0	40	+40	0
180	250	+30	0	46	+46	0
250	315	+35	0	52	+52	0
315	400	+40	0	57	+57	0
400	500	+45	0	63	+63	0
500	630	+50	0	70	+70	0
630	800	+75	0	–	+100	0
800	1000	+100	0	–	+100	0
1000	1250	+125	0	–	+115	0
1250	1600	+160	0	–	+125	0
1600	2000	+200	0	–	+150	0

Remark: 1) Being suitable for any single radial plane of tapered bore;
2) Being suitable for inner ring of radial bearing of tapered bore with taper 1:30;
3) Definition of symbol:
d1-- Basic diameter of theoretical big end of tapered bore $d1=d + 1/30 B$;
 Δdmp -- Deviation of average bore diameter in single plane of theoretical small end of tapered bore;
 $\Delta d1mp$ -- Deviation of average bore diameter in single plane of theoretical big end of tapered bore;
Vdp-- Deviation of bore diameter in single plane;
B-- Nominal width of inner ring;
 α --1/2 of tapered bore nominal taper;
 $\alpha = 0^{\circ} 57' 17.4'' = 0.95484^{\circ} = 0.016665rad$

Table 31 Tolerances for inch taper roller bearings (AFBMA 19)

Applicable bearing type	Inner ring										Unit: μm
	Nominal bore diameter		Tolerance of single bore diameter Δds								
	d mm (1/25.4)		CLASS 4		CLASS 2		CLASS 3		CLASS 0		
	over	incl.	high	low	high	low	high	low	high	low	
All types	—	76.2 (3.0)	+13	0	+13	0	+13	0	+13	0	
	76.2 (3.0)	266.7 (10.5)	+25	0	+25	0	+13	0	+13	0	
	266.7 (10.5)	304.8 (12.0)	+25	0	+25	0	+13	0	+13	0	
	304.8 (12.0)	609.6 (24.0)	+51	0	+51	0	+25	0	—	—	
	609.6 (24.0)	914.4 (36.0)	+76	0	—	—	+38	0	—	—	
	914.4 (36.0)	1219.2 (48.0)	+102	0	—	—	+51	0	—	—	
	1219.2 (48.0)	—	+127	0	—	—	+76	0	—	—	

Table 32 Tolerances for inch taper roller bearings (AFBMA 19)

Applicable bearing type	Outer ring										Unit: μm
	Nominal outside diameter		Tolerance of single outside diameter ΔDs								
	D mm (1/25.4)		CLASS 4		CLASS 2		CLASS 3		CLASS 0		
	over	incl.	high	low	high	low	high	low	high	low	
All types	—	266.7 (10.5)	+25	0	+25	0	+13	0	+13	0	
	266.7 (10.5)	304.8 (12.0)	+25	0	+25	0	+13	0	+13	0	
	304.8 (12.0)	609.6 (24.0)	+51	0	+51	0	+25	0	—	—	
	609.6 (24.0)	914.4 (36.0)	+76	0	+76	0	+38	0	—	—	
	914.4 (36.0)	1219.2 (48.0)	+102	0	—	—	+51	0	—	—	
	1219.2 (48.0)	—	+127	0	—	—	+76	0	—	—	
	—	—	—	—	—	—	—	—	—	—	

Table 33 Tolerances for inch taper roller bearings (AFBMA 19)

Radial runout			Unit: μm			
Applicable bearing type	Nominal outside diameter		Radial runout of inner ring and outer ring Kia and Kea			
	D mm (1/25.4)		CLASS 4	CLASS 2	CLASS 3	CLASS 0
	over	incl.	max	max	max	max
All types	—	266.7 (10.5)	51	38	8	4
	266.7 (10.5)	304.8 (12.0)	51	38	8	4
	304.8 (12.0)	609.6 (24.0)	51	38	18	—
	609.6 (24.0)	914.4 (36.0)	76	51	51	—
	914.4 (36.0)	1219.2 (48.0)	76	—	76	—
	1219.2 (48.0)	—	76	—	76	—

Table 34 Tolerances for inch taper roller bearings (AFBMA 19)

Assembly width and combination width					
Applicable bearing type	Nominal bore diameter		Nominal outside diameter		
	d mm (1/25.4)		D mm (1/25.4)		
	over	incl.	over	incl.	
Single row	—	101.6 (4.0)	—	—	
	101.6 (4.0)	266.7 (10.5)	—	—	
	266.7 (10.5)	304.8 (12.0)	—	508.0 (20.0)	
	304.8 (12.0)	609.6 (24.0)	508.0 (20.0)	—	
	304.8 (12.0)	609.6 (24.0)	—	—	
		—	—	—	
Double row	—	101.6 (4.0)	—	—	
	101.6 (4.0)	266.7 (10.5)	—	—	
	266.7 (10.5)	304.8 (12.0)	—	—	
	304.8 (12.0)	609.6 (24.0)	—	508.0 (20.0)	
	304.8 (12.0)	609.6 (24.0)	508.0 (20.0)	—	
	609.6 (24.0)	—	—	—	
Double row (TNA type)	—	127.0 (5.0)	—	—	
	127.0 (5.0)	—	—	—	
Four row	Whole dimensional range		—	—	

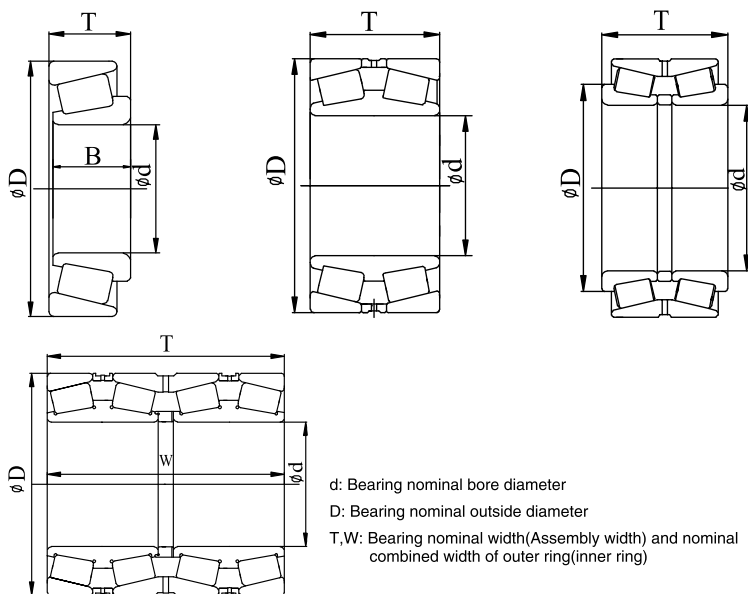


Figure 16 Illustration of inch taper roller bearings

Unit: μm

Tolerance for assembly width and combination width ΔTs , ΔWs								
CLASS 4		CLASS 2		CLASS 3		CLASS 0		
high	low	high	low	high	low	high	low	
+203	0	+203	0	+203	-203	+203	-203	
+356	-254	+203	0	+203	-203	+203	-203	
+356	-254	+203	0	+203	-203	+203	-203	
-	-	+381	-381	+203	-203	-	-	
-	-	+381	-381	+381	-381	-	-	
+381	-381	-	-	+381	-381	-	-	
+406	0	+406	0	+406	-406	+406	-406	
+711	-508	+406	-203	+406	-406	+406	-406	
+711	-508	+406	-203	+406	-406	+406	-406	
-	-	+762	-762	+406	-406	-	-	
-	-	+762	-762	+762	-762	-	-	
+762	-762	-	-	+762	-762	-	-	
-	-	+254	0	+254	0	-	-	
-	-	+762	0	+762	0	-	-	
+1524	-1524	+1524	-1524	+1524	-1524	+1524	-1524	

Table 35 Tolerances for thrust ball bearings (GB/T307.4-2005)

Shaft washer and middle ring								Unit: μm	
Nominal bore diameter d (mm)		Tolerance of average bore diameter in single plane Δdmp		Deviation of bore diameter in single plane Vdp	Variation of thickness for raceway of inner ring and middle ring S_i			Deviation of height of unidirectional bearing ΔTs	
		Class0, 6, 5		Class0, 6, 5	Class0	Class6	Class5	Class0	
over	incl.	high	low	max	max			high	low
80	120	0	-20	15	15	8	4	0	-150
120	180	0	-25	19	15	9	5	0	-175
180	250	0	-30	23	20	10	5	0	-200
250	315	0	-35	26	25	13	7	0	-225
315	400	0	-40	30	30	15	7	0	-300
400	500	0	-45	34	30	18	9	-	-
500	630	0	-50	38	35	21	11	-	-
630	800	0	-75	55	40	25	13	-	-
800	1000	0	-100	75	45	30	15	-	-
1000	1250	0	-125	95	50	35	18	-	-
1250	1600	0	-160	120	60	40	25	-	-

Table 36 Tolerances for thrust ball bearings (GB/T307.4-2005)

Housing washer						Unit: μm	
Nominal outside diameter D (mm)		Tolerance of average outside diameter in single plane ΔDmp		Deviation of outside diameter in single plane VDp	Deviation of thickness of raceway for housing washer S_e		
		Class 0、6、5		Class 0、6、5	Class 0、6、5		
over	incl.	high	low	max	max		
80	120	0	-22	17	Values are identical to those for inner ring of same bearing,same class(S_i).		
120	180	0	-25	19			
180	250	0	-30	23			
250	315	0	-35	26			
315	400	0	-40	30			
400	500	0	-45	34			
500	630	0	-50	38			
630	800	0	-75	55			
800	1000	0	-100	75			
1000	1250	0	-125	95			
1250	1600	0	-160	120			

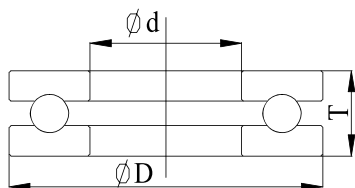


Figure 17 Illustration of thrust ball bearings

d: Bearing nominal bore diameter
D: Bearing nominal outside diameter
T: Bearing nominal height(single direction)

Table 37 Tolerances for spherical roller thrust bearings (Class0)(GB/T307.4-2005)

Shaft washer					Unit: μm		
Nominal bore diameter d (mm)		Tolerance of average bore diameter in single plane Δdmp		Deviation of bore diameter in single plane Vdp	Reference values		
					Lateral runout Sd	Deviation of height ΔTs	
over	incl.	high	low	max	max	high	low
80	120	0	-20	15	25	+200	-200
120	180	0	-25	19	30	+250	-250
180	250	0	-30	23	30	+300	-300
250	315	0	-35	26	35	+350	-350
315	400	0	-40	30	40	+400	-400
400	500	0	-45	34	45	+450	-450

Table 38 Tolerances for spherical roller thrust bearings (Class0)(GB/T307.4-2005)

Housing washer				Unit: μm	
Nominal outside diameter D (mm)		Tolerance of average outside diameter in single plane ΔDmp			
over	incl.	high	low		
120	180	0	-25		
180	250	0	-30		
250	315	0	-35		
315	400	0	-40		
400	500	0	-45		
500	630	0	-50		
630	800	0	-75		
800	1000	0	-100		

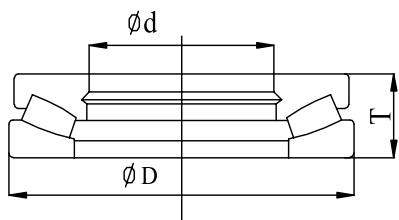


Figure 18 Illustration of spherical roller thrust bearings

d: Bearing nominal bore diameter
D: Bearing nominal outside diameter
T: Bearing nominal height

Table 39 Chamfer dimension limits for metric radial and thrust bearings
(except taper roller bearings)(GB/T274-1991)

Unit: mm

Minimum single chamfer dimensions	Nominal bearing bore diameter d		Maximum chamfer dimensions		
			Radial bearings		Thrust bearings
r _{smin}	over	incl.	r _{1,3max}	r _{2,4max}	r _{1,2,3,4max}
0.3	—	40	0.6	1	0.8
	40	—	0.8	1	0.8
0.6	—	40	1	2	1.5
	40	—	1.3	2	1.5
1	—	50	1.5	3	2.2
	50	—	1.9	3	2.2
1.1	—	120	2	3.5	2.7
	120	—	2.5	4	2.7
1.5	—	120	2.3	4	3.5
	120	—	3	5	3.5
2	—	80	3	4.5	4
	80	220	3.5	5	4
	220	—	3.8	6	4
2.1	—	280	4	6.5	4.5
	280	—	4.5	7	4.5
2.5	—	100	3.8	6	—
	100	280	4.5	6	—
	280	—	5	7	—
3	—	280	5	8	5.5
	280	—	5.5	8	5.5
4	—	—	6.5	9	6.5
5	—	—	8	10	8
6	—	—	10	13	10
7.5	—	—	12.5	17	12.5
9.5	—	—	15	19	15
12	—	—	18	24	18
15	—	—	21	30	21
19	—	—	25	38	25

Table 40 Chamfer dimension limits for metric radial taper roller bearings

Unit: mm

Minimum single chamfer dimensions	Nominal bearing bore/outside diameter d/D		Maximum chamfer dimensions	
r_{smin}	over	incl.	$r_{1,3max}$	$r_{2,4max}$
0.3	–	40	0.7	1.4
	40	–	0.9	1.6
0.6	–	40	1.1	1.7
	40	–	1.3	2
1	–	50	1.6	2.5
	50	–	1.9	3
1.5	–	120	2.3	3
	120	250	2.8	3.5
	250	–	3.5	4
2	–	120	2.8	4
	120	250	3.5	4.5
	250	–	4	5
2.5	–	120	3.5	5
	120	250	4	5.5
	250	–	4.5	6
3	–	120	4	5.5
	120	250	4.5	6.5
	250	400	5	7
	400	–	5.5	7.5
4	–	120	5	7
	120	250	5.5	7.5
	250	400	6	8
	400	–	6.5	8.5
5	–	180	6.5	8
	180	–	7.5	9
6	–	180	7.5	10
	180	–	9	11
7.5	–	–	12.5	17
9.5	–	–	15	19

Table 41 Chamfer dimension limits for inch taper roller bearings

Minimum single chamfer dimensions r_{smin}		Inner ring-Nominal bearing bore diameter d (mm)		Maximum chamfer dimensions		
				r_1	r_2	
over	incl.	over	incl.	max	max	
0.6	1.4	–	101.6	$r_{1min}+0.5$	$r_{2min}+1.3$	
		101.6	254.0	$r_{1min}+0.6$	$r_{2min}+1.8$	
		254.0	–	$r_{1min}+0.9$	$r_{2min}+2$	
1.4	2.5	–	101.6	$r_{1min}+0.5$	$r_{2min}+1.3$	
		101.6	254.0	$r_{1min}+0.6$	$r_{2min}+1.8$	
		254.0	–	$r_{1min}+2$	$r_{2min}+3$	
2.5	4	–	101.6	$r_{1min}+0.5$	$r_{2min}+1.3$	
		101.6	254.0	$r_{1min}+0.6$	$r_{2min}+1.8$	
		254.0	400.0	$r_{1min}+2$	$r_{2min}+4$	
		400.0	–	$r_{1min}+2.5$	$r_{2min}+4.5$	
4	5	–	101.6	$r_{1min}+0.5$	$r_{2min}+1.3$	
		101.6	254.0	$r_{1min}+0.6$	$r_{2min}+1.8$	
		254.0	–	$r_{1min}+2.5$	$r_{2min}+4$	
5	6	–	101.6	$r_{1min}+0.5$	$r_{2min}+1.3$	
		101.6	254.0	$r_{1min}+0.6$	$r_{2min}+1.8$	
		254.0	–	$r_{1min}+3$	$r_{2min}+5$	
6	7.5	–	101.6	$r_{1min}+0.5$	$r_{2min}+1.3$	
		101.6	254.0	$r_{1min}+0.6$	$r_{2min}+1.8$	
		254.0	–	$r_{1min}+4.5$	$r_{2min}+6.5$	
7.5	9.5	–	101.6	$r_{1min}+0.5$	$r_{2min}+1.3$	
		101.6	254.0	$r_{1min}+0.6$	$r_{2min}+1.8$	
		254.0	–	$r_{1min}+6.5$	$r_{2min}+9.5$	
9.5	12	–	101.6	$r_{1min}+0.5$	$r_{2min}+1.3$	
		101.6	254.0	$r_{1min}+0.6$	$r_{2min}+1.8$	
		254.0	–	$r_{1min}+8$	$r_{2min}+11$	

Unit: μm

Outer ring-Nominal bearing outside diameter D (mm)			Maximum chamfer dimensions	
			r_3	r_4
	over	incl.	max	max
	–	168.3	$r_{3\min}+0.6$	$r_{4\min}+1.2$
168.3		266.7	$r_{3\min}+0.8$	$r_{4\min}+1.4$
266.7		355.6	$r_{3\min}+1.7$	$r_{4\min}+1.7$
355.6		–	$r_{3\min}+0.9$	$r_{4\min}+2$
	–	168.3	$r_{3\min}+0.6$	$r_{4\min}+1.2$
168.3		266.7	$r_{3\min}+0.8$	$r_{4\min}+1.4$
266.7		355.6	$r_{3\min}+1.7$	$r_{4\min}+1.7$
355.6		–	$r_{3\min}+2$	$r_{4\min}+3$
	–	168.3	$r_{3\min}+0.6$	$r_{4\min}+1.2$
168.3		266.7	$r_{3\min}+0.8$	$r_{4\min}+1.4$
266.7		355.6	$r_{3\min}+1.7$	$r_{4\min}+1.7$
355.6		400.0	$r_{3\min}+2$	$r_{4\min}+4$
400.0		–	$r_{3\min}+2.5$	$r_{4\min}+4.5$
	–	168.3	$r_{3\min}+0.6$	$r_{4\min}+1.2$
168.3		266.7	$r_{3\min}+0.8$	$r_{4\min}+1.4$
266.7		355.6	$r_{3\min}+1.7$	$r_{4\min}+1.7$
355.6		–	$r_{3\min}+2.5$	$r_{4\min}+4$
	–	168.3	$r_{3\min}+0.6$	$r_{4\min}+1.2$
168.3		266.7	$r_{3\min}+0.8$	$r_{4\min}+1.4$
266.7		355.6	$r_{3\min}+1.7$	$r_{4\min}+1.7$
355.6		–	$r_{3\min}+3$	$r_{4\min}+5$
	–	168.3	$r_{3\min}+0.6$	$r_{4\min}+1.2$
168.3		266.7	$r_{3\min}+0.8$	$r_{4\min}+1.4$
266.7		355.6	$r_{3\min}+1.7$	$r_{4\min}+1.7$
355.6		–	$r_{3\min}+4.5$	$r_{4\min}+6.5$
	–	168.3	$r_{3\min}+0.6$	$r_{4\min}+1.2$
168.3		266.7	$r_{3\min}+0.8$	$r_{4\min}+1.4$
266.7		355.6	$r_{3\min}+1.7$	$r_{4\min}+1.7$
355.6		–	$r_{3\min}+6.5$	$r_{4\min}+9.5$
	–	168.3	$r_{3\min}+0.6$	$r_{4\min}+1.2$
168.3		266.7	$r_{3\min}+0.8$	$r_{4\min}+1.4$
266.7		355.6	$r_{3\min}+1.7$	$r_{4\min}+1.7$
355.6		–	$r_{3\min}+8$	$r_{4\min}+11$

5. Internal clearance and preload of rolling mill bearings

5.1 Internal clearance

Bearing internal clearance refers to clearance between the rings and rolling elements, the gap allows bearing rings to have free radial or axial movement.

Clearance can be divided into radial clearance and axial clearance according to move direction, shown in Figure 19.

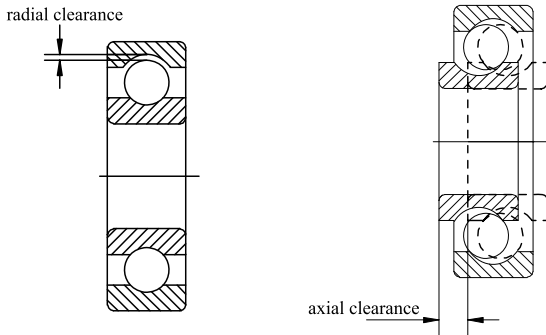


Figure 19 Bearing clearance illustration

Clearance can be divided into original clearance, fit clearance and working clearance according to the condition of rolling mill bearings.

5.2 Working clearance

Theoretic clearance less the expansion or contracting amount arisen from the interference when mounting to the shaft or housing is “installation clearance”. The clearance after dimension variation result from the installation clearance plus or minus the internal temperature variation is called “effective clearance”.

The internal clearance when bearings are installed in machine and rotate with load, namely effective clearance plus elastic deformation resulting from load, is called “working clearance”.

5.3 Clearance selection

As the fit of the inner ring is handled by interference fit during bearing installation, the original clearance will reduce accordingly, however the internal clearance will increase accordingly by load, the different expansion of the inner ring and outer ring due to temperature rise in operation will cause the internal bearing clearance to reduce accordingly. Therefore, the working

clearance should be calculated as follows:

$$U=U_0 - (\delta_f + \delta_t) + \delta_w \qquad \text{(Formula 11)}$$

In the formula

U — Bearing working clearance

U_0 — Bearing internal original clearance

$$\delta_f = \delta_{fo} + \delta_{fi}$$

δ_{fo} — Clearance reduction by fit of bearing outer ring and housing

δ_{fi} — Clearance reduction by fit of bearing inner ring and shaft

δ_t — Clearance reduction by temperature difference of bearing inner ring and outer ring

δ_w — Clearance increase by bearing load

Theoretically, maximum fatigue life may be obtained with slight negative value of working clearance, but it's difficult to remain the condition. Generally speaking, it's advisable to choose zero or slight positive value of working clearance to ensure ideal fatigue life and operation. See Figure 20 for relationship between working clearance and fatigue life.

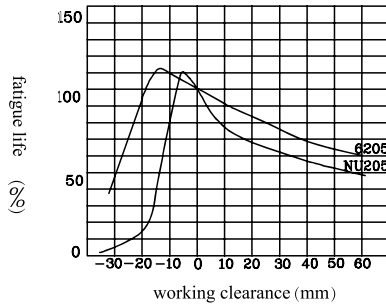


Figure 20 Correlations between working clearance and fatigue life

Bearing internal clearance before installation is generally designated by theoretical clearance.

The original internal clearance of all types of bearings is shown in table 42 ~ 50.

Table 42 Radial internal clearance of cylindrical roller bearings with cylindrical bore

Unit: μm

Nominal bore diameter d (mm)		C2		C0		C3		C4		C5	
over	incl.	min	max	min	max	min	max	min	max	min	max
80	100	15	50	50	85	75	110	110	140	155	190
100	120	15	55	50	90	85	125	105	165	180	220
120	140	15	60	60	105	100	145	145	190	200	245
140	160	20	70	70	120	115	165	165	215	225	275
160	180	25	75	75	125	120	170	170	220	250	300
180	200	35	90	90	145	140	195	195	250	275	330
200	225	45	105	105	165	160	220	220	280	305	365
225	250	45	110	110	175	170	235	235	300	330	395
250	280	55	125	125	195	190	260	260	330	370	440
280	315	55	130	130	205	200	275	275	350	410	485
315	355	65	145	145	225	225	305	305	385	455	535
355	400	100	190	190	280	280	370	370	460	510	600
400	450	110	210	210	310	310	410	410	510	565	665
450	500	110	220	220	330	330	440	440	550	625	735
500	560	120	240	240	360	360	480	480	600	–	–
560	630	140	260	260	380	380	500	500	620	–	–
630	710	145	285	285	425	425	565	565	705	–	–
710	800	150	310	310	470	470	630	630	790	–	–
800	900	180	350	350	520	520	690	690	860	–	–
900	1000	200	390	390	580	580	770	770	960	–	–
1000	1120	220	430	430	640	640	850	850	1060	–	–
1120	1250	230	470	470	710	710	950	950	1190	–	–
1250	1400	270	530	530	790	790	1050	1050	1310	–	–

Table 43 Axial internal clearance of four point contact ball bearings

Unit: μm

Nominal bore diameter d (mm)		C2		C0		C3		C4	
over	incl.	min	max	min	max	min	max	min	max
60	80	46	96	86	136	126	176	166	216
80	100	56	116	96	156	136	196	176	236
100	140	66	136	116	176	156	216	196	256
140	180	76	156	136	196	176	236	216	276
180	220	96	176	156	216	196	256	236	296
220	260	115	195	175	235	215	295	275	335
260	300	135	215	195	275	255	335	295	355
300	350	155	235	215	295	275	355	335	415
350	400	175	265	245	325	305	385	365	465
400	500	205	305	285	385	355	455	435	525
500	600	255	355	335	445	425	545	525	615

Table 44 Axial internal clearance of double row angular contact ball bearings

Unit: μm

Nominal bore diameter d (mm)		C2		C0	
over	incl.	min	max	min	max
100	140	70	140	120	180
140	180	80	160	140	200
180	220	100	180	160	220
220	260	120	200	180	240
260	300	140	220	200	280
300	355	160	240	220	300
355	400	180	270	250	330
400	450	200	290	270	360
450	500	220	310	290	390
500	560	240	330	310	420
560	630	260	360	340	450
630	710	280	390	370	490
710	800	300	420	400	540
800	900	330	450	440	590
900	1000	360	500	480	630

Table 45 Radial internal clearance of deep groove ball bearings

Unit: μm

Nominal bore diameter d (mm)		C2		C0		C3		C4		C5	
over	incl.	min	max	min	max	min	max	min	max	min	max
80	100	1	18	12	36	30	58	53	84	75	120
100	120	2	20	15	41	36	66	61	97	90	140
120	140	2	23	18	48	41	81	71	114	105	160
140	160	2	23	18	53	46	91	81	130	120	180
160	180	2	25	20	61	53	102	91	147	135	200
180	200	2	30	25	71	63	117	107	163	150	230
200	225	2	35	25	85	75	140	125	195	175	265
225	250	2	40	30	95	85	160	145	225	205	300
250	280	2	45	35	105	90	170	155	245	225	340
280	315	2	55	40	115	100	190	175	270	245	370
315	355	3	60	45	125	110	210	195	300	275	410
355	400	3	70	55	145	130	240	225	340	315	460
400	450	3	80	60	170	150	270	250	380	350	510
450	500	3	90	70	190	170	300	280	420	390	570
500	560	10	100	80	210	190	330	310	470	440	630
560	630	10	110	90	230	210	360	340	520	490	690
630	710	20	130	110	260	240	400	380	570	540	760
710	800	20	140	120	290	270	450	430	630	600	840
800	900	20	160	140	320	300	500	480	700	670	940
900	1000	20	170	150	350	330	550	530	770	740	1040
1000	1120	20	180	160	380	360	600	580	850	820	1150
1120	1250	20	190	170	410	390	650	630	920	890	1260

Table 46 Radial internal clearance of spherical roller bearings with cylindrical bore

Unit: μm

Nominal bore diameter d (mm)		C2		C0		C3		C4		C5	
over	incl.	min	max	min	max	min	max	min	max	min	max
80	100	35	60	60	100	100	136	136	180	180	225
100	120	40	75	75	120	120	160	160	210	210	260
120	140	50	95	95	145	145	190	190	240	240	300
140	160	60	110	110	170	170	220	220	280	280	350
160	180	65	120	120	180	180	240	240	310	310	390
180	200	70	130	130	200	200	260	260	340	340	430
200	225	80	140	140	220	220	290	290	380	380	470
225	250	90	150	150	240	240	320	320	420	420	520
250	280	100	170	170	260	260	350	350	460	460	570
280	315	110	190	190	280	280	370	370	500	500	630
315	355	120	200	200	310	310	410	410	550	550	690
355	400	130	220	220	340	340	450	450	600	600	750
400	450	140	240	240	370	370	500	500	660	660	820
450	500	140	260	260	410	410	550	550	720	720	900
500	560	150	280	280	440	440	600	600	780	780	1000
560	630	170	310	310	480	480	650	650	850	850	1100
630	710	190	350	350	530	530	700	700	920	920	1190
710	800	210	390	390	580	580	770	770	1010	1010	1300
800	900	230	430	430	650	650	860	860	1120	1120	1440
900	1000	260	480	480	710	710	930	930	1220	1220	1570
1000	1120	290	530	530	780	780	1020	1020	1330	1330	1720
1120	1250	320	580	580	860	860	1120	1120	1460	1460	1870

Table 47 Radial internal clearance of spherical roller bearings with tapered bore

Unit: μm

Nominal bore diameter d (mm)		C2		C0		C3		C4		C5	
over	incl.	min	max	min	max	min	max	min	max	min	max
80	100	55	80	80	110	110	140	140	180	180	230
100	120	65	100	100	135	135	170	170	220	220	280
120	140	80	120	120	160	160	200	200	260	260	330
140	160	90	130	130	180	180	230	230	300	300	380
160	180	100	140	140	200	200	260	260	340	340	430
180	200	110	160	160	220	220	290	290	370	370	470
200	225	120	180	180	250	250	320	320	410	410	520
225	250	140	200	200	270	270	350	350	450	450	570
250	280	150	220	220	300	300	390	390	490	490	620
280	315	170	240	240	330	330	430	430	540	540	680
315	355	190	270	270	360	360	470	470	590	590	740
355	400	210	300	300	400	400	520	520	650	650	820
400	450	230	330	330	440	440	570	570	720	720	910
450	500	260	370	370	490	490	630	630	790	790	1000
500	560	290	410	410	540	540	680	680	870	870	1100
560	630	320	460	460	600	600	760	760	980	980	1230
630	710	350	510	510	670	670	850	850	1090	1090	1360
710	800	390	570	570	750	750	960	960	1220	1220	1500
800	900	440	640	640	840	840	1070	1070	1370	1370	1690
900	1000	490	710	710	930	930	1190	1190	1520	1520	1860

Table 48 Radial internal clearance of double row and four row taper roller bearings

Unit: μm

Nominal bore diameter d (mm)		C1		C2		C0		C3		C4		C5	
over	incl.	min	max	min	max	min	max	min	max	min	max	min	max
80	100	0	20	20	45	45	70	70	100	100	130	130	170
100	120	0	25	25	50	50	80	80	110	110	150	150	200
120	140	0	30	30	60	60	90	90	120	120	170	170	230
140	160	0	30	30	65	65	100	100	140	140	190	190	260
160	180	0	35	35	70	70	110	110	150	150	210	210	280
180	200	0	40	40	80	80	120	120	170	170	230	230	310
200	225	0	40	40	90	90	140	140	190	190	260	260	340
225	250	0	50	50	100	100	150	150	210	210	290	290	380
250	280	0	50	50	110	110	170	170	230	230	320	320	420
280	315	0	60	60	120	120	180	180	250	250	350	350	460
315	355	0	70	70	140	140	210	210	280	280	390	390	510
355	400	0	70	70	150	150	230	230	310	310	440	440	580
400	450	0	80	80	170	170	260	260	350	350	490	490	650
450	500	0	90	90	190	190	290	290	390	390	540	540	720
500	560	0	100	100	210	210	320	320	430	430	590	590	790
560	630	0	110	110	230	230	350	350	480	480	660	660	880
630	710	0	130	130	260	260	400	400	540	540	740	740	910
710	800	0	140	140	290	290	450	450	610	610	830	830	1100
800	900	0	160	160	330	330	500	500	670	670	920	920	1240
900	1000	0	180	180	360	360	540	540	720	720	980	980	1300
1000	1120	0	200	200	400	400	600	600	820	—	—	—	—
1120	1250	0	220	220	450	450	670	670	900	—	—	—	—
1250	1400	0	250	250	500	500	750	750	980	—	—	—	—

Table 49 Radial internal clearance of recommended four row cylindrical roller bearings with cylindrical bore

Unit: $\mu\text{ m}$

Nominal bore diameter d (mm)		C1		C2		C3	
over	incl.	min	max	min	max	min	max
65	80	10	25	20	40	40	60
80	100	10	30	25	45	45	70
100	120	10	30	25	50	50	80
120	140	10	35	30	60	60	90
140	160	10	35	35	65	65	100
160	180	10	40	35	75	75	110
180	200	15	45	40	80	80	120
200	225	15	50	45	90	90	135
225	250	15	50	50	100	100	150
250	280	20	55	55	110	110	165
280	315	20	60	60	120	120	180
315	355	20	65	65	135	135	200
355	400	25	75	75	150	150	225
400	450	25	85	85	170	170	255
450	500	25	95	95	190	190	285

Table 50 Radial internal clearance of recommended double row cylindrical roller bearings with tapered bore

Unit: μm

Nominal bore diameter d (mm)		C1		C2	
over	incl.	min	max	min	max
65	80	25	40	40	60
80	100	35	55	45	70
100	120	40	60	50	80
120	140	45	70	60	90
140	160	50	75	65	100
160	180	55	85	75	110
180	200	60	90	80	120
200	225	60	95	90	135
225	250	65	100	100	150
250	280	75	110	110	165
280	315	80	120	120	180
315	355	90	135	135	200
355	400	100	150	150	225
400	450	110	170	170	255
450	500	120	190	190	285

Rolling mill bearings must have a certain amount of clearance for the following reasons:

- 1) overproof interference amount will cause a sharp decline of bearing life;
- 2) limited precision of rolling mill;
- 3) the operation heating and random cases will reduce the clearance.

For common bearings on most occasions, clearance group 0 can meet the requirements. For some special occasions, clearance of greater than or less than group 0 should be chosen to meet the requirements.

Table 51 is for the recommended clearance value.

Table 51 Illustration of clearance selection

Application condition	Purpose	Illustration
Heavy load or shock load and high ring interference fit	Mill roll neck (cylindrical bearings) 、 railway vehicles, axles	C3
Vibration or impacted load and interference fit of inner ring	Shaker, railway vehicles main motor, tractor final stage reducer	C3、 C4 C4 C4
Shaft and inner ring with heat treatment	Paper dryer, rolling mill roll	C3、 C4 C3
Clearance fit for both inner and outer rings	mill roll neck	C2

5.4 Preload of bearings

Normally rolling mill bearings have certain internal clearance, but on many occasions such as bearing installation or paired bearing assembly, preload is often imposed on the bearings, which causes pre-deformation between rolling elements and the inner and outer rings. Under this condition, bearings run with negative clearance to achieve the working target. Bearing preload applies to thrust ball bearings or roller bearings, single row angular contact ball bearings, single row taper roller bearings, double row taper roller bearings, double direction taper roller thrust bearings and paired angular contact ball bearings assembly, also applies to single row deep groove bearings and paired assembly with radial clearance greater than normal value (group C3).

5.4.1 Purpose of preload

Main purpose of rolling mill bearing preload:

1) To precisely determine the position of a shaft in radial and axial directions. Within the limit of load, rolling mill bearings with preload have smaller elastic deformation than bearings without preload. It improves the rotation precision and bearing rigidity. For example, main shaft bearings for machining tool spindle.

2) To reduce the axial and radial bearing runout, to lead rolling element in non-load region, and prevent vibration or abnormal noise. Example of application is bearings for motor.

3) Enlarge bearing internal load area, improve internal load distribution and extend bearing life.

4) To restrict the sliding rotation and sliding revolution of rolling elements. For thrust bearings by horizontal shaft mounting, preload can keep rolling elements in correct position.

5) Reasonable preload can prevent injury and reduce friction wear.

5.4.2 Method of preload

For different types of rolling mill bearings, preload can be axial or radial.

5.4.2.1 There are two main types of axial preload: position preload and constant pressure preload, see Figure 21.

Constant pressure preload is a method that uses coil spring, butterfly spring to apply a proper amount of preload to bearing. Because the rigidity

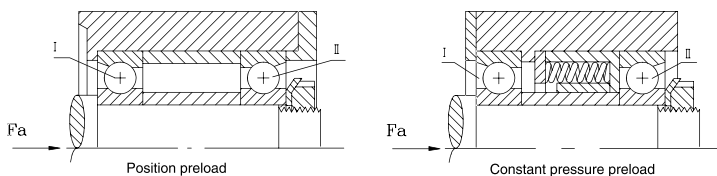


Figure 21 Axial preload method of rolling mill bearings

of preload spring is generally smaller than that of bearing, the preload value is determined by preload device itself and is kept almost constant although relative position of bearing varies during operation, and preload of bearing support is not subject to temperature change.

Position preload is a method to obtain the proper preload by applying adjusting spacer or washer to keep constant relative position.

Position preload allows bearing to keep constant relative position. As for the influence on variation of bearing rigidity by bearing load: position preload is less than constant pressure preload. However, with positioning preload, varying working temperature will cause dimension change between shaft and bearing housing, and dimension change of two bearings' locating parts, which will influence preload amount.

Rolling mill bearing preload adjusted by the outer ring or inner ring depends on if adjusting parts such as nuts and cover are easy to install and dismantle, consideration must also be given to the fit of bearing rings.

5.4.2.2 Radial preload

Radial preload is a method by using interference fit to make bearing inner ring expansion, to eliminate the radial clearance, which makes bearings in a pre-tightening state.

Radial preload is intended to increase the number of rolling elements in load area, to improve the bearing rigidity. In case of high speed cylindrical roller bearings, radial preload can reduce sliding of rolling elements to raceway by centrifugal force.

For bearings with tapered bore, adjust position of inner ring relative to adapter sleeve by locknut, reduce bearing radial clearance to achieve radial preload. The correlations between tapered bore axial displacement and variation of internal clearance are listed in table 52.

5.4.2.3 Minimum radial load amount

The radial load carrying area is relevant to bearing radial load capacity as well as internal clearance during operation of rolling bearings. In general, when bearing internal clearance increases, the radial load carrying area reduces. However, radial load area increases with the increase of bearing radial load. The change of internal load carrying area and load capacity of rolling elements will influence smooth operation of bearings and roll-slide ratio of rolling elements. Especially under high speed and light load condition, the inertia of bearing rolling elements and cage, also with lubrication friction, have an adverse influence on the rolling. At the same time in non-load carrying area (including part of load area), destructive sliding movement occurs between rolling elements and raceway. Therefore, it is necessary for ball bearings and roller bearings to accommodate a certain amount of radial load to achieve good performance.

In general, the sum of quality of components supported by bearings and external load often exceed the required minimum radial bearing load capacity. If not, an additional load must be imposed. For radial bearings it can be achieved by increasing belt tension and other methods to exert radial preload capacity, for angular contact ball bearings and taper roller bearings, it can be done by axial preload and pressing inner rings and outer rings to each other.

Table 52 Correlations between tapered bore axial displacement and variation of bearing internal clearance

Unit: μm

Nominal bore diameter d (mm)		Decrease of radial clearance		Press amount at axial direction				Minimum residual clearance		
				taper 1:12		taper 1:30				
over	incl.	min	max	min	max	min	max	C0	C3	C4
30	40	0.020	0.025	0.35	0.40	—	—	0.015	0.025	0.040
40	50	0.025	0.030	0.40	0.45	—	—	0.020	0.030	0.050
50	65	0.030	0.040	0.45	0.60	—	—	0.025	0.035	0.055
65	80	0.040	0.050	0.60	0.75	—	—	0.025	0.040	0.070
80	100	0.045	0.060	0.70	0.90	1.70	2.20	0.035	0.050	0.080
100	120	0.050	0.070	0.75	1.10	1.90	2.70	0.050	0.065	0.100
120	140	0.065	0.090	1.10	1.40	2.70	3.50	0.055	0.080	0.110
140	160	0.075	0.100	1.20	1.60	3.00	4.00	0.055	0.090	0.130
160	180	0.080	0.110	1.30	1.70	3.20	4.20	0.060	0.100	0.150
180	200	0.090	0.130	1.40	2.00	3.50	5.00	0.070	0.100	0.160
200	225	0.100	0.140	1.60	2.20	4.00	5.50	0.080	0.120	0.180
225	250	0.110	0.150	1.70	2.40	4.20	6.00	0.090	0.130	0.200
250	280	0.120	0.170	1.90	2.70	4.70	6.70	0.100	0.140	0.220
280	315	0.130	0.190	2.00	3.00	5.00	7.50	0.110	0.150	0.240
315	355	0.150	0.210	2.40	3.30	6.00	8.20	0.120	0.170	0.260
355	400	0.170	0.230	2.60	3.60	6.50	9.00	0.130	0.190	0.290
400	450	0.200	0.260	3.10	4.00	7.70	10.00	0.130	0.200	0.310
450	500	0.210	0.280	3.30	4.40	8.20	11.00	0.160	0.230	0.350
500	560	0.240	0.320	3.70	5.00	9.20	12.50	0.170	0.250	0.360
560	630	0.260	0.350	4.00	5.40	10.00	13.50	0.200	0.290	0.410
630	710	0.300	0.400	4.60	6.20	11.50	15.50	0.210	0.310	0.450
710	800	0.340	0.450	5.30	7.00	13.30	17.50	0.230	0.350	0.510
800	900	0.370	0.500	5.70	7.80	14.30	19.50	0.270	0.390	0.570
900	1000	0.410	0.550	6.30	8.50	15.80	21.00	0.300	0.430	0.640
1000	1120	0.450	0.600	6.80	9.00	17.00	23.00	0.320	0.480	0.700

6. Materials for rolling mill bearings and requirements

6.1 Materials of bearing rings and rolling elements

According to national standards and application demand, currently high carbon chromium bearing steel, carburizing bearing steel, high temperature bearing steel, stainless steel are used for bearing rings and rolling elements, these materials have been used on different occasions according to their different characteristics.

Table 53 shows high carbon chromium bearing steel used on ordinary occasions, with the largest amount of application, accounting for over 80% of the total.

Table 53

Material code	Characteristics and use	Technical features
GCr15	For ordinary occasions, largest amount, suitable for martensite and bainite quenching	Effective wall thickness below 26mm, light narrow series below 16mm, quenching and tempering hardness HRC58 ~ 64
GCr18Mo	Special bainite steel, for high impact-proof occasions, only suitable for bainite quenching	Effective wall thickness within 26~48mm, light narrow series below 16mm, quenching and tempering hardness HRC58 ~ 62
GCr15SiMn	For ordinary occasions, large bearings, only suitable for bainite quenching	Effective wall thickness above 26mm, light narrow series above 16mm, quenching and tempering hardness HRC58 ~ 62

* For technical information of imported foreign brand materials, please contact FV.

Table 54 is carburizing bearing steel suitable for high impact occasion, it should be subject to carburizing and quenching with complex technics.

Materials of high temperature bearings and stainless steel bearings are rarely used for rolling mill bearings, and not listed in the catalogue.

Table 54

Material code	Characteristics and use	Technical features
G20CrNi2MoA	For high impact conditions, small and medium bearings shallow carburization	Effective carburized layer depth within 1.5 ~ 2.3mm Quenching and tempering hardness HRC59 ~ 64
G20Cr2Ni4A	For high impact conditions, medium and large bearings deep carburization	Effective carburized layer depth is greater than 2.3mm Quenching and tempering hardness HRC59 ~ 63

* For technical information of imported foreign brand materials, please contact FV.

6.2 Cage materials listed in table 55.

Table 55

Material code	Characteristics and use	Technical features
08Al or 10#	Steel stamping type cage, for small and medium taper roller bearings	Easy stamping, light weight
ZCuZn40Pb2	Suitable for most rolling mill bearings and other small or medium bearings	Easy to cut, low friction coefficient, moderate intensity
ZCuAl10Fe3Mn2	for high temperature bearings	Easy to cut, high intensity, high anti-abrasion
20#	For strong impact, heavy load working condition	High intensity, not easy to cut

* For technical information of imported foreign brand materials, please contact FV.

7. Fits for rolling mill bearings

7.1 Purpose of fit

The bore diameter and outside diameter of the rolling mill bearings are manufactured according to standard tolerance. The inner ring and shaft, outer ring and housing bore are fitted to the extent of tightness by controlling shaft neck tolerance and housing tolerance. The inner ring and the shaft are fitted by bore basis system, the outer ring and the housing bore axis are fitted by shaft basis system.

The purpose of the fit is to fix bearing inner ring or outer ring to shaft or housing firmly, to avoid negative circumferential sliding.

The unfavorable circumferential slide (called creep) may cause abnormal heat, fitting surface wear (iron powder will enter the bearing) and vibration problems, so that the bearing can not operate effectively.

Therefore, in the fit of rolling mill bearings, it's important to give certain amount of interference to the rings as it has to support load, fix the rings to the shaft or housing to prevent relative motion.

7.2 Correlations between dimension tolerance for shaft/housing bore and fitting (bearings with class 0 tolerance), as shown in following Figure 22.

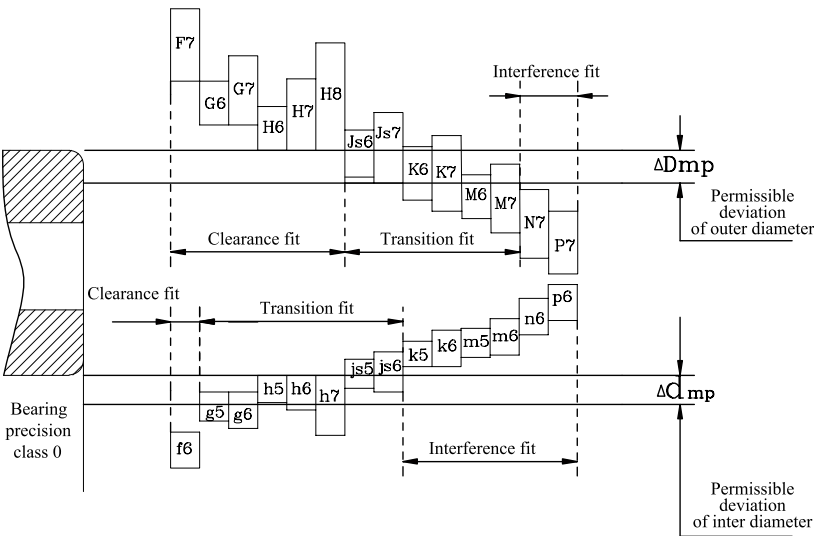


Figure 22 Correlations between dimension tolerance for shaft/housing bore and fitting (bearings with class 0 tolerance)

7.3 Selection of fit

Consideration must be given to application conditions of the bearings when selecting fit type:

- “ for load character, see table 56
- “ for load size, see table 57
- “ temperature distribution during operation
- “ bearing internal clearance
- “ requirement for rotation precision
- “ processing quality, material and wall thickness of the shaft and housing
- “ the method of mounting and dismounting
- “ axial displacement of floating side bearing
- “ if it's necessary to use fitting face to keep away from shaft thermal expansion
- “ type and dimension of rolling mill bearings
- “ other factors

Table 56 Relationship between load type and fit

Rotation pattern	Load direction	Load type	Fit		Illustration
			Inner ring and shaft	Outer ring and housing	
Inner ring rotating, outer ring stationary	Fixed	Inner ring rotating load, outer ring stationary load	Require interference fit (k,m,n,p,r)	Clearance fit acceptable (F,G,H,JS)	Rolling mill roll neck, spur gear unit, motor
Inner ring stationary, outer ring rotating	Rotation (with outer ring)				Wheel with poor dynamic balance
Inner ring stationary, outer ring rotating	Fixed	Inner ring stationary load, outer ring rotating load	Clearance fit acceptable (f,g,h,js)	Require interference fit (K,M,N,P)	Wheels and pulleys with fixed shaft
Inner ring rotating, outer ring stationary	Rotation (with inner ring)				Shaker (unbalanced vibration)
Indeterminate	Rotation or fixed	Indeterminate direction	Interference fit	Interference fit	Crankshaft

Table 57 Type and size of load

Radial load	Ball bearings	Roller bearings (taper roller bearings excluded)	Tapered roller bearings
Common load	$P \leq 0.07C$	$P \leq 0.08C$	$P \leq 0.13C$
Normal load	$0.07C < P \leq 0.15C$	$0.08C < P \leq 0.18C$	$0.13C < P \leq 0.26C$
Heavy load	$P > 0.15C$	$P > 0.18C$	$P > 0.26C$

7.4 Recommended fit

With regard to shaft diameter, bore dimension tolerance of the bearing box, the metric series have been standardized in accordance with ISO286 (dimension tolerance and fit). Therefore, fit tolerance is determined by the selected shaft diameter, bore dimension tolerance.

For rolling mill bearings with cylindrical bore and cylindrical outside diameter, interference or clearance fit can be achieved by selecting the appropriate shaft and bearing box housing tolerance range from ISO tolerance system. Roller bearings only need to use part of ISO tolerance class.

Bearings with tapered bore can be directly installed on the taper shaft, or mounted in grooved taper shaft journal sleeve (adapter sleeve and withdrawal sleeve); while taper sleeve should be mounted in the cylindrical shaft journal. In such case, the fit of inner ring, unlike cylindrical bore shaft, is not determined by the chosen shaft tolerance, but determined by the distance inner ring is pushed to bearing housing or taper sleeve. At this time special attention must be paid to internal interference reduction. When using adapter or withdrawal sleeve to fix bearing, taper sleeve seat allows large diameter tolerance of ring, but the cylindrical form tolerance will reduce.

As mentioned above, selecting correct fit of rolling mill bearings need to know the actual load conditions, working temperature and other requirements, which are actually very difficult to know. Therefore, in most cases the selection is based on experience.

The most common fits are shown in 58 ~ 64.

7.5 Recommended fit of bearings for mill roll neck, see table 65 ~ 67.

7.6 Tolerance of form and position of shaft and housing bore

To ensure the precise fit of shaft and housing bore, the rolling mill bearings, tolerances of form and position for shaft and housing refer to table 68 and Figure 24、Figure 25, roughness of mating surface is shown in table 69.

Table 58 Recommended fits for radial bearings (Class 0, 6X and 6) and shafts

Conditions ¹⁾		Ball bearings		Cylindrical roller bearings		Spherical roller bearings		
				Taper roller bearings				
		shaft diameter (mm)						
over	incl.	over	incl.	over	incl.			
Bearings with cylindrical bore (Class 0, 6X and 6)								
Rotating load or indeterminate direction load of inner ring	Common load or variable load	18	100	–	40	–	–	
		100	200	40	140	–	–	
		–	–	140	200	–	–	
	Normal load	18	100	–	40	–	40	
		100	140	40	100	40	65	
		140	200	100	140	65	100	
		200	280	140	200	100	140	
		–	–	200	400	140	280	
		–	–	–	–	280	500	
		–	–	–	–	500	–	
	Heavy load or impact load	–	–	50	140	50	100	
		–	–	140	200	100	140	
		–	–	200	–	140	500	
		–	–	–	–	500	–	
Stationary load of inner ring	Require that inner ring can be easily moved on shaft	Full shaft diameters						
	Not require that inner ring can be easily moved on shaft	Full shaft diameters						
Only central axial load		Full shaft diameters						
Bearings with tapered bore(Class 0) (with adapter or withdrawal sleeve)								
Any load		Full shaft diameters						

	Shaft tolerance range	Remark	Reference applications
	Bearings with cylindrical bore （Class 0, 6X and 6）		
	js6	js5, k5 and m5 are used for replacing js6, k6 and m6 when installation precision is required to be high.	Electrical appliances, machine tools, pumps, blowers and carriers etc
	k6		
	m6		
	k5	For single row angular contact ball bearings and taper roller bearings, because there is no need considering internal clearance caused by fits, k6 and m6 can be used for replacing k5 and m5.	Motor, steam turbine and internal combustion engine and woodworking machinery etc
	m5		
	m6		
	n6		
	p6		
	r6		
	r7		
	n6	Internal clearance of bearing is required to be bigger than standard clearance.	Railway vehicles axle and traction motor etc
	p6		
	r6		
	r7		
	g6	g5 is adopted when installation precision is required to be high; f6 also can be adopted for facilitating easier movement.	Wheels with fixed axles etc
	h6	h5 can be adopted when installation precision is required to be high.	Tension gear pulley etc
	js6	—	—
	h9/IT5 ²⁾	h10/IT7 ²⁾ also can be adopted for transmission shafts	

Remark: 1) Refer to table 57 for classification of load.

2) IT5 and IT7 tolerance of form and position (circularity tolerances and cylindricity tolerance) of shaft should respectively be within tolerance range of IT5 and IT7. See Appendix 1 for standard tolerance value of IT5 and IT7.

3) The table is suitable for solid steel shafts.

Table 59 Recommended fits for radial bearings (Class 0, 6X and 6) and housings

Conditions				Tolerance range of housing bore	
Housing	Type of load ¹⁾		Axial displacement of outer ring ²⁾		
Integrated type or split type	Stationary load of outer ring	Any load	Easy to move	H7	
		Common load or normal load		H8	
		High temperature for shaft and inner ring		G7	
Integrated type		Requirements of rotating at high running accuracy under common load or normal load	Be unable to move in principle	K6	
			Be able to move	JS6	
			Requirements low-noise rotation	Easy to move	H6
	Indeterminate direction load	Common load or normal load	Be able to move	JS7	
		Normal load or heavy load	Be unable to move in principle	K7	
		Strong impact load	Be unable to move	M7	
	Rotating load of outer ring	Common load or variable load	Be unable to move	M7	
		Normal load or heavy load		N7	
		Thin section housing and heavy load or strong impact load		P7	

	Remark	Reference applications
	G7 also can be adopted for large sized bearing, or if the temperature difference is big between outer ring and housing.	Ordinary bearing device, railway vehicle axle box and power transmission device etc
	—	
	F7 also can be adopted for large sized bearing, or if the temperature difference is big between outer ring and housing.	Drying cylinder etc
	Be mainly used for roller bearings.	
	Be mainly used for roller bearings.	
	—	
	JS6 and K6 is used for replacing JS7 and K7 when installation precision is required to be high.	Motor, pump and main bearing of crankshaft etc
	—	Railway vehicle main motor etc
	—	Roller of convey belt, logging block and tension pulley etc
	Be mainly suitable for ball bearing .	Wheel hub with ball bearings etc
	Be mainly used for roller bearing.	Wheel hub with roller bearings and large end bearing of connecting rod

Remark: 1) Refer to table 57 for classification of load.

2) Show that outer ring of non-separable bearing whether to axially move.

3) The table is suitable for cast iron or steel housings.

4) When bearings only bear central axial load, tolerance range should be selected for radial clearance existing between outer ring and housing.

Table 60 Recommended fits for inch taper roller bearings
(class 4 and class 2) and shafts

Load condition		Nominal bore diameter d (mm)		Deviation of single bore diameter Δds (μ m)		
		over	incl.	high	low	
Rotating load of inner ring	Normal load	–	76.2	+13	0	
		76.2	304.8	+25	0	
		304.8	609.6	+51	0	
		609.6	914.4	+76	0	
	Heavy load, impact load and high-speed rotation	–	76.2	+13	0	
		76.2	304.8	+25	0	
		304.8	609.6	+51	0	
		609.6	914.4	+76	0	
Rotating load of outer ring	Normal load (without impact)	–	76.2	+13	0	
		76.2	304.8	+25	0	
		304.8	609.6	+51	0	
		609.6	914.4	+76	0	
	Normal load (without impact)	–	76.2	+13	0	
		76.2	304.8	+25	0	
		304.8	609.6	+51	0	
		609.6	914.4	+76	0	
	Heavy load, impact load and high-speed rotation	–	76.2	+13	0	
		76.2	304.8	+25	0	
		304.8	609.6	+51	0	
			914.4	+76	0	

	Dimensional tolerance of shaft diameter (μ m)		Remark
	high	low	
	+38	+25	For bearing with $d \leq 152.4\text{mm}$, its internal clearance should be more than standard clearance.
	+64	+38	
	+127	+76	
	+190	+114	
	Tolerance value making average interference at $0.0005 \times d$ (mm).		Bearings with internal clearance being more than standard clearance are generally used.
	+13	0	Axial movement cannot be made for inner ring.
	+25	0	
	+51	0	
	+76	0	
	0	-13	Axial movement can be made for inner ring.
	0	-25	
	0	-51	
	0	-76	
	Tolerance value making average interference at $0.0005 \times d$ (mm).		Bearings with internal clearance being more than standard clearance are generally used.

Table 61 Recommended fits for inch taper roller bearings
(class 4 and class 2) and housings

Load condition		Nominal outside diameter D (mm)		Deviation of single outside diameter of bearing ΔDs (μ m)		Dimensional tolerance of housing bore diameter (μ m)		Remark
		over	incl.	high	low	high	low	
Rotating load of inner ring	Be used for free end or fixed end	-	76.2	+25	0	+76	+51	Outer ring can easily move axially.
		76.2	127.0	+25	0	+76	+51	
		127.0	304.8	+25	0	+76	+51	
		304.8	609.6	+51	0	+152	+102	
		609.6	914.4	+76	0	+229	+152	
	Axial position of outer ring can be adjusted	-	76.2	+25	0	+25	0	Outer ring can move axially.
		76.2	127.0	+25	0	+25	0	
		127.0	304.8	+25	0	+51	0	
		304.8	609.6	+51	0	+76	+25	
		609.6	914.4	+76	0	+127	+51	
	Axial position of outer ring can't be adjusted	-	76.2	+25	0	-13	-38	Outer ring is axially fixed.
		76.2	127.0	+25	0	-25	-51	
		127.0	304.8	+25	0	-25	-51	
		304.8	609.6	+51	0	-25	-76	
		609.6	914.4	+76	0	-25	-102	
Rotating load of outer ring	Axial position of outer ring can not be adjusted	-	76.2	+25	0	-13	-38	Outer ring is axially fixed.
		76.2	127.0	+25	0	-25	-51	
		127.0	304.8	+25	0	-25	-51	
		304.8	609.6	+51	0	-25	-76	
			914.4	+76	0	-25	-102	

Table 62 Recommended fits for shaft washer of thrust bearings
(Class 0 and 6) and shafts

Conditions		Diameter of shaft mm		Shaft tolerance range	Remark
		over	incl.		
Central axial load (For all thrust bearings)		Full shaft diameters		js6	h6 is also adopted.
Synthesis load (for spherical roller thrust bearings)	Stationary load of shaft washer	Full shaft diameters		js6	–
	Rotating load or indeterminate direction load of shaft washer	–	200	k6	js6, k6, m6 are respectively used for replacing k6, m6, n6.
		200	400	m6	
		400	–	n6	

Table 63 Recommended fits for housing washer of thrust bearings
(Class 0 and 6) and housings

Conditions		Tolerance range of housing bore	Remark
Central axial load (For all thrust bearings)		–	Select tolerance range making housing washer and housing bore have radial clearance.
		H8	Thrust ball bearings with high precision.
Synthesis load (for spherical roller thrust bearings)	Stationary load of housing washer	H7	–
	Rotating load or indeterminate direction load of housing washer	K7	General use condition.
		M7	Radial load is bigger.

Table 64 Recommended fits for bearings bearing axial load

Inner ring and roll neck (shaft)		Outer ring and chock (housing)	
Type of bearing	Tolerance range of shaft	Type of bearing	Tolerance range of housing bore
Deep groove ball bearings	f6 or f7 (needing to be pressed into shaft sleeve as shown in Figure 23)	Deep groove ball bearings	D10
Angular contact ball bearings		Angular contact ball bearings	
Thrust ball bearings		Thrust ball bearings	E8
Cylindrical roller thrust bearings		Cylindrical roller thrust bearings	H7
Taper roller thrust bearings		Taper roller thrust bearings	

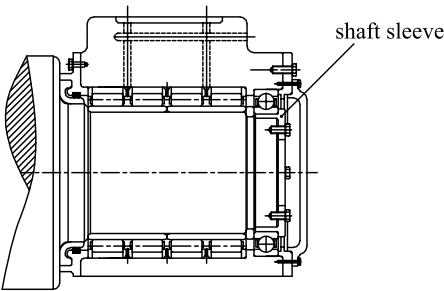


Figure 23 Recommended fit of shaft sleeve

Table 65 Recommended fits for roll neck four row cylindrical roller bearings
(inner ring is interference fits)

Inner ring and roll neck (shaft)						Outer ring and chock(housing)					
Nominal bore diameter d (mm)		Deviation of average bore diameter in single plane Δdmp (μm)		Dimensional tolerance of roll neck diameter (μm)		Nominal outside diameter D (mm)		Deviation of average outside diameter in single plane ΔDmp (μm)		Dimensional tolerance of chock bore diameter (μm)	
over	incl.	high	low	high	low	over	incl.	high	low	high	low
80	120	0	-20	+59	+37(p6)	120	150	0	-18	+40	0(H7)
120	180	0	-25	+68	+43(p6)	150	180	0	-25	+40	0(H7)
180	250	0	-30	+79	+50(p6)	180	250	0	-30	+46	0(H7)
250	315	0	-35	+88	+56(p6)	250	315	0	-35	+52	0(H7)
315	400	0	-40	+98	+62(p6)	315	400	0	-40	+57	0(H7)
400	500	0	-45	+108	+68(p6)	400	500	0	-45	+63	0(H7)
500	560	0	-50	+194	+150(r6)	500	630	0	-50	+146	+76(F7)
560	630	0	-50	+199	+155(r6)					+92	+22(G7)
630	710	0	-75	+225	+175(r6)						
710	800	0	-75	+235	+185(r6)	630	800	0	-75	+160	+80(F7)
800	900	0	-100	+266	+210(r6)					+104	+24(G7)
900	1000	0	-100	+276	+220(r6)						
1000	1120	0	-125	+316	+250(r6)	800	1000	0	-100	+176	+86(F7)
1120	1250	0	-125	+326	+260(r6)					+116	+26(G7)
						1000	1250	0	-125	+203	+98(F7)
										+133	+28(G7)
						1250	1600	0	-160	+235	+110(F7)
										+155	+30(G7)

Remark: Recommended fits in the table are general estimation value. To avoid creep existing at inner ring, based on different bearing materials and working conditions, different recommended fits are formulated for Stanley. Please consult Stanley when referring to the table.

Table 66 Recommended fits for roll neck metric four row taper roller bearings

Inner ring and roll neck (shaft)						Outer ring and chock(housing)					
Nominal bore diameter d (mm)		Deviation of average bore diameter in single plane Δdmp (μ m)		Dimensional tolerance of roll neck diameter (μ m)		Nominal outside diameter D (mm)		Deviation of average outside diameter in single plane ΔDmp (μ m)		Dimensional tolerance of chock bore diameter (μ m)	
over	incl.	high	low	high	low	over	incl.	high	low	high	low
80	120	0	-20	-120	-150	120	150	0	-18	+57	+25
120	180	0	-25	-150	-175	150	180	0	-25	+100	+50
180	250	0	-30	-175	-210	180	250	0	-30	+120	+50
250	315	0	-35	-210	-240	250	315	0	-35	+115	+50
315	400	0	-40	-240	-245	315	400	0	-40	+110	+50
400	500	0	-45	-245	-250	400	500	0	-45	+105	+50
500	630	0	-50	-250	-325	500	630	0	-50	+100	+50
630	800	0	-75	-325	-350	630	800	0	-75	+150	+75
800	1000	0	-100	-350	-425	800	1000	0	-100	+150	+75
1000	1250	0	-125	-425	-510	1000	1250	0	-125	+175	+100
1250	1600	0	-160	-510	-600	1250	1600	0	-160	+215	+125
-	-	-	-	-	-	1600	2000	0	-200	+250	+150

Table 67 Recommended fits for roll neck inch four row taper roller bearings

Inner ring and roll neck (shaft)						Outer ring and chock(housing)					
Nominal bore diameter d (mm)		Deviation of average bore diameter in single plane Δd_{mp} (μm)		Dimensional tolerance of roll neck diameter (μm)		Nominal outside diameter D (mm)		Deviation of average outside diameter in single plane ΔD_{mp} (μm)		Dimensional tolerance of chock bore diameter (μm)	
over	incl.	high	low	high	low	over	incl.	high	low	high	low
76.2	101.6	+25	0	-75	-100	-	304.8	+25	0	+75	+50
101.6	127.0	+25	0	-100	-125	304.8	609.6	+51	0	+150	+100
127.0	152.4	+25	0	-125	-150	609.6	914.4	+76	0	+225	+150
152.4	203.2	+25	0	-150	-175	914.4	1219.2	+102	0	+300	+200
203.2	304.8	+25	0	-175	-200	1219.2	1524.0	+127	0	+375	+250
304.8	609.6	+51	0	-200	-250	1524.0	-	+127	0	+450	+300
609.6	914.4	+76	0	-250	-325						
914.4	1219.2	+102	0	-300	-400						
1219.2	-	+127	0	-375	-475						

Table 68 Tolerances of form and position for shaft and housing

Basic dimension (mm)		Cylindricity t (μ m)						Circle runout of endface t ₁ (μ m)					
		Shaft neck			housing bore			Shaft shoulder			Shoulder of housing bore		
		Tolerance classes											
P0	P6	P5	P0	P6	P5	P0	P6	P5	P0	P6	P5		
over	incl.	Maximum tolerance value (μ m)											
30	50	4	2.5	1.5	7	4	2.5	12	8	5	20	12	8
50	80	5	3	2	8	5	3	15	10	6	25	15	10
80	120	6	4	2.5	10	6	4	15	10	6	25	15	10
120	180	8	5	3.5	12	8	5	20	12	8	30	20	12
180	250	10	7	4.5	14	10	7	20	12	8	30	20	12
250	315	12	8	6	16	12	8	25	15	10	40	25	15
315	400	13	9	7	18	13	9	25	15	10	40	25	15
400	500	15	10	8	20	15	10	25	15	10	40	25	15

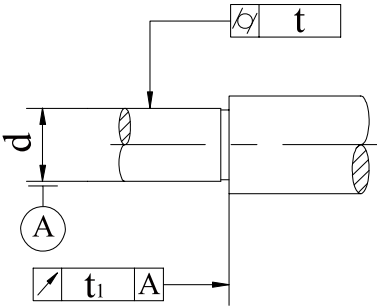


Figure 24

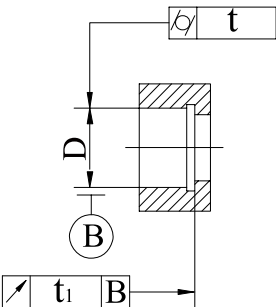


Figure 25

Table 69 Roughness of mating surface

Mating surface	Precision grade of bearing	Dimensional tolerance grade for mating surface	Nominal bearing bore or outside diameter (mm)	
			~ 80	80~500
			Surface roughness parameter Ra (μm)	
Shaft neck	P0	IT6	1.00	1.60
	P6	IT5	0.63	1.00
	P5	—	0.40	0.63
Housing bore	P0	IT7	1.60	2.50
	P6	IT6	1.00	1.60
	P5		0.63	1.00
Endface for shaft shoulder and housing bore shoulder	P0		2.00	2.50
	P6		1.25	2.00
	P5		1.00	1.60

**Four-row
cylindrical roller bearings**

Four row cylindrical roller bearings

This kind of bearings are the most widely used bearings for various rolling mills in the metallurgical industry.

1. Main characteristics

- a. The bearings take on the largest value of dynamic load rating in limited space;
- b. They can be used for high speed;
- c. The bearings allow precise limiting tolerance;
- d. The inner ring and outer components (outer ring, complete sets of rollers) are interchangeable, advantageous to quick roll changing;
- e. The bearings can bear radial load only.

2. Symbolism

According to JB/T5389.1–1995 standard, four row cylindrical roller bearings are symbolized by:

Type code

+

Dimension code

+

Postfix code

The type code is composed of capital Latin letters, showing structure of the bearings:

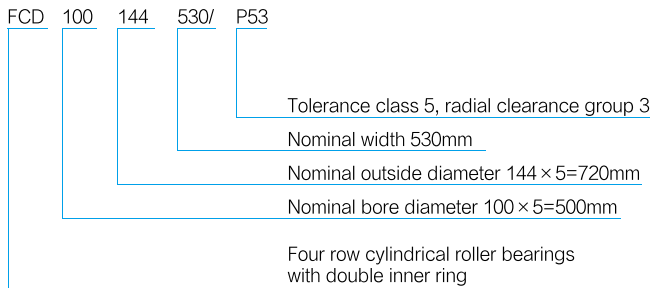
Type code	Structure
FC	Four row cylindrical roller bearings with single inner ring
FCD	Four row cylindrical roller bearings with double inner ring
FCDP	Four row cylindrical roller bearings with double inner ring and loose rib in outer ring

Dimension code is composed of Arabic numerals, from left to right, showing code of nominal bore diameter (d), nominal outside diameter (D) and nominal width (B) in mm as follows:

Code item	Nominal bore diameter (d) code	Nominal outside diameter (D) code	Nominal width (B) code
Presentation	Nominal bore diameter mm/5	Nominal outside diameter mm/5	Nominal width mm

Postfix code is additional code showing change in the internal structure, tolerance class, clearance, heat treatment etc., see section 1 “type and code of rolling mill bearings” for “guide of rolling mill bearing application technology” .

Illustration:



3. Bearing structure type

Based on the three basic structure, there are several variant structure:

FC·····A type: without oil groove or hole in the outside diameter, with oil groove on outer ring surface;

FC·····B type: with oil groove and hole in the outside diameter, with oil groove on outer ring surface;

FC·····E type: without oil groove or hole in the outside diameter, with oil groove on outer ring surface, without rib in the outside diameter, integrated window cage;

FCD·····A type: without oil groove or hole in outside diameter, with oil groove on outer ring surface;

FCD·····B type: with oil groove and hole in outside diameter, with oil groove on outer ring surface;

FCD·····Y type: without oil groove or hole in outside diameter, with oil groove on outer ring surface, with spacer between the two outer rings, the structure wins patent of FV ;

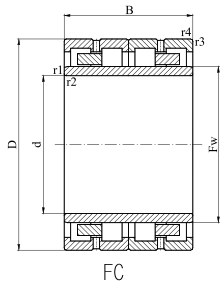
FCD·····2LS type: without oil groove or hole in outside diameter, sealed type;

FCDP·····E type: with oil groove and hole in outer diameter, with oil groove in inner surface, dowel cage (hollow roller) or solid widow type.

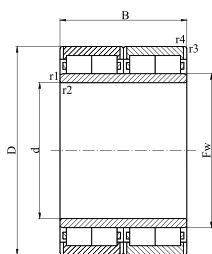
4. Equivalent radial dynamic load $Pr=Fr$

5. Equivalent radial static load $Por=Fr$

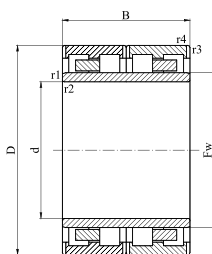
Four row cylindrical roller bearings
for interference fit on the roll neck
d 80--130mm



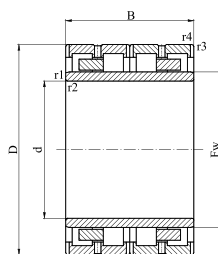
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
80	115	108	90	1.5	1.1	284	656	FC1623108	
90	140	70	105	1.5	1.1	239	385	FC182870	672718
	140	74	105	1.5	1.1	244	496	FC182874	
	140	105	105	1.5	1.1	394	736	FC1828105	672718K
100	135	80	110	1.5	1.5	176	425	FC202780	
	140	70	111	1.5	1.1	298	606	FC202870	672820K
	140	80	111	1.5	1.1	238	484	FC202880	672720K
	140	104	111	1.5	1.1	400	820	FC2028104	672720
	145	70	113	1.5	1.1	248	542	FC202970	
	150	106	113	1.5	1.1	470	854	FC2030106	
110	150	80	122	1.5	1.5	200	520	FC223080	
	150	120	122	1.5	1.5	370	800	FC2230120	
	170	90	127	2	2	428	752	FC223490	672722K
	170	92	127	2	2	379	752	FC223492	
	170	120	127	2	2	615	1180	FC2234120	672722
115	165	90	132	1.5	1.1	398	751	FC233390	
120	165	87	134.5	1.5	1.1	374	745	FC243387	
	170	90	133	2	2	337	787	FC243490	
	180	92	137	2	2	427	751	FC243692	672824
	180	105	135	2	2	550	1200	FC2436105	672724
	180	120	136	2	2	477	1061	FC2436120	
	215	102	148	2.1	2.1	605	1072	FC2443102	
	215	174	147	2.1	2.1	1060	1600	FC2443174	
130	175	90	143	2	2	291	783	FC263590	
	200	104	150	2	2	566	998	FC2640104	672726K
	200	110	150	2	2	608	1040	FC2640110	
	200	125	149	2	2	700	1190	FC2640125	672726



FC-E



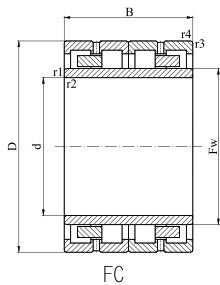
FC-A



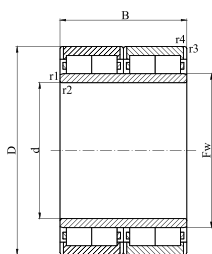
FC-B

Bore (mm) d	Reference designations					Ref. Mass kg
	SKF	FAG	NTN	NSK	KOYO	
80						3.76
90						4.42 4.25 6.08
100				100RV1401	20FC1570	3.24 3.32 3.83 4.91 3.81 6.65
110					22FC1790	4.32 6.28 7.54 7.78 10.3
				110RV1701		
115					23FC1690	6.52
120				120RV1601	24FC1787	5.66 6.51 8.22 9.45 11.3 16.3 27.3
			4R2437 4R2438		4CR120	
				120RV2101		
130			4R2628		26FC20104 26FC20110	6.85 12.1 13.0 14.5
				130RV2001	26FC20125	

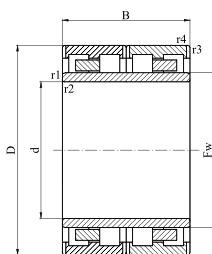
Four row cylindrical roller bearings
for interference fit on the roll neck
d 140--160mm



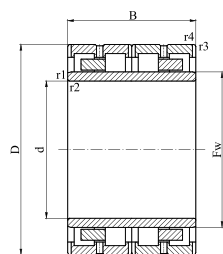
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
140	190	119	154	2	2	704	1248	FC2838119	
	210	80	156	2	2	500	970	FC284280	
	210	100	158	2	2	715	1248	FC2842100	
	210	106	158	2	2	715	1248	FC2842106	672828
	210	116	160	2	2	640	1130	FC2842116	
	210	125	158	2	2	715	1265	FC2842125	672728
	210	155	158	2	2	715	1331	FC2842155	
145	210	155	166	2	2	1080	1930	FC2942155	
	225	156	169	2	2	1250	1960	FC2945156	
	230	156	169	2	2	886	1827	FC2946156	
150	210	120	166	2	2	587	1380	FC3042120	
	220	120	167	2	2	702	1193	FC3044120	672930K
	220	150	168	2	2	900	1700	FC3044150	
	225	112	170	2	2	550	1210	FC3045112	
	225	120	169	2	2	702	1408	FC3045120	672730K
	225	150	169	2	2	801	1670	FC3045150	
	230	130	174	2	2	845	1520	FC3046130	
	230	150	177	2	2	950	1790	FC3046150	
	230	156	174	2	2	1250	2080	FC3046156	672730
160	220	180	177	2.1	2.1	964	2560	FC3244180	
	225	120	177	2.1	2.1	639	1340	FC3245120	
	230	130	178	2.1	2.1	781	1320	FC3246130	
	230	130	180	2.1	2.1	830	1340	FC3246130E	
	230	168	177	2.1	2.1	1040	2170	FC3246168	
	230	168	179	2.1	2.1	1160	2200	FC3246168E	
	230	168	180	2.1	2.1	1040	2200	FC3246168E1	
	230	180	178	2.1	2.1	1080	2280	FC3246180	



FC-E



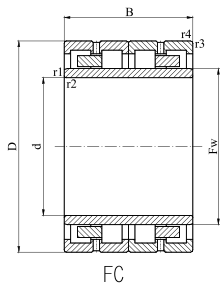
FC-A



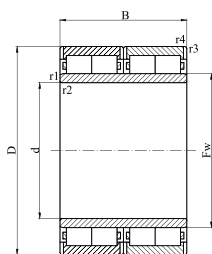
FC-B

Bore (mm)	Reference designations					Ref. Mass
d	SKF	FAG	NTN	NSK	KOYO	kg
140					28FC19119W	9.70
						9.64
						12.2
						13.2
			4R2823	140RV2101	28FC21116A	13.9
						14.9
145						18.1
	314625	511605	4R2906	145RV2101	29FC21155	18.1
	313924A	512764	4R2908	145RV2201	313924	23.2
						24.7
150						12.5
						15.5
						19.3
			4R3031	150RV2201	30FC22150A	16.3
						16.2
						20.9
			4R3029	150RV2301	30FC23130-1	19.7
						22.8
160	313891A	508955	4R3040	150RV2302	313891-1	24.6
			4R3224		32FC22180	20.2
						14.9
				160RV2301	32FC23130	17.7
	314190	541515	4R3226		314190	17.6
						22.8
	315189A	510150	4R3232			23.5
				160RV2302	32FC23170A	23.5
				160RV2303	32FC23180	24.6

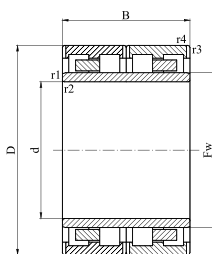
Four row cylindrical roller bearings
for interference fit on the roll neck
d 160--180mm



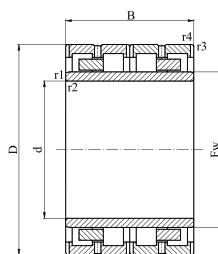
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r1,2min	r3,4min	Cr	Cor	New	Old
160	240	120	183	2.1	2.1	745	1320	FC3248120	
	240	124	183	2.1	2.1	635	1301	FC3248124	672732K
	240	168	183	2.1	2.1	1042	2310	FC3248168	672732
	240	170	183	2.1	2.1	1080	2290	FC3248170	
170	230	120	187	2	2	819	1610	FC3446120	
	230	130	188.5	2	2	780	1400	FC3446130	
	230	180	186	2.1	2.1	1034	2035	FC3446180	
	240	130	190	2.1	2.1	913	1830	FC3448130	
	240	156	189	2.1	2.1	972	2170	FC3448156	
	250	150	192	2.1	2.1	720	1716	FC3450150	
	250	168	192	2.1	2.1	1210	2320	FC3450168	
	250	170	192	2.1	2.1	1210	2418	FC3450170	672734
	255	180	193	2.1	2.1	1380	2500	FC3451180	
	260	120	195	2.1	2.1	860	1752	FC3452120	672734K
	260	150	195	2.1	2.1	1030	1840	FC3452150	
	260	170	195	2.1	2.1	1034	2096	FC3452170	
	260	192	195	2.1	2.1	1087	2240	FC3452192	672734KU
	260	225	196	2.1	2.1	1930	3350	FC3452225	
180	250	120	200	2.1	2.1	610	1578	FC3650120	
	250	130	200	2.1	2.1	716	1922	FC3650130	
	250	156	198	2.1	2.1	880	2230	FC3650156	672736K
	250	156	200	2.1	2.1	1020	2230	FC3650156E	
	260	120	202	2.1	2.1	735	1577	FC3652120	672836
	260	124	202	2.1	2.1	735	1577	FC3652124	
	260	156	198	2.1	2.1	835	2200	FC3652156	
	260	160	202	2.1	2.1	880	2230	FC3652160	672736U
	260	168	202	2.1	2.1	1280	2500	FC3652168	672736



FC-E



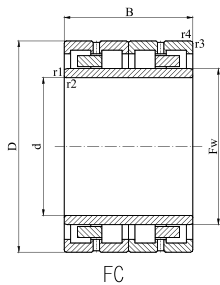
FC-A



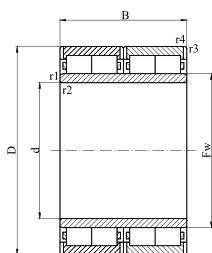
FC-B

Bore (mm)	Reference designations					Ref. Mass
d	SKF	FAG	NTN	NSK	KOYO	kg
160				160RV2401	32FC24120W	18.6
						19.6
						26.7
			4R3225	160RV2402	32FC24170	27.8
170			4R3426	170RV2301	34FC23120	14.3
	313673	508370				15.6
						24.5
	BC4B635122	510440B				18.7
			4R3429		34FC24156	22.2
						25.1
				170RV2501	34FC25168	28.1
				170RV2502	34FC25170	28.6
			4R3425	170RV2503		30.5
						23.2
				170RV2602	34FC26150	28.8
						32.7
						36.9
	313587B	505470	4R3431			43.3
180						18.1
						19.5
						23.4
			4R3625	180RV2501	36FC25156A	22.8
						21.1
						21.7
						27.3
						28.4
	313812	507536	4R3628	180RV2601	313812W	29.5

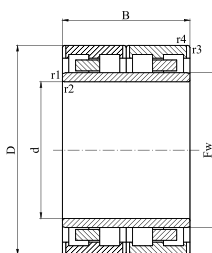
Four row cylindrical roller bearings
for interference fit on the roll neck
d 180--200mm



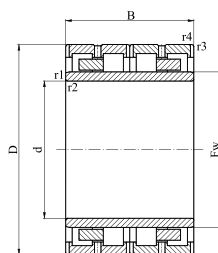
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
180	260	180	202	2.1	2.1	1100	2800	FC3652180	
	265	180	204	2.1	2.1	1340	2690	FC3653180	
	280	180	206	2.1	2.1	1287	2995	FC3656180E	
	280	180	207	2.1	2.1	1287	2995	FC3656180	672736K
	280	200	205	2.1	2.1	1620	2990	FC3656200	
	290	192	210	2.1	2.1	1287	2478	FC3658192	
190	260	168	208	2.1	2.1	1140	2520	FC3852168	672838
	260	168	212	2.1	2.1	1340	2600	FC3852168E	
	265	124	213	2.1	2.1	819	1921	FC3853124	
	270	166	212	2.1	2.1	1034	2460	FC3854166	
	270	168	212	2.1	2.1	1034	2460	FC3854168	672738K
	270	170	213	2.1	2.1	1290	2910	FC3854170	
	270	200	212	2.1	2.1	1660	3350	FC3954200	672738
	280	200	214	2.1	2.1	1830	3370	FC3856200	
200	250	200	215	1	1	900	2500	FC4050200	
	265	180	217	2	2	1200	2790	FC4053180	
	270	120	222	2.1	2.1	617	1630	FC4054120	
	270	170	222	2.1	2.1	1290	2700	FC4054170	
	280	170	222	2.1	2.1	1630	3000	FC4056170	
	280	188	222	2.1	2.1	1350	2810	FC4056188	672740K
	280	190	223	3	3	1460	3100	FC4056190	
	280	200	222	2.1	2.1	1630	3350	FC4056200E	
	280	200	224	2.1	2.1	1410	3200	FC4056200	672940
	290	130	226	2.1	2.1	941	1916	FC4058130	
	290	192	226	2.1	2.1	1730	3310	FC4058192	672740
	290	202	226	2.1	2.1	1540	3310	FC4058202	
	310	130	229	2.1	2.1	1113	2254	FC4062130	



FC-E



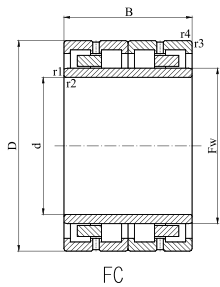
FC-A



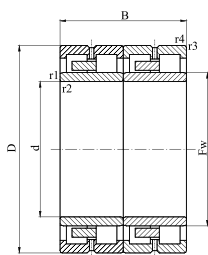
FC-B

Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
180			4R3618	180RV2602		32.9
		524372				33.8
					36FC28200	46.2
						41.4
						46.3
						50.5
190	313651	507735	4R3820	190RV2601	38FC26168-1	25.5
						27.2
						21.3
						30.4
						30.8
			4R3818	190RV2702	38FC27170A	31.7
	314199B	508657	4R3821	190RV2701	314199	37.5
	314049A	510199	4R3823	190RV2801		42.3
200				200RV2521		23.8
					40FC27180	27.2
						19.6
	314553	522742	4R4039		314553	28.5
	314385	507344			40FC28170	32.5
					40FC28188	36.2
				200RV2803	40FC28190A	36.5
	313893	508726	4R4037	200RV2802	313893-1	39.3
				200RV2801	40FC28200	39.4
						38.5
	313811	512580	4R4041	200RV2901	313811	42.8
						43.4
						36.3

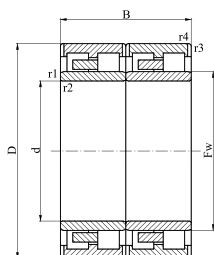
Four row cylindrical roller bearings
for interference fit on the roll neck
d 200--220mm



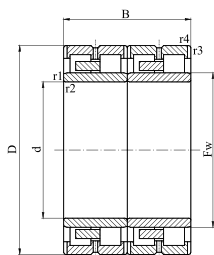
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
200	310	200	229	2.1	2.1	1573	3625	FC4062200	
	310	230	229	2.1	2.1	2360	4000	FC4062230	
	320	216	231	2.1	2.1	2120	3900	FC4064216	
210	290	192	234	2.1	2.1	1185	3245	FC4258192	
	290	192	236	2.1	2.1	1700	3400	FC4258192E	
	300	170	234	2.1	2.1	1215	2845	FC4260170	
	300	210	234	2.1	2.1	1660	3490	FC4260210	672742
220	290	192	239	2.1	2.1	1190	3350	FC4458192	
	300	160	245	2.1	2.1	1000	2590	FC4460160	
	300	190	240	2.1	2.1	1219	3323	FC4460190	
	300	192	242	2.1	2.1	1219	3323	FC4460192	672744
	300	200	240	2.1	2.1	1790	3900	FCD4460200	
	310	190	246	2.1	2.1	1320	3450	FC4462190	
	310	192	246	2.1	2.1	1830	3650	FC4462192	
	310	192	247	2.1	2.1	1540	3450	FC4462192E	
	310	204	247	2.1	2.1	1420	3750	FCD4462204	
	310	215	242	2.1	2.1	1590	3950	FCD4462215	
	310	225	244	2.1	2.1	2200	4300	FCD4462225E	
	310	225	245	2.1	2.1	1940	4150	FCD4462225	
	310	265	245	2.1	2.1	1690	4700	FCD4462265	
	320	160	245	2.1	2.1	1190	2550	FC4464160	
	320	192	246	2.1	2.1	1600	3440	FC4464192	672844
	320	210	246	2.1	2.1	1900	3750	FCD4464210	
	320	210	248	2.1	2.1	1790	3650	FCD4464210E	
	330	230	249	2.1	2.1	2360	4000	FCD4466230	
	340	180	256	3	3	1500	2750	FC4468180	
	340	192	246	2.1	2.1	1820	3600	FC4468192	672744K



FCD



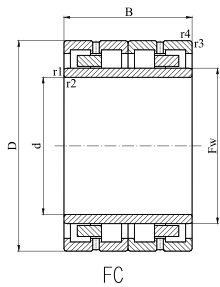
FCD-A



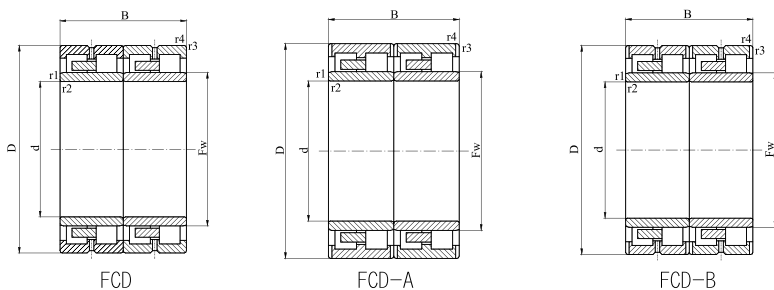
FCD-B

Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
200		524373				59.5
	313639/VJ202	503901.N12BA		200RV3102		64.3
			4R4028	200RV3231		67.2
210						38.2
	313646	507628	4R4206	210RV2901	42FC29192	41.2
					42FC30120	38.8
						47.9
220			4R4413			33.8
			4R4419			32.8
						39.3
						39.7
	BC2B322341/HB1VJ202	567623				41.2
						45.1
	313839	507333	4R4426		313837A	46.3
				220RV3101	313837-1	46.3
			4R4425			49.8
			4R4420			51.5
	313894B	514461			44FC31225A	54.5
		506869	4R4416	220RV3102	44FC31225	54.9
			4R4430			63.5
			4R4428			46.5
						51.5
		509216		220RV3203	44FC32210	61.2
			4R4429	220RV3201	44FC32210-1	56.1
	314889/VJ202	541452				68.5
					44FC34180A	60.3
						64.2

Four row cylindrical roller bearings
for interference fit on the roll neck
d 220--260mm

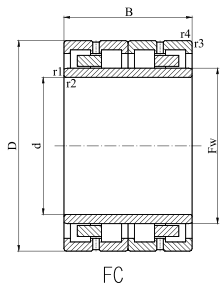


Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r1,2min	r3,4min	Cr	Cor	New	Old
220	340	210	250	2.1	2.1	1909	3846	FCD4468210	672844Y
	340	290	250	2.1	2.1	3250	5400	FCD4468290	
	345	210	250	2.1	2.1	1909	3846	FCD4469210	
230	330	170	260	2.1	2.1	1140	2970	FC4666170	
	330	206	258	2.1	2.1	1520	3800	FC4666206E	
	330	206	260	2.1	2.1	2080	4000	FC4666206	672746
	340	260	261	2.1	2.1	2390	5100	FCD4668260	
	365	250	266	2.1	2.1	2640	4900	FCD4673250	
240	330	180	265	2.1	2.1	2040	3800	FC4866180	
	330	220	264	2.1	2.1	1830	4340	FCD4866220	672748
	330	220	270	2.1	2.1	2080	4400	FCD4866220E	
	340	192	268	2.1	2.1	1474	3582	FC4868192	672748K
	340	220	268	2.1	2.1	2400	4200	FCD4868220	
	350	220	270	2.1	2.1	1576	4073	FCD4870220	
	360	218	270	3	3	2130	4060	FC4872290	
	360	220	272	2.1	2.1	2250	4374	FCD4872220E	
	360	220	274	2.1	2.1	1760	4050	FCD4872220	
	360	290	270	3	3	3300	6550	FC4872218	
250	340	170	274	3	3	1392	3488	FC5068170	
	340	220	274	3	3	1329	3123	FC5068220	
	340	230	270	3	3	1700	4350	FCD5068230	
	350	220	274	3	3	1700	4350	FC5070220E	
	350	220	278	3	3	1930	4350	FC5070220	672750
	350	230	278	3	3	1700	4350	FCD5070230	672750K1
	360	220	282	3	3	1700	4240	FC5072220	672750K
260	360	192	288	3	3	1609	3874	FC5272192	
	360	200	288	3	3	1550	4550	FC5272200	

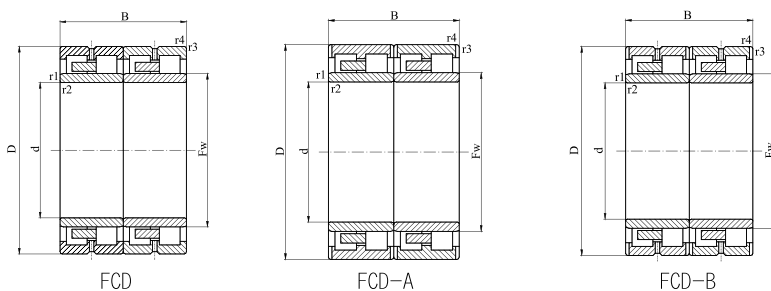


Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
220	525147					70.2
						96.3
						73.8
230	4R4614					47.4
						58.6
	313824	508727		230RV3301	313824	58.0
			4R4611	230RV3401	46FC34260	81.0
	313581A	529113		230RV3601	313581AW	100
240	635194	504547				49.5
					48FC33220	56.4
	313921	508368	4R4811	240RV3301	312943/1YD	58.0
						55.4
		513703	4R4806	240RV3403	48FC34220	71.0
						71.0
				240RV3601	48FC36218	77.4
			4R4807			78.8
						79.6
	BC4B322292A/HB3				48FC36290W	130
250						45.0
						52.8
						65.0
						58.0
			4R5008	250RV3501	50FC35220	65.0
						68.7
						73.0
260						60.0
						62.0

Four row cylindrical roller bearings
for interference fit on the roll neck
d 260--280mm

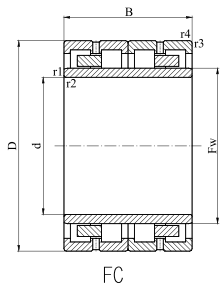


Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
260	360	204	287	3	3	1980	4400	FC5272204	
	360	230	292	3	3	1980	4650	FC5272230	
	360	260	287	3	3	2300	5320	FCD5272260	
	370	192	291	3	3	1670	4012	FC5274192	
	370	200	292	3	3	1771	4120	FC5274200	672752K
	370	220	292	3	3	2160	4650	FC5274220	672752
	370	230	292	3	3	1760	4450	FC5274230	
	380	220	292	3	3	2104	4900	FC5276220	
	380	280	294	3	3	2820	6250	FCD5276280E	
	380	280	295	3	3	2720	6250	FCD5276280	672852
	380	290	296	3	3	3900	7100	FCD5280290	
	400	335	294	3	3	4300	7340	FCD5280335	
265	370	234	300	3	3	2500	5400	FC5374234	
270	380	230	298	3	3	2330	5050	FC5476230	672754
	380	275	298	3	3	3080	6990	FCD5476275E	
	380	275	300	3	3	3080	6990	FCD5476275	672754K1
	390	220	306	3	3	1800	4803	FC5478220	
	390	240	298	3	3	2236	5330	FCD5478240	
	400	220	305	3	3	1822	4600	FC5480220	672854
280	375	200	307	3	3	1500	4310	FC5675200	672956
	380	170	306	3	3	1710	3590	FC5676170	
	380	192	310	3	3	1560	4580	FC5676192	
	380	290	308.5	3	3	2750	6950	FCD5676290	
	390	220	312	3	3	2240	5000	FC5678220	672756
	390	240	312	3	3	2360	5500	FC5678240	
	390	275	308	3	3	3600	7200	FCD5678275	
	390	275	312	3	3	3150	6400	FCD5678275E	

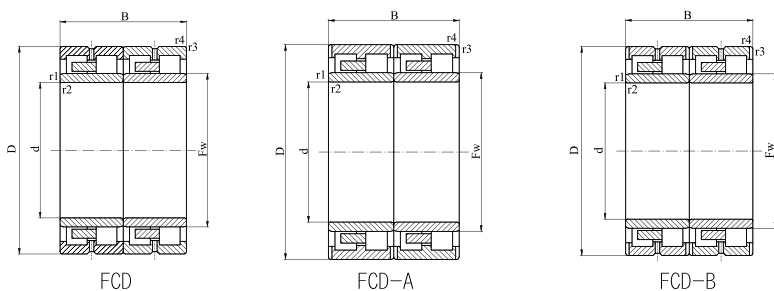


Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
260	314997/VJ202					64.5
	BC4B320956				52FC36260	73.5
						80.0
						66.0
						68.9
	313823	507336	4R5217	260RV2701	313823	76.5
						79.3
						85.0
			4R5213	260RV3801	52FC38280	108
						108
	313427B	518214		260RV4001		135
		521065			52FC40335W	149
265	313922	517423			53FC37234	80.0
270				270RV3801	54FC38230	81.8
						97.8
						102
						86.7
						94.0
						95.3
280					56FC38170W	63.5
						55.0
						64.6
	BC4-0001					75.0
	313822	507339	4R5611	280RV3901	313822	81.5
				280RV3902		90.0
	314719C	527104		280RV3903		105
		513729A	4R5612		56FC39275	105

Four row cylindrical roller bearings
for interference fit on the roll neck
d 280--320mm

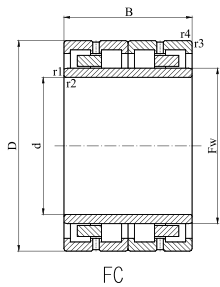


Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
280	400	285	316	3	3	3400	7350	FCD5680285	
	410	300	313	3	3	3900	7450	FCD5682300	672856
	420	280	318	3	3	2945	7212	FCD5684280	
	420	300	319	3	3	3470	7350	FCD5684300	
290	390	190	316	4	4	2050	4550	FC5878190	
	390	234	320	4	4	2270	5600	FC5878234	
	400	180	320	4	4	2189	5385	FC5880180	
	410	240	320	4	4	2570	5600	FC5882240	672758
	420	300	327	4	4	3300	7500	FCD5884300	
	440	310	328	4	4	4300	9700	FCD5888310	
300	400	300	328	4	4	2720	6900	FCD6080300	
	420	180	332	4	4	2200	6780	FCD6084180	
	420	218	332	4	4	2350	5010	FC6084218	672760K
	420	240	332	4	4	2670	5750	FC6084240	672760
	420	240	334	4	4	2020	5450	FC6084240E	
	420	300	332	4	4	3740	8800	FCD6084300	
	440	320	337	4	4	2843	8212	FCD6088320	
	460	270	344	4	4	2670	5800	FCD6092270	
	460	350	341	4	4	5500	9700	FCD6092350	
310	430	240	344.5	4	4	2610	5950	FC6286240	
320	440	240	351	4	4	2169	6100	FC6488240	
	440	286	350	4	4	6900	8564	FCD6488286	
	440	300	351	4	4	2720	8280	FCD6488300	
	450	180	355	4	4	2193	5364	FC6490180	
	450	240	354	4	4	2320	5750	FC6490240	
	450	240	355	4	4	2700	5750	FC6490240E	
	460	240	364	4	4	2920	7200	FCD6492240	

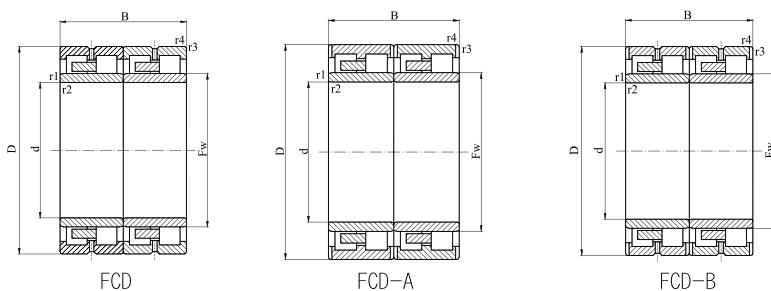


Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
280	314170/VJ202	513342		280RV4021		120
	314897/VJ202	510350				134
						137
	313487	507356				150
290	635195					67.0
				290RV3901	58FC39234	79.6
					58FC40180W	68.0
			4R5806	290RV4101	58FC41240	103
			4R5805	290RV4201	58FC42300	141
		517796				170
300			E-4R6014	300RV4021	60FC40300	104
						92.4
					60FC42218	93.7
				300RV4201	60FC42240	103
			E-4R6017			106
	314484D	560840	E-4R6020	300RV4221	60FC42300W	130
						177
			E-4R6019			162
		517795				250
310			E-4R6202	310RV4301	62FC43240	107
320			E-4R6414			113
		537046				142
						142
						90.1
						125
					64FC45240	116
	BC4B322216/VJ202	804571				140

Four row cylindrical roller bearings
for interference fit on the roll neck
d 320--360mm

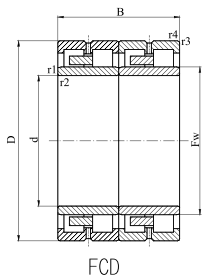


Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
320	460	280	357	4	4	2800	7400	FCD6492280	
	460	300	357	4	4	2567	6087	FCD6492300	
	460	340	360	4	4	3860	9450	FCD6492340	
	470	350	357	4	4	5200	9780	FCD6494350	
	480	290	364	4	4	3520	8640	FCD6496290	
	480	350	364	4	4	5600	10800	FCD6496350	
330	430	230	358	4	4	2340	5850	FC6686230	
	440	200	360	4	4	2160	4850	FC6688200	
	460	340	364	4	4	3860	9150	FCD6692340E	
	460	340	365	4	4	4650	10200	FCD6692340	
340	450	250	364	4	4	2400	6530	FC6890250E	
	450	250	368	4	4	2750	6800	FC6890250E1	
	450	250	371	4	4	2720	6750	FC6890250	672768K
	460	260	370	4	4	2380	7600	FC6892260	672768
	480	280	374	4	4	2840	7870	FC6896280	
	480	350	378	4	4	5300	11000	FCD6896350	
	490	300	377	4	4	3350	8300	FCD6898300	
	500	370	385	4	4	6550	13200	FCD68100370	
	560	380	396	4	4	7650	12900	FCD68112380	
345	480	350	376	3	3	4400	10300	FCD6996350	
350	500	380	389	4	4	5700	11400	FCD70100380	
	500	410	388	4	4	7100	14300	FCD70100410	
	520	300	401	4	4	5100	9000	FCD70104300	
360	480	290	392	4	4	3470	8510	FCD7296290E	
	480	290	394	4	4	3250	8300	FCD7296290	
	500	250	394	4	4	3580	7350	FCD72100250	
	510	370	397	4	4	3756	9870	FCD72102370	

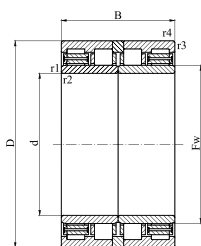


Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
320						159
						163
			E-4R6412		64FC46340A	178
		532592				225
						187
	314274B	541851		320RV4811		235
330				330RV4301		87.4
			E-4R6603	330RV4401	66FC44200W	83.6
					66FC46340	174
	313445C	543447	E-4R6605	330RV4601		182
340				340RV4502	68FC45250BW	109
				340RV4501		106
						124
						125
						160
	314485A	527634		340RV4801	68FC48350C	205
			E-4R6804			187
	BC4B322261/HB1	517794				260
	313404A	545171				350
345				345RV4821		190
350	314563/VJ202	532381				242
	BC4B322777/HB1	532001				285
	BC2B319878/VJ202	568450				220
360					72FC48290	145
				360RV4801		146
	BC2B320075/VJ202					145
						273

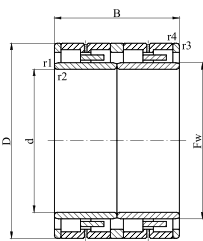
Four row cylindrical roller bearings
for interference fit on the roll neck
d 360--400mm



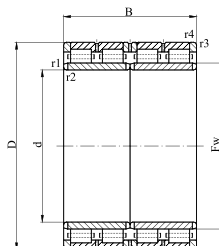
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
360	510	380	399	4	4	5200	12300	FCD72102380	
	510	400	397	4	4	4250	11500	FCDP72102400	
	520	380	405	4	4	6200	13700	FCDP72104380	
370	480	230	400	4	4	2100	6250	FCD7496230	
	480	250	401	4	4	2830	7422	FCD7496250	
	520	380	409	4	4	6100	14400	FCDP74104380	
	520	400	413	4	4	4740	11900	FCDP74104400	
	530	400	413	4	4	4433	13402	FCDP74106400	
	540	400	415	4	4	5250	12400	FCDP74108400	
375	545	400	417	4	4	6310	14500	FCDP75109400	
380	500	290	414	4	4	3350	8800	FCD76100290	
	520	280	417	4	4	3650	9150	FCD76104280	
	520	280	426	4	4	2860	7200	FCD76104280E	
	520	290	418	4	4	3750	8850	FCD76104290	
	520	300	416	4	4	3550	9600	FCD76104300	
	540	300	421	4	4	5010	11000	FCD76108300	
	540	340	424	4	4	4700	10900	FCD76108340	
	540	380	422	4	4	3800	10900	FCD76108380	
	540	400	422	4	4	6700	14400	FCDP76108400E	
	540	400	424	4	4	5050	12000	FCDP76108400	
	560	300	424	4	4	4950	9650	FCDP76112300	
	560	325	428	4	4	5320	10600	FCDP76112325	
390	510	290	424	4	4	3400	9000	FCD78102290	
	540	320	431	4	4	5500	12200	FCD78108320	
	550	310	430	4	4	5120	11200	FCD78110310	
	550	400	434	4	4	5150	12400	FCDP78110400	
400	520	250	432	5	5	3000	7700	FCD80104250	



FCD-Y



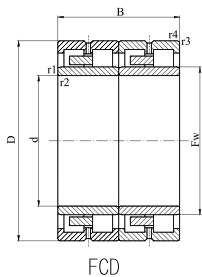
FCDP



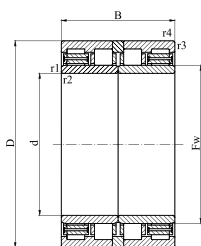
FCDP-E

Bore (mm) d	Reference designations					Ref. Mass kg
	SKF	FAG	NTN	NSK	KOYO	
360					72FC51380	249
			E-4R7203			262
		562913			72FC52380	266
370			E-4R7405			106
				370RV4801		116
	314486A	543975		370RV5211	74FC52380	255
					74FC52400W	268
						312
				370RV5401	74FC54400A	311
375					75FC55400	315
380				380RV5001		153
			E-4R7605	380RV5202	76FC52280	174
	NNU4976B/DRW33					185
		576360		380RV5201	76FC52290	182
			E-4R7607			210
	313030A	541982				220
				380RV5431		249
						290
	BC4B313511B	544794	E-4R7604	380RV5411	76FC54400W	295
	315606			380RV5401	76FC54400CW	280
390	BC4B322189					260
	BC4B322264/HB1					265
				390RV5101		156
	BC4B322498	578278				230
	313190A					240
400				390RV5521	78FC55400AW	303
				400RV5202	80FC52250W	137

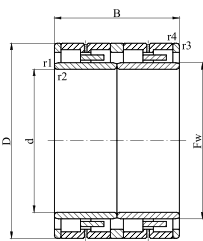
Four row cylindrical roller bearings
for interference fit on the roll neck
d 400--460mm



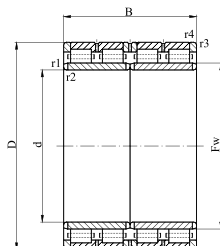
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
400	540	380	436	5	5	4550	9780	FCDP80108380	
	550	300	438	5	5	4460	10400	FCDP80110300E	
	550	300	441	5	5	4150	9750	FCDP80110300	
	560	400	446	5	5	5650	13600	FCDP80112400	
	560	410	445	5	5	7800	16500	FCDP80112410	
	590	440	450	5	5	8300	16600	FCDP80118440	
410	560	400	450	5	5	6700	16600	FCDP82112400	
	600	440	460	5	5	9300	18600	FCDP82120440	
420	560	280	457	5	5	3930	9350	FCD84112280	
	580	260	468	5	5	3740	9650	FCD84116260	
	580	320	463	5	5	4680	19800	FCD84116320	
	600	440	470	5	5	8150	17600	FCDP84120440	
	620	300	473	5	5	5200	15800	FCD84124300	
	620	400	473	5	5	6930	15600	FCDP84124400E	
	620	400	478	5	5	5000	13400	FCDP84124400	
430	570	340	465	5	5	6000	16800	FCD86114340	
	591	420	476	5	5	5200	13400	FCDP86118420	
440	620	450	487	5	5	8800	19600	FCDP88124450E	
	620	450	490	5	5	7450	19000	FCDP88124450	
	650	355	494	5	5	6700	14000	FCD88130355	
	660	340	492	5	5	6710	13700	FCDP88132340	
445	600	435	478	3	2	9150	16000	FCDP89120435	
	635	375	496	4	4	6240	14600	FCDP89127375	
450	590	300	490	5	5	3910	12000	FCD90118300	
	590	435	486	5	5	8150	19000	FCDP90118435	
	630	450	500	5	5	6950	17500	FCDP90126450	
460	610	320	499	5	5	4100	14600	FCD92122320	



FCD-Y



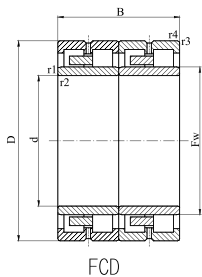
FCDP



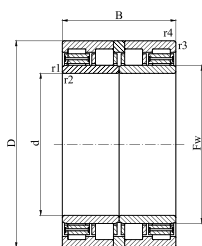
FCDP-E

Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
400		533426				273
					80FC55300	214
				400RV5501		213
			E-4R8007	400RV5612	80FC56400W	303
	313015DC	513769A	E-4R8010	400RV5611	80FC56410	231
	315802/VJ202	542395				415
410	316689	543736				300
	313877B	517436		410RV6011		425
420			E-4R8403	420RV5601	84FC56280	191
	BC2B320074A/VJ202					210
	313555C/VJ202	533053				250
	313513	545467		420RV6011	4CR420A	400
						416
	314391/VJ202	509394				430
			E-4R8401			410
430		526415				260
				430RV5921		347
440	314554B	545628	E-4R8801	440RV6213	88FC62450AW	427
				440RV6221		430
	316899A					420
	635043					333
445		543174				353
					4CR445	385
450	315811E					245
		542648				345
				450RV6321	90FC63450A	433
460		526420				290

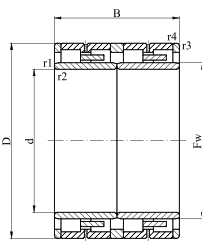
Four row cylindrical roller bearings
for interference fit on the roll neck
d 460--500mm



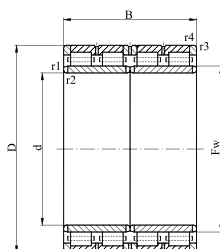
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
460	620	320	500	5	5	4800	16200	FCD92124320	
	620	400	502	5	5	6500	17000	FCD92124400	
	650	355	509.5	5	5	6270	14600	FCD92130355	
	650	424	510	5	5	9000	18300	FCDP92130424	
	650	470	509	5	5	10400	22400	FCDP92130470	
	660	475	508	5	5	11000	35000	FCDP92132475	
	670	500	522	5	5	7650	22700	FCDP92134500	
	700	540	519	5	5	12000	37500	FCDP92140540	
475	600	368	504	3	3	5500	14600	FCDP95120368	
480	650	340	522	5	5	6550	18400	FCDP96130340	
	650	420	522	5	5	8120	23700	FCDP96130420	
	650	450	525	5	5	9000	21200	FCDP96130450	
	680	420	528	5	5	9800	19300	FCD96136420	
	680	500	528	5	5	9130	23000	FCDP96136500	
	680	500	532	5	5	11600	24000	FCDP96136500E	
	680	500	534	5	5	9000	23100	FCDP96136500E1	
	700	500	534	5	5	12200	34200	FCDP96140500	
	700	530	536	5	5	11200	31500	FCDP96140530	
495	615	360	530	6	6	4030	12000	FCDP99123360	
500	650	260	542	6	6	4020	10200	FCDP100130260	
	670	450	540	6	6	8300	22300	FCDP100134450E	
	670	450	556	6	6	9000	22800	FCDP100134450	
	680	450	550	6	6	10200	22000	FCDP100136450	
	690	470	547	6	6	7650	22500	FCDP100138470	
	690	510	552	6	6	9010	24600	FCDP100138510	
	700	500	554	6	6	11600	38000	FCDP100140500	
	700	515	554	6	6	9100	25200	FCDP100140515	



FCD-Y



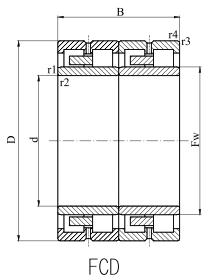
FCDP



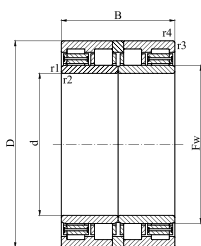
FCDP-E

Bore (mm) d	Reference designations					Ref. Mass kg
	SKF	FAG	NTN	NSK	KOYO	
460		526026				290
			E-4R9209	460RV6211	92FC62400BW	344
	313031A	541756				380
	315196A	513584A				450
	314560	518846	E-4R9216	460RV6511	92FC65470W	510
		517693				585
				460RV6721		596
		529368				785
475	BC4B326261/HA1					235
480		525884				320
		525912				440
	316690B	547660	E-4R9609			439
	319320	533522				515
	316624					605
	313516D	514445B	E-4R9604			585
				480RV6801	96FC68500	630
		546152V				675
		523399				720
495					99FC62360	235
500	319254/VJ202					225
	316083A			500RV6712E		463
		533023				458
	BC4B316515	546335				509
			E-4R10016			590
			E-4R10006	500RV6921	100FC69510	590
		517692				615
			E-4R10011	500RV7021		680

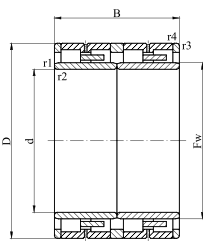
Four row cylindrical roller bearings
for interference fit on the roll neck
d 500--560mm



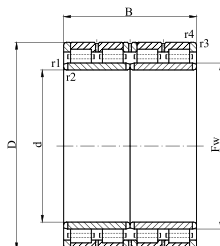
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
500	710	480	558	6	6	11200	23200	FCDP100142480	
	720	400	558	6	6	7920	17600	FCDP100144400	
	720	530	560	6	6	9950	25300	FCDP100144530	
	720	530	568	6	6	12700	28500	FCDP100144530E	
510	670	320	554	6	6	4950	13500	FCDP102134320	
	680	500	560	6	6	10400	26000	FCDP102136500	
	700	540	558	6	6	8300	25000	FCDP102140540	
	730	520	565	6	6	13400	42000	FCDP102146520E	
	730	520	569	6	6	9520	22000	FCDP102146520	
	760	550	570	6	6	14600	28000	FCDP102152550	
520	700	540	564	6	6	8200	25500	FCDP104140540	
	735	535	574.5	6	6	10400	26600	FCDP104147535	
	750	530	576	6	6	13700	45000	FCDP104150530	
530	700	540	574	6	6	8150	26500	FCDP106140540	
	760	520	587	6	6	13700	29000	FCDP106152520E	
	760	520	590	6	6	9150	26700	FCDP106152520	
	780	500	591	6	6	9350	20400	FCDP106156500	
	780	570	595	6	6	12500	30600	FCDP106156570	
	780	570	601	6	6	14600	32500	FCDP106156570E	
	870	670	615	6	6	21200	38000	FCDP106174670	
545	810	580	614	6	6	13500	33400	FCDP109162580	
550	740	510	600	6	6	12200	28500	FCDP110148510	
	800	520	612	6	6	11700	27000	FCDP110160520E	
	800	520	622	6	6	9450	26500	FCDP110160520	
	800	560	610	6	6	15300	30500	FCDP110160560	
560	680	360	590	6	6	4650	16500	FCDP112136360	
	800	600	620	6	6	13000	33400	FCDP112160600	



FCD-Y



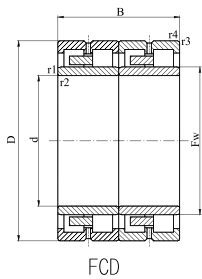
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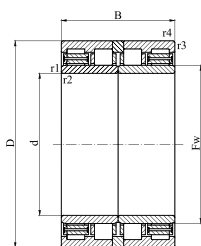
FCDP-E

Bore (mm) d	Reference designations					Ref. Mass kg
	SKF	FAG	NTN	NSK	KOYO	
500	316968A	530488		500RV7111		615
	BC4B322066					530
				500RV7211	100FC72530	782
	314441B	513378A	E-4R10015		100FC72530C	780
510			E-4R10201	510RV6701	102FC67320	335
	BC4B319411	567725A				522
			E-4R10202			689
		541646				745
	BC4-8009/HB1					750
	BC4-8007/HB1	517690				950
520			E-4R10403			658
			E-4R10402	520RV7331	104FC74535	740
		541647				810
530			E-4R10603			626
	314886A	531597				775
			E-4R10601			800
	315040/VJ202					805
				530RV7813	106FC78570	952
	314517A	517689A	E-4R10502	530RV7811		960
		543481				1680
545					109FC81580	1090
550	316691B	532843			110FC74510	639
	316115/VJ202	549875				895
			E-4R11001			965
	BC4B322719/HB1	517688				985
560			E-4R11202			265
				560RV8011	112FC80600	1010

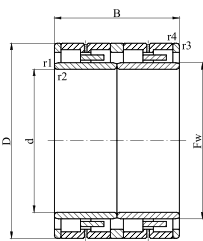
Four row cylindrical roller bearings
for interference fit on the roll neck
d 560--660mm



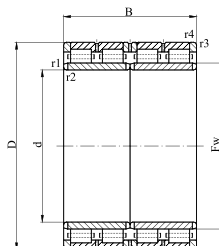
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
560	820	600	625	6	6	14200	34000	FCDP112164600	
	820	630	625	6	6	14400	45200	FCDP112164630	
570	750	530	622	5	5	6750	25200	FCDP114150530	6727/570
	815	594	628	6	6	13700	34500	FCDP114163594	
	830	600	635	6	6	17600	67800	FCDP114166600	
580	850	640	648	6	6	18000	38000	FCDP116170640	
590	820	590	649	6	6	13100	35100	FCDP118164590	
600	820	550	660	6	6	14000	33500	FCD120164550	
	820	575	660	6	6	15000	36000	FCDP120164575	
	870	540	672	6	6	15300	38300	FCDP120174540	
	870	640	672	6	6	18300	40000	FCDP120174640E	
	870	640	682	6	6	15100	40000	FCDP120174640	
	920	680	674	6	6	22800	67100	FCDP120184680	
610	820	430	665	6	6	9350	23600	FCDP122164430	
	850	570	670	6	6	13200	34900	FCDP122170570	
	870	660	680	6	6	15400	41500	FCDP122174660	
630	800	360	675	5	5	6850	19500	FCDP126160360	
	850	436	690	6	6	7480	23600	FCDP126170436	
	900	670	698	6	6	20800	63500	FCDP126180670	
640	870	610	697	6	3	14200	40000	FCDP128174610	
	880	600	700	6	6	15000	40800	FCDP128176600	
650	900	650	704	7.5	7.5	17200	41500	FCDP130180650	
	920	670	723	7.5	7.5	20800	46500	FCDP130184670	
	920	690	723	7.5	7.5	16600	45500	FCDP130184690	
	920	690	724	7.5	7.5	16700	46500	FCDP130184690E	
660	820	440	702	7.5	7.5	7480	22800	FCDP132164440	
	880	450	727	7.5	7.5	7210	23600	FCDP132176450	



FCD-Y



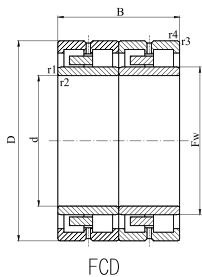
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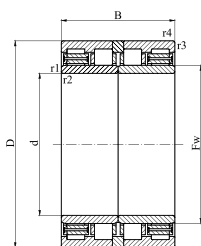
FCDP-E

Bore (mm) d	Reference designations					Ref. Mass kg
	SKF	FAG	NTN	NSK	KOYO	
560	BC4B322930/HA4	517687A				1080
		526708			112FC82630	1240
570			E-4R11402	570RV8111	114FC81594	662
		517686				1010
						1200
580		517685				1275
590					118FC82590	990
600		518780				900
	315175A(C)	528518		600RV8212E	120FC82575	936
	315068A	533259	E-4R12002			1150
	315513	517684A	E-4R12001	600RV8713	120FC87640	1340
	314317A			600RV8711	4CR600A	1300
		526235				1800
610	315257A					652
					122FC85570	1040
			E-4R12202	610RV8711	122FC87660	1400
630	BC2-8012/HB1VJ202				126FC80360	440
						720
		517683				1525
640				640RV8711		1100
					128FC88600	1130
650	BC4-8002/HA6					1260
	313007C	515194A	E-4R13005	650RV9212	130FC92670	1460
			E-4R13003	650RV9211	130FC92690B	1550
					130FC92690	1490
660	239509FA		E-4R13201			530
	313477/VJ202	509944				785

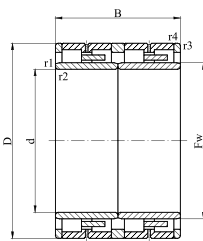
Four row cylindrical roller bearings
for interference fit on the roll neck
d 670--800mm



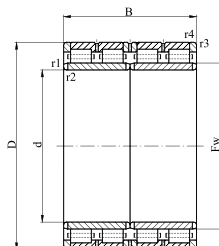
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
670	870	530	725	6	3	13700	34500	FCDP134174530	
	950	690	740	5	4	22400	50000	FCDP134190690	
	950	700	750	7.5	7.5	14500	47300	FCDP134190700	
680	940	600	743	7.5	7.5	19000	53400	FCDP136188600	
	980	640	760	7.5	7.5	21000	45000	FCDP136196640	
690	980	715	767	7.5	7.5	22800	54000	FCDP138196715	
	980	750	766	7.5	7.5	19200	53000	FCDP138196750	
700	930	620	763	7.5	7.5	17000	44000	FCDP140186620	
	980	700	774	7.5	7.5	17800	49000	FCDP140196700	
	1000	710	770	4	4	18900	47400	FCDP140200710	
710	1000	715	787.5	7.5	7.5	23200	56000	FCDP142200715	
	1020	710	785	4	4	19300	49100	FCDP142204710	
725	1000	700	796	6	6	18200	53500	FCDP145200700	
730	940	500	780	7.5	7.5	12300	42500	FCDP146188500	
	960	620	790	7.5	7.5	17600	45000	FCDP146192620	
	1000	700	798	7.5	7.5	13570	39140	FCDP146200700	
	1030	750	809	7.5	7.5	25500	58500	FCDP146206750	
750	1000	500	816	7.5	7.5	12300	33500	FCDP150200500	
	1000	670	813	7.5	7.5	20400	50000	FCDP150200670	
	1090	615	836	7.5	7.5	21600	43000	FCDP150218615	
755	1070	750	837	7.5	7.5	21700	58500	FCDP151214750	
760	1030	750	828	7.5	7.5	20500	61100	FCDP152206750E	
	1030	750	834	7.5	7.5	18200	53500	FCDP152206750	
	1080	790	846	7.5	7.5	23800	65500	FCDP152216790	
780	1070	780	853	7.5	7.5	26500	64000	FCDP156214780	
790	1120	810	875	7.5	4	30000	69500	FCDP158224810	
800	1080	700	870	7.5	7.5	16500	55000	FCD160216700	



FCD-Y



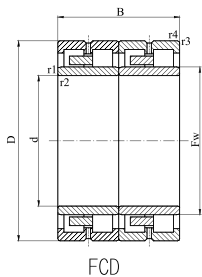
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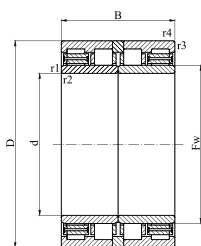
FCDP-E

Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
670		533258				827
		517682				1606
						1670
680		533683				1295
	313154C	524229				1750
690	313008A	517681	E-4R13802	690RV9831	138FC98715	1780
				690RV9812	138FC98750	1850
700	316967	530487	E-4R14003	700RV9311		1197
				700RV9821	140FC98700	1680
					140FC100710W	1810
710	313403C	517680A	E-4R14205	710RV1011		1860
					142FC102710	1940
725			E-4R14501	725RV1011	145FC100700W	1730
730		526447				920
	315982	525438		730RV9611		1220
						1734
	314518B	517679		730RV1011		2040
750	314420/VJ202					1150
	315973	524881A		750RV1011		1480
		800494				1966
755				755RV1011		2230
760			E-4R15204		152FC103750	2000
				760RV1031		1880
	312979D					2440
780	BC4-8015/HB1	540088			156FC107780	2300
790		517678				2605
800			E-4R16004			1950

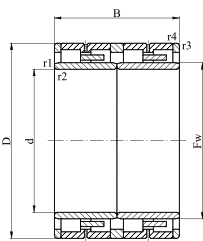
Four row cylindrical roller bearings
for interference fit on the roll neck
d 800--950mm



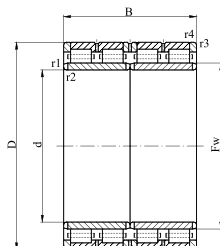
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
800	1080	700	878	7.5	7.5	22800	58500	FCDP160216700E	
	1080	750	880	7.5	7.5	18700	56500	FCDP160216750	
	1150	850	905	5	5	25200	68000	FCDP160230850	
820	1130	800	903	7.5	7.5	27000	68000	FCDP164226800	
	1160	840	910	7.5	7.5	25000	71000	FCDP164232840	
	1160	840	911	7.5	7.5	25600	72000	FCDP164232840E	
830	1080	710	896	6	6	22800	61000	FCDP166216710	
840	1160	840	920	7.5	7.5	24900	71000	FCDP168232840	
	1180	880	917	10	5	33500	86000	FCDP168236880	
850	1150	650	941	7.5	7.5	15700	51000	FCDP170230650	
	1150	800	930	7.5	7.5	19700	71000	FCDP170230800	
	1150	840	928	7.5	7.5	30500	76500	FCDP170230840	
	1180	650	945	7.5	7.5	19600	54500	FCDP170236650	
	1180	850	928	7.5	7.5	24100	78500	FCDP170236850E	
	1180	850	940	7.5	7.5	24600	72000	FCDP170236850	
	1220	900	940	7.5	7.5	28000	82400	FCDP170244900	
860	1130	670	934	6	6	18400	56500	FCDP172226670	
	1140	750	938	7.5	7.5	20100	60900	FCDP172228750	
865	1180	750	945.3	7.5	7.5	27500	67000	FCDP173236750	
880	1140	800	946	6	6	23600	77400	FCDP176228800	
900	1220	840	989	7.5	7.5	31500	80000	FCDP180244840	
	1280	930	1000	7.5	7.5	39000	93000	FCDP180256930	
920	1280	865	1015	7.5	7.5	28000	80000	FCDP184256865	
940	1320	1000	1029	7.5	4	41500	98000	FCDP1882641000	
950	1300	850	1044	7.5	7.5	27200	91100	FCDP190260850	
	1360	975	1075	6	6	34100	100000	FCDP190272975	
	1360	1000	1075	7.5	5	38000	110000	FCDP1902721000	



FCD-Y



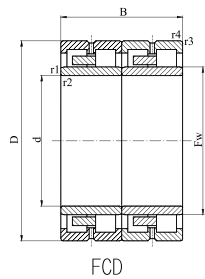
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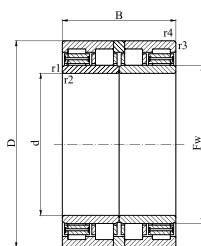
FCDP-E

Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
800	315599A	526169		800RV1011		1950
			E-4R16005	800RV1032	160FC108750	2050
		524137				3150
820	BC4B320455	803317	E-4R16406	820RV1117	164FC113800A	2540
			E-4R16403		164FC116840	2930
				820RV1111A		2900
830		567729			166FC108710	1724
840			E-4R16801	840RV1111	168FC116840	2840
		524060				3300
850	315826A(B)	545636	E-4R17001			1980
			E-4R17003			2430
				850RV1114		2630
			E-4R17004	850RV1133	170FC118650	2270
			E-4R17002			2970
				850RV1111	170FC118850	2850
		523397				3720
860				860RV1132		1780
					172FC114750	2080
865	BC4B319668	566883				2462
880					176FC114800	2210
900	316043	527048		900RV1212		3060
	313528C	541812		900RV1213	180FC128930	4300
920				920RV1211A		3510
940		517676				4375
950						3500
	BC4B319862					4850
	314520C	517369A		950RV1311		5020

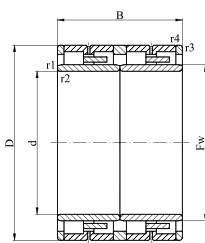
Four row cylindrical roller bearings
for interference fit on the roll neck
d 980--1200mm



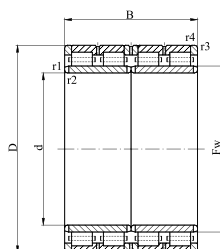
Principal dimensions (mm)						Basic load ratings KN		Designations	
d	D	B	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
980	1310	880	1061.7	6	6	25700	82000	FCDP196262880	
	1360	1000	1080	7.5	5	41500	106000	FCDP1962721000	
990	1360	760	1080	7.5	6	30500	68000	FCDP198272760	
1000	1310	880	1080	7.5	7.5	23400	88500	FCDP200262880	
	1360	800	1090	7.5	7.5	25000	85000	FCDP200272800E	
	1360	800	1101	7.5	4	24700	80000	FCDP200272800	
1030	1380	850	1124	7.5	7.5	29800	90900	FCDP206276850	
1040	1440	1000	1133	7.5	5	45000	106000	FCDP2082881000	
1060	1360	800	1137	7.5	5	32500	91500	FCDP212272800	
1100	1500	1000	1194	7.5	4	47500	116000	FCDP2203001000	
1120	1580	1150	1255	7.5	7.5	43500	134500	FCDP2243161150	
1150	1500	760	1240	7.5	5	33500	86500	FCDP230300760	
1200	1590	1050	1295	7.5	7.5	36000	133000	FCDP2403181050E	
	1590	1050	1305	7.5	6	47500	134000	FCDP2403181050	



FCD-Y



FCDP

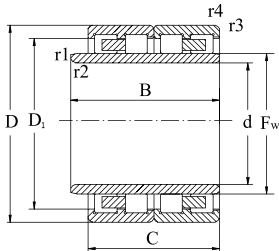


FCDP-E

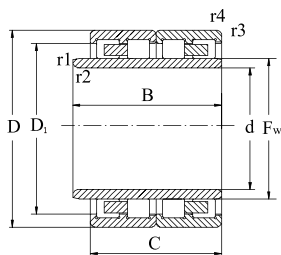
Bore (mm) d	Reference designations					Ref. Mass
	SKF	FAG	NTN	NSK	KOYO	kg
980	319303					3350
		517740				4671
990		522071				3269
1000	316234A		E-4R20001			3260
			E-4R20002			3530
		527021				3600
1030			E-4R20601		206FC138850A	3680
1040		517675				5040
1060		521910				3005
1100		517737				5305
1120				1120RV1511		7400
1150		518206				3622
1200	315494B		E-4R24002			6220
		518649				5970

Four row cylindrical roller bearings
for clearance fit on the roll neck

d 115--360mm



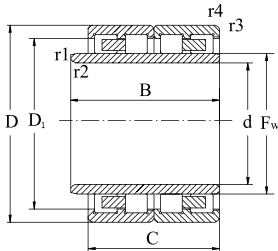
Principal dimensions (mm)							Basic load ratings KN	
d	D	B	C	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor
115	165	107.5	90	132.5	1.1	1.1	402	765
135	188	121	120	150	1.5	1.5	632	1260
139.7	215	195	187	156.285	3.0	0.4	1010	2280
170	260	250	225	196	2.5	2.1	1930	3350
200	280	180	170	222	2.1	2.1	1630	3000
	280	200	180	222	2.0	2.0	1280	2620
	310	260	230	229	3.0	3.0	2360	3750
220	340	320	290	250	3.0	2.0	3550	5850
240	330	240	220	270	2.1	2.1	1720	4300
	350	224	184	270	3.0	3.0	1610	3110
250	350	320	290	277	3.0	3.0	3100	6000
260	370	240	220	292	3.0	3.0	2200	4605
270	380	295	275	300	2.1	2.1	3550	7200
280	390	240	220	312	2.1	3.0	2280	4300
	390	250	220	312	3.0	3.0	2240	5000
300	420	320	300	332	4.0	1.5	4150	8800
	420	330	300	332	4.0	1.5	3740	8800
320	440	240	230	351	3.0	3.0	2530	5490
	440	280	240	353	3.0	3.0	2500	5670
	440	370	340	350	4.0	1.5	4650	9500
340	480	356	350	376	3.0	3.0	4190	9630
	480	370	350	378	4.0	1.5	5300	11000
	500	410	370	385	6.0	3.0	5850	11200
350	500	400	380	388	6.0	3.0	6550	13200
	520	320	300	401	5.0	5.0	5100	9000
360	480	250	230	392	3.0	3.0	2800	6450
	510	400	380	399	4.0	1.5	6100	12200



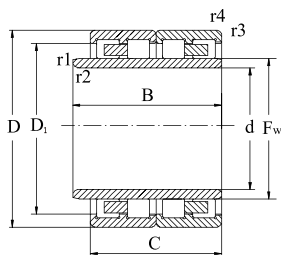
Bore (mm) d	Reference designations				Ref. Mass kg
	SKF	FAG	NSK	KOYO	
115	BC4B319738A				8.51
135				27FC19120	10.3
139.7	BC4B466971B				25.2
170		801083			41.8
200	319019	530908		40FC28180/200	35.1
					34.4
					64.9
220		580510			100
240	BC4B320415			48FC35184/224	60.5
					62.4
250		801076			86.5
260	BC4B319464/HA3	536897			79.4
270	315605	522009			100
280	319259	533575			83.9
					84.5
300	319129 BC4-0003	532504			135
					140
320		580511		64FC44230/240	103
				64FC44240/280	131
					160
340	319040A	531839 580512		68FC48350	200
					210
					289
350	BC4B326858/HB3	801476			246
					240
360	316890B	533808		72FC48230/250	117
					260

Four row cylindrical roller bearings
for clearance fit on the roll neck

d 370--750mm



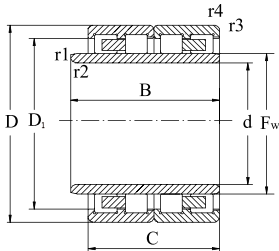
Principal dimensions (mm)							Basic load ratings KN	
d	D	B	C	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor
370	520	410	380	409	3.0	1.5	6100	11800
380	540	400	380	424	4.0	1.5	5700	13700
	540	400	380	422	4.0	1.5	6700	14000
410	560	420	400	450	3.0	2.0	7500	16000
430	570	360	340	465	4.0	5.0	6200	13200
440	620	430	410	487	2.1	2.0	8650	17600
	620	470	450	487	4.0	3.0	9500	20000
	620	470	450	487	4.0	3.0	9300	19300
460	650	460	424	510	4.0	3.0	7810	18300
	650	490	470	509	5.0	2.5	10400	22000
	680	410	410	516	2.5	2.5	9800	18300
480	650	450	450	525	3.0	3.0	9800	22000
500	670	450	450	540	2.1	5.0	9500	21200
	670	470	450	540	4.0	4.0	9500	21600
	670	479	450	540	6.0	5.0	8250	22000
	670	517	450	540	6.0	5.0	8250	22000
	680	420	405	550	5.0	5.0	6710	17600
530	760	555	520	587	5.0	2.5	13700	29000
550	740	527	510	600	2.1	2.0	12200	28500
570	830	630	600	635	3.0	4.0	16600	34500
580	780	520	486	634	4.0	2.0	9900	27000
	780	521	486	634	4.0	2.0	9900	27000
	780	558	486	634	4.0	2.0	9900	27000
600	870	578	540	672	5.0	4.0	15300	31500
710	929.9	645	635	767	5.0	5.0	15500	47000
750	1080	665	650	833	7.5	7.5	19000	46900



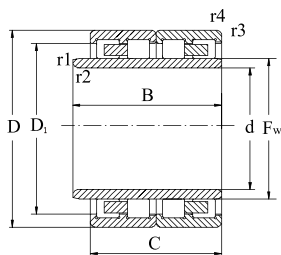
Bore (mm)	Reference designations				Ref. Mass
d	SKF	FAG	NSK	KOYO	kg
370		801082			258
380	315606	522007			295
	BC4B320989/HA3	565463			300
410	BC4B320612	561269			293
430		533022			245
440		579578			398
	BC4B320608	533578			434
		561271			428
460	BC4B322993A/HA7				490
		536712			513
		567014			527
480		533487			443
500		540386			459
		564182			454
	BC4-8010/HA4				485
	BC4-8011/HA4				475
			500RV6812	100FC68405	451
530		579713			809
550		579741			645
570		532470			1155
580	BC4-8012/HA4				700
	BC4B326140/HA4				700
	BC4-8013/HA4				715
600	BC4B322497/HA4	572137			1260
710				142FC93635	1310
750				4CR750	2020

Four row cylindrical roller bearings
for clearance fit on the roll neck

d 760--1200mm



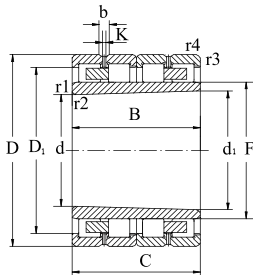
Principal dimensions (mm)							Basic load ratings KN	
d	D	B	C	Fw	r _{1,2min}	r _{3,4min}	Cr	Cor
760	1080	805	790	845	6.0	6.0	23100	63500
	1080	805	790	847	6.0	6.0	22600	61700
765	1010	718	708	827	6.0	6.0	19100	58000
	1065	662	652	840	6.0	6.0	19200	51700
820	1100	745	720	892	6.0	3.0	19800	58500
	1130	825	800	903	7.5	7.5	24200	68000
850	1180	875	850	940	7.5	7.5	25400	72700
855	1094.9	665	655	918	6.0	6.0	18000	58000
860	1160	735	710	940	7.5	6.0	20800	60000
870	1145	705	685	940	6.0	6.0	20500	62900
900	1230	895	870	985	7.5	7.5	26900	77500
	1230	895	870	990	7.5	7.5	26400	77500
	1280	1050	840	1000	7.5	7.5	28900	79100
920	1280	815	800	1010	7.5	7.5	28700	79900
	1280	865	850	1015	7.5	7.5	27600	77500
	1300	975	950	1019	7.5	7.5	32600	92600
950	1300	965	950	1036	7.5	7.5	32600	96900
1080	1358.8	825	800	1150	7.5	7.5	25400	87000
1200	1509.85	1027.5	1005	1278	7.5	7.5	36600	131000



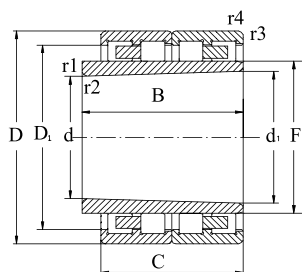
Bore (mm) d	Reference designations				Ref. Mass
	SKF	FAG	NSK	KOYO	kg
760		760RV1032A		4CR760A 4CR760	2460 2440
765				153FC101708A 153FC107652	1610 1870
820	BC4B316341/HA4 319313		820RV1132 820RV1134		2000 2570
850		850RV1112A		4CR850A	2930
855				171FC109655	1580
860		860RV1133		172FC116710	2200
870				174FC115685A	1990
900		900RV1211		4CR900A 180FC123870 180FC128840	3200 3170 3890
920				184FC128800 184FC128850 4CR920A	3280 3530 4190
950				4CR950A	3920
1080				216FC136800	2840
1200				240FC151101	4390

Four row cylindrical roller bearings
with tapered bore

d 105--231mm



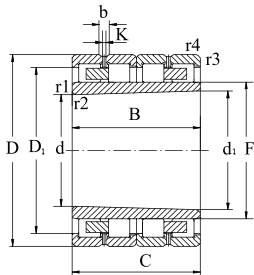
Principal dimensions (mm)						Reference designations	
d	D	B	C	r _{1,2min}	r _{3,4min}	SKF	FAG
105	150	71	71	0.6	1.1	319148B	
125	180	100	90	1.0	1.5	BC4B319768K30	
140	210	155	155	1.1	1.1	313900B	
151.5	230	168	168	1.1	2.0	314024C	505467
	230	168	168	2.0	2.0	BC4B467334C	803431
160	240	175	175	1.0	2.0	313436	507509
160.69	260	178.7	166	2.1	1.2	BC4B466949	
162	230	130	130	1.0	2.0	312863	500861
170	260	160	160	0.6	1.1	313423A	
175	260	180	180	1.0	2.0	BC4B457919VCA	
181	260	180	180	2.0	2.0	314874A	509665
	260	180	180	1.0	2.0	BC4B452683A	
181.5	260	168	168	1.1	2.0	314023A	505466
	260	168	168	1.5	1.5	BC4B467333B	
182	260	168	183	1.0	2.0	312942	500860
183.33	280	200	200	1.5	2.0	BC4B457920VCA	
190	280	200	200	1.1	2.1	313583	503745
	290	180	180	1.0	2.1	313422	507508
192	270	170	170	1.0	2.1	313153	502284
200.833	310	230	230	3.0	3.0	BC4B457922VAB	
202	290	192	192	1.0	2.1	313152	502279
	290	207	192	1.0	2.1	312858	
	290	202.23	192	1.5	2.1	BC4B467419	
205	310	225	225	1.1	3.0	313584K	503742
228.33	325	200	200	1.0	2.0	BC4B461839	
230	330	220	220	1.1	2.1	313438A	506743A
231	330	235	220	1.1	2.1	312943C	500857A



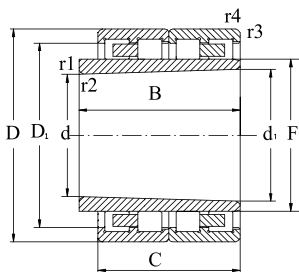
Bore (mm)	Other dimensions (mm)			Basic load ratings KN		Ref. Mass
d	d ₁	F	D ₁	Cr	Cor	kg
105	107.367	123	138	255	475	4.10
125	128.333	147	165	429	880	7.90
140	152.917	166	190	809	1560	17.0
151.5	165.5	179	204	1160	2200	24.0
	165.5	178.81	201	1160	2280	23.0
160	174.583	189	216	1250	2550	35.2
160.69	175.582	195.85	226	1100	2550	34.0
162	172.833	188.5	211	780	1400	16.0
170	183.33	200	230	1100	2160	29.5
175	190	204	231	1210	3150	32.0
181	196	209	234	1250	2650	29.5
	196	209	231	968	2600	28.0
181.5	195.5	209	234	1220	2550	27.9
	195.5	209	231	968	2600	27.0
182	196	212	237	1340	2600	28.0
183.33	200	216.8	247	1380	3450	43.0
190	206.667	222	252	1630	3350	40.0
	205	223	257	1560	2850	41.0
192	206.167	222	248	1290	2700	28.5
200.833	220	238.3	272	1870	4750	62.5
202	218	236	264	1700	3400	39.5
	219.25	236	264	1700	3400	42.5
	218.85	223.5	258	1300	3600	49.0
205	223.75	244	278	2200	4300	58.0
228.33	245	265	295	1610	4550	48.5
230	248.333	266	300	2280	4650	57.5
231	249.333	270	300	2080	4300	59.0

Four row cylindrical roller bearings
with tapered bore

d 246.67--950mm



Principal dimensions (mm)						Reference designations	
d	D	B	C	r _{1,2min}	r _{3,4min}	SKF	FAG
246.67	380	280	280	3.0	2.5	BC4B457927	
255	370	249	234	1.1	3.0	312860	
260	400	250	250	1.1	3.0	313439	522518A
	400	285	285	1.1	3.0	313532A	507518
266.25	400	285	285	4.0	3.2	BC4B457929VCA	
320	480	350	350	1.5	1.5	BC4B316345A	505356
340	520	300	300	2.0	5.0	315767K	
356.67	550	400	400	3.2	4.0	BC4B457939VAA	510302A
365	540	300	300	2.0	2.0	313041C	
382.5	590	450	450	5.0	5.0	319352	
412.335	650	488	480	5.0	4.5	BC4B467373VCA	
	650	488	488	4.0	4.0	314964	527181
412.5	630	450	450	1.5	4.0	BC4B457945VCA	
440	650	355	355	3.0	3.0	313032	
485	740	540	540	5.0	5.0	315523	577938
511.584	780	580	580	3.0	5.0	BC4B457956VCE	
551.667	830	580	580	3.0	5.0	BC4B457960VCA	
571.627	870	640	640	3.0	4.0	BC4B319446	
571.667	870	640	640	4.0	5.0	BC4B457962VCA	
606.667	920	640	640	4.0	5.0	315526	
633.334	960	680	680	4.0	5.0	BC4B457969	
773.334	1120	800	800	4.0	6.0	BC4B319991/HA4	
811.692	1180	850	850	1.5	6.0	BC4B457984VCA	
918.354	1330	950.125	950	6.0	5.0	BC4B457995VCA	
950	1360	1000	1000	4.0	5.0	314520CK30	



Bore (mm)	Other dimensions (mm)			Basic load ratings KN		Ref. Mass
d	d ₁	F	D ₁	Cr	Cor	kg
246.67	270	292.5	334	2640	7100	115
255	274.5	300	336	2240	5400	82.0
260	280.833	310	357	3000	5850	110
	283.75	316	360	3400	7350	125
266.25	290	312.4	354	3200	7500	120
320	349.167	378	431	5400	11200	215
340	365	401	469	4290	9000	215
356.67	390	423.7	483	6700	15000	335
365	390	421	490	5010	11000	230
382.5	420	452.8	524	6930	16300	425
412.335	453.002	494.5	569	7480	21200	565
	453.002	494.5	581	9800	19000	576
412.5	450	487.8	554	6600	19000	490
440	469.583	509.5	585	6270	14600	400
485	530	572.3	659	13200	28500	830
511.584	559.917	602.7	690	11900	34700	915
551.667	600	647.6	734	12300	32500	1070
571.627	621.96	670	780	13400	40500	1335
571.667	625	673.2	768	17900	50000	1170
606.667	660	715.8	818	16500	45000	1525
633.334	690	745.73	845	14500	45000	1675
773.334	800.001	874.85	1003	23800	65500	2715
811.692	840.025	919.5	1046	25100	68000	2980
918.354	950.025	1038.9	1179	26400	85000	4380
950	983.33	1075	1229	38000	110000	4830

**Double row
cylindrical roller bearings**

Double row cylindrical roller bearings

1. Axial angular alignment error

Double row cylindrical roller bearings have limited capacity of axial angle alignment error, just like single row bearings with cage. They can only compensate angular alignment error with a fraction of radian. FV bearings with logarithmic profile have the actual value:

- Narrow type 18 series bearings: 4' radians;
- Wide type 22、23、29 and 30 series bearings: 3' radians.

These values apply to occasions in which shaft and bearing housing axial position remain the same. Larger axis angular alignment error is available according to the load size and required lifetime. In this case, please contact technical service department of FV for details.

For double row cylindrical roller bearings, any axis angular alignment error generated by the inner ring relative to outer ring will exert torque load in the bearing, and these additional bearing load will shorten lifetime of bearings.

2. Tolerance

FV double row cylindrical roller bearings standard series have tolerance of ordinary level (see table 20、21、22、23) but excluding the NNC bearings, the outer ring width (ΔCs) and the outer ring width deviation (Vcs) have wide tolerance. As the outer ring has rib on one side, ΔCs tolerance range is as twice as the normal tolerance, and zero is the symmetry center. For example, bearings with bore diameter 100mm, $\Delta Cs = \pm 200 \mu m$, Vcs are as three times as the normal tolerance.

3. Radial internal clearance

FV double row cylindrical roller bearings standard series have ordinary group or group C3 clearance.

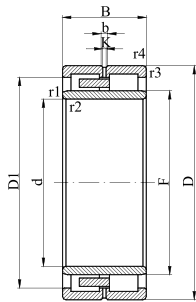
4. Effects of running temperature on bearing materials

FV double row cylindrical roller bearings are treated with special heat treatment, the maximum running temperature can be up to +150 °C, while the size will not change too much; please refer to the section “materials for rolling mill bearings and requirements” for “guide of rolling mill bearing application technology”.

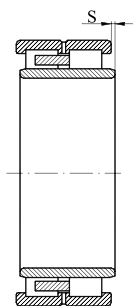
5. Radial equivalent dynamic load $P_r=Fr$

6. Radial equivalent static load $P_{or}=Fr$

Double row cylindrical roller bearings
d 100--240mm

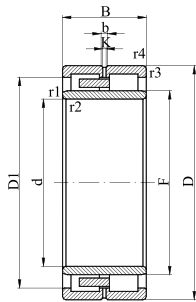


Principal dimensions (mm)					Speed ratings	Designations	
d	D	B	r _{1,2min}	r _{3,4min}	Oil (rpm)	Cylindrical bore	Tapered bore
100	140	40	1.1	1.1	6300	NNU4920/W33	NNU4920K/W33
	165	65	1.1	2.0	3600	NNU4120/W33	NNU4120K30/W33
105	145	40	1.1	1.1	6000	NNU4921/W33	NNU4921K/W33
	175	69	1.1	2.0	3400	NNU4121/W33	NNU4121K30/W33
110	150	40	1.1	1.1	6000	NNU4922/W33	NNU4922K/W33
	180	69	1.1	2.0	3200	NNU4122/W33	NNU4122K30/W33
120	165	45	1.1	1.1	5300	NNU4924/W33	NNU4924K/W33
	200	80	1.1	2.0	3000	NNU4124/W33	NNU4124K30/W33
130	180	50	1.5	1.5	4800	NNU4926/W33	NNU4926K/W33
	210	80	2.0	1.1	2800	NNU4126/W33	NNU4126K30/W33
140	190	50	1.5	1.5	4500	NNU4928/W33	NNU4928K/W33
	225	85	2.1	2.1	2600	NNU4128/W33	NNU4128K30/W33
150	210	60	2.0	2.0	4300	NNU4930/W33	NNU4930K/W33
	250	100	2.1	2.1	2400	NNU4130/W33	NNU4130K30/W33
160	220	60	2.0	2.0	4000	NNU4932/W33	NNU4932K/W33
	270	109	2.1	2.1	2200	NNU4132/W33	NNU4132K30/W33
170	230	60	2.0	2.0	3800	NNU4934/W33	NNU4934K/W33
	280	109	2.1	2.1	2000	NNU4134/W33	NNU4134K30/W33
180	250	69	2.0	2.0	3400	NNU4936/W33	NNU4936K/W33
	300	118	3.0	3.0	1900	NNU4136/W33	NNU4136K30/W33
190	260	69	2.0	2.0	3200	NNU4938/W33	NNU4938K/W33
	320	128	3.0	3.0	1800	NNU4138/W33	NNU4138K30/W33
200	280	80	2.1	2.1	3000	NNU4940/W33	NNU4940K/W33
	340	140	3.0	3.0	1700	NNU4140/W33	NNU4140K30/W33
220	300	80	2.1	2.1	2800	NNU4944/W33	NNU4944K/W33
	370	150	4.0	4.0	1500	NNU4144/W33	NNU4144K30/W33
240	320	80	2.1	2.1	2600	NNU4948/W33	NNU4948K/W33

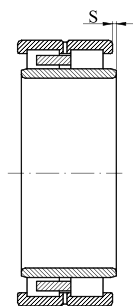


Bore (mm) d	Basic load ratings KN		Other dimensions (mm)					Ref. Mass kg
	Cr	Cor	D ₁	F	b	K	S	
100	128	255	126	113	5.5	3.0	1.7	1.92
	358	570	145	117	5.5	3.0	1.8	5.53
105	130	260	131	118	5.5	3.0	1.7	2.08
	413	670	154	124	5.5	3.0	1.7	6.71
110	132	270	136	123	5.5	3.0	1.7	2.05
	418	710	159	129	5.5	3.0	1.7	6.95
120	176	340	151	134.5	5.5	3.0	1.7	2.86
	523	865	176	141	5.5	3.0	1.0	11.2
130	187	390	162	146	5.5	3.0	2.2	3.85
	561	965	186	151	8.3	4.5	2.1	10.5
140	190	400	172	156	5.5	3.0	2.2	4.12
	627	1040	200	161	8.3	4.5	2.4	13.2
150	330	655	191	168.5	5.5	3.0	2.0	6.25
	748	1290	219	177	8.3	4.5	4.3	18.1
160	330	680	201	178.5	5.5	3.0	2.0	6.63
	935	1530	238	188	8.3	4.5	4.1	25.0
170	336	695	211	188.5	5.5	3.0	2.0	6.95
	968	1630	248	198	8.3	4.5	4.0	26.0
180	402	850	226	202	8.3	4.5	2.3	10.5
	1080	1830	265	211	11.1	6.0	3.9	32.5
190	402	880	236	212	8.3	4.5	2.3	11.0
	1320	2200	282	222	11.1	6.0	4.0	41.0
200	484	1040	253	225	11.1	6.0	3.7	15.0
	1470	2550	299	235	11.1	6.0	5.3	51.0
220	512	1140	273	245	11.1	6.0	3.7	16.5
	1650	2900	325	258	13.9	7.5	5.5	65.0
240	528	1220	293	265	11.1	6.0	3.7	17.5

Double row cylindrical roller bearings
d 240--500mm

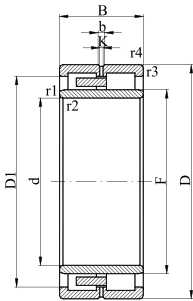


Principal dimensions (mm)					Speed ratings	Designations	
d	D	B	r _{1,2min}	r _{3,4min}	Oil (rpm)	Cylindrical bore	Tapered bore
240	400	160	4.0	4.0	1400	NNU4148/W33	NNU4148K30/W33
	440	180	4.0	4.0	1300	NNU4152/W33	NNU4152K30/W33
280	380	100	2.1	2.1	2200	NNU4956/W33	NNU4956K/W33
	460	180	5.0	5.0	1200	NNU4156/W33	NNU4156K30/W33
300	420	118	3.0	3.0	2000	NNU4960/W33	NNU4960K/W33
	500	200	5.0	5.0	1100	NNU4160/W33	NNU4160K30/W33
320	440	118	3.0	3.0	1900	NNU4964/W33	NNU4964K/W33
	540	218	5.0	5.0	1000	NNU4164/W33	NNU4164K30/W33
340	460	118	3.0	3.0	1700	NNU4968/W33	NNU4968K/W33
	580	243	5.0	5.0	950	NNU4168/W33	NNU4168K30/W33
360	480	118	3.0	3.0	1700	NNU4972/W33	NNU4972K/W33
	600	243	5.0	5.0	900	NNU4172/W33	NNU4172K30/W33
380	520	140	4.0	4.0	1500	NNU4976/W33	NNU4976K/W33
	620	243	5.0	5.0	850	NNU4176/W33	NNU4176K30/W33
400	540	140	4.0	4.0	1500	NNU4980/W33	NNU4980K/W33
	650	250	6.0	6.0	800	NNU4180/W33	NNU4180K30/W33
420	560	140	4.0	4.0	1400	NNU4984/W33	NNU4984K/W33
	700	280	6.0	6.0	750	NNU4184/W33	NNU4184K30/W33
440	600	160	4.0	4.0	1300	NNU4988/W33	NNU4988K/W33
	720	280	6.0	6.0	700	NNU4188/W33	NNU4188K30/W33
460	620	160	4.0	4.0	1200	NNU4992/W33	NNU4992K/W33
	760	300	7.5	7.5	670	NNU4192/W33	NNU4192K30/W33
480	650	170	5.0	5.0	1200	NNU4996/W33	NNU4996K/W33
	790	308	7.5	7.5	630	NNU4196/W33	NNU4196K30/W33
500	670	170	5.0	5.0	1100	NNU49/500/W33	NNU49/500K/W33
	830	325	7.5	7.5	600	NNU41/500/W33	NNU41/500K30/W33

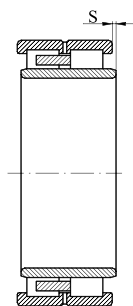


Bore (mm) d	Basic load ratings KN		Other dimensions (mm)					Ref. Mass kg
	Cr	Cor	D ₁	F	b	K	S	
240	1980	3650	353	282	13.9	7.5	4.6	85.0
260	748	1700	326	292	13.9	7.5	4.5	30.5
	2200	3900	387	306	13.9	7.5	5.1	110
280	765	1800	346	312	13.9	7.5	4.5	32.5
	2550	4750	407	326	13.9	7.5	6.3	120
300	1020	2360	379	339	16.7	9.0	5.5	50.0
	2860	5300	442	351	16.7	9.0	7.3	155
320	1060	2500	399	359	16.7	9.0	5.5	53.0
	3410	6200	476	375	16.7	9.0	8.9	200
340	1100	2650	419	379	16.7	9.0	5.5	56.5
	4020	7500	510	402	16.7	9.0	10.0	260
360	1120	2800	439	399	16.7	9.0	5.5	58.5
	4290	8500	530	422	16.7	9.0	5.9	275
380	1450	3600	471	426	16.7	9.0	5.5	87.5
	4290	8500	550	442	16.7	9.0	7.4	285
400	1470	3800	491	446	16.7	9.0	5.5	91.5
	4730	9500	577	463	16.7	9.0	7.5	325
420	1510	4000	511	466	16.7	9.0	5.5	95.5
	5500	11400	609	497	16.7	9.0	12.2	440
440	2050	5200	545	490	16.7	9.0	3.2	130
	5720	11800	638	511	22.3	12.0	10.8	450
460	2090	5500	565	510	16.7	9.0	3.2	135
	6440	13200	672	537	22.3	12.0	12.8	535
480	2330	6100	592	534	22.3	12.0	3.5	160
	7040	14300	701	557	22.3	12.0	12.0	590
500	2330	6100	612	554	22.3	12.0	3.5	165
	7480	15000	734	582	22.3	12.0	14.1	710

Double row cylindrical roller bearings
d 530--1180mm

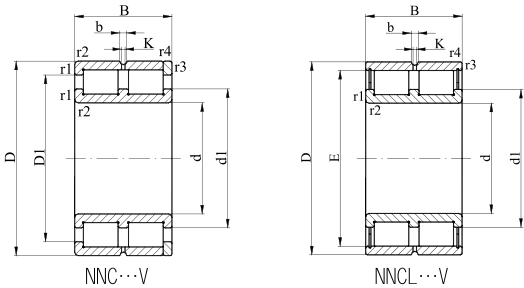


Principal dimensions (mm)					Speed ratings	Designations	
d	D	B	r _{1,2min}	r _{3,4min}	Oil (rpm)	Cylindrical bore	Tapered bore
530	710	180	5.0	5.0	1000	NNU49/530/W33	NNU49/530K/W33
	870	335	7.5	7.5	560	NNU41/530/W33	NNU41/530K30/W33
560	750	190	5.0	5.0	950	NNU49/560/W33	NNU49/560K/W33
	920	355	7.5	7.5	530	NNU41/560/W33	NNU41/560K30/W33
600	800	200	5.0	5.0	900	NNU49/600/W33	NNU49/600K/W33
	980	375	7.5	7.5	480	NNU41/600/W33	NNU41/600K30/W33
630	850	218	6.0	6.0	850	NNU49/630/W33	NNU49/630K/W33
	1030	400	7.5	7.5	450	NNU41/630/W33	NNU41/630K30/W33
670	900	230	6.0	6.0	800	NNU49/670/W33	NNU49/670K/W33
	1090	412	7.5	7.5	430	NNU41/670/W33	NNU41/670K30/W33
710	950	243	6.0	6.0	700	NNU49/710/W33	NNU49/710K/W33
	1150	438	9.5	9.5	380	NNU41/710/W33	NNU41/710K30/W33
750	1000	250	6.0	6.0	670	NNU49/750/W33	NNU49/750K/W33
	1220	475	9.5	9.5	360	NNU41/750/W33	NNU41/750K30/W33
800	1060	258	6.0	6.0	—	NNU49/800/W33	NNU49/800K/W33
	1280	475	9.5	9.5	—	NNU41/800/W33	NNU41/800K30/W33
850	1120	272	6.0	6.0	—	NNU49/850/W33	NNU49/850K/W33
900	1180	280	6.0	6.0	—	NNU49/900/W33	NNU49/900K/W33
950	1250	300	7.5	7.5	—	NNU49/950/W33	NNU49/950K/W33
1000	1320	315	7.5	7.5	—	NNU49/1000/W33	NNU49/1000K/W33
1060	1400	335	7.5	7.5	—	NNU49/1060/W33	NNU49/1060K/W33
1120	1460	335	7.5	7.5	—	NNU49/1120/W33	NNU49/1120K/W33
1180	1540	335	7.5	7.5	—	NNU49/1180/W33	NNU49/1180K/W33

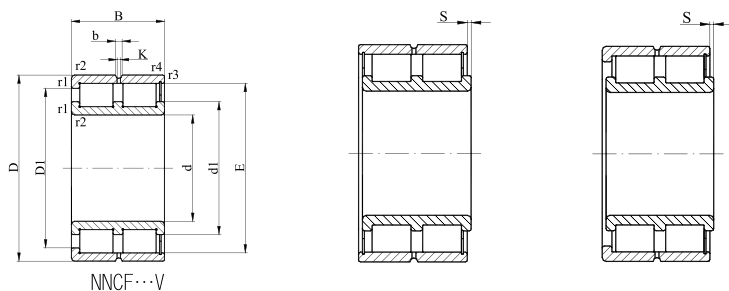


Bore (mm) d	Basic load ratings KN		Other dimensions (mm)					Ref. Mass kg
	Cr	Cor	D ₁	F	b	K	S	
530	2860	7800	649	588	22.3	12.0	5.5	200
	7810	16000	770	618	22.3	12.0	17.0	790
560	3190	8650	687	623	22.3	12.0	5.5	235
	8800	18300	814	653	22.3	12.0	7.5	930
600	3580	10200	734	666	22.3	12.0	5.5	280
	9900	21100	868	699	22.3	12.0	18.5	1100
630	4020	11400	776	704	22.3	12.0	7.0	355
	11000	24000	912	734	22.3	12.0	19.7	1330
670	4950	13700	822	738	22.3	12.0	6.0	410
	12100	25500	969	774	22.3	12.0	19.5	1500
710	5390	15300	879	782	22.3	12.0	7.5	480
	13400	28500	1024	820	22.3	12.0	20.5	1790
750	5500	16000	918	831	22.3	12.0	7.5	540
	16100	35500	1083	871	22.3	12.0	19.0	2230
800	5830	17000	974	884	22.3	12.0	8.0	615
	16500	36500	1141	921	22.3	12.0	18.6	2390
850	5940	18000	1029	939	22.3	12.0	8.5	360
900	6600	20000	1082	986	22.3	12.0	8.5	805
950	7370	22400	1149	1046	22.3	12.0	9.0	960
1000	8580	26000	1212	1103	22.3	12.0	9.5	1250
1060	10500	30500	1288	1160	22.3	12.0	10.0	1350
1120	10500	31500	1348	1220	22.3	12.0	10.0	1450
1180	11900	36000	1421	1285	22.3	12.0	15.3	1650

Double row full complement
cylindrical roller bearings
d 80--140mm

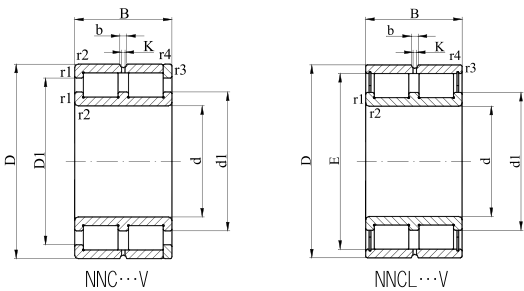


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
80	110	30	1.0	1.0	110	210	NNC4916V
	110	30	1.0	1.0	110	210	NNCF4916V
	110	30	1.0	1.0	110	210	NNCL4916V
	125	60	1.1	1.1	286	469	NNCF5016V
90	125	35	1.1	1.1	146	292	NNC4918V
	125	35	1.1	1.1	146	292	NNCF4918V
	125	35	1.1	1.1	146	292	NNCL4918V
	140	67	1.5	1.5	369	635	NNCF5018V
100	140	40	1.1	1.1	194	400	NNC4920V
	140	40	1.1	1.1	194	400	NNCF4920V
	140	40	1.1	1.1	194	400	NNCL4920V
	150	67	1.5	1.5	391	600	NNCF5020V
110	150	40	1.1	1.1	201	430	NNC4922V
	150	40	1.1	1.1	201	430	NNCF4922V
	150	40	1.1	1.1	201	430	NNCL4922V
	170	80	2.0	2.0	528	957	NNCF5022V
120	165	45	1.1	1.1	224	480	NNC4924V
	165	45	1.1	1.1	224	480	NNCF4924V
	165	45	1.1	1.1	224	480	NNCL4924V
	180	80	2.0	2.0	561	1050	NNCF5024V
130	180	50	1.5	1.5	255	540	NNC4926V
	180	50	1.5	1.5	255	540	NNCF4926V
	180	50	1.5	1.5	255	540	NNCL4926V
	200	95	2.0	2.0	704	1380	NNCF5026V
140	190	50	1.5	1.5	265	576	NNC4928V
	190	50	1.5	1.5	265	576	NNCF4928V
	190	50	1.5	1.5	265	576	NNCL4928V

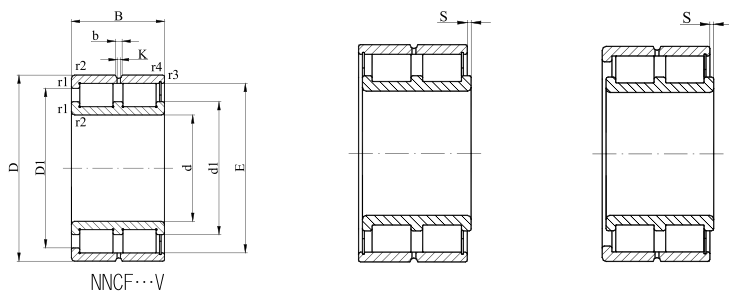


Bore (mm) d	Other dimensions(mm)						Speed ratings(rpm)		Ref. Mass
	E	d ₁	D ₁	b	K	S	Grease	Oil	kg
80	—	90.5	98	5	3.5	—	1200	2600	0.90
	101.2	90.5	98	5	3.5	1	1200	2600	0.88
	101.2	90.5	98	5	3.5	1	1200	2600	0.88
	117.2	94.8	112	5	3.5	2.5	1100	2400	2.60
90	—	103.5	111.5	5	3.5	—	1100	2300	1.40
	115.5	103.5	111.5	5	3.5	1.5	1100	2300	1.37
	115.5	103.5	111.5	5	3.5	1.5	1100	2300	1.37
	130.3	106	125	5	3.5	2.5	1000	2200	3.75
100	—	116	126	5	3.5	—	950	2000	2.10
	130	116	126	5	3.5	2	950	2000	2.00
	130	116	126	5	3.5	2	950	2000	2.00
	140	116	134	6	3.5	2.5	950	2000	4.05
110	—	125	135	6	3.5	—	900	1900	2.30
	138.6	125	135	6	3.5	2	900	1900	2.20
	138.6	125	135	6	3.5	2	900	1900	2.20
	157	128	150	6	3.5	2.5	850	1800	6.60
120	—	139	149	6	3.5	—	800	1700	3.20
	154	139	149	6	3.5	3	800	1700	3.00
	154	139	149	6	3.5	3	800	1700	3.00
	168	139	161	6	3.5	2.5	800	1700	7.10
130	—	149	161	6	3.5	—	750	1600	4.20
	166	149	161	6	3.5	4	750	1600	4.00
	166	149	161	6	3.5	4	750	1600	4.00
	183.5	153	176	6	3.5	2.5	700	1500	11.0
140	—	159	171	6	3.5	—	700	1500	4.40
	176.4	159	171	6	3.5	4	700	1500	4.20
	176.4	159	171	6	3.5	4	700	1500	4.20

Double row full complement
cylindrical roller bearings
d 140--180mm

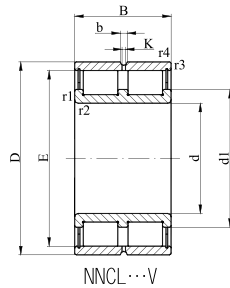
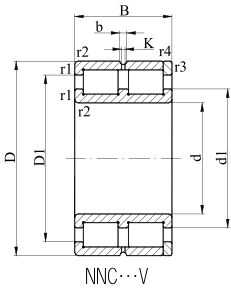


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
140	210	95	2.0	2.0	737	1500	NNCF5028V
150	190	40	1.1	1.1	233	585	NNC4830V
	190	40	1.1	1.1	233	585	NNCF4830V
	190	40	1.1	1.1	233	585	NNCL4830V
	210	60	2.0	2.0	383	850	NNC4930V
	210	60	2.0	2.0	383	850	NNCF4930V
	210	60	2.0	2.0	383	850	NNCL4930V
	225	100	2.1	2.1	842	1680	NNCF5030V
160	200	40	1.1	1.1	242	620	NNC4832V
	200	40	1.1	1.1	242	620	NNCF4832V
	200	40	1.1	1.1	242	620	NNCL4832V
	220	60	2.0	2.0	399	906	NNC4932V
	220	60	2.0	2.0	399	906	NNCF4932V
	220	60	2.0	2.0	399	906	NNCL4932V
	240	109	2.1	2.1	1010	1950	NNCF5032V
170	215	45	1.1	1.1	264	655	NNC4834V
	215	45	1.1	1.1	264	655	NNCF4834V
	215	45	1.1	1.1	264	655	NNCL4834V
	230	60	2.0	2.0	413	950	NNC4934V
	230	60	2.0	2.0	413	950	NNCF4934V
	230	60	2.0	2.0	413	950	NNCL4934V
	260	122	2.1	2.1	1140	2170	NNCF5034V
180	225	45	1.1	1.1	270	695	NNC4836V
	225	45	1.1	1.1	270	695	NNCF4836V
	225	45	1.1	1.1	270	695	NNCL4836V
	250	69	2.0	2.0	550	1220	NNC4936V
	250	69	2.0	2.0	550	1220	NNCF4936V

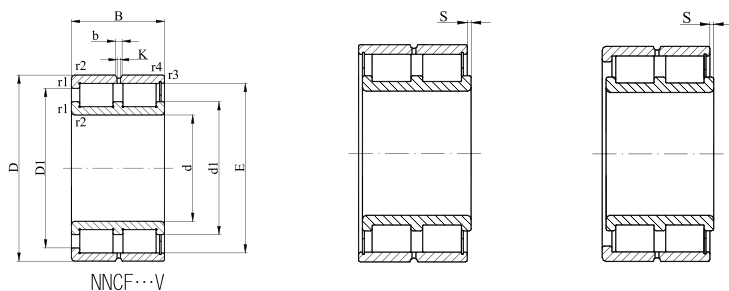


Bore (mm) d	Other dimensions(mm)						Speed ratings(rpm)		Ref. Mass
	E	d ₁	D ₁	b	K	S	Grease	Oil	kg
140	195.5	165	188	7	4	3	670	1400	11.5
150	—	165	175	7	4	—	700	1500	3.00
	178.7	165	175	7	4	2	700	1500	2.90
	178.7	165	175	7	4	2	700	1500	2.80
	—	171	188	7	4	—	670	1400	7.00
	192	171	188	7	4	4	670	1400	6.80
	192	171	188	7	4	4	670	1400	6.80
	209	175	201	7	4	3	630	1300	14.0
160	—	176	186	7	4	—	670	1400	3.20
	190.1	176	186	7	4	2	670	1400	3.05
	190.1	176	186	7	4	2	670	1400	3.05
	—	184	198	7	4	—	630	1300	7.20
	203.9	184	198	7	4	4	630	1300	7.10
	203.9	184	198	7	4	4	630	1300	7.10
	225	185	215	7	4	3	600	1200	17.0
170	—	186	197	7	4	—	630	1300	4.20
	201.7	186	197	7	4	3	630	1300	4.10
	201.7	186	197	7	4	3	630	1300	4.00
	—	192	206	7	4	—	600	1200	7.60
	212.2	192	206	7	4	4	600	1200	7.50
	212.2	192	206	7	4	4	600	1200	7.50
	243	198	232	7	4	5	560	1100	23.0
180	—	196	207	7	4	—	600	1200	4.50
	211.3	196	207	7	4	3	600	1200	4.30
	211.3	196	—	7	4	3	600	1200	4.30
	—	205	226	7	4	—	560	1100	11.0
	231.1	205	226	7	4	4	560	1100	10.8

Double row full complement
cylindrical roller bearings
d 180--240mm

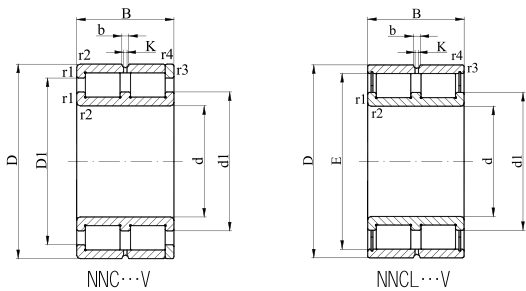


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
180	250	69	2.0	2.0	550	1220	NNCL4936V
	280	136	2.1	2.1	1320	2580	NNCF5036V
190	240	50	1.5	1.5	305	760	NNC4838V
	240	50	1.5	1.5	305	760	NNCF4838V
	240	50	1.5	1.5	305	760	NNCL4838V
	260	69	2.0	2.0	562	1290	NNC4938V
	260	69	2.0	2.0	562	1290	NNCF4938V
	260	69	2.0	2.0	562	1290	NNCL4938V
	290	136	2.1	2.1	1380	2690	NNCF5038V
200	250	50	1.5	1.5	315	800	NNC4840V
	250	50	1.5	1.5	315	800	NNCF4840V
	250	50	1.5	1.5	315	800	NNCL4840V
	280	80	2.1	2.1	661	1500	NNC4940V
	280	80	2.1	2.1	661	1500	NNCF4940V
	280	80	2.1	2.1	661	1500	NNCL4940V
	310	150	2.1	2.1	1570	3130	NNCF5040V
220	270	50	1.5	1.5	330	878	NNC4844V
	270	50	1.5	1.5	330	878	NNCF4844V
	270	50	1.5	1.5	330	878	NNCL4844V
	300	80	2.1	2.1	690	1610	NNC4944V
	300	80	2.1	2.1	690	1610	NNCF4944V
	300	80	2.1	2.1	690	1610	NNCL4944V
	340	160	3.0	3.0	1870	3680	NNCF5044V
240	300	60	2.0	2.0	501	1292	NNC4848V
	300	60	2.0	2.0	501	1292	NNCF4848V
	300	60	2.0	2.0	501	1292	NNCL4848V
	320	80	2.1	2.1	725	1762	NNC4948V

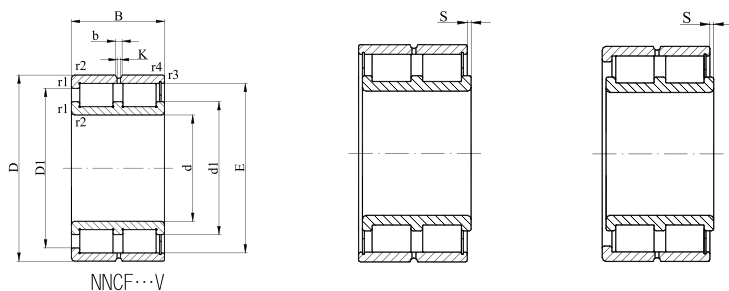


Bore (mm) d	Other dimensions(mm)						Speed ratings(rpm)		Ref. Mass kg
	E	d ₁	D ₁	b	K	S	Grease	Oil	
180	231.1	205	226	7	4	4	560	1100	10.8
	260.5	212	249	8	4	6	560	1100	30.5
190	—	208	220	7	4	—	560	1100	5.80
	225.4	208	220	7	4	4	560	1100	5.65
	225.4	208	—	7	4	4	560	1100	5.65
	—	217	234	7	4	—	560	1100	11.5
	241.3	217	234	7	4	4	560	1100	11.3
	241.3	217	234	7	4	4	560	1100	11.3
	270	222	258	8	4	6	530	1000	31.5
200	—	219	230	7	4	—	560	1100	6.00
	235.9	219	230	7	4	4	560	1100	5.90
	235.9	219	—	7	4	4	560	1100	5.90
	—	233	251	8	4	—	530	1000	16.0
	260	233	251	8	4	5	530	1000	15.9
	260	233	251	8	4	5	530	1000	15.9
	288	236	276	8	4	7	500	950	41.0
220	—	240	252	7	4	—	530	1000	6.55
	256.9	240	252	7	4	4	530	1000	6.55
	256.9	240	252	7	4	4	530	1000	6.55
	—	250	269	8	4	—	500	950	17.5
	277.2	250	269	8	4	5	500	950	17.2
	277.2	250	269	8	4	5	500	950	17.2
	313.5	255	300	8	4	7	450	850	52.5
240	—	261	276	8	4	—	480	900	10.3
	282.4	261	276	8	4	4	480	900	10.0
	282.4	261	276	8	4	4	480	900	10.0
	—	273	292	8	4	—	450	850	18.7

Double row full complement
cylindrical roller bearings
d 240--320mm

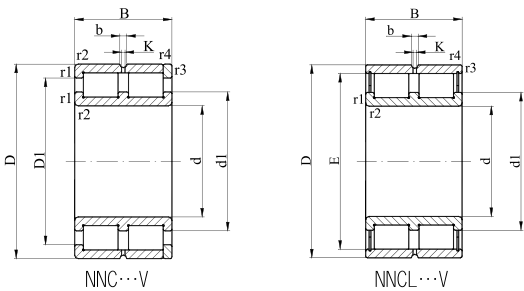


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
240	320	80	2.1	2.1	725	1762	NNCF4948V
	320	80	2.1	2.1	725	1762	NNCL4948V
	360	160	3.0	3.0	1980	4050	NNCF5048V
260	320	60	2.0	2.0	523	1406	NNC4852V
	320	60	2.0	2.0	523	1406	NNCF4852V
	320	60	2.0	2.0	523	1406	NNCL4852V
	360	100	2.1	2.1	1080	2550	NNC4952V
	360	100	2.1	2.1	1080	2550	NNCF4952V
	360	100	2.1	2.1	1080	2550	NNCL4952V
	400	190	4.0	4.0	2640	5340	NNCF5052V
280	350	69	2.0	2.0	682	1860	NNC4856V
	350	69	2.0	2.0	682	1860	NNCF4856V
	350	69	2.0	2.0	682	1860	NNCL4856V
	380	100	2.1	2.1	1120	2710	NNC4956V
	380	100	2.1	2.1	1120	2710	NNCF4956V
	380	100	2.1	2.1	1120	2710	NNCL4956V
	420	190	4.0	4.0	2700	5610	NNCF5056V
300	380	80	2.1	2.1	801	2146	NNC4860V
	380	80	2.1	2.1	801	2146	NNCF4860V
	380	80	2.1	2.1	801	2146	NNCL4860V
	420	118	3.0	3.0	1560	3630	NNC4960V
	420	118	3.0	3.0	1560	3630	NNCF4960V
	420	118	3.0	3.0	1560	3630	NNCL4960V
	460	218	4.0	4.0	3410	7180	NNCF5060V
320	400	80	2.1	2.1	832	2300	NNC4864V
	400	80	2.1	2.1	832	2300	NNCF4864V
	400	80	2.1	2.1	832	2300	NNCL4864V

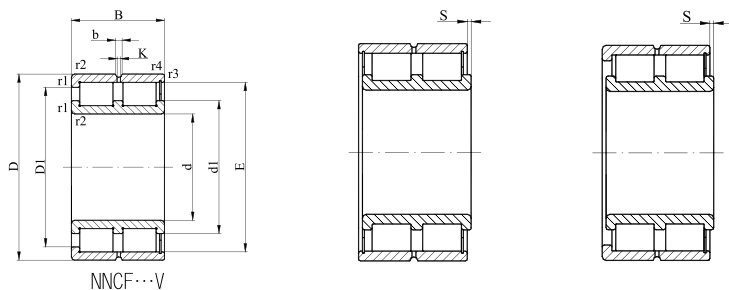


Bore (mm) d	Other dimensions(mm)						Speed ratings(rpm)		Ref. Mass
	E	d ₁	D ₁	b	K	S	Grease	Oil	kg
240	300.1	273	292	8	4	5	450	850	18.5
	300.1	273	292	8	4	5	450	850	18.5
	355.6	278	322	9.4	5	7	430	800	56.0
260	—	283	298	8	4	—	430	800	11.1
	304.7	283	298	8	4	4	430	800	11.0
	304.7	283	298	8	4	4	430	800	10.8
	—	294	324	9.4	5	—	400	750	33.1
	331.5	294	324	9.4	5	6	400	750	32.2
	331.5	294	324	9.4	5	6	400	750	32.2
	373.5	304	357	9.4	5	7	380	700	85.5
280	—	308	325	8	4	—	400	750	16.1
	332.9	308	325	8	4	4	400	750	16.0
	332.9	308	—	8	4	4	400	750	15.8
	—	316	346	9.4	5	—	380	700	34.5
	353.5	316	346	9.4	5	6	380	700	34.2
	353.5	316	346	9.4	5	6	380	700	34.2
	389	320	372	9.4	5	7	360	670	90.5
300	—	330	349	9.4	5	—	380	700	23.0
	357.4	330	349	9.4	5	6	380	700	23.0
	357.4	330	349	9.4	5	6	380	700	23.0
	—	343	381	9.4	5	—	340	630	53.0
	390.2	343	381	9.4	5	6	340	630	52.8
	390.2	343	381	9.4	5	6	340	630	52.8
	432	355	413	9.4	5	9	320	600	130
320	—	353	372	9.4	5	—	340	630	24.5
	380.3	353	372	9.4	5	6	340	630	24.5
	380.3	353	372	9.4	5	6	340	630	24.5

Double row full complement
cylindrical roller bearings
d 320--400mm

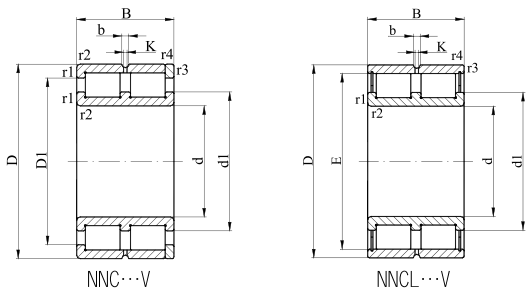


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
320	440	118	3.0	3.0	1600	3835	NNC4964V
	440	118	3.0	3.0	1600	3835	NNCF4964V
	440	118	3.0	3.0	1600	3835	NNCL4964V
	480	218	4.0	4.0	3470	7450	NNCF5064V
340	420	80	2.1	2.1	850	2415	NNC4868V
	420	80	2.1	2.1	850	2415	NNCF4868V
	420	80	2.1	2.1	850	2415	NNCL4868V
	460	118	3.0	3.0	1640	4035	NNC4968V
	460	118	3.0	3.0	1640	4035	NNCF4968V
	460	118	3.0	3.0	1640	4035	NNCL4968V
	520	243	5.0	5.0	4180	9200	NNCF5068V
360	440	80	2.1	2.1	880	2570	NNC4872V
	440	80	2.1	2.1	880	2570	NNCF4872V
	440	80	2.1	2.1	880	2570	NNCL4872V
	480	118	3.0	3.0	1690	4240	NNC4972V
	480	118	3.0	3.0	1690	4240	NNCF4972V
	480	118	3.0	3.0	1690	4240	NNCL4972V
	540	243	5.0	5.0	4290	9570	NNCF5072V
380	480	100	2.1	2.1	1300	3650	NNC4876V
	480	100	2.1	2.1	1300	3650	NNCF4876V
	480	100	2.1	2.1	1300	3650	NNCL4876V
	520	140	4.0	4.0	2124	5460	NNC4976V
	520	140	4.0	4.0	2124	5460	NNCF4976V
	520	140	4.0	4.0	2124	5460	NNCL4976V
	560	243	5.0	5.0	4400	9940	NNCF5076V
400	500	100	2.1	2.1	1320	3750	NNC4880V
	500	100	2.1	2.1	1320	3750	NNCF4880V

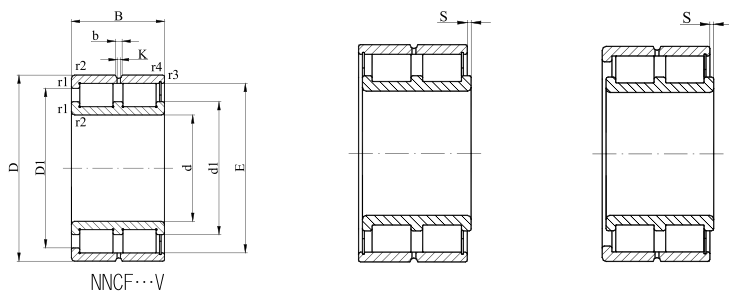


Bore (mm) d	Other dimensions(mm)						Speed ratings(rpm)		Ref. Mass
	E	d ₁	D ₁	b	K	S	Grease	Oil	kg
320	—	365	399	9.4	5	—	320	600	56.0
	409	365	399	9.4	5	6	320	600	55.2
	409	365	399	9.4	5	6	320	600	55.2
	447.5	370	429	9.4	5	9	300	560	135
340	—	370	389	9.4	5	—	320	600	25.5
	397.4	370	389	9.4	5	6	320	600	25.5
	397.4	370	389	9.4	5	6	320	600	25.5
	—	383	413	9.4	5	—	300	560	60.5
	427.1	383	413	9.4	5	6	300	560	59.5
	427.1	383	413	9.4	5	6	300	560	59.5
	486	399	465	9.4	5	11	280	530	185
360	—	393	412	9.4	5	—	300	560	27.0
	420.2	393	412	9.4	5	6	300	560	27.0
	420.2	393	412	9.4	5	6	300	560	27.0
	—	399	437	9.4	5	—	300	560	61.0
	446	399	437	9.4	5	6	300	560	61.0
	446	399	437	9.4	5	6	300	560	61.0
	504	417	483	9.4	5	11	260	500	195
380	—	421	445	9.4	5	—	280	530	45.5
	456	421	445	9.4	5	6	280	530	45.5
	456	421	445	9.4	5	6	280	530	45.5
	—	433	466	9.4	5	—	260	500	93.0
	481.5	433	466	9.4	5	7	260	500	92.4
	481.5	433	466	9.4	5	7	260	500	92.4
	532	435	511	9.4	5	11	240	480	200
400	—	436	460	9.4	5	—	260	500	47.5
	470.3	436	460	9.4	5	6	260	500	47.5

Double row full complement
cylindrical roller bearings
d 400--460mm

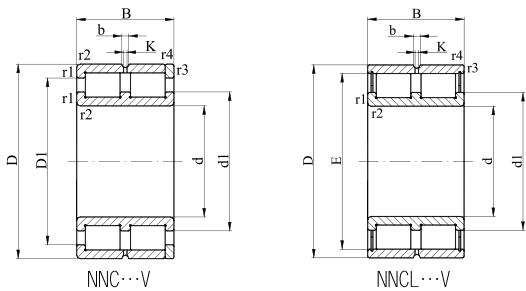


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
400	500	100	2.1	2.1	1320	3750	NNCL4880V
	540	140	4.0	4.0	2185	5730	NNC4980V
	540	140	4.0	4.0	2185	5730	NNCF4980V
	540	140	4.0	4.0	2185	5730	NNCL4980V
	600	272	5.0	5.0	5500	12300	NNCF5080V
420	520	100	2.1	2.1	1353	4000	NNC4884V
	520	100	2.1	2.1	1353	4000	NNCF4884V
	520	100	2.1	2.1	1353	4000	NNCL4884V
	560	140	4.0	4.0	2235	6000	NNC4984V
	560	140	4.0	4.0	2235	6000	NNCF4984V
	560	140	4.0	4.0	2235	6000	NNCL4984V
	620	272	5.0	5.0	5610	12800	NNCF5084V
440	540	100	2.1	2.1	1400	4150	NNC4888V
	540	100	2.1	2.1	1400	4150	NNCF4888V
	540	100	2.1	2.1	1400	4150	NNCL4888V
	600	160	4.0	4.0	2990	7570	NNC4988V
	600	160	4.0	4.0	2990	7570	NNCF4988V
	600	160	4.0	4.0	2990	7570	NNCL4988V
	650	280	6.0	6.0	6160	14100	NNCF5088V
460	580	118	3.0	3.0	1560	4614	NNC4892V
	580	118	3.0	3.0	1560	4614	NNCF4892V
	580	118	3.0	3.0	1560	4614	NNCL4892V
	620	160	4.0	4.0	3030	7770	NNC4992V
	620	160	4.0	4.0	3030	7770	NNCF4992V
	620	160	4.0	4.0	3030	7770	NNCL4992V
	680	300	6.0	6.0	6440	14700	NNCF5092V

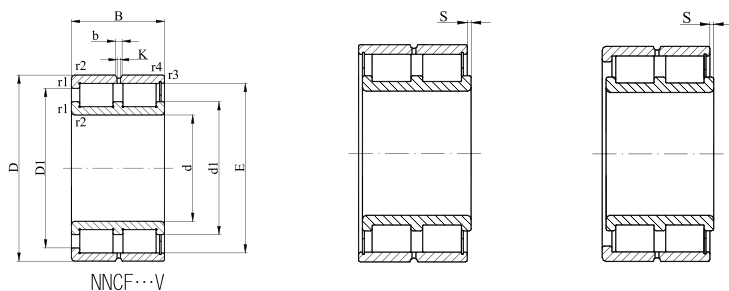


Bore (mm) d	Other dimensions(mm)						Speed ratings(rpm)		Ref. Mass
	E	d ₁	D ₁	b	K	S	Grease	Oil	kg
400	470.3	436	460	9.4	5	6	260	500	47.5
	502	454	486	9.4	5	—	240	480	97.5
	502	454	486	9.4	5	7	240	480	96.5
	502	454	486	9.4	5	7	240	480	96.5
	560	464	536	9.4	5	11	220	450	270
420	—	458	482	9.4	5	—	240	480	49.5
	492.6	458	482	9.4	5	6	240	480	49.5
	492.6	458	482	9.4	5	6	240	480	49.5
	—	470	512	9.4	5	—	220	450	100
	522.5	470	512	9.4	5	7	220	450	99.5
	522.5	470	512	9.4	5	7	220	450	99.5
	579	483	555	9.4	5	11	200	430	280
440	—	480	504	9.4	5	—	220	450	52.0
	514.6	480	504	9.4	5	6	220	450	52.0
	514.6	480	504	9.4	5	6	220	450	52.0
	—	503	544	9.4	5	—	200	430	140
	563.5	503	544	9.4	5	7	200	430	138
	563.5	503	544	9.4	5	7	200	430	138
	608	507	583	9.4	5	11	190	400	320
460	—	505	531	9.4	5	—	200	430	77.5
	543.3	505	531	9.4	5	7	200	430	76.9
	543.3	505	—	9.4	5	7	200	430	76.9
	—	512	564	9.4	5	—	190	400	145
	577	512	564	9.4	5	7	190	400	141
	577	512	564	9.4	5	7	190	400	141
	638	527	609	9.4	5	14	180	380	365

Double row full complement
cylindrical roller bearings
d 480--530mm



Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
480	600	118	3.0	3.0	1597	4838	NNC4896V
	600	118	3.0	3.0	1597	4838	NNCF4896V
	600	118	3.0	3.0	1597	4838	NNCL4896V
	650	170	5.0	5.0	3300	8420	NNC4996V
	650	170	5.0	5.0	3300	8420	NNCF4996V
	650	170	5.0	5.0	3300	8420	NNCL4996V
	700	300	6.0	6.0	6710	15300	NNCF5096V
500	620	118	3.0	3.0	1625	4987	NNC48/500V
	620	118	3.0	3.0	1625	4987	NNCF48/500V
	620	118	3.0	3.0	1625	4987	NNCL48/500V
	670	170	5.0	5.0	3360	8850	NNC49/500V
	670	170	5.0	5.0	3360	8850	NNCF49/500V
	670	170	5.0	5.0	3360	8850	NNCL49/500V
	720	300	6.0	6.0	6820	15900	NNCF50/500V
530	650	118	3.0	3.0	1700	5400	NNC48/530V
	650	118	3.0	3.0	1700	5400	NNCF48/530V
	650	118	3.0	3.0	1700	5400	NNCL48/530V
	710	180	5.0	5.0	3910	10200	NNC49/530V
	710	180	5.0	5.0	3910	10200	NNCF49/530V
	710	180	5.0	5.0	3910	10200	NNCL49/530V



Bore (mm) d	Other dimensions(mm)						Speed ratings(rpm)		Ref. Mass kg
	E	d ₁	D ₁	b	K	S	Grease	Oil	
480	—	529	555	9.4	5	—	190	400	80.0
	567.3	529	555	9.4	5	7	190	400	89.8
	567.3	529	555	9.4	5	7	190	400	89.8
	—	537	592	9.4	5	—	180	380	170
	605.5	537	592	9.4	5	8	180	380	166
	605.5	537	592	9.4	5	8	180	380	166
	657	548	630	9.4	5	14	170	360	380
500	—	546	571	9.4	5	—	190	400	82.5
	583.5	546	571	9.4	5	7	190	400	83.0
	583.5	546	—	9.4	5	7	190	400	83.0
	—	568	611	9.4	5	—	170	360	179
	631.5	568	611	9.4	5	8	170	360	175
	631.5	568	611	9.4	5	8	170	360	175
	678	569	651	9.4	5	14	170	360	390
530	—	577	603	9.4	5	7	170	360	87.5
	615	577	603	9.4	5	7	170	360	87.2
	615	577	603	9.4	5	7	170	360	87.2
	—	588	648	9.4	5	—	160	300	208
	663	588	648	9.4	5	8	160	300	205
	663	588	648	9.4	5	8	160	300	205

**Double row full complement
cylindrical roller bearings for
crane sheaves**

Double row full complement cylindrical roller bearings for crane sheaves

1. Characteristics

Such kind of bearings are designed for hoist pulley and adopt full complement structure, the bearings can bear heavy load with impact and are inseparable; both surfaces have seal ring and are filled with lubricant grease; outer ring has check ring which facilitates axial location. Surface of bearings is treated through phosphating or galvanizing antirust.

2. Radial equivalent dynamic load

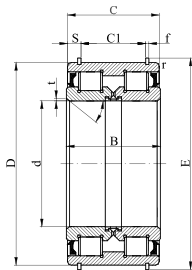
$$P_r = F_r$$

3. Radial equivalent static load

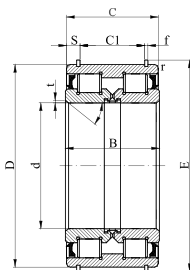
$$P_{or} = F_r$$

Double row full complement cylindrical roller bearings
for crane sheaves

d 80--240mm



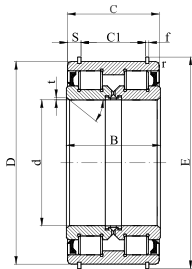
Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	B	C	t	r _{min}	Cr	Cor	
80	125	60	59	1.5	0.6	238	457	NNF5016N2V
85	130	60	59	1.5	0.6	247	489	NNF5017N2V
90	140	67	66	1.5	0.6	319	606	NNF5018N2V
95	145	67	66	1.5	0.6	326	530	NNF5019N2V
100	150	67	66	1.5	0.6	332	651	NNF5020N2V
110	170	80	79	1.8	0.6	424	813	NNF5022N2V
120	180	80	79	1.8	0.6	441	874	NNF5024N2V
130	190	80	79	1.8	0.6	430	790	NNF130N2V
	200	95	94	1.8	0.6	584	1150	NNF5026N2V
140	200	80	79	1.8	0.6	445	840	NNF140N2V
	210	95	94	1.8	0.6	610	1240	NNF5028N2V
150	210	80	79	1.8	0.6	465	920	NNF150N2V
	225	100	99	2.0	0.6	710	1400	NNF5030N2V
160	220	80	79	1.8	0.6	480	970	NNF160N2V
	240	109	108	2.0	0.6	786	1640	NNF5032N2V
170	230	80	79	1.8	0.6	490	1030	NNF170N2V
	260	122	121	2.0	0.6	977	2020	NNF5034N2V
180	240	80	79	1.8	0.6	500	1080	NNF180N2V
	280	136	135	2.0	0.6	1150	2440	NNF5036N2V
190	260	80	79	1.8	0.6	520	1130	NNF190N2V
	290	136	135	2.0	0.6	1180	2530	NNF5038N2V
200	270	80	79	1.8	0.6	540	1210	NNF200N2V
	310	150	149	2.0	0.6	1390	2980	NNF5040N2V
220	300	95	94	2.0	1.0	700	1550	NNF220N2V
	340	160	159	2.0	1.0	1620	3590	NNF5044N2V
240	320	95	94	2.0	1.0	740	1700	NNF240N2V
	360	160	159	2.0	1.0	1690	3850	NNF5048N2V



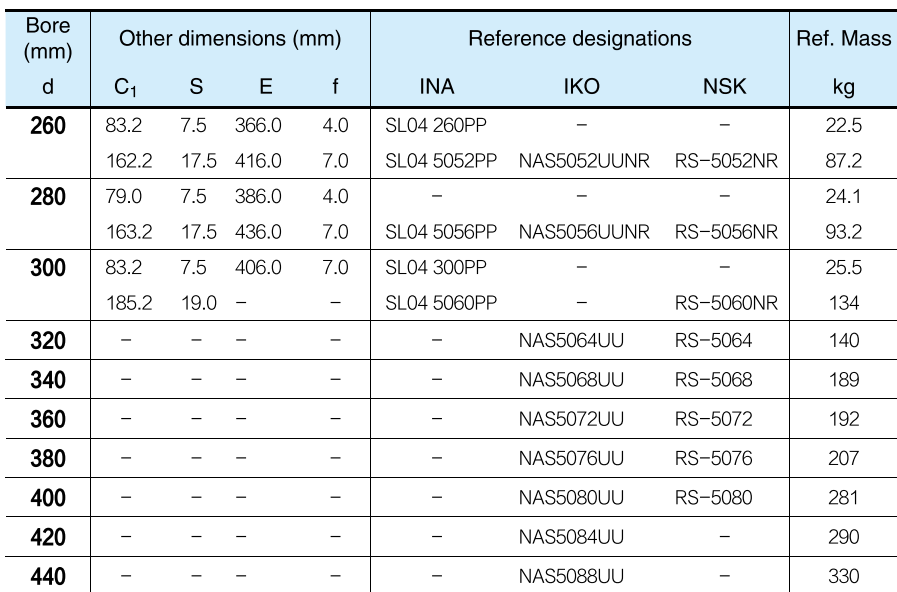
Bore (mm) d	Other dimensions (mm)				Reference designations			Ref. Mass kg
	C ₁	S	E	f	INA	IKO	NSK	
80	54.2	5.5	129.5	2.5	SL04 5016PP	NAS5016UUNR	RS-5016NR	2.71
85	54.2	5.5	134.5	2.5	SL04 5017PP	NAS5017UUNR	RS-5017NR	2.83
90	59.2	6.0	145.4	2.5	SL04 5018PP	NAS5018UUNR	RS-5018NR	3.72
95	59.2	6.0	150.4	2.5	SL04 5019PP	NAS5019UUNR	RS-5019NR	3.91
100	59.2	6.0	155.4	2.5	SL04 5020PP	NAS5020UUNR	RS-5020NR	4.04
110	70.2	7.0	175.4	2.5	SL04 5022PP	NAS5022UUNR	RS-5022NR	6.53
120	71.2	7.0	188.4	3.0	SL04 5024PP	NAS5024UUNR	RS-5024NR	7.15
130	71.2	7.0	206.0	3.0	SL04 130PP	—	—	7.52
	83.2	8.5	208.4	3.0	SL04 5026PP	NAS5026UUNR	RS-5026NR	10.8
140	71.2	7.0	216.0	3.0	SL04 140PP	—	—	8.09
	83.2	8.5	218.4	3.0	SL04 5028PP	NAS5028UUNR	RS-5028NR	11.5
150	71.2	7.0	226.0	3.0	SL04 150PP	—	—	8.45
	83.2	9.0	233.4	3.0	SL04 5030PP	NAS5030UUNR	RS-5030NR	13.9
160	71.2	7.0	236.0	3.0	SL04 160PP	—	—	8.82
	95.2	9.5	248.4	3.0	SL04 5032PP	NAS5032UUNR	RS-5032NR	17.2
170	71.2	7.0	250.0	3.0	SL04 170PP	—	—	9.34
	107.2	11.0	270.0	4.0	SL04 5034PP	NAS5034UUNR	RS-5034NR	23.1
180	71.2	7.0	260.0	3.0	SL04 180PP	—	—	9.83
	118.2	12.5	294.0	5.0	SL04 5036PP	NAS5036UUNR	RS-5036NR	30.8
190	73.2	7.0	282.0	3.0	SL04 190PP	—	—	12.7
	118.2	12.5	300.0	5.0	SL04 5038PP	NAS5038UUNR	RS-5038NR	32.4
200	73.2	7.0	292.0	3.0	SL04 200PP	—	—	13.2
	128.2	14.5	320.0	5.0	SL04 5040PP	NAS5040UUNR	RS-5040NR	41.7
220	83.2	7.5	322.0	4.0	SL04 220PP	—	—	19.5
	138.2	14.5	356.0	6.0	SL04 5044PP	NAS5044UUNR	RS-5044NR	53.5
240	83.2	7.5	346.0	4.0	SL04 240PP	—	—	21.2
	138.2	14.5	376.0	6.0	SL04 5048PP	NAS5048UUNR	RS-5048NR	57.3

Double row full complement cylindrical roller bearings
for crane sheaves

d 260--440mm



Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	B	C	t	r _{min}	Cr	Cor	
260	340	95	94	3.0	1.0	840	1990	NNF260N2V
	400	190	189	3.0	1.1	2380	4980	NNF5052N2V
280	360	95	94	2.0	1.5	870	2020	NNF280N2V
	420	190	189	3.0	1.1	2600	5350	NNF5056N2V
300	380	95	94	3.0	1.5	900	2250	NNF300N2V
	460	218	216	3.0	1.5	3000	6610	NNF5060N2V
320	480	218	216	3.0	1.5	2950	6930	NNF5064N2V
340	520	243	241	3.5	2.0	3590	8420	NNF5068N2V
360	540	243	241	3.5	2.0	3660	8720	NNF5072N2V
380	560	243	241	3.5	2.0	3730	9020	NNF5076N2V
400	600	272	270	3.5	2.0	4510	11000	NNF5080N2V
420	620	272	270	3.5	2.0	4650	11400	NNF5084N2V
440	650	280	278	4.5	3.0	4940	12200	NNF5088N2V



**Single row
cylindrical roller bearings**

Single row cylindrical roller bearings

When NU type bearings and HJ snap ring are used in combination, they can locate the shaft in single direction. NU type bearings must not be fitted with snap rings on two sides, otherwise they will impose axial pressure on rollers.

1. EC type bearings

The inner rings of EC type bearings are improved in geometry shape, which ensure higher load carrying capacity compared with the same basic dimension of the early bearings. EC type bearings accommodate high axial load carrying capacity thanks to new design of ribs and roller face; the good contact condition ensures good lubrication and low running temperature in roller flange contact area. These characteristics make FV EC type bearings more versatile.

2. Other single row cylindrical roller bearings

In addition to the bearings listed in this catalogue, FV also produces a variety of other single row cylindrical roller bearings, welcome to contact technical service department of FV.

3. Dimensions

The basic dimension of single row cylindrical roller bearings listed in the table is in accordance with ISO15–1998 standard.

4. Axis angular alignment error

The axis angular alignment error of cylindrical roller bearings outer ring against inner ring, i.e. compensate axis angular alignment error, is only a fraction of radian. The actual value for bearings with logarithmic contact surface is:

Cylindrical roller bearings have as limited capacity of axial angle alignment error of outer ring against inner ring, namely they compensate a fraction of radian angular alignment error:

- Narrow type 10、2、3 and 4 series bearings: 4' radian;
- Wide type 22 and 23 series bearings: 3' radian.

The values apply only to applications with fixed axis location of bearing box. Larger axis angular error is permissible sometimes, in this case, please consult technical service department of FV.

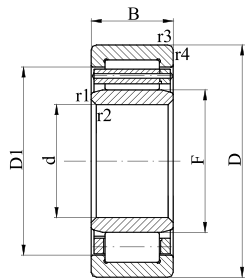
5. Tolerance

FV single row cylindrical roller bearings have ordinary class tolerance.

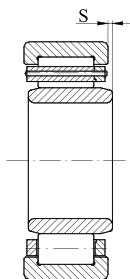
6. Radial equivalent dynamic load $P_r = F_r$

7. Radial equivalent static load $P_{or} = F_r$

Single row cylindrical roller bearings
d 80--130mm

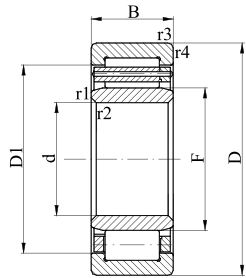


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
80	140	26	2	2	140	170	NU216
	170	39	2.1	2.1	255	275	NU316
	170	59	2.1	2.1	355	425	NU2316
85	150	28	2	2	163	193	NU217
	180	41	3	3	270	300	NU317
	180	60	3	3	365	450	NU2317
90	160	30	2	2	183	216	NU218
	190	43	3	3	315	345	NU318
	190	64	3	3	430	530	NU2318
95	170	32	2.1	2.1	220	265	NU219
	200	45	3	3	335	380	NU319
	200	67	3	3	455	585	NU2319
100	180	34	2.1	2.1	251	305	NU220
	215	47	3	3	391	440	NU320
	215	73	3	3	583	735	NU2320
105	190	36	2.1	2.1	264	315	NU221
	225	49	3	3	440	500	NU321
110	200	38	2.1	2.1	292	365	NU222
	240	50	3	3	468	540	NU322
	240	80	3	3	682	900	NU2322
120	215	40	2.1	2.1	341	430	NU224
	260	55	3	3	539	620	NU324
	260	86	3	3	792	1040	NU2324
130	230	40	3	3	358	455	NU226
	280	58	4	4	627	750	NU326
	280	93	4	4	935	1250	NU2326

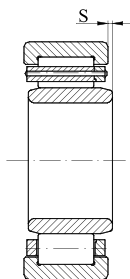


Bore(mm) d	Other dimensions (mm)			Speed ratings(rpm)		Ref. Mass kg
	F	D ₁	S	Grease	Oil	
80	95.3	121.6	1.2	4000	4800	1.54
	101	142.7	2.8	3200	3800	3.95
	101	142.7	3.6	3200	3800	5.91
85	100.5	130.3	2.0	3800	4500	1.92
	108	151.3	3.0	3000	3600	5.35
	108	151.3	5.0	3000	3600	6.93
90	107	138.5	1.4	3600	4300	2.41
	113.5	160.2	3.0	2800	3400	5.42
	113.5	160.2	6.0	2800	3400	8.11
95	112.5	147.4	1.4	3200	3800	2.81
	121.5	168.2	3.5	2800	3400	6.33
	121.5	168.2	7.2	2800	3400	9.32
100	119	157	1.7	3200	3800	7.69
	127.5	182	2.9	2400	3000	7.69
	127.5	182	5.9	2400	3000	12.2
105	125	164	2.0	3000	3600	4.12
	133	190	3.4	2200	2800	8.83
110	132.5	174	2.1	2800	3400	4.81
	143	201	3.0	2000	2600	10.5
	143	201	3.0	2000	2600	18.6
120	143.5	188	1.9	2400	3000	5.75
	154	219	3.7	1900	2400	13.5
	154	219	7.2	1900	2400	24.2
130	153.5	202	2.1	2200	2800	6.49
	167	236	3.7	1800	2200	18.5
	167	236	8.7	1800	2200	30.5

Single row cylindrical roller bearings
d 140--240mm

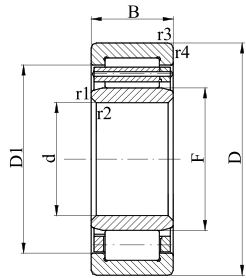


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
140	250	42	3	3	391	510	NU228
	300	62	4	4	682	830	NU328
	300	102	4	4	1050	1430	NU2328
150	270	45	3	3	446	600	NU230
	320	65	4	4	781	965	NU330
	320	108	4	4	1190	1630	NU2330
160	290	48	3	3	501	680	NU232
	340	68	4	4	880	1080	NU332
	340	114	4	4	1320	1860	NU2332
170	310	52	4	4	616	815	NU234
	360	72	4	4	809	1040	NU334
	360	120	4	4	1230	1800	NU2334
180	320	52	4	4	627	850	NU236
	380	75	4	4	913	1180	NU336
	380	126	4	4	1400	2040	NU2336
190	340	55	4	4	693	965	NU238
	400	78	5	5	1140	1500	NU338
	400	132	5	5	1830	2500	NU2338
200	360	58	4	4	765	1060	NU240
	420	80	5	5	990	1320	NU340
	420	138	5	5	2050	2850	NU2340
220	400	65	4	4	765	1080	NU244
	460	88	5	5	1210	1630	NU344
	460	145	5	5	1790	2700	NU2344
240	440	72	4	4	952	1370	NU248
	500	95	5	5	1450	2000	NU348

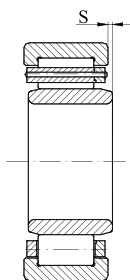


Bore(mm) d	Other dimensions (mm)			Speed ratings(rpm)		Ref. Mass kg
	F	D ₁	S	Grease	Oil	
140	169	217	2.4	2000	2600	8.32
	180	252	3.7	1800	2200	22.5
	180	252	9.7	1800	2200	37.0
150	182	234	2.5	1900	2400	10.5
	193	270	4.0	1700	2000	27.5
	193	270	10.5	1700	2000	45.0
160	195	250	2.7	1800	2200	15.0
	204	286	4.0	1500	1800	32.5
	204	286	11.0	1500	1800	53.0
170	207	269	2.9	1800	2200	19.0
	220	290	4.6	1600	1900	38.5
	220	290	5.2	1400	1700	63.2
180	217	279	2.9	1700	2000	19.5
	232	306	4.4	1500	1800	43.5
	232	306	5.1	1300	1600	73.0
190	230	295	3.0	1600	1900	23.5
	245	338	4.3	1200	1500	50.0
	240	341	9.5	1200	1500	84.9
200	243	312	2.6	1500	1800	28.5
	260	337	4.0	1300	1600	56.8
	247	350	9.0	1200	1500	96.8
220	270	332	2.3	1500	1800	38.5
	284	371	5.2	1200	1500	74.6
	284	371	6.8	1000	1300	150
240	295	365	3.4	1300	1600	51.5
	310	403	5.6	1000	1300	94.6

Single row cylindrical roller bearings
d 240--400mm

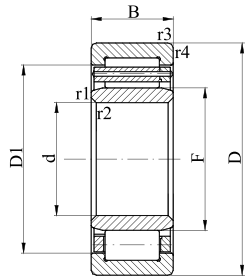


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
240	500	155	5	5	2120	3250	NU2348
260	480	80	5	5	1170	1700	NU252
	540	102	6	6	1940	2700	NU352
	540	165	6	6	3190	4500	NU2352
280	500	80	5	5	1140	1700	NU256
	580	108	6	6	1800	2500	NU356
	580	175	6	6	2700	4300	NU2356
300	540	85	5	5	1420	2120	NU260
	620	109	7.5	7.5	2080	3000	NU360
	620	185	7.5	7.5	4020	5850	NU2360
320	440	56	3	3	580	1050	NU1964
	440	72	3	3	755	1470	NU2964
	480	74	4	4	905	1470	NU1064
	580	92	5	5	1540	2270	NU264
340	460	56	3	3	600	1120	NU1968
	460	72	3	3	780	1570	NU2968
	520	82	5	5	1080	1740	NU1068
	620	92	6	6	1590	2410	NU268
360	480	56	3	3	605	1160	NU1972
	480	72	3	3	790	1630	NU2972
	540	82	5	5	1110	1830	NU1072
	650	95	6	6	1650	2560	NU272
380	520	65	4	4	775	1470	NU1976
	560	82	5	5	1140	1910	NU1076
	680	95	6	6	1700	2700	NU276
400	540	65	4	4	785	1520	NU1980

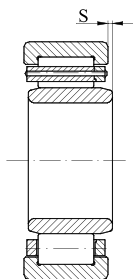


Bore (mm) d	Other dimensions (mm)			Speed ratings(rpm)		Ref. Mass kg
	F	D ₁	S	Grease	Oil	
240	310	403	6.4	950	1200	155
260	320	397	3.4	1100	1400	68.5
	337	455	4.2	900	1100	120
	319	463	1.8	900	1100	190
280	340	417	3.8	1100	1400	71.5
	362	469.3	22.0	1000	1300	147
	362	467	6.6	850	1000	236
300	364	451	4.8	1000	1300	89.5
	388	506.7	9.5	900	1000	168
	371	535	11.0	800	950	270
320	352	408	–	–	–	25.7
	352	408	–	–	–	33.5
	360	440	3.5	1200	1400	46.1
	390	510	5.3	950	1200	112
340	372	–	1.8	–	–	27.1
	372	428	8.5	–	–	35.0
	385	475	6.5	1100	1300	61.8
	420	–	–	–	–	128
360	392	–	–	–	–	28.8
	392	448	–	–	–	36.7
	405	495	6.5	1000	1300	64.6
	445	–	16.7	–	–	144
380	418	482	–	–	–	41.2
	425	–	6.5	1000	1200	67.5
	470	–	–	–	–	158
400	438	502	3.9	–	–	43.0

Single row cylindrical roller bearings
d 400--850mm

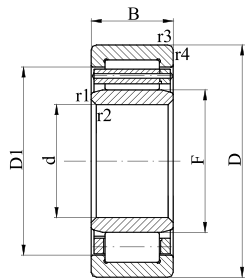


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
400	540	82	4	4	1060	2250	NU2980
	600	90	5	5	1360	2280	NU1080
420	560	65	4	4	830	1600	NU1984
	560	82	4	4	1080	2320	NU2984
	620	80	5	5	1390	2380	NU1084
440	600	95	4	4	1300	2760	NU2988
	650	94	6	6	1470	2530	NU1088
460	620	74	4	4	1170	2260	NU1992
	620	95	4	4	1340	2930	NU2992
	680	100	6	6	1580	2740	NU1092
480	650	78	5	5	1200	2390	NU1996
	650	100	5	5	1600	3450	NU2996
	700	100	6	6	1620	2860	NU1096
500	720	100	6	6	1660	2970	NU10/500
530	710	82	5	5	1460	2910	NU19/530
	710	106	5	5	1770	3900	NU29/530
560	750	85	5	5	1510	3100	NU19/560
600	800	90	5	5	1590	3400	NU19/600
	800	118	5	5	2160	5000	NU29/600
630	850	100	6	6	1850	3900	NU19/630
670	900	103	6	6	1870	3800	NU19/670
710	950	106	6	6	2300	5000	NU19/710
	950	140	6	6	3450	8400	NU29/710
800	1060	115	6	6	2760	6150	NU19/800
850	1120	118	6	6	2780	6350	NU19/850
	1120	155	6	6	4450	10500	NU29/850

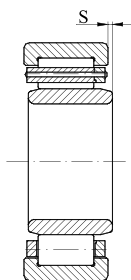


Bore (mm) d	Other dimensions (mm)			Speed ratings(rpm)		Ref. Mass kg
	F	D ₁	S	Grease	Oil	
400	438	502	7.6	–	–	54.9
	450	550	7.0	900	1100	88.2
420	458	522	–	–	–	45.0
	458	522	2.4	–	–	58.2
	470	570	11.0	850	1100	91.7
440	484	–	–	–	–	79.9
	493	–	7.0	800	1000	105
460	500	580	–	–	–	63.2
	504	–	–	–	–	83.1
	516	624	–	750	950	123
480	525	–	6.5	–	–	75.0
	525	605	–	–	–	98.5
	536	644	7.8	750	900	125
500	556	664	11.2	710	850	131
530	575	–	–	–	–	92.0
	578	662	3.3	–	–	119
560	610	–	2.7	–	–	106
600	655	–	4.5	–	–	127
	655	745	–	–	–	170
630	690	–	7.2	–	–	163
670	731	–	13.0	–	–	181
710	775	–	–	–	–	213
	776	–	–	–	–	285
800	870	–	–	–	–	282
850	925	1045	12.3	–	–	320
	917	–	–	–	–	426

Single row cylindrical roller bearings
d 900--1120mm

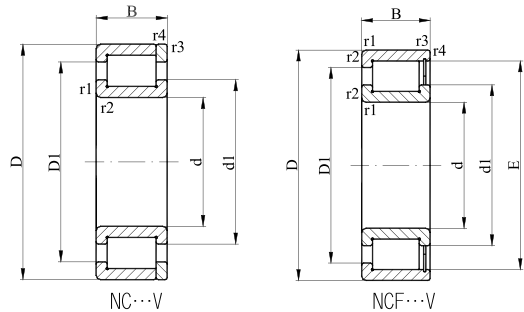


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
900	1090	112	5	5	2580	7100	NU28/900
	1090	140	5	5	2990	8600	NU38/900
1000	1220	128	6	6	3200	8850	NU28/1000
1060	1280	165	6	6	3750	11300	NU38/1060
1120	1360	180	6	6	5700	17300	NU38/1120

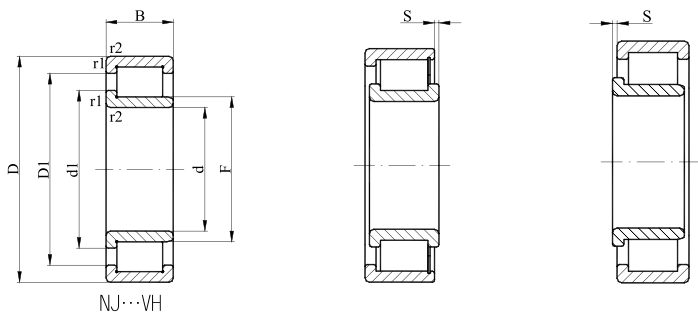


Bore (mm) d	Other dimensions (mm)			Speed ratings(rpm)		Ref. Mass kg
	F	D ₁	S	Grease	Oil	
900	950	—	—	—	—	217
	950	—	—	—	—	269
1000	1058	—	—	—	—	319
1060	1120	—	—	—	—	427
1120	1150	—	—	—	—	547

Single row full complement
cylindrical roller bearings
d 80--110mm

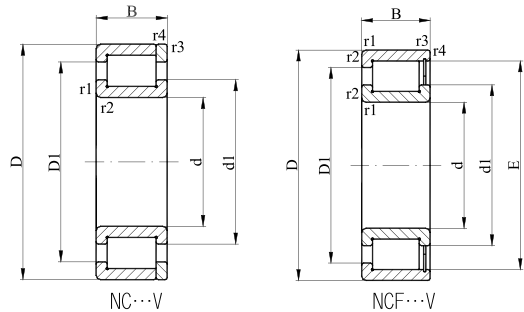


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
80	110	19	1	0.6	81	128	NC2916V
	110	19	1	0.6	81	128	NCF2916V
	125	34	1.1	0.6	194	285	NC3016V
	125	34	1.1	0.6	194	285	NCF3016V
	170	58	2.1	—	455	550	NJ2316VH
85	120	22	1.1	1	105	168	NC2917V
	120	22	1.1	1	105	168	NCF2917V
	130	34	1.1	0.6	195	295	NC3017V
	130	34	1.1	0.6	195	295	NCF3017V
	180	60	3	—	482	695	NJ2317VH
90	125	22	1.1	1	105	172	NC2918V
	125	22	1.1	1	105	172	NCF2918V
	140	37	1.5	1	227	348	NC3018V
	140	37	1.5	1	227	348	NCF3018V
	190	64	3	—	520	790	NJ2318VH
95	130	22	1.1	1	108	180	NC2919V
	130	22	1.1	1	108	180	NCF2919V
	145	37	1.5	1	230	360	NC3019V
	145	37	1.5	1	230	360	NCF3019V
100	140	24	1.1	1	132	224	NC2920V
	140	24	1.1	1	132	224	NCF2920V
	150	37	1.5	1	242	375	NC3020V
	150	37	1.5	1	242	375	NCF3020V
	215	73	3	—	704	1030	NJ2320VH
110	150	24	1.1	1	140	250	NC2922V
	150	24	1.1	1	140	250	NCF2922V

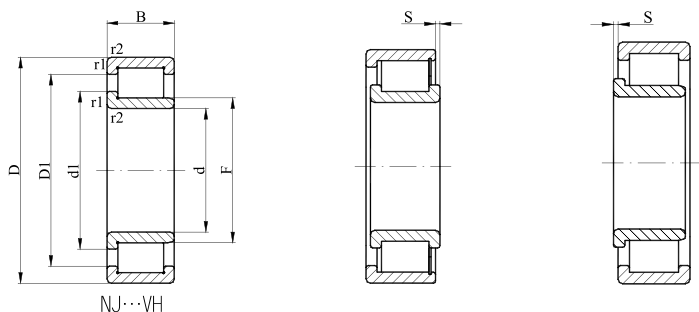


Bore (mm) d	Other dimensions (mm)					Speed ratings(rpm)		Ref. Mass
	E	F	d ₁	D ₁	S	Grease	Oil	kg
80	—		90.7	98.7	—	1200	2600	0.57
	102.7		90.7	98.7	0.75	1200	2600	0.53
	—		94.8	112	—	1100	2400	1.56
	117.2		94.8	112	1.8	1100	2400	1.52
	—	98.3	109	141	4	700	1500	6.41
85	—		99.1	109	—	1100	2400	0.79
	112.5		99.1	109	0.75	1100	2400	0.78
	—		99.2	116	—	1100	2400	1.61
	121.6		99.2	116	1.8	1100	2200	1.55
	—	107.02	117.4	151.5	4	670	1400	7.31
90	—		102	111	—	1100	2400	0.91
	115.6		102	111	0.75	1100	2400	0.82
	—		106.2	125	—	1000	2200	2.12
	130.3		106.2	125	2	1000	2200	2.05
	—	108.8	121	156	4	670	1400	8.75
95	—		107	117	—	1000	2200	0.94
	120.4		107	117	0.75	1000	2200	0.86
	—		111	129	2	950	2000	2.28
	135.1		111	129	4.5	950	2000	2.15
100	—		114	124	—	1000	2200	1.25
	129		114	124	0.75	1000	2200	1.15
	—		116	134	—	950	2000	2.29
	139.9		116	134	2	950	2000	2.22
	—	122.8	136	176	4.5	600	1200	13.1
110	—		126	137	—	900	1900	1.35
	141.3		126	137	0.75	900	1900	1.25

Single row full complement
cylindrical roller bearings
d 110--160mm

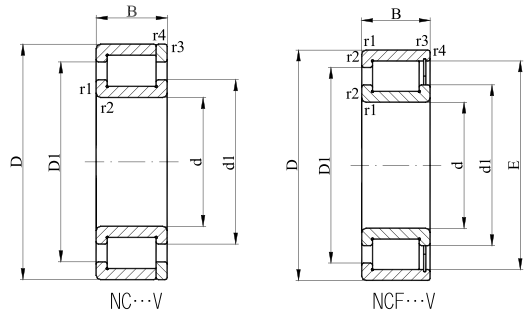


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
110	170	45	2	1	330	510	NC3022V
	170	45	2	1	330	510	NCF3022V
	240	80	3	—	858	1060	NJ2322VH
120	165	27	1.1	1	172	290	NC2924V
	165	27	1.1	1	172	290	NCF2924V
	180	46	2	1	341	550	NC3024V
	180	46	2	1	341	550	NCF3024V
	260	86	3	—	935	1300	NJ2324VH
130	180	30	1.5	1.1	205	360	NC2926V
	180	30	1.5	1.1	205	360	NCF2926V
	200	52	2	1	429	695	NC3026V
	200	52	2	1	429	695	NCF3026V
	280	93	4	—	1080	1660	NJ2326VH
140	190	30	1.5	1.1	220	390	NC2928V
	190	30	1.5	1.1	220	390	NCF2928V
	210	53	2	1	468	750	NC3028V
	210	53	2	1	468	750	NCF3028V
	300	102	4	—	1250	1910	NJ2328VH
150	190	20	1.1	1	108	200	NC1830V
	190	20	1.1	1	108	200	NCF1830V
	210	36	2	1.1	286	500	NC2930V
	210	36	2	1.1	286	500	NCF2930V
	225	56	2.1	1.1	539	880	NC3030V
	225	56	2.1	1.1	539	880	NCF3030V
	320	108	4	—	1450	2240	NJ2330VH
160	200	20	1.1	1.1	112	212	NC1832V

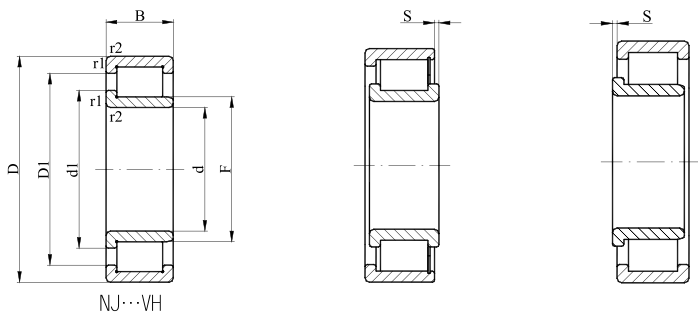


Bore (mm) d	Other dimensions (mm)					Speed ratings(rpm)		Ref. Mass
	E	F	d ₁	D ₁	S	Grease	Oil	kg
110	—		129	150	—	850	1800	3.79
	157		129	150	3	850	1800	3.65
	—	134.5	151	198	5	560	1100	17.8
120	—		136	149	—	850	1800	1.88
	154.3		136	149	0.75	850	1800	1.71
	—		139	160	—	800	1700	4.11
	167.9		139	160	3.5	800	1700	3.95
	—	147.4	164	211	5.5	530	1000	22.5
130	—		147	161	—	750	1600	2.52
	167.1		147	161	0.75	750	1600	2.32
	—		154	179	—	700	1500	6.05
	186.5		154	179	3.5	700	1500	5.82
	—	157.95	175	226	6	500	950	28.3
140	—		159	173	—	700	1500	2.59
	180		159	173	0.75	700	1500	2.42
	—		163	180	—	670	1400	6.21
	198.2		163	180	3.5	670	1400	6.11
	—	168.5	187	241	6.5	450	850	35.5
150	—		163	176	1.5	700	1500	1.54
	179.5		163	176	1.5	700	1500	1.31
	—		171	188	—	670	1400	4.05
	195.5		171	188	0.8	670	1400	3.85
	—		174	203	—	630	1300	7.72
	211.7		174	203	3.5	630	1300	7.51
	—	182.5	202	261	6.5	430	800	42.5
160	—		173	185	1.5	670	1400	1.61

Single row full complement
cylindrical roller bearings
d 160--190mm

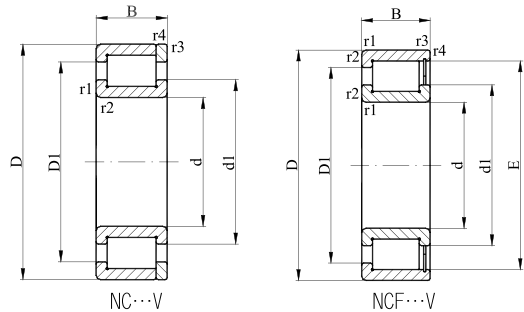


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
160	200	20	1.1	1.1	112	212	NCF1832V
	220	36	2	1.1	297	540	NC2932V
	220	36	2	1.1	297	540	NCF2932V
	240	60	2.1	1.1	583	970	NC3032V
	240	60	2.1	1.1	583	970	NCF3032V
	340	114	4	–	1630	2550	NJ2332VH
170	215	22	1.1	1.1	149	272	NC1834V
	215	22	1.1	1.1	149	272	NCF1834V
	230	36	2	1.1	308	570	NC2934V
	230	36	2	1.1	308	570	NCF2934V
	260	67	2.1	1.1	737	1230	NC3034V
	260	67	2.1	1.1	727	1230	NCF3034V
	360	120	3	–	1760	2450	NJ2334VH
180	225	22	1.1	1.1	147	275	NC1836V
	225	22	1.1	1.1	147	275	NCF1836V
	250	42	2	1.1	391	695	NC2936V
	250	42	2	1.1	391	695	NCF2936V
	280	74	2.1	2.1	825	1400	NC3036V
	280	74	2.1	2.1	825	1400	NCF3036V
	380	126	3	–	1900	2700	NJ2336VH
190	240	24	1.5	1.5	172	320	NC1838V
	240	24	1.5	1.5	172	320	NCF1838V
	260	42	2	1.1	440	782	NC2938V
	260	42	2	1.1	440	782	NCF2938V
	290	75	2.1	2.1	858	1450	NC3038V
	290	75	2.1	2.1	858	1450	NCF3038V

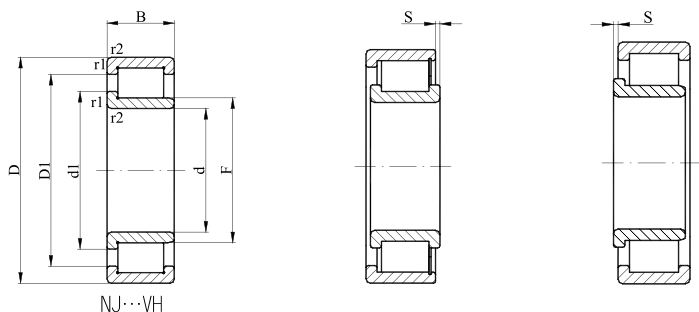


Bore (mm) d	Other dimensions (mm)					Speed ratings(rpm)		Ref. Mass kg
	E	F	d ₁	D ₁	S	Grease	Oil	
160	189		173	185	1.5	670	1400	1.45
	—		181	198	—	630	1300	4.03
	205.7		181	198	0.8	630	1300	4.05
	—		185	215	—	600	1200	9.26
	225.1		185	215	4	600	1200	9.11
	—	196.55	216.7	286	7	400	750	48.8
170	—		185	200	1.5	630	1300	2.02
	204.5		185	200	1.5	630	1300	1.85
	—		192	208	—	600	1200	4.53
	216		192	208	0.8	600	1200	4.25
	—		198	232	—	560	1100	13.7
	243.2		198	232	7	560	1100	12.5
	—	203.5	225	294	7	380	700	59.5
180	—		196	211	1.5	600	1200	2.21
	215.2		196	211	1.5	600	1200	1.95
	—		203	223	—	560	1100	6.41
	232		203	223	1	560	1100	6.25
	—		212	249	—	560	1100	17.1
	260.5		212	249	5	560	1100	16.5
	—	221.74	243	312	9	360	670	69.6
190	—		208	225	1.8	560	1100	2.72
	229		208	225	1.8	560	1100	2.45
	—		212	236	—	560	1100	6.81
	244		212	236	1	560	1100	6.55
	—		222	258	—	530	1000	17.9
	270		222	258	6	530	1000	17.1

Single row full complement
cylindrical roller bearings
d 190--260mm

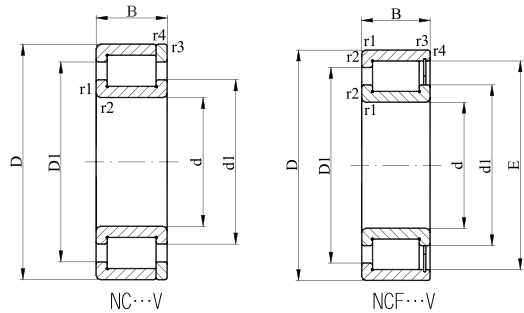


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
190	400	132	4	—	2080	2900	NJ2338VH
200	250	24	1.5	1.5	176	335	NC1840V
	250	24	1.5	1.5	176	335	NCF1840V
	280	48	2.1	1.5	528	965	NC2940V
	280	48	2.1	1.5	528	965	NCF2940V
	310	82	2.1	2.1	990	1750	NC3040V
	310	82	2.1	2.1	990	1750	NCF3040V
	420	138	5	—	2290	3680	NJ2340VH
220	270	24	1.5	1.5	183	365	NC1844V
	270	24	1.5	1.5	183	365	NCF1844V
	300	48	2.1	1.5	550	1030	NC2944V
	300	48	2.1	1.5	550	1030	NCF2944V
	340	90	3	3	1190	2100	NC3044V
	340	90	3	3	1190	2100	NCF3044V
240	300	28	2	2	260	510	NC1848V
	300	28	2	2	260	510	NCF1848V
	320	48	2.1	1.5	583	1140	NC2948V
	320	48	2.1	1.5	583	1140	NCF2948V
	360	92	3	3	1250	2240	NC3048V
	360	92	3	3	1250	2240	NCF3048V
260	320	28	2	2	270	550	NC1852V
	320	28	2	2	270	550	NCF1852V
	360	60	2.1	1.5	737	1430	NC2952V
	360	60	2.1	1.5	737	1430	NCF2952V
	400	104	4	4	1610	2920	NC3052V
	400	104	4	4	1610	2920	NCF3052V

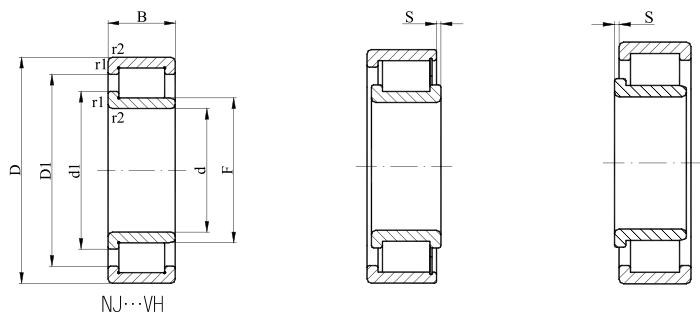


Bore (mm) d	Other dimensions (mm)					Speed ratings(rpm)		Ref. Mass
	E	F	d ₁	D ₁	S	Grease	Oil	kg
190	–	224.6	247.6	327	7	400	700	80.2
200	–		216	233	1.8	560	1100	3.41
	237.5		216	233	1.8	560	1100	3.41
	–		227	253	–	530	1000	9.52
	262		227	253	3	530	1000	9.15
	–		237	276	–	500	950	23.2
	287.75		237	276	6.5	500	950	22.5
	–	238.65	266	342	9	320	600	92.3
220	–		237	253	1.8	530	1000	3.35
	258		237	253	1.8	530	1000	2.85
	–		248	274	–	480	900	10.9
	283		248	274	2.5	480	900	9.93
	–		255	299	–	450	850	30.5
	312.7		255	299	7	450	850	29.5
240	–		261	281	1.8	480	900	5.31
	287		261	281	1.8	480	900	4.42
	–		268	296	–	450	850	12.1
	303		268	296	2.5	450	850	11.2
	–		278	322	–	430	800	33.2
	335.6		278	322	7	430	800	32.1
260	–		281	302	1.8	430	800	5.55
	307.2		281	302	1.8	430	800	4.75
	–		294	321	–	400	750	19.3
	333.7		294	321	5	400	750	18.5
	–		307	357	–	380	700	47.5
	373.5		307	357	8	380	700	46.5

Single row full complement
cylindrical roller bearings
d 280--380mm

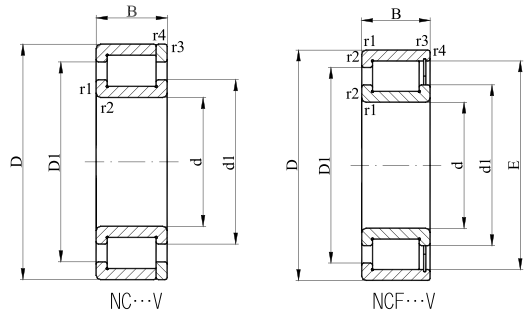


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
280	350	33	2	2	330	655	NC1856V
	350	33	2	2	330	655	NCF1856V
	380	60	2.1	1.5	897	1730	NC2956V
	380	60	2.1	1.5	897	1730	NCF2956V
	420	106	4	4	1680	3100	NC3056V
	420	106	4	4	1680	3100	NCF3056V
300	380	38	2.1	2.1	418	850	NC1860V
	380	38	2.1	2.1	418	850	NCF1860V
	420	72	3	3	1120	2200	NC2960V
	420	72	3	3	1120	2200	NCF2960V
320	400	38	2.1	2.1	440	900	NC1864V
	400	38	2.1	2.1	440	900	NCF1864V
	440	72	3	3	1140	2360	NC2964V
	440	72	3	3	1140	2360	NCF2964V
340	420	38	2.1	2.1	446	900	NC1868V
	420	38	2.1	2.1	446	900	NCF1868V
	460	72	3	3	1190	2500	NC2968V
	460	72	3	3	1190	2500	NCF2968V
360	440	38	2.1	2.1	457	1000	NC1872V
	440	38	2.1	2.1	457	1000	NCF1872V
	480	72	3	3	1230	2600	NC2972V
	480	72	3	3	1230	2600	NCF2972V
380	480	46	2.1	2.1	627	1290	NC1876V
	480	46	2.1	2.1	627	1290	NCF1876V
	520	82	4	4	1570	3250	NC2976V
	520	82	4	4	1570	3250	NCF2976V

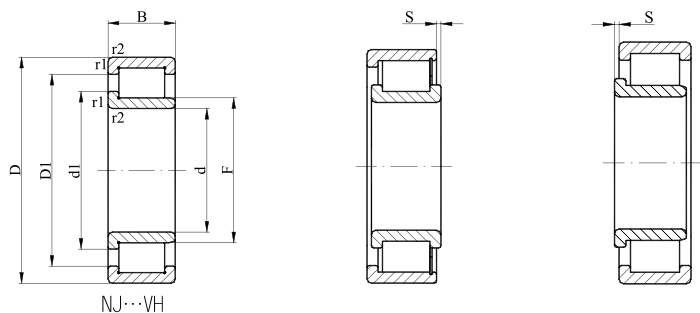


Bore (mm) d	Other dimensions (mm)					Speed ratings(rpm)		Ref. Mass
	E	F	d ₁	D ₁	S	Grease	Oil	kg
280	–		305	328	2.5	400	750	8.03
	334		305	328	2.5	400	750	7.12
	–		319	346	–	380	700	21.1
	362.7		319	346	4	380	700	20.3
	–		324	375	–	360	670	52.5
	391		324	375	9	360	670	50.1
300	–		329	356	3	360	670	11.5
	363		329	356	3	360	670	10.2
	–		342	375	–	340	630	32.3
	390.5		342	375	5	340	630	31.5
320	–		349	376	3	340	630	11.3
	383		349	376	3	340	630	10.5
	–		363	395	–	320	600	34.0
	411		363	395	5	320	600	33.0
340	–		369	395	3	320	600	12.8
	403		369	395	3	320	600	11.0
	–		383	415	–	300	560	36.0
	431		383	415	5	300	560	35.0
360	–		389	416	3	300	560	12.4
	423.2		389	416	3	300	560	12.0
	–		403	436	–	280	530	36.8
	451.5		403	436	5	280	530	36.5
380	–		416	450	3.5	280	530	19.9
	458		416	450	3.5	280	530	19.5
	–		427	473	–	260	500	53.5
	488		427	473	5	260	500	52.5

Single row full complement
cylindrical roller bearings
d 400--710mm

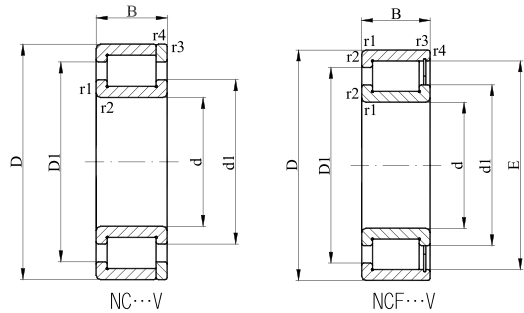


Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
400	500	46	2.1	2.1	627	1340	NC1880V
	500	46	2.1	2.1	627	1340	NCF1880V
	540	82	4	4	1650	3450	NC2980V
	540	82	4	4	1650	3450	NCF2980V
420	520	46	2.1	2.1	660	1430	NC1884V
	520	46	2.1	2.1	660	1430	NCF1884V
	560	82	4	4	1650	3600	NC2984V
	560	82	4	4	1650	3600	NCF2984V
440	540	46	2.1	2.1	670	1460	NC1888V
	540	46	2.1	2.1	670	1460	NCF1888V
	600	95	4	4	2010	4400	NC2988V
	600	95	4	4	2010	4400	NCF2988V
460	580	56	3	3	913	1960	NC1892V
	580	56	3	3	913	1960	NCF1892V
	620	95	4	4	2050	4500	NC2992V
	620	95	4	4	2050	4500	NCF2992V
480	600	56	3	3	935	2040	NCF1896V
	650	100	5	5	2290	5100	NCF2996V
500	620	56	3	3	952	2120	NCF18/500V
	670	100	5	5	2380	5300	NCF29/500V
530	650	56	3	3	990	2240	NCF18/530V
560	680	56	3	3	1020	2360	NCF18/560V
600	730	60	3	3	1050	2550	NCF18/600V
630	780	69	4	4	1250	2900	NCF18/630V
670	820	69	4	4	1300	3150	NCF18/670V
710	870	74	4	4	1540	3750	NCF18/710V

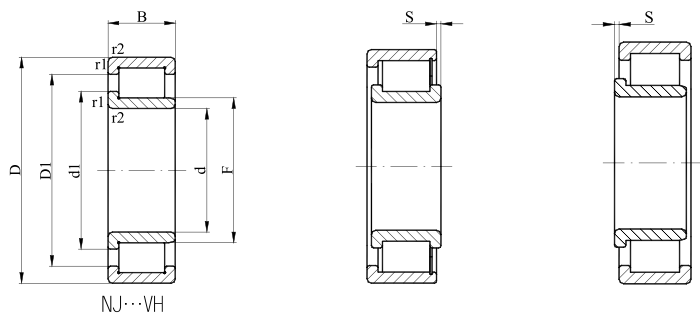


Bore (mm) d	Other dimensions (mm)					Speed ratings(rpm)		Ref. Mass
	E	F	d ₁	D ₁	S	Grease	Oil	kg
400	–		433	467	3.5	260	500	21.2
	475		433	467	3.5	260	500	20.5
	–		450	496	–	240	480	55.0
	511		450	496	5	240	480	54.5
420	–		457	491	3.5	240	480	21.6
	499		457	491	3.5	240	480	21.0
	–		463	509	–	220	450	57.7
	524		463	509	5	220	450	57.0
440	–		474	508	3.5	220	450	22.6
	516		474	508	3.5	220	450	22.0
	–		502	545	–	200	430	81.1
	565.5		502	545	6	200	430	80.5
460	–		501	543	5	200	430	34.8
	553		501	543	5	200	430	34.0
	–		516	558	–	190	400	83.9
	579		516	558	6	190	400	83.5
480	573.5		521	563	5	190	400	35.5
	606		538	584	–	180	380	98.0
500	594		542	584	5	180	380	36.5
	634.5		567	612	7	170	360	100
530	624.5		572	614	5	170	360	38.5
560	655		603	645	5	160	340	40.5
600	696		644	686	7	150	320	51.5
630	739		680	728	8	140	300	72.5
670	783		724	772	8	130	280	74.2
710	831		766	818	8	120	260	90.2

Single row full complement
cylindrical roller bearings
d 750--1000mm



Principal dimensions (mm)					Basic load ratings KN		Designations
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
750	920	78	5	5	1760	4300	NCF18/750V
800	980	82	5	5	1940	4800	NCF18/800V
850	1030	82	5	5	2050	5200	NCF18/850V
900	1090	85	5	5	2240	5700	NCF18/900V
950	1150	90	5	5	2420	6300	NCF18/950V
1000	1220	100	6	6	2920	7500	NCF18/1000V



Bore (mm) d	Other dimensions (mm)					Speed ratings(rpm)		Ref. Mass
	E	F	d_1	D_1	S	Grease	Oil	kg
750	880		810	867	6	110	240	110
800	936		863	922	9	100	220	130
850	986		911	972	9	95	200	135
900	1044		966	1029	9	90	190	160
950	1103		1021	1087	10	80	170	185
1000	1165		1073	1148	12	75	160	230

**Split single row
cylindrical roller bearings**

Split single row cylindrical roller bearings

Split cylindrical roller bearings are mainly applied in crankshaft and position in which it's difficult for bearing installation. In applications when it's hard to make maintenance and change integrated cylindrical roller bearings and when equipment need keep running, split cylindrical roller bearings show their particular superiority. They are mainly applied in piggy steel cold roll crankshaft, spine shaft, excavators, rolling mill drive spindle and large ventilation equipments.

FV has successfully developed split cylindrical roller bearings that can be easily installed in any space at any time. The bearings meet the demand of continuous casting drive rolls in continuous casting cooling area.

1. Split double row cylindrical roller bearings

Split double row cylindrical roller bearings were developed for rolling mill transmission bearings. Two semi-outer rings installed in bearing housing combine with each other, some key links can also be used to prevent the rotation. An angle forms between the split inner ring section and the bearing center line to ensure smooth rotation, connected by a clamp. Split brass cage is located by rollers. The axial clearance is supposed to cater to the thermal expansion of shaft length of universal joint.

2. Dimensions

Dimensions of split cylindrical roller bearings have not been standardized.

3. Axis angle alignment error

Split single row cylindrical roller bearings and double row cylindrical roller bearings have a “logarithm” curve contact face between roller and raceway, which effectively improves internal stress distribution of bearings, and allows for a small angle alignment error of 2°.

4. Tolerance

Split cylindrical roller bearings are produced according to the standard tolerance level, but excluding the width tolerance of inner ring and outer ring; the standard tolerance is based on ISO492–1986.

5. Internal clearance

Split cylindrical roller bearings conform to standard, the values are based on ISO5753–1991.

6. Load carrying capacity

As split bearings have less number of rollers, the load carrying capacity

is smaller than that of integrated bearings.

In calculating equivalent dynamic load, consideration must be given that the rollers should not go beyond the joint to raceway. The values depend on the working condition, see page 24 the section “equivalent dynamic load” for “guide of rolling mill bearing application technology”.

7. Speed

Vibration occurs during operation due to the split structure, which limits its speed. The speed is about 50% of the integrated bearings, which may not meet customers' demand. Customers having requirement for higher speed, please consult FV.

8. Design of relative components

Split bearings are suitable for load and rotation in positive and negative directions. For higher load $P > 0.12C_r$ is advisable, machining tolerance of the installation shaft is h6. Bearings with the same direction and light load ($P < 0.12C_r$), machining tolerance of the installation shaft can be h7, in light load and low speed, shaft tolerance is h9/IT7 for bearings with adapter sleeve, the bearing housing tolerance H7.

Split cylindrical roller bearings are often used to replace the integrated bearings originally installed, under such condition, the shaft machining tolerance should be n6 – r7.

9. Equivalent dynamic load

The equivalent dynamic load is calculated as following formula when the bearings bear pure radial load:

$$P = b F_r$$

Selecting b value must take account of working condition and requirement for steady operation as follows:

Require constant, smooth and reliable operation: 1.1–1.3 advisable

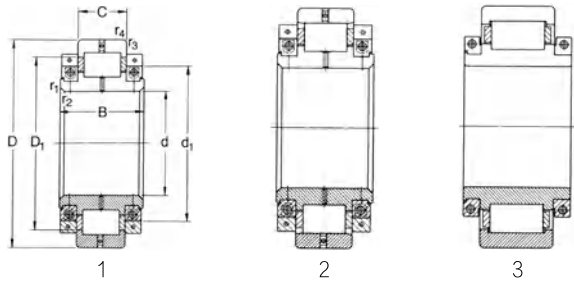
The equipments have to bear large impact and unsteady force:
1.3–2.0 advisable

The equipments have to bear great impact load or swinging:
2.0–4.0 advisable

10. Equivalent static load

$$P_{or} = F_r$$

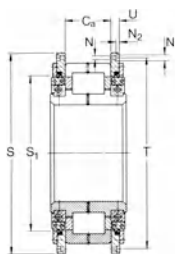
Split single row cylindrical roller bearings
d 220--414mm



Principal dimensions (mm)						Basic load ratings KN		Radial internal clearance (mm)		Designations	Design Type
d	D	B	C	r _{1,2}	r _{3,4}	Cr	Cor	Min	Max		
220	393.7	156	90.5	8 × 45°	2	1210	1800	0.105	0.165	SCRB0001	5
240	440	156	90.5	8 × 45°	3	1320	2040	0.105	0.165	SCRB0002	1
	440	156	90.5	8 × 45°	3	1320	2040	0.105	0.165	SCRB0003	6
	440	156	90.5	8 × 45°	3	1320	2040	0.105	0.165	SCRB0004	6
300	558.8	220	139.7	12 × 45°	5	2330	3250	0.130	0.205	SCRB1005	1
	558.8	220	139.7	12 × 45°	5	2330	3250	0.130	0.205	SCRB0005	1
	558.8	220	139.7	12 × 45°	5	2330	3250	0.130	0.205	SCRB0006	1
	558.8	220	139.7	12 × 45°	5	2330	3250	0.130	0.205	SCRB0007	6
	558.8	220	139.7	12 × 45°	5	2330	3250	0.130	0.205	SCRB0008	6
	558.87	220	139.7	12 × 45°	6	2330	3250	0.130	0.205	SCRB0009	7
318	622.37	272	160.4	12 × 45°	7.5	2920	4400	0.145	0.225	SCRB0010	1
	622.37	272	160.4	12 × 45°	7.5	2920	4400	0.145	0.225	SCRB0011	1
	622.37	272	160.4	12 × 45°	7.5	2920	4400	0.145	0.225	SCRB0012	5
320	622.37	272	160.4	12 × 45°	7.5	2920	4400	0.145	0.225	SCRB0013	1
	622.37	272	160.4	12 × 45°	7.5	2920	4400	0.145	0.225	SCRB0014	1
	622.37	272	160.4	12 × 45°	7.5	2920	4400	0.145	0.225	SCRB0015	5
	622.37	272	160.4	12 × 45°	7.5	2920	4400	0.145	0.225	SCRB0016	5
355.6	488.95	146	74.6	3	3	720	1220	0.280	0.370	SCRB0017	4
400	600	220	148	5	5	2550	4900	0.190	0.280	SCRB0018	3
414	740	320	190	12 × 45°	7.5	4020	6700	0.210	0.310	SCRB0019	1
	740	320	190	12 × 45°	7.5	4020	6700	0.210	0.310	SCRB0020	5
	740	320	190	12 × 45°	7.5	4020	6700	0.210	0.310	SCRB0021	5



4



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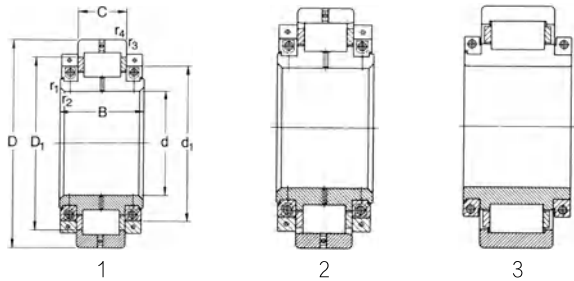
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Bore (mm)	Other dimensions (mm)										Ref. designations	Ref. Mass
d	d ₁	D ₁	S	S ₁	T	U	N	N ₁	N ₂	Ca	SKF	kg
220	312	339	460	380	430	32	14	20	15	90.5	316350DA	90.0
240	340	373									319307C	105
	340	373	510	405	475	15.85	18	26	17.5	100.1	319307A	125
	340	373	510	405	475	15.85	18	26	17.5	100.1	319307B	125
300	434	478									316733DC	210
	434	478									316733DD	210
	434	478	640	500	600	33.75	18	26	17.5	150.4	316733DA	305
	434	478	640	500	600	33.75	18	26	17.5	150.4	316733DB	305
	434	478	640	478	600	33.75	18	26	17.5	150.4	316733	305
	434	—									BCSB322810	230
318	475	521									BCSB322213CC	365
	475	521									BCSB322213CD	350
	475	521	700	540	660	30.5	18	26	17.5	160.4	BCSB322213CA	515
320	475	521									316351CC	345
	475	521									316351CD	330
	475	521	700	540	660	30.5	18	26	17.5	160.4	316351CA	470
	475	521	700	540	660	30.5	18	26	17.5	160.4	316351CB	470
355.6	450	—									BC1B319605	72.5
400	520	540									BCS-8000	200
414	584	635									316352CC	550
	584	635	820	650	780	34.5	18	26	17.5	190	316352CA	700
	584	635	820	650	780	34.5	18	26	17.5	190	316352CB	700

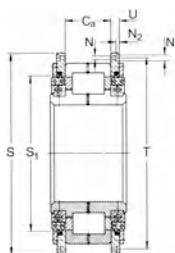
Split single row cylindrical roller bearings
d 420--1120mm



Principal dimensions (mm)							Basic load ratings KN		Radial internal clearance (mm)		Designations	Design Type
d	D	B	C	r _{1,2}	r _{3,4}		Cr	Cor	Min	Max		
420	740	320	190	12 × 45°	7.5		4020	6700	0.210	0.310	SCRB1021	5
500	850.9	360	210	12 × 45°	7.5		5010	9000	0.220	0.330	SCRB0022	1
	850.9	360	210	12 × 45°	7.5		5010	9000	0.220	0.330	SCRB0023	1
	850.9	360	210	12 × 45°	7.5		5010	9000	0.220	0.330	SCRB0024	5
	850.9	360	210	12 × 45°	7.5		5010	9000	0.220	0.330	SCRB0025	5
580	750	160	90	4	5		1190	2280	0.380	0.500	SCRB0026	2
630	794	190	88	5	2		1760	4300	0.380	0.500	SCRB0027	4
749.92	920	165	78	2 × 30°	4		1680	4050	0.270	0.365	SCRB0028	7
900	1090	150	85	6	6		1720	4250	0.400	0.520	SCRB0029	7
1000	1220	170	100	6	6		2700	6400	0.430	0.550	SCRB0030	7
1120	1360	210	106	2 × 30°	6		3140	7650	0.350	0.650	SCRB0031	7
	1360	210	106	2	6		3140	7650	0.350	0.650	SCRB0032	7



4



5



6



7

Bore (mm)	Other dimensions (mm)										Ref. designations	Ref. Mass
d	d ₁	D ₁	S	S ₁	T	U	N	N ₁	N ₂	Ca	SKF	kg
420	584	635	820	650	780	34.5	18	26	17.5	190	BC1B319576DA	680
500	718	734									316353DC	880
	718	734									316353DD	850
	718	734	930	790	890	29.5	18	26	17.5	210	316353DA	985
	718	734	930	790	890	29.5	18	26	17.5	210	316353DB	985
580	682	—									BC1M580-319470	135
630	728	—									BCSB316283A	160
749.92	831	—									BCSB320861	190
900	1015	1022									BCSB316586	240
1000	1124	1142									BCSB320099	345
1120	1225	1285									BCSB320806A	475
	1225	—									BCSB320806	470

**Four row
taper roller bearings**

Four row taper roller bearings

Four row taper roller bearings consist of two double row inner rings, one double row outer ring and two single outer rings: one inner spacer is set between two inner rings; two middle spacer rings between three outer rings can adjust clearance. When the bearings bear bigger radial load, they also can bear axial load at two directions at the same time, but their allowable rotation speed is not high. They are mainly used in rolling bearing of rolling mill. In recent years, four row taper roller bearings with double surface seal ring have been produced and have been widely applied.

Four row taper roller bearings with medium and small size are made of bearing steel; large sized four row taper roller bearings are made of carburizing steel. Hollow roller and pillar cage are adopted for bearings with especially big size, in order to prolong service life of bearings.

1. Material of cage

Sheet pressing cage is usually adopted for four row taper roller bearings; pillar-welding cage is used for bearings with especially big size.

2. Allowable angular error of axis

Concerning four row taper roller bearings, generally, axle cannot have inclination in relation to casing hole; if inclination exists, the value cannot be more than $2''$. When four row taper roller bearings bear roll-bending force as rolling bearings and inclination of axle is more than $2''$ according to requirements of production technology, roller and raceway of bearings will produce extra stress, which will increase bearing load and further shorten service life of bearings.

3. Tolerance and clearance

Four row taper roller bearings are P0 grade in tolerance; bearings having higher precision grade also can be produced according to requirements of users.

Concerning clearance of four row taper roller bearings, clearance of bearings has been adjusted based on production agreement of bearings (based on clearance of standard unit if there is no production agreement) according to regulation procedure when assembled. Users should re-adjust clearance after use for some periods. Please consult technical service department of FV for relative method of adjusting clearance.

4. Radial equivalent dynamic load

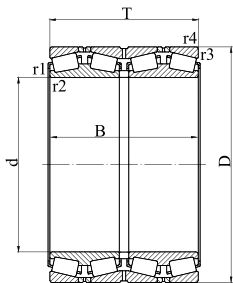
When $F_a/F_r \leq e$ $P_r = F_r + Y_1 F_a$

When $F_a/F_r > e$ $P_r = 0.67 F_r + Y_2 F_a$

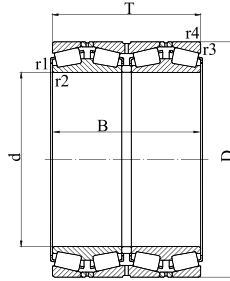
5. Radial equivalent static load

$P_{or} = F_r + Y_0 F_a$

Metric four row taper roller bearings
d 140--420mm

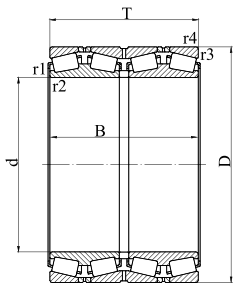


Principal dimensions (mm)					Basic load ratings KN		Designations	
d	D	T	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
140	210	185	2.5	2	605	1400	382028	2077128
150	210	165	2.5	2	602	1580	382930	2077930
170	260	230	3	2.5	1270	3290	382034	2077134
200	310	275	3	2.5	1760	4200	382040	2077140
220	340	305	4	3	2070	5430	382044	2077144
240	360	310	4	3	2110	5610	382048	2077148
250	385	255	5	4	1390	2570	381050	77150
260	360	265	3	2.5	1760	5220	382952	2077952
	400	345	5	4	2710	7140	382052	2077152
280	460	324	5	4	2840	7290	381156	1077756
300	420	300	4	3	2330	7210	382960	2077960
	460	390	5	4	3180	9330	382060	2077160
	500	370	5	4	3390	8710	381160	1077760
320	480	390	5	4	3180	9330	382064	2077164
340	460	310	4	3	2480	8100	382968	2077968
	520	325	5	4	3100	8620	381068	77168
	580	425	5	4	4580	11700	381168	1077768
360	540	325	5	4	3360	8840	381072	77172
380	560	325	5	4	3360	8840	381076	77176
	620	420	5	4	4710	12300	381176	1077776
395	545	288.7	7.5	4	2470	6600		77779
400	600	356	5	4	4160	10400	381080	77180
420	620	356	5	4	4160	10400	381084	77184
	700	480	6	5	6780	18500	381184	1077784

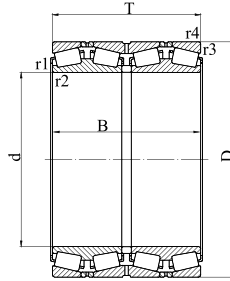


Bore (mm) d	Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Grease	Oil	e	Y ₁	Y ₂	Y ₀	
140	800	1000	0.37	0.2	0.3	2.0	24.1
150	800	1000	0.27	2.5	3.7	2.4	21.2
170	670	850	0.44	1.5	2.3	1.5	39.5
200	560	700	0.37	1.7	2.3	2.1	75.1
220	500	630	0.35	1.9	2.8	1.9	98.5
240	450	560	0.31	2.2	3.2	2.1	91.3
250	430	530	0.38	1.8	2.6	1.7	108
260	450	560	0.37	1.8	2.7	1.8	76.3
	430	530	0.29	2.3	3.4	2.3	153
280	360	450	0.33	2.1	3.1	2.0	200
300	380	480	0.29	2.3	3.4	2.3	130
	360	450	0.31	2.2	3.2	2.1	219
	340	430	0.32	2.1	3.2	2.1	285
320	340	430	0.42	1.6	2.4	1.6	234
340	340	430	0.31	2.2	3.2	2.1	145
	320	400	0.29	2.3	3.4	2.3	234
	280	360	0.42	1.6	2.4	1.6	441
360	300	380	0.30	2.3	3.3	2.2	248
380	280	380	0.31	2.1	3.2	2.1	281
	240	360	0.46	1.5	2.2	1.4	487
395	300	360	0.44	–	–	–	192
400	240	320	0.40	1.7	2.5	1.7	317
420	220	300	0.41	1.6	2.4	1.6	358
	190	260	0.32	2.1	3.2	2.1	760

Metric four row taper roller bearings
d 440--1060mm

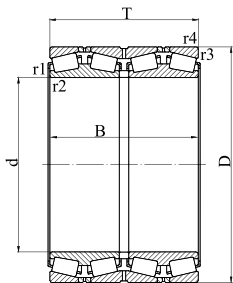


Principal dimensions (mm)					Basic load ratings KN		Designations	
d	D	T	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
440	650	376	6	5	4290	12390	381088	77188
460	620	310	4	3	3360	10200	381992	1077992
	680	410	6	5	5130	14200	381092	77192
480	650	338	5	4	3390	10500	381996	1077996
	700	420	6	5	5780	16900	381096	77196
500	720	420	6	5	5880	17400	3810/500	771/500
530	780	450	6	5	7520	21500	3810/530	771/530
	870	590	7.5	6	9320	26100	3811/530	10777/530
560	750	368	5	4	4370	13300	3819/560	10779/560
	920	620	7.5	6	11200	26100	3811/560	10777/560
600	800	380	5	4	5500	18900	3819/600	10779/600
	870	480	6	5	8370	25400	3810/600	771/600
	980	650	7.5	6	12700	36700	3811/600	10777/600
630	850	418	6	5	6440	19800	3819/630	10779/630
	920	515	7.5	6	9170	26800	3810/630	771/630
	1030	670	7.5	6	14400	39900	3811/630	10777/630
670	900	412	6	5	6940	22300	3819/670	10779/670
	1090	710	7.5	6	15700	39900	3811/670	10777/670
710	1030	555	7.5	6	11200	35800	3810/710	771/710
	1150	750	9.5	8	17100	50900	3811/710	10777/710
750	1090	605	7.5	6	13100	42400	3810/750	771/750
	1220	840	9.5	8	21900	68000	3811/750	10777/750
950	1360	880	7.5	6	23300	83600	3820/950	20771/950
1060	1500	1000	9.5	8	29100	105000	3820/1060	20771/1060

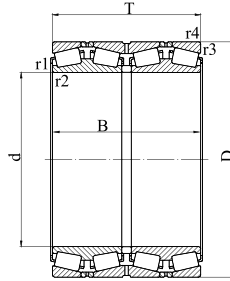


Bore (mm) d	Speed ratings (rpm)		Calculation factors				Ref. Mass
	Grease	Oil	e	Y ₁	Y ₂	Y ₀	kg
440	200	280	0.43	1.6	2.3	1.5	401
460	200	280	0.40	1.7	2.5	1.7	173
	180	240	0.31	2.2	3.2	2.1	476
480	190	260	0.42	1.6	2.4	1.6	301
	170	220	0.32	2.1	3.1	2.1	547
500	160	200	0.33	2.1	3.1	2.0	565
530	140	180	0.38	1.8	2.6	1.7	744
	120	160	0.46	1.5	2.2	1.4	1422
560	140	180	0.43	1.6	2.3	1.5	456
	100	140	0.39	1.7	2.6	1.7	1635
600	120	160	0.33	2.1	3.1	2.0	536
	100	140	0.41	1.7	2.5	1.6	995
	90	120	0.32	2.1	3.2	2.1	1970
630	100	140	0.40	1.7	2.5	1.7	720
	95	130	0.42	1.6	2.4	1.6	1158
	85	110	0.30	2.2	3.3	2.2	2201
670	95	130	0.44	1.5	2.3	1.5	959
	75	95	0.32	2.1	3.2	2.1	2665
710	75	95	0.43	1.6	2.3	1.5	1568
	67	85	0.32	2.1	3.2	2.1	3227
750	70	90	0.43	1.6	2.4	1.6	1874
	48	80	0.32	2.1	3.2	2.1	3994
950	–	–	0.26	2.6	3.8	2.6	4087
1060	–	–	0.26	2.6	3.8	2.6	5896

Inch four row taper roller bearings
d 120.650--254.000mm

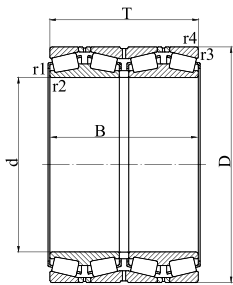


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
120.650	174.625	139.703	141.288	0.8	1.5	737	1560	IFTB1001
127.000	182.562	158.750	158.750	1.5	3.3	781	1760	IFTB1002
139.700	200.025	160.338	157.162	0.8	3.3	858	2080	IFTB1003
152.400	222.250	174.625	174.625	1.5	1.5	1120	2500	IFTB0001
165.100	225.425	168.275	165.100	0.8	3.3	858	2200	IFTB0002
177.800	247.650	192.088	192.088	1.5	3.3	1230	3000	IFTB0003
187.325	269.875	211.138	211.138	1.5	3.3	1650	3800	IFTB0004
190.500	266.700	188.912	187.325	1.5	3.3	1340	3250	IFTB0005
198.438	284.162	225.425	225.425	1.5	3.3	1790	4150	IFTB0006
205.000	320.000	203.500	203.500	4	3	1900	3650	IFTB0007
206.375	282.575	190.500	190.500	0.8	3.3	1300	3350	IFTB0008
220.000	320.000	200.000	200.000	1	3	1760	4050	IFTB0009
	340.000	303.500	303.500	4	3	3080	6700	IFTB0010
220.662	314.325	239.712	239.712	1.5	3.3	2200	5200	IFTB0011
228.600	311.150	200.025	200.025	1.5	3.3	1760	4050	IFTB0012
234.950	327.025	196.850	196.850	1.5	3.3	1540	4250	IFTB0013
240.000	338.000	248.000	248.000	4	3	2380	5500	IFTB0014
	360.000	308.500	308.500	4	3	3300	7350	IFTB0015
241.224	355.498	228.600	228.600	1.5	3.3	2160	5000	IFTB0016
241.478	349.148	228.600	228.600	1.5	3.3	2160	5000	IFTB0017
244.475	327.025	193.675	193.675	1.5	3.3	1830	4300	IFTB0018
	381.000	304.800	304.800	3.3	4.8	2970	6700	IFTB0019
245.000	380.000	254.000	255.500	1.5	4	2640	5600	IFTB0020
247.650	400.050	253.995	249.235	1.5	6.4	2920	6300	IFTB0021
254.000	358.775	269.875	269.875	1.5	3.3	2860	7100	IFTB0022

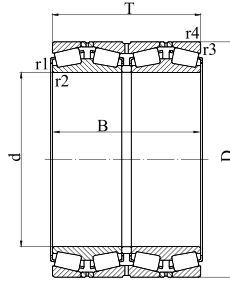


Bore (mm) d	Calculation factors				Ref. designations		Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	TIMKEN	
120.650	0.33	2.0	3.0	2.0	BT4B332406/HA1	M244749D/10/10D	11.2
127.000	0.30	2.3	3.4	2.2	BT4B330880/HA1	48290DW/20/20D	14.5
139.700	0.33	2.0	3.0	2.0	331138A	48680D/20/20D	15.5
152.400	0.33	2.0	3.0	2.0	331329	M231649D/10/10CD	23.2
165.100	0.37	1.8	2.7	1.8	330835C	46791DW/20/21D	20.5
177.800	0.44	1.5	2.3	1.4	331480	67791DW/20/21D	29.0
187.325	0.33	2.0	3.0	2.0	331382	M238849DW/10/10CD	41.0
190.500	0.48	1.4	2.1	1.4	331249	67885DW/20/20CD	33.5
198.438	0.33	2.0	3.0	2.0	330899A	M240648D/11/11D	47.5
205.000	0.46	1.5	2.2	1.4	BT4B328065/HA1		54.5
206.375	0.50	1.5	2.0	1.3	331486	67986DW/20/21CD	36.5
220.000	0.33	2.0	3.0	2.0	BT4B328348/HA1		54.0
	0.43	1.6	2.3	1.6	BT4B328003/HA1		100
220.662	0.33	2.0	3.0	2.0	331156	M244249DW/10/10CD	61.5
228.600	0.33	2.0	3.0	2.0	BT4B332637/HA1	LM245149DW/10/10D	43.5
234.950	0.40	1.7	2.5	1.6	331399	8576DW/20/20CD	54.0
240.000	0.40	1.7	2.5	1.6	BT4B328015/HA1		70.0
	0.33	2.0	3.0	2.0	BT4B328508		110
241.224	0.35	1.9	2.9	1.8	331787	EE127094D/138/139D	81.5
241.478	0.35	1.9	2.9	1.8	330782A	EE127097DW/135/136D	74.5
244.475	0.33	2.0	3.0	2.0	330862B	LM247748DW/10/10D	46.0
	0.52	1.3	1.9	1.3	BT4B328690/HA1	EE126096DW/150/151D	130
245.000	0.44	1.5	2.3	1.4	331398		105
247.650	0.40	1.7	2.5	1.6	614096B	EE220975DW/1575/1576D	120
254.000	0.33	2.0	3.0	2.0	331275A	M249748DW/10/10CD	88.0

Inch four row taper roller bearings
d 260.000--330.200mm

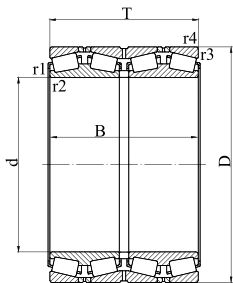


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
260.000	440.000	298.500	298.500	2.5	5	3910	7350	IFTB0023
260.350	422.275	317.500	314.325	6.4	3.3	4130	8000	IFTB0024
266.700	355.600	228.600	230.188	1.5	3.3	2050	5600	IFTB0025
269.875	381.000	282.575	282.575	3.3	3.3	3080	7500	IFTB0026
276.225	393.700	269.875	269.878	1.5	6.4	2970	6400	IFTB0027
279.400	381.000	269.875	269.875	1.5	3.3	2920	7500	IFTB0028
	393.700	269.875	269.875	1.5	6.4	3030	7100	IFTB0029
279.578	380.898	244.475	244.475	1.5	3.3	2290	6400	IFTB0030
280.000	380.000	290.000	290.000	1	2.5	3030	8000	IFTB0031
	395.000	288.000	288.000	2.5	4	3470	8300	IFTB0032
	420.000	250.000	250.000	2	5	3190	6550	IFTB0033
	460.000	324.000	324.000	6	6	4680	9300	IFTB0034
285.750	380.898	244.475	244.475	1.5	3.3	2290	6400	IFTB0035
292.100	422.275	269.875	269.875	6.4	3.3	3520	8000	IFTB0036
300.000	440.000	279.400	280.988	3.3	4.8	3190	7800	IFTB0037
	460.000	388.500	388.500	5	5	5390	12500	IFTB0038
300.038	422.275	311.150	311.150	3.3	3.3	3800	9500	IFTB0039
304.648	438.048	279.400	280.990	3.3	4.8	3470	8000	IFTB0040
304.800	419.100	269.875	269.875	1.5	6.4	3360	8150	IFTB0041
	482.600	377.825	365.125	3.3	3.3	5010	10400	IFTB0042
304.902	412.648	266.700	266.700	3.3	3.3	3080	8000	IFTB0043
317.500	422.275	269.875	269.875	1.5	3.3	3080	8150	IFTB0044
	438.150	276.225	276.225	1.5	3.3	3520	8300	IFTB0045
	447.675	327.025	327.025	3.3	3.3	4400	10800	IFTB0046
330.200	444.500	301.625	301.625	3.3	3.3	3690	9650	IFTB0047

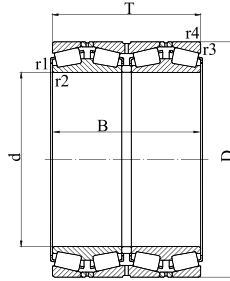


Bore (mm) d	Calculation factors				Ref. designations		Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	TIMKEN	
260.000	0.54	1.5	1.8	1.3	BT4B328551/HA1		190
260.350	0.33	2.0	3.0	2.0	BT4B331487G/HA1	HM252349DGW/10/10D	180
266.700	0.37	1.8	2.7	1.8	330822B	LM451349DW/10/10CD	63.5
269.875	0.33	2.0	3.0	2.0	BT4B331168B	M252349D/10/10CD	105
276.225	0.40	1.7	2.5	1.6	331288	EE275109DW/55/56CD	100
279.400	0.35	1.9	2.9	1.8	BT4B328293/HA1		91.0
	0.37	1.8	2.7	1.8	BT4B332390/HA1	EE135111DW/55/56D	102
279.578	0.43	1.6	2.3	1.6	330540A	LM654644DW/10/10CD	86.0
280.000	0.28	2.4	3.6	2.5	BT4B328613G/HA1		95.0
	0.28	2.4	3.6	2.5	BT4B328807/HA1		110
	0.35	1.9	2.9	1.8	BT4B328664/HA1		115
	0.35	1.9	2.9	1.8	BT4B332441G/HA1		215
285.750	0.43	1.6	2.3	1.6	330337A	LM654648DW/10/10CD	81.0
292.100	0.31	2.2	3.3	2.2	331968	EE330116DGW/66/67D	125
300.000	0.43	1.6	2.3	1.6	BT4B328725G/HA1		145
	0.33	2.0	3.0	2.0	BT4B332472		240
300.038	0.33	2.0	3.0	2.0	331287	HM256849D/10/10CD	140
304.648	0.48	1.4	2.1	1.4	331492	M757448DW/10/10D	135
304.800	0.33	2.0	3.0	2.0	BT4B331687/HA1	M257149DW/10/10D	110
	0.35	1.9	2.9	1.8	330693C		265
304.902	0.31	2.2	3.3	2.2	330758A	M257248DW/10/10D	105
317.500	0.31	2.2	3.3	2.2	330870A	LM258648DW/10/10D	105
	0.43	1.6	2.3	1.6	BT4B334020G/HA4		125
	0.33	2.0	3.0	2.0	BT4B331161AG/HA1	HM259049D/10/10CD	165
330.200	0.33	2.0	3.0	2.0	BT4B332647G/HA1	M260149DW/10/10D	135

Inch four row taper roller bearings
d 330.302--406.400mm

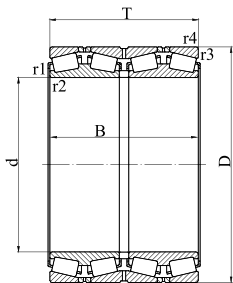


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
330.302	438.023	254.000	247.650	1.5	3.3	2600	7350	IFTB0048
333.375	469.900	342.900	342.900	3.3	3.3	4570	11400	IFTB0049
340.000	520.000	323.500	323.500	1.5	5	5230	10400	IFTB0050
342.900	571.500	342.900	342.540	3.3	6.4	6270	11600	IFTB0051
343.052	457.098	254.000	254.000	1.5	3.3	2810	6800	IFTB0052
346.075	488.950	358.775	358.775	3.3	3.3	4950	12500	IFTB0053
347.662	469.900	260.350	260.350	1.5	3.3	3800	10200	IFTB0054
	469.900	292.100	292.100	3.3	3.3	3800	10200	IFTB0055
355.000	490.000	316.000	316.000	1.5	3.3	4130	11000	IFTB0056
355.600	482.600	269.875	265.112	1.5	3.3	3190	8000	IFTB0057
	488.950	317.500	317.500	1.5	3.3	4130	11000	IFTB0058
360.000	510.000	380.000	380.000	2	6	5610	14300	IFTB0059
	540.000	280.000	280.000	5	5	4400	9000	IFTB0060
368.300	523.875	382.588	382.588	3.3	6.4	5380	15000	IFTB0061
374.650	501.650	260.350	250.825	1.5	3.3	3360	8150	IFTB1061
380.000	560.000	325.000	325.000	2	5	5500	11800	IFTB0062
	560.000	360.000	360.000	2	6	6160	13700	IFTB0063
	620.000	368.000	368.000	6	6	7040	13700	IFTB0064
384.175	546.100	400.050	400.050	3.3	6.4	6440	16600	IFTB0065
385.762	514.350	317.500	317.500	3.3	3.3	4290	12000	IFTB0066
395.000	545.000	288.900	268.000	5	10	2910	9500	IFTB0067
406.400	546.100	288.925	268.288	1.5	6.4	3910	9500	IFTB0068
	546.100	288.925	288.925	1.5	6.4	4020	10200	IFTB0069
	565.150	381.000	381.000	3.3	6.4	6050	15600	IFTB0070
	590.550	400.050	400.050	3.3	6.4	6930	16600	IFTB0071

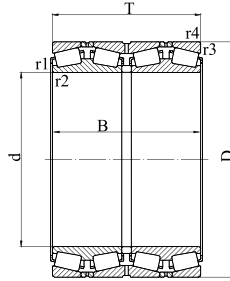


Bore (mm) d	Calculation factors				Ref. designations		Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	TIMKEN	
330.302	0.46	1.5	2.2	1.4	331664	EE138131D/72/73XD	110
333.375	0.33	2.0	3.0	2.0	331381	HM261049DW/10/10CD	190
340.000	0.30	2.3	3.4	2.2	BT4B332963/HA1		245
342.900	0.33	2.0	3.0	2.0	BT4B331553/HA1		365
343.052	0.48	1.4	2.1	1.4	330661C	LM761649DW/10/10D	110
346.075	0.33	2.0	3.0	2.0	331228	HM262749D/10/10CD	220
347.662	0.33	2.0	3.0	2.0	BT4B331077AG/HA1	LM262449DW/10/10D	130
	0.33	2.0	3.0	2.0	331092A	M262449DW/10/10D	150
355.000	0.33	2.0	3.0	2.0	331508		185
355.600	0.48	1.4	2.1	1.4	330662AG	LM763449DW/10/10D	140
	0.33	2.0	3.0	2.0	331271	M263349DW/10/10D	195
360.000	0.33	2.0	3.0	2.0	332059		255
	0.44	1.5	2.3	1.4	BT4B3328159/HA1		230
368.300	0.33	2.0	3.0	2.0	331159A	HM265049DW/10/10CD	275
374.650	0.48	1.4	2.1	1.4	BT4B332188/HA1	LM765149DW/10/10D	140
380.000	0.31	2.2	3.3	2.2	BT4B3328294/HA1		265
	0.40	1.7	2.5	1.6			295
	0.43	1.6	2.3	1.6			438
384.175	0.33	2.0	3.0	2.0	331149A	HM266449DW/10/10CD	310
385.762	0.43	1.6	2.3	1.6	331202	LM665949DGW/10/10CD	190
395.000	0.48	1.4	2.1	1.4	BT4B332824/HA1		195
406.400	0.48	1.4	2.1	1.4	331465	LM867949DGW/10/11	185
	0.48	1.4	2.1	1.4	BT4B330650CG	LM767749DW/10/10D	185
	0.33	2.0	3.0	2.0	BT4B331347AG/HA1	M267949DGW/10/10D	300
	0.33	2.0	3.0	2.0	331133A	EE833161DGW/231/233D	370

Inch four row taper roller bearings
d 409.575--479.425mm

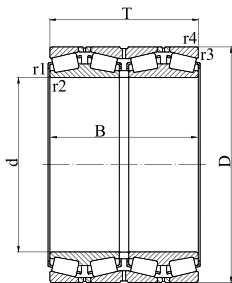


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
409.575	546.100	334.962	334.962	1.5	6.4	4680	13200	IFTB0072
415.925	590.550	434.975	434.975	3.3	6.4	7210	19300	IFTB0073
420.000	560.000	437.000	437.000	4	6	5830	16300	IFTB0074
	620.000	355.000	355.000	2	5	6440	14600	IFTB0075
430.000	570.000	336.550	336.550	1.5	3.3	4950	14000	IFTB0076
431.800	571.500	279.400	279.400	1.5	3.3	3690	9650	IFTB0077
	571.500	336.550	336.550	1.5	3.3	4950	14000	IFTB0078
	635.000	355.600	355.600	6.4	6.4	6600	15000	IFTB0079
440.000	580.000	420.000	420.000	4.5	6.7	6050	17600	IFTB0080
	650.000	353.500	353.500	6.4	6.4	6600	15000	IFTB0081
444.500	571.500	336.550	336.550	1.5	3.3	4950	14300	IFTB0082
447.675	635.000	463.550	463.550	3.3	6.4	8250	22000	IFTB0083
450.000	580.000	450.000	450.000	3	6	6160	19600	IFTB0084
	595.000	368.000	368.000	3	6	5500	16300	IFTB0085
	595.000	404.000	404.000	3	6	5500	16300	IFTB0086
457.073	730.148	419.100	412.750	1.5	6.4	8970	19600	IFTB0087
457.200	596.900	279.400	276.225	1.5	3.3	4180	10800	IFTB0088
	596.900	320.000	320.000	3.3	3.3	4840	13700	IFTB0089
460.000	610.000	360.000	360.000	3	6	6050	16300	IFTB0090
	610.000	400.000	400.000	2.5	4	6270	17300	IFTB0091
	625.000	421.000	421.000	3	9	7210	20000	IFTB0092
462.000	615.950	330.200	330.200	3.3	6.4	5500	15000	IFTB0093
475.000	600.000	368.000	368.000	2	6	5280	16600	IFTB0094
	660.000	450.000	450.000	4	6	8580	22400	IFTB0095
479.425	679.450	495.300	495.300	3.3	6.4	9350	22500	IFTB0096

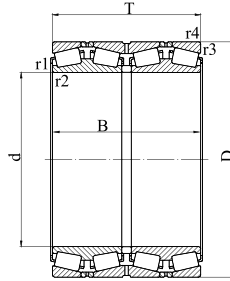


Bore (mm) d	Calculation factors				Ref. designations		Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	TIMKEN	
409.575	0.43	1.6	2.3	1.6	BT4B331333/HA1	M667949D/11/11D	220
415.925	0.33	2.0	3.0	2.0	331160A	M268749DW/10/10CD	395
420.000	0.31	2.2	3.3	2.2	BT4B328826G/HA1		285
	0.31	2.2	3.3	2.2	BT4B328374/HA1		375
430.000	0.44	1.5	2.3	1.4	331192A		240
431.800	0.54	1.5	2.0	1.3	331125A	LM869449DW/10/10CD	200
	0.44	1.5	2.3	1.4	BT4B331226/HA1	LM769349DW/10/10D	240
	0.33	2.0	3.0	2.0	332060	EE931070DGW/250/251XD	385
440.000	0.26	2.6	3.9	2.5	BT4B328829/HA1		300
	0.33	2.0	3.0	2.0	332313		410
444.500	0.31	2.2	3.3	2.2	BT4B328670		215
447.675	0.33	2.0	3.0	2.0	330608C	M270749ADW/10/10CD	485
450.000	0.24	2.8	4.2	2.8	BT4B328161/HA1		280
	0.33	2.0	3.0	2.0	BT4B332773/HA1	M270449DA/10/10D	285
	0.33	2.0	3.0	2.0	BT4B328365/HA1	M270449DA/410	305
457.073	0.40	1.7	2.5	1.6	BT4B328287G/HA1	EE671798DGW/2873/2875D	630
457.200	0.48	1.4	2.1	1.4	331169A	L770847DW/10/10D	200
	0.44	1.5	2.3	1.4	BT4B334006		235
460.000	0.33	2.0	3.0	2.0	331977		295
	0.28	2.4	3.6	2.5	BT4B328285		315
	0.33	2.0	3.0	2.0	BT4B332502/HA1	M271149DW/10/10D	382
462.000	0.40	1.7	2.5	1.6	BT4B328692		275
475.000	0.30	2.3	3.4	2.2	BT4B328913G/HA1		250
	0.30	2.3	3.4	2.2	BT4B329007/HA1		460
479.425	0.33	2.0	3.0	2.0	330886B	M272749DW/10/10D	605

Inch four row taper roller bearings
d 482.600--584.200mm

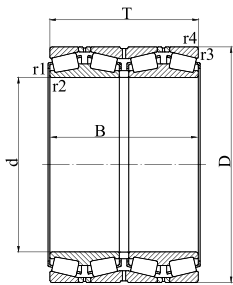


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
482.600	615.950	330.200	330.200	6.4	6.4	5120	15300	IFTB0097
	615.950	330.200	419.100	3.5	6.4	5120	15300	IFTB0098
	630.000	420.000	420.000	3.3	6.4	6600	19300	IFTB0099
	647.700	417.512	417.512	3.3	6.4	7210	20000	IFTB0100
488.950	622.300	365.125	365.125	3	3	5610	17300	IFTB0101
489.026	634.873	320.675	320.675	3.3	3.3	5120	14600	IFTB0102
500.000	720.000	400.000	400.000	3	6	8250	20400	IFTB0103
501.650	673.100	387.350	400.050	3.3	6.4	7210	19300	IFTB0104
	711.200	520.700	520.700	3.3	6.4	10200	27500	IFTB0105
508.000	762.000	463.550	463.550	6.4	6.4	10100	23200	IFTB0106
510.000	655.000	379.000	377.000	1.5	6.4	6270	19000	IFTB0107
514.350	673.100	422.275	422.275	3.3	6.4	7210	21600	IFTB0108
519.112	736.600	536.575	536.575	3.3	6.4	11400	31000	IFTB0109
520.700	711.200	400.050	400.050	3.3	6.4	7480	19600	IFTB0110
536.575	761.873	558.800	558.800	3.3	6.4	11700	32000	IFTB0111
540.000	690.000	400.000	400.000	3	6	5720	16300	IFTB0112
	690.000	400.000	434.000	1	5	5720	16300	IFTB0113
558.800	736.600	322.268	322.268	3.3	6.4	6270	16600	IFTB0114
	736.600	409.575	409.575	3.3	6.4	7650	22000	IFTB0115
	736.600	457.200	455.612	3.3	6.4	8420	26000	IFTB0116
560.000	920.000	618.000	618.000	7.5	7.5	16500	34000	IFTB0117
571.500	812.800	593.725	593.725	3.3	6.4	12100	32000	IFTB0118
584.200	730.250	349.250	342.900	1.5	3.3	5500	17000	IFTB0119
	762.000	401.638	396.875	3.3	6.4	7650	22400	IFTB0120
	901.700	539.747	523.080	3.3	9.7	13400	28000	IFTB0121

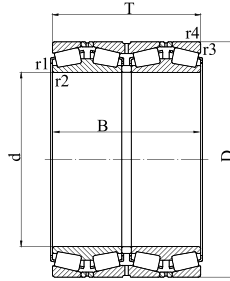


Bore (mm) d	Calculation factors				Ref. designations		Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	TIMKEN	
482.600	0.33	2.0	3.0	2.0	332096	LM272249DW/10/10D	245
	0.33	2.0	3.0	2.0	BT4B331626A/HA1	LM272249DWA/10/10D	265
	0.33	2.0	3.0	2.0	BT4B328773G/HA1		345
	0.33	2.0	3.0	2.0	331259	M272647DGW/10/10D	400
488.950	0.35	1.9	2.9	1.8	BT4B328391G/HA1		265
489.026	0.35	1.9	2.9	1.8	331090A	LM772749DW/10/10D	270
500.000	0.35	1.9	2.9	1.8	BT4B328524/HA1		550
501.650	0.31	2.2	3.3	2.2	BT4B331499G/HA1	EE641198DGW/265/266D	395
	0.33	2.0	3.0	2.0	331081A	M274149DW/10/10D	755
508.000	0.37	1.8	2.7	1.8	332131	EE531201DGW/300/301XD	730
510.000	0.33	2.0	3.0	2.0	BT4B331747A		330
514.350	0.31	2.2	3.3	2.2	331157A	LM274449DW/10/10D	410
519.112	0.33	2.0	3.0	2.0	331078A	M275349D/10/10D	755
520.700	0.33	2.0	3.0	2.0	BT4B331243A/HA1	LM275349DGW/10/10D	460
536.575	0.33	2.0	3.0	2.0	BT4B331174/HA1	M276449ADW/10/10D	835
540.000	0.33	2.0	3.0	2.0	331978		375
	0.33	2.0	3.0	2.0	BT4B334038G/HA3		400
558.800	0.35	1.9	2.9	1.8	331165A	EE843220DW/90/91CD	375
	0.35	1.9	2.9	1.8	330993BG	LM377449DW/10/10CD	475
	0.33	2.0	3.0	2.0	BT4B331346A/HA1	LM277149DA/10/10D	545
560.000	0.40	1.7	2.5	1.6	BT4B328509/HA4		1700
571.500	0.33	2.0	3.0	2.0	330529B	M278749DW/10/10D	1000
584.200	0.43	1.6	2.3	1.6	331189		330
	0.48	1.4	2.1	1.4	331148A	LM778549DW/10/10D	485
	0.33	2.0	3.0	2.0	BT4B328314G/HA1	EE665231DGW/355/356D	1250

Inch four row taper roller bearings
d 585.788--711.200mm

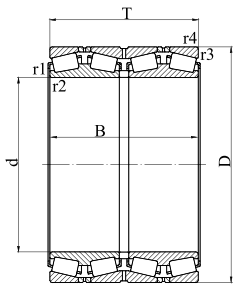


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
585.788	771.525	479.425	479.425	3.3	6.4	9900	30000	IFTB0122
595.312	844.550	615.950	615.950	3.3	6.4	13400	36500	IFTB0123
596.900	980.000	609.600	604.838	6.4	12.7	16800	36500	IFTB0124
600.000	870.000	488.000	488.000	3	6	12500	29000	IFTB0125
603.250	857.250	622.300	622.300	3.3	6.4	14700	40500	IFTB0126
609.600	787.400	361.950	361.950	3.3	6.4	7370	21200	IFTB0127
	813.562	479.425	479.425	3.3	6.4	10600	30500	IFTB0128
	863.600	660.400	660.400	3.3	6.4	15100	41500	IFTB0129
620.000	800.000	363.500	363.500	3	6	7480	21600	IFTB0130
635.000	901.700	654.050	654.050	3.3	6.4	15700	45000	IFTB0131
646.112	857.250	542.925	542.925	3.3	6.4	12100	36500	IFTB0132
650.000	915.000	674.000	674.000	3.3	6.4	16100	45000	IFTB0133
	1030.000	560.000	560.000	15	10	16500	36500	IFTB0134
657.225	933.450	676.275	676.275	3.3	6.4	17200	49000	IFTB0135
660.000	855.000	318.480	319.192	4.8	9.7	6160	17000	IFTB0136
	855.000	318.500	318.500	5	7.5	7040	18600	IFTB0137
660.400	812.800	365.125	365.125	3.3	6.4	6710	22400	IFTB0138
676.000	910.000	620.000	620.000	4	8	14200	41500	IFTB0139
679.450	901.700	552.450	552.450	3.3	6.4	12300	36500	IFTB0140
682.625	965.200	701.675	701.675	3.3	6.4	17600	50000	IFTB0141
685.800	876.300	355.600	352.425	3.3	6.4	7210	22000	IFTB0142
	876.300	355.600	434.975	3.3	6.4	7210	22000	IFTB0143
708.025	930.275	565.150	565.150	3.3	6.4	13000	39000	IFTB0144
710.000	900.000	410.000	410.000	3	6	8800	26500	IFTB0145
711.200	914.400	317.500	317.500	3.3	6.4	7040	19300	IFTB0146

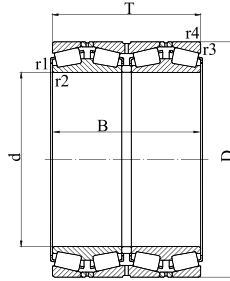


Bore (mm) d	Calculation factors				Ref. designations		Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	TIMKEN	
585.788	0.33	2.0	3.0	2.0	331093A	LM278849D/10/10D	625
595.312	0.33	2.0	3.0	2.0	331300	M280049D/10/10D	1115
596.900	0.40	1.7	2.5	1.6	331566		1920
600.000	0.33	2.0	3.0	2.0	BT4B328350G/HA1		940
603.250	0.33	2.0	3.0	2.0	331625	M280249DGW/10/10XD	1235
609.600	0.37	1.8	2.7	1.8	331175A	EE649242DW/310/311CD	455
	0.33	2.0	3.0	2.0	331925	LM280249DW/10/10D	715
	0.31	2.2	3.3	2.2	332391	M280349D/10/10D	1240
620.000	0.37	1.8	2.7	1.8	BT4B328510/HA1		465
635.000	0.33	2.0	3.0	2.0	330990A	M281049D/10/10D	1420
646.112	0.33	2.0	3.0	2.0	BT4B332671/HA1	LM281049DW/10/10D	875
650.000	0.33	2.0	3.0	2.0	332307	M281349DGW/10/10D	1430
	0.31	2.2	3.3	2.2	BT4B332827AG/HA1		1830
657.225	0.33	2.0	3.0	2.0	330824A	M281649D/10/10D	1575
660.000	0.35	1.9	2.9	1.8	BT4B331065AG/HA4	EE749259DGW/334/335D	490
	0.35	1.9	2.9	1.8	BT4B328511/HA1		490
660.400	0.33	2.0	3.0	2.0	331190	L281149D/10/10CD	420
676.000	0.33	2.0	3.0	2.0	BT4B332906/HA4		1150
679.450	0.33	2.0	3.0	2.0	331700	LM281849DW/10/10D	975
682.625	0.33	2.0	3.0	2.0	331503G/HA1	M282249D/10/10D	1750
685.800	0.43	1.6	2.3	1.6	331089	EE655271D/345/346D	530
	0.43	1.6	2.3	1.6	BT4B328704G/HA1	EE655271DWA/345/346D	580
708.025	0.33	2.0	3.0	2.0	BT4B332098A/HA4	LM282549D/10/10D	1030
710.000	0.35	1.9	2.9	1.8	331351	L882449DGW/10/10D	660
711.200	0.37	1.8	2.7	1.8	330882C	EE755281D/360/361CD	525

Inch four row taper roller bearings
d 714.375--1004.634mm

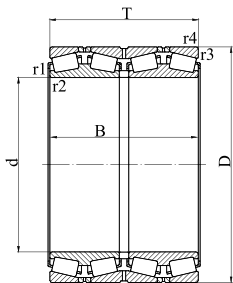


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
714.375	1016.000	704.850	704.850	3.3	6.4	18700	53000	IFTB0147
717.550	946.150	565.150	565.150	3.3	6.4	13400	40500	IFTB0148
730.000	940.000	500.000	500.000	3.5	8	12100	36000	IFTB0149
730.250	1035.050	755.650	755.650	3.3	6.4	20500	58500	IFTB0150
749.300	990.600	605.000	605.000	3.3	6.4	15000	45500	IFTB0151
	1066.800	736.600	723.900	25.4 × 20°	12.7	20500	58500	IFTB0152
750.000	1130.000	690.000	690.000	4	7.5	20100	46500	IFTB0153
762.000	1066.800	736.600	723.900	8	12.7	20500	58500	IFTB0154
	1079.500	787.400	787.400	4.8	12.7	22400	65500	IFTB0155
812.800	1143.000	768.350	768.350	6.4	12.7	22000	63000	IFTB0156
825.500	1168.400	844.550	844.550	4.8	12.7	26000	76500	IFTB0157
850.000	1360.000	910.000	910.000	6	12	34700	83000	IFTB0158
863.600	1130.300	644.525	717.550	9.7	3.3	19800	62000	IFTB0159
	1130.300	669.925	669.925	4.8	12.7	19800	62000	IFTB0160
	1169.987	844.550	844.550	4.8	12.7	23800	76500	IFTB0161
	1181.100	666.750	666.750	4.8	12.7	20900	57000	IFTB0162
	1219.200	889.000	876.300	4.8	12.7	28100	81500	IFTB0163
887.888	1220.000	844.550	844.550	4.8	12.7	26000	76500	IFTB0164
889.000	1219.200	784.225	880.000	9.7	3.3	27000	78000	IFTB0165
901.700	1295.400	914.400	901.700	4.8	12.7	30800	86500	IFTB0166
938.213	1270.000	825.500	825.500	4.8	12.7	26000	81500	IFTB0167
939.800	1333.500	952.500	952.500	4.8	12.7	31900	95000	IFTB0168
1001.000	1360.000	800.000	800.000	12	12.7	27500	81500	IFTB0169
1003.300	1358.900	800.100	800.100	4.8	12.7	27500	81500	IFTB0170
1004.634	1308.100	730.250	812.800	12.7	3.3	24600	76500	IFTB0171

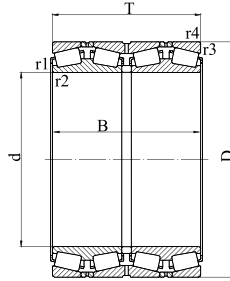


Bore (mm) d	Calculation factors				Ref. designations		Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	TIMKEN	
714.375	0.35	1.9	2.9	1.8	BT4B331358/HA4	M383240D/10/10D	1950
717.550	0.33	2.0	3.0	2.0	332244	LM282847DW/10/10D	1900
730.000	0.35	1.9	2.9	1.8	331752		925
730.250	0.33	2.0	3.0	2.0	330803A	M283449DW/10/10D	2170
749.300	0.33	2.0	3.0	2.0	331616	LM283649D/10/10D	1250
	0.33	2.0	3.0	2.0	331094A	EE325296D/420/421XD	2250
750.000	0.48	1.4	2.1	1.4	BT4B328376/HA4		2430
762.000	0.33	2.0	3.0	2.0	331907	M284148DW/11/10D	2145
	0.33	2.0	3.0	2.0	330676B	M284249DW/10/10D	2480
812.800	0.33	2.0	3.0	2.0	331248		2590
825.500	0.33	2.0	3.0	2.0	BT4B331066A/HA4	M285848DW/10/10D	3050
850.000	0.35	1.9	2.9	1.8	331069		5440
863.600	0.33	2.0	3.0	2.0	BT4B332571/HA4		2100
	0.33	2.0	3.0	2.0	BT4B331123B	LM286248DW/10/10D	1900
	0.33	2.0	3.0	2.0	BT4B332967/HA4		2700
	0.33	2.0	3.0	2.0	BT4B331649/HA4	LM286449D/10/10D	2150
	0.33	2.0	3.0	2.0	BT4B330742A/HA4	EE547341D/480/481D	3470
887.888	0.33	2.0	3.0	2.0	BT4B332981/HA4	LM286749D/711	3080
889.000	0.33	2.0	3.0	2.0	BT4B332602/HA4		3340
901.700	0.33	2.0	3.0	2.0	330903A	EE634356D/510/510D	4170
938.213	0.35	1.9	2.9	1.8	330726A	LM287649D/10/10D	3230
939.800	0.33	2.0	3.0	2.0	BT4B330944AG/HA4	LM287849DW/10/10D	4510
1001.000	0.31	2.2	3.3	2.2	BT4B334031/HA1		3390
1003.300	0.31	2.2	3.3	2.2	BT4B331372/HA4		3450
1004.634	0.33	2.0	3.0	2.0	BT4B332720/HA4		3060

Inch four row taper roller bearings
d 1070.000--1250.000mm



Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
1070.000	1400.000	889.762	889.762	4	12	30300	100000	IFTB0172
1080.000	1450.000	950.000	950.000	5	12	33600	108000	IFTB0173
1139.825	1509.712	923.925	923.925	4.8	12.7	33600	108000	IFTB0174
1200.150	1593.850	990.600	990.600	4.8	12.7	38000	125000	IFTB0175
1250.000	1550.000	890.000	890.000	5	12	30300	114000	IFTB0176



Bore (mm) d	Calculation factors				Ref. designations		Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	TIMKEN	
1070.000	0.33	2.0	3.0	2.0	BT4B328100/HA4	JLM288449DW/410	3730
1080.000	0.33	2.0	3.0	2.0	BT4B331559/HA4		4450
1139.825	0.31	2.2	3.3	2.2	BT4B331334/HA4		4840
1200.150	0.33	2.0	3.0	2.0	331440	LM288949D/10/10D	5635
1250.000	0.33	2.0	3.0	2.0	BT4B328819G/HA1		3820

**Sealed four row
taper roller bearings**

Sealed four row taper roller bearings

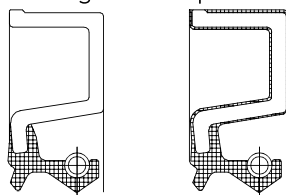
1. Preface

During the process using four row taper roller bearings, because much cooling water spatters around roller axle box or rolling lubricating oil and oxide skin are mixed into oil slurry, working environment of bearing is very bad. Furthermore, the rolls need to be changed rapidly often, making seal ring of bearing box be damaged during loading and unloading process. Actually, majority operation for rolling mill bearings is not ended by fatigue breakdown caused by normal contact pressure. Main failure cause including insufficient lubrication of bearing, mechanical impurities and water intrusion causes damaging bearing: influence of mechanical impurities in lubricant on service life of bearing is very obvious. When particle of mechanical impurities in lubricant is less than $3\mu\text{m}$, there is no influence on fatigue life of bearing; when particle of mechanical impurities in lubricant is more than $40\mu\text{m}$, fatigue life of bearing is shorter by seven times than fatigue life of mechanical impurities with particle being equal to or less than $3\mu\text{m}$. Water in lubricant also has obvious influence on service life of bearing. Although we do not understand actual influence theory of water in lubricant on service life of bearing very clearly, but dissolved water or free water in lubricant will bring harmful influence to service life of bearing. Water can erode bearing and shorten its service life. We can also think that: microscopic cracking is produced on bearing raceway because it bears completely reversed stress. Water enters cracks to cause corrosion and hydrogen brittleness, thereby accelerating expansion of crack, making bearing bigger stripping occur on bearing in advance. At the same time, water and glycol emulsion and its contrary emulsified mixture also can shorten service life of bearing. Although water content of these two emulsified mixtures are different from pollutants, but test result shows that: when water content of lubricant grease is increased to 10%, service life of bearing is only 30% of former service life.

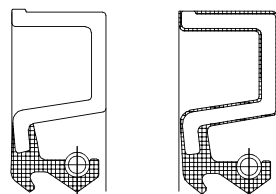
Final reason for influence of mechanical impurities and water on service life of bearing is that: sealing of bearing is not good, which can be proved by direct or indirect use experience. Besides mechanical sealing of former bearing box used by rolling mill bearing, self-sealed rolling mill bearing is developed and popularized, making rolling mill bearing box form a double-layered sealed device, which is an effective method prolonging service life of bearing.

2. Structure type of sealing ring used by rolling mill bearings

Secondary-lip exposure skeleton or encapsulate double-lip seal ring structure (Attached figure1) is generally adopted for structure of sealing ring for self-sealed rolling mill bearings. The seal ring structure is simple, which is very effective for low pressure lubricating system adopted by rolling mill bearings. Especially section shape of seal ring and clamping spring makes lip of seal ring and sealed rotation contact

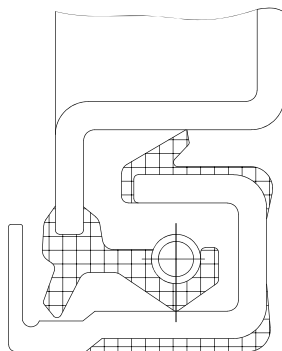


Attached figure 1



Attached figure 2

surface have better tracing ability. With smaller radial force of lip, seal ring has better sealing result. Because of simple assemble and accurate location and good concentricity of double-lip seal ring of expose skeleton, it is often applied widely. Seal ring with cocurrent secondary-lip (Attached figure2), avoids secondary lip turning to adapt to demand of installation and is a better seal ring structure under the situation no forcing cone installed at installation part. Assembled mountable seal ring (Attached figure3) has better sealing property because it cab form oil cavity retaining lubricant grease and form maze after assembled.

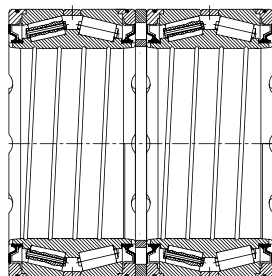


Attached figure 3

However, because space position for installed sealing ring is limited for self-sealed rolling mill four row taper roller bearings and empty cavity formed by two lips is very narrow, main function of seal ring is water proof, it cannot substitute traditional sealing parts for fully-sealing bearing box seat, it just increases an auxiliary layer of water proof sealing inside bearing, which is very effective in improving working environment of bearing.

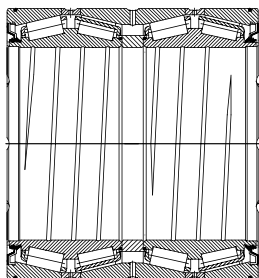
3. Installation part of seal ring for self-sealed rolling mill four row taper roller bearings

Installation part for seal ring of self-sealed rolling mill four row taper roller bearings generally has two following installation structure types: seal ring is fixed on retaining ring (Attached figure 4), width of retaining ring can be used as shoulder block of bearing seat to be installed in bearing box, external surface of retaining ring is sealed through using O seal ring, to avoid intrusion of water and other dirt caused by loose fit between outer ring of bearing and bearing box; lip of seal ring is contacted with prolonged part for smaller retaining side of inner ring of bearing.

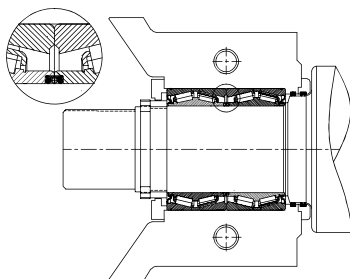


Attached figure 4

The other installation structure is that: seal ring is fixed on outer ring of bearing (Attached figure5), O seal ring is installed on external surface of outer ring for bearing, to avoid intrusion of water and other dirt. Lip of seal ring is contacted with prolonged part for retaining side of inner ring of bearing. Whether to adopt any one of these two self-sealing installation structures, O seal ring or rubber ring are installed between the inner rings or between the inner ring and inner spacer (Attached figure6), to avoid intrusion of water and dirt from gap of axle neck with loose fit. Because main function of seal ring for self-sealed four row taper roller bearings is to avoid intrusion of water and pollutants, but not avoid leakage of lubricant grease. Air side at lip part of seal ring is installed externally. External lip avoids intrusion of external water and impurities; internal lip avoids leakage of lubricant. Although the sealing device is very narrow, because dimension of the bearing is same as that of former bearing without sealing device, self-sealed four row taper roller bearings generally cannot reach bearing capacity of former bearing without seal ring, dynamic load ratings can be reduced by about 10%. However, four row taper



Attached figure 5



Attached figure 6

roller bearings with seal ring improve lubrication condition and clean degree of work for bearing, thereby prolonging operation time of bearing and greatly remedying loss of reducing rated load caused by decrease of rolling contact surface.

4. Advantages of four row taper roller bearings with seal ring

Compared with open type bearing structure without seal ring, four row taper roller bearings with seal ring have many following advantages:

- (1) They can reach longer service life;
- (2) Compared with open type structure without seal ring, consumption of lubricating grease of bearing is obviously decreased;
- (3) Certain period can be prolonged for interval time for maintenance;
- (4) They can use same installation size to replace current open structural bearing without seal ring;
- (5) Seal ring is cast from reinforced thin steel plate framework and fluororubber. It's clamping spring can guarantee certain pressure of lip of seal ring. When work slid speed is less than 35m/s, seal ring has good heat resistance and high chemical stability and work temperature can approximate $-20 \sim +150^{\circ}\text{C}$.

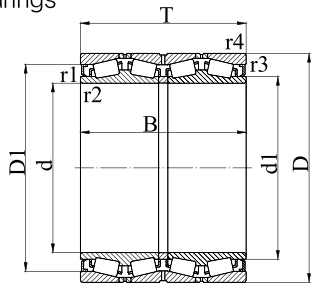
5. Notes during using

(1) When adopt four row taper roller bearings with seal ring, an overflow hole should be set between bearing and external seal of bearing box. Size of hole should be based on distributing water filtered into seal ring of bearing box from the hole and its design should be suitable for rolling mill.

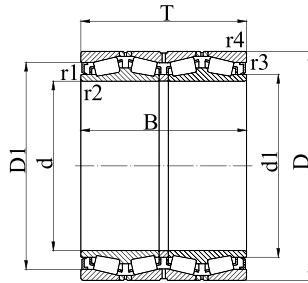
(2) Lubricant grease of rolling mill bearing which can reach one use cycle must be filled in self-sealed four row taper roller bearings. Filled quantity of lubricant grease should be based on filling two thirds of empty cavity in bearing according to size of bearing. Excessive lubricant grease will over flow from lip inside seal ring and block overflow hole of bearing box, which will recue performance of waterproof and pollution prevention.

(3) Special installation tool must be adopted when bearing is installed to avoid damaging sealing device of bearing and guarantee lip of seal ring and its corresponding contact part to reliably form ideal friction pairs.

Sealed four row taper roller bearings
d 152.400--385.762mm

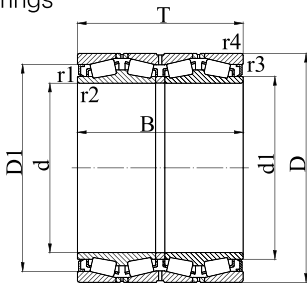


Principal dimensions (mm)								Designations
d	D	T	B	d ₁	D ₁	r _{1,2min}	r _{3,4min}	
152.400	244.475	187.325	192.088	170	218	1.0	3.3	SFTB0001
203.200	317.500	266.700	266.700	230	282	2.5	3.3	SFTB0002
206.375	282.575	226.000	226.000	220	258	0.6	3.3	SFTB0003
220.000	295.000	315.000	315.000	236	272	0.6	2.5	SFTB0004
220.662	314.325	239.712	239.712	241	279	1.5	3.3	SFTB0005
228.600	400.050	296.875	296.875	265	346	2.5	3.3	SFTB0006
240.000	338.000	340.000	340.000	260	306	1.5	4.0	SFTB1007
241.478	349.148	228.600	228.600	265	317	1.5	3.3	SFTB0007
254.000	358.775	269.875	269.875	272	320	1.5	3.3	SFTB0008
260.000	365.000	340.000	340.000	280	327	2.5	3.5	SFTB0009
266.700	355.600	228.600	230.188	285	330	1.5	3.3	SFTB0010
276.225	393.700	269.875	269.875	302	358	1.0	6.4	SFTB0011
279.400	393.700	269.875	269.875	302	358	1.0	6.4	SFTB0012
280.000	395.000	340.000	340.000	302	358	2.5	3.5	SFTB0013
285.750	380.898	244.475	244.475	303	344	1.0	3.3	SFTB0014
300.000	440.000	279.400	280.990	334	393	3.3	4.8	SFTB0015
304.648	438.048	279.400	280.990	334	393	2.0	4.8	SFTB0016
304.800	419.100	269.875	269.875	328	380	1.0	6.4	SFTB0017
304.902	412.648	266.700	266.700	328	374	1.0	3.3	SFTB0018
305.000	438.048	279.400	280.990	334	393	2.0	4.8	SFTB0019
317.500	422.275	269.875	269.875	338	388	1.5	3.3	SFTB0020
333.375	469.900	342.900	342.900	362	426	2.5	3.3	SFTB0021
343.052	457.098	254.000	254.000	362	420	1.0	3.3	SFTB0022
355.600	482.600	269.875	265.112	380	436	1.5	3.3	SFTB0023
385.762	514.350	317.500	317.500	412	470	1.0	3.3	SFTB0024

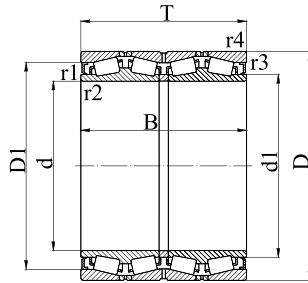


Bore (mm) d	Basic load ratings KN		Calculation factors				Ref. designations		Ref. Mass kg
	Cr	Cor	e	Y ₁	Y ₂	Y ₀	SKF	FAG	
152.400	1300	2160	0.33	2.0	3.0	2.0	BT4B329121G/HA1VA901		30.0
203.200	2460	4900	0.31	2.2	3.3	2.2	BT4B329123G/HA1VA901	577254	76.0
206.375	1300	3350	0.50	1.4	2.0	1.3	BT4B329090G/HA1VA901		40.0
220.000	1510	4050	0.40	1.7	2.5	1.6	BT4B328853G/HA1VA902		55.0
220.662	1790	3800	0.35	1.9	2.9	1.8	BT4B328546G/HA1		56.0
228.600	3360	5700	0.44	1.5	2.3	1.4	BT4B328918G/HA1VA901		148
240.000	2380	5500	0.40	1.7	2.5	1.6	BT4B328854G/HA1VA902		88.0
241.478	1900	3650	0.35	1.9	2.9	1.8	BT4B328668G/HA1	573331	64.0
254.000	2330	5400	0.33	2.0	3.0	2.0	BT4B329071G/HA1VA901	578140	84.0
260.000	3140	8000	0.35	1.9	2.9	1.8	BT4B329093G/HA1VA902		112
266.700	1720	4150	0.35	1.9	2.9	1.8	BT4B328468G/HA1	546485	68.0
276.225	2750	5850	0.37	1.8	2.7	1.8	BT4B328920G/HA1VA901	567712	96.0
279.400	2750	5850	0.37	1.8	2.7	1.8	BT4B328917G/HA1VA901	575940	69.0
280.000	3580	8650	0.33	2.0	3.0	2.0	BT4B329092G/HA1VA901		128
285.750	2200	5500	0.43	1.6	2.3	1.6	BT4B328878G/HA1VA901	564701A	74.0
300.000	3080	6700	0.46	1.5	2.2	1.4	BT4B334126G/HA1VA901		137
304.648	3080	6700	0.46	1.5	2.2	1.4	BT4B334408G/HA1VA901	579080	129
304.800	2860	6950	0.35	1.9	2.9	1.8	BT4B329067G/HA1VA901	567935	108
304.902	2510	6100	0.33	2.0	3.0	2.0	BT4B328278G/HA1	567163	98.0
305.000	3080	6700	0.46	1.5	2.2	1.4	BT4B334076G/HA1VA901	564887	129
317.500	2640	6550	0.33	2.0	3.0	2.0	BT4B334023G/HA1VA901	581035	98.0
333.375	4290	10400	0.33	2.0	3.0	2.0	BT4B328921G/HA1VA901		182
343.052	2700	6400	0.48	1.4	2.9	1.4	BT4B328817G/HA1VA901	564672A	109
355.600	3080	7500	0.46	1.5	2.2	1.4	BT4B328870G/HA1VA901	567934	136
385.762	3910	10000	0.40	1.7	2.5	1.6	BT4B334042G/HA1VA901	573580	174

Sealed four row taper roller bearings
d 406.400--685.800mm

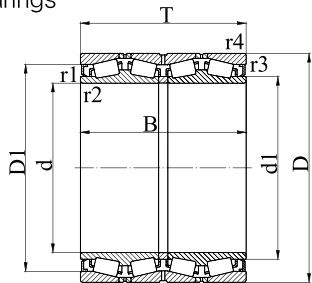


Principal dimensions (mm)								Designations
d	D	T	B	d ₁	D ₁	r _{1,2min}	r _{3,4min}	
406.400	546.100	288.925	288.925	434	498	1.5	6.4	SFTB0025
409.575	546.100	334.962	334.962	434	498	1.0	6.4	SFTB0026
415.925	590.550	434.975	434.975	450	530	3.3	6.4	SFTB0027
416.000	574.000	440.000	440.000	450	530	2.5	5.0	SFTB0028
430.000	575.000	380.000	380.000	458	530	1.5	5.0	SFTB0029
440.000	590.000	480.000	480.000	468	539	1.0	5.0	SFTB0030
450.000	595.000	398.000	398.000	480	554	2.0	6.0	SFTB0031
457.200	596.900	279.400	276.225	484	550	1.5	3.3	SFTB0032
460.000	610.000	360.000	360.000	488	555	3.0	6.0	SFTB0033
475.000	600.000	368.000	368.000	498	560	2.0	6.0	SFTB0034
479.425	679.450	495.300	495.300	360	420	3.3	6.4	SFTB0035
482.600	615.950	330.200	330.200	505	577	1.0	6.4	SFTB0036
489.026	634.873	320.675	320.675	516	588	1.0	3.3	SFTB0037
510.000	655.000	379.000	377.000	536	594	1.5	6.4	SFTB0038
540.000	690.000	434.000	434.000	565	636	2.0	5.0	SFTB0039
558.800	736.600	322.262	322.262	595	685	1.5	6.4	SFTB0040
571.500	812.800	593.725	593.725	625	725	3.3	6.4	SFTB0041
585.788	771.525	479.425	479.425	622	708	4.0	6.4	SFTB0042
609.600	787.400	361.950	361.950	645	735	3.3	6.4	SFTB0043
635.000	901.700	654.050	654.050	692	805	3.3	6.4	SFTB0044
660.000	855.000	318.480	400.842	707	800	4.0	5.0	SFTB1044
660.400	812.800	365.125	385.424	692	784	2.0	6.4	SFTB1045
679.450	901.700	552.450	552.450	722	824	3.3	6.4	SFTB0045
682.625	965.200	701.675	701.675	740	860	3.3	6.4	SFTB0046
685.800	876.300	355.600	352.425	730	818	3.3	6.4	SFTB0047

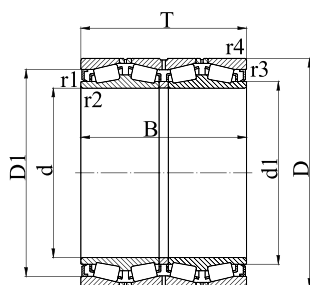


Bore (mm) d	Basic load ratings KN		Calculation factors				Ref. designations		Ref. Mass kg
	Cr	Cor	e	Y ₁	Y ₂	Y ₀	SKF	FAG	
406.400	3910	9500	0.48	1.4	2.1	1.4	BT4B328838G/HA1VA901	572499	183
409.575	4570	12000	0.40	1.7	2.5	1.6	BT4B329004G/HA1VA901	576482	210
415.925	7040	18000	0.33	2.0	3.0	2.0	BT4B328893G/HA1VA901	576306	379
416.000	6050	17000	0.33	2.0	3.0	2.0	BT4B334130G/HA1VA903		341
430.000	5230	14300	0.33	2.0	3.0	2.0	BT4B334095G/HA1VA901		267
440.000	7040	19200	0.28	2.4	3.6	2.5	BT4B334055G/HA1VA902	575693	371
450.000	5500	16300	0.33	2.0	3.0	2.0	BT4B328846G/HA1VA901		301
457.200	3960	10000	0.48	1.4	2.1	1.4	BT4B328827G/HA1VA901	567523	191
460.000	5120	12900	0.37	1.8	2.7	1.8	BT4B328727G/HA1VA901		270
475.000	4730	14000	0.33	2.0	3.0	2.0	BT4B334078G/HA1VA901		235
479.425	8580	22400	0.33	2.0	3.0	2.0	BT4B334116G/HA1VA901	572067	565
482.600	4950	13700	0.33	2.0	3.0	2.0	BT4B328842G/HA1VA901	564694A	232
489.026	4840	12500	0.37	1.8	2.7	1.8	BT4B334014G/HA1VA901	572123	248
510.000	5720	16300	0.35	1.9	2.9	1.8	BT4B334022G/HA1VA901		311
540.000	7040	21200	0.33	2.0	3.0	2.0	BT4B334028G/HA1VA901		392
558.800	5830	14300	0.35	1.9	2.9	1.8	BT4B328864G/HA1VA901	575848	343
571.500	11900	33500	0.33	2.0	3.0	2.0	BT4B334144G/HA1VA901		998
585.788	9520	27500	0.33	2.0	3.0	2.0	BT4B328888G/HA1VA901	575824	596
609.600	6820	18600	0.37	1.8	2.7	1.8	BT4B328871G/HA1VA901	572690	430
635.000	14500	41500	0.35	1.9	2.9	1.8	BT4B334141G/HA1VA901	580638	1354
660.000	6270	17300	0.35	1.9	2.9	1.8	BT4B334002G/HA1VA901		488
660.400	6600	20400	0.33	2.0	3.0	2.0	BT4B328977G/HA1VA901		396
679.450	12100	36000	0.33	2.0	3.0	2.0	BT4B334015G/HA1VA901	575037	975
682.625	17200	49000	0.35	1.9	2.9	1.8	BT4B334060G/HA1VA901		651
685.800	7210	20000	0.37	1.8	2.7	1.8	BT4B328955G/HA1VA901	572930	506

Sealed four row taper roller bearings
d 710.000--863.600mm



Principal dimensions (mm)								Designations
d	D	T	B	d ₁	D ₁	r _{1,2min}	r _{3,4min}	
710.000	900.000	410.000	410.000	753	842	3.0	6.0	SFTB0048
711.200	914.400	317.500	317.500	760	852	2.5	6.4	SFTB0049
749.300	990.600	605.000	605.000	801	900	3.3	6.4	SFTB0050
762.000	1079.500	787.400	784.400	825	964	4.8	12.7	SFTB0051
825.500	1168.400	844.550	844.550	900	1050	4.8	12.7	SFTB0052
863.600	1169.987	844.550	844.550	912	1050	4.8	12.7	SFTB0053



Bore (mm) d	Basic load ratings KN		Calculation factors				Ref. designations		Ref. Mass kg
	Cr	Cor	e	Y ₁	Y ₂	Y ₀	SKF	FAG	
710.000	8250	24000	0.33	2.0	3.0	2.0	BT4B334051G/HA1VA901		602
711.200	6600	17300	0.37	1.8	2.7	1.8	BT4B329010G/HA1VA901		490
749.300	13200	40500	0.37	1.8	2.7	1.8	BT4B334082G/HA1VA901		1274
762.000	21200	61000	0.35	1.9	2.9	1.8	BT4B334075G/HA1VA901		2248
825.500	24600	73500	0.31	2.2	3.3	2.2	BT4B334135G/HA1VA901		2958
863.600	23300	71000	0.37	1.8	2.7	1.8	BT4B334150G/HA4VA901		2630

Four row taper roller bearings without spacer rings

Four row taper roller bearings without spacer rings

Four row taper roller bearings without spacer rings are the latest development of four row taper roller bearings in recent years. They have two structural types: structure without seal rings and structure with seal rings. They have following advantages:

1. Service life of bearing becomes longer because effective cross section of bearing is fully used.
2. Because without spacer rings adopt oil-air lubrication, consumption of lubricating oil is lowered (90% can be saved).
3. Prolong interval time of maintenance and lower maintenance cost.
4. Because there is little lubricant grease in cavity of sealing bearing, pumping of lubricant grease is limited and temperature rise is lower.
5. No unnecessary lubricant grease splatters. No pollution on cooling liquid of steel rolling system. And quality of rolled product is improved.
6. Reduce pollution of environment and conform requirement of energy saving and emissions reduction.

Additional code of four row taper roller bearings without spacer rings is as below:

2LS—Seal ring is set at two faces

G—Spiral groove is set hole of inner ring of bearing

W—Lubricating oil groove is set at endface of outer ring and inner ring

W1—Lubricating oil groove is set at endface of inner ring of bearing

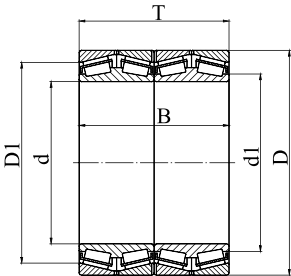
W0—Lubricating oil groove is set at endface of outer ring of bearing

S1—Seal ring or O-shaped ring is set between two inner rings of bearing

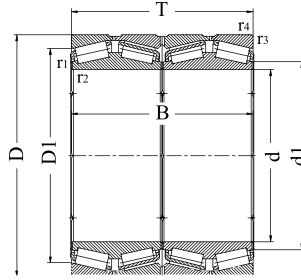
Example of additional code: FTWS0066–2LS/GW1

Four row taper roller bearings
without spacer rings

d 260.350--406.400mm

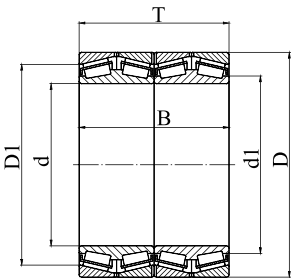


Principal dimensions (mm)								Designations
d	D	T	B	d ₁	D ₁	r _{1,2min}	r _{3,4min}	
260.350	422.275	317.500	314.325	298	372	6.4	3.3	FTWS0001
292.100	422.275	269.875	269.875	324	379	6.4	3.3	FTWS0002
304.800	419.100	269.875	269.875	328	378	1.0	6.4	FTWS0003
	495.300	342.900	342.900	350	440	2.0	6.4	FTWS0004
304.902	412.648	266.700	266.700	325	374	3.3	3.3	FTWS0005
317.500	422.275	269.875	269.875	342	384	1.5	3.3	FTWS0006
	422.275	269.875	269.875	338	389	1.5	3.3	FTWS0007
	447.675	327.025	327.025	340	398	3.3	3.3	FTWS0008
330.302	438.023	254.000	247.650	354	394	1.5	3.3	FTWS0009
333.375	469.900	342.900	342.900	362	420	3.3	3.3	FTWS0010
340.000	520.000	323.500	323.500	378	490	6.0	6.0	FTWS0011
342.900	533.400	301.625	307.975	390	475	3.3	3.3	FTWS0012
343.052	457.098	254.000	254.000	366	413	1.5	3.3	FTWS0013
	457.098	254.000	254.000	362	420	1.0	3.3	FTWS0014
	457.098	254.000	254.000	362	420	1.0	3.3	FTWS0015
347.662	469.900	260.350	260.350	372	430	1.5	3.3	FTWS0016
355.000	490.000	316.000	316.000	382	446	1.5	3.3	FTWS0017
355.600	482.600	269.875	265.113	382	432	1.5	3.3	FTWS0018
	482.600	269.875	265.113	380	436	1.5	3.3	FTWS0019
	488.950	317.500	317.500	392	448	1.5	3.3	FTWS0020
	488.950	317.500	317.500	382	446	1.0	3.3	FTWS0021
360.000	540.000	325.000	325.000	398	485	1.5	3.0	FTWS0022
380.000	560.000	360.000	390.000	417	500	3.3	5.0	FTWS0023
384.175	546.100	400.050	400.050	416	496	3.3	6.4	FTWS0024
385.762	514.350	317.500	317.500	411	471	1.0	3.3	FTWS0025
406.400	546.100	288.925	288.925	434	494	1.5	6.4	FTWS0026

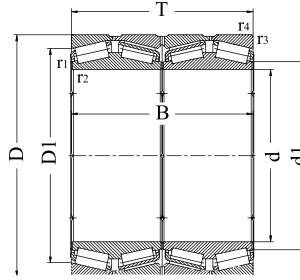


Bore (mm) d	Basic load ratings KN		Calculation factors				Ref. designations	Ref. Mass Kg
	Cr	Cor	e	Y ₁	Y ₂	Y ₀	SKF	
260.350	4460	8000	0.33	2.0	3.0	2.0	BT4B331487BG/HA1	165
292.100	3800	8000	0.31	2.2	3.3	2.2	BT4B331968BG/HA1	125
304.800	2920	6700	0.31	2.2	3.3	2.2	BT4-8057G/HA1C300VA901	105
	5120	9300	0.40	1.7	2.5	1.6	BT4-8061G/HA1C400VA901	245
304.902	3190	7500	0.31	2.2	3.3	2.2	BT4-0004G/HA1	100
317.500	3360	8150	0.31	2.2	3.3	2.2	330870BG	105
	3250	6550	0.33	2.0	3.0	2.0	BT4B334023E1/C675	94.5
	4730	10800	0.33	2.0	3.0	2.0	BT4B331161BG/HA1	165
330.302	2810	7350	0.46	1.5	2.2	1.4	BT4B331664AG/HA1	105
333.375	4130	10200	0.33	2.0	3.0	2.0	BT4-8017/HA1C600VA941	185
340.000	5610	10400	0.30	2.3	3.4	2.2	BT4B332963B/HA1	240
342.900	4730	8800	0.33	2.0	3.0	2.0	BT4-8034G/HA1	240
343.052	3450	6800	0.48	1.4	2.1	1.4	330661E/C475	110
	3350	6400	0.48	1.4	2.1	1.4	BT4B328817E1/C475	110
	2550	6000	0.68	1.0	1.5	1.0	BT4B334106BG/HA1C300VA901	105
347.662	3910	8500	0.33	2.0	3.0	2.0	BT4B331077BG/HA1	125
355.000	4460	10000	0.33	2.0	3.0	2.0	BT4-8020G/HA1VA901	170
355.600	4000	8000	0.48	1.4	2.1	1.4	330662E/C480	140
	3550	7500	0.46	1.5	2.2	1.4	BT4B328870EX1/C480	134
	4460	11000	0.33	2.0	3.0	2.0	331271BG	180
	5100	10000	0.33	2.0	3.0	2.0	BT4B328912E3/C675	170
360.000	5720	10800	0.30	2.3	3.4	2.2	BT4-8015G/HA1	250
380.000	6710	13700	0.40	1.7	2.5	1.6	BT4-8033G/HA1	300
384.175	6160	15000	0.35	1.9	2.9	1.8	BT4-8025G/HA1C300VA903	300
385.762	4180	10000	0.40	1.7	2.5	1.6	BT4B334042BG/HA1VA901	175
406.400	5000	10200	0.48	1.4	2.1	1.4	BT4B330650E/C500	186

Four row taper roller bearings
without spacer rings
d 406.400–460.000mm

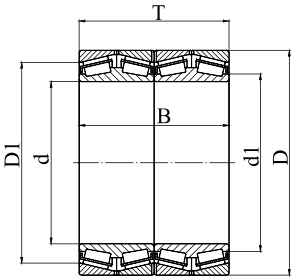


Principal dimensions (mm)								Designations
d	D	T	B	d ₁	D ₁	r _{1,2min}	r _{3,4min}	
406.400	546.100	288.925	288.925	434	498	1.5	6.4	FTWS0027
	546.100	288.925	288.925	434	498	1.5	6.4	FTWS0028
	546.100	288.925	288.925	434	498	1.5	6.4	FTWS0029
	546.100	288.925	268.288	434	494	1.5	6.4	FTWS0030
	546.100	330.000	330.000	434	498	1.5	6.4	FTWS0031
	546.100	330.000	330.000	438	498	1.5	6.4	FTWS0032
	565.150	440.000	440.000	436	508	1.5	6.4	FTWS0033
409.575	546.100	334.962	334.962	434	498	1.0	6.4	FTWS0034
	546.100	334.962	334.962	434	498	1.0	6.4	FTWS0035
	546.100	334.962	334.962	438	490	1.5	6.4	FTWS0036
420.000	574.000	480.000	480.000	450	530	2.5	5.0	FTWS0037
430.000	570.000	380.000	380.000	458	510	2.0	5.0	FTWS0038
	575.000	380.000	380.000	458	518	1.5	5.0	FTWS0039
	640.000	465.000	465.000	486	578	2.5	4.0	FTWS0040
431.800	571.500	279.400	279.400	458	530	1.5	3.3	FTWS0041
	571.500	336.550	336.550	458	516	1.5	3.3	FTWS0042
	571.500	336.550	336.550	458	530	1.5	3.3	FTWS0043
440.000	590.000	480.000	480.000	468	539	1.0	5.0	FTWS0044
447.600	635.000	463.500	463.500	488	588	3.3	6.4	FTWS0045
450.000	595.000	368.000	368.000	484	550	3.0	6.0	FTWS0046
	595.000	368.000	368.000	486	542	3.0	6.0	FTWS0047
	595.000	404.000	404.000	480	545	2.0	6.0	FTWS0048
	595.000	415.000	415.000	478	544	1.5	6.0	FTWS0049
457.200	596.900	279.400	276.225	484	550	1.5	3.3	FTWS0050
	596.900	279.400	276.225	484	550	1.5	3.3	FTWS0051
460.000	610.000	360.000	360.000	479	565	3.0	6.0	FTWS1051

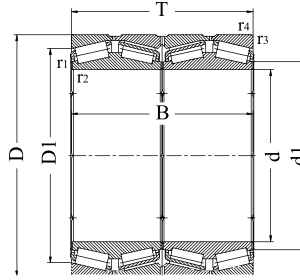


Bore (mm) d	Basic load ratings KN		Calculation factors				Ref. designations	Ref. Mass Kg
	Cr	Cor	e	Y ₁	Y ₂	Y ₀	SKF	
406.400	4180	9500	0.48	1.4	2.1	1.4	BT4B328838BG/HA1VA901	180
	4180	9500	0.48	1.4	2.1	1.4	BT4B328838BG/HA1VA902	180
	3300	7800	0.68	1.0	1.5	1.0	BT4-8014G/HA1VA901	185
	4180	9500	0.48	1.4	2.1	1.4	331465BG	180
	4400	10200	0.48	1.4	2.1	1.4	BT4B334093BG/HA1VA902	200
	5010	13200	0.43	1.6	2.3	1.6	BT4B334092AG/HA1	225
	7650	18600	0.33	2.0	3.0	2.0	BT4-8002G/HA1	340
409.575	4840	12000	0.40	1.7	2.5	1.6	BT4-8021G/HA1VA919	205
	4840	12000	0.40	1.7	2.5	1.6	BT4B329004BG/HA1VA901	205
	5010	13200	0.43	1.6	2.3	1.6	BT4B331333BG/HA1	220
420.000	7210	18600	0.31	2.2	3.3	2.2	BT4-8018G/HA1VA901	345
430.000	5280	14000	0.44	1.5	2.3	1.4	BT4-8049G/HA1	260
	6440	16600	0.40	1.7	2.5	1.6	BT4-8006BG/HA1	280
	9520	21200	0.26	2.6	3.9	2.5	BT4-8040G/HA4	530
431.800	3740	9000	0.54	1.3	1.8	1.3	BT4-8019G/HA1VA901	185
	5280	14000	0.44	1.5	2.3	1.4	BT4B331226BG/HA1	240
	4840	12700	0.44	1.5	2.3	1.4	BT4-8003G/HA1VA902	215
440.000	7650	20000	0.28	2.4	3.6	2.5	BT4B334055ABG/HA1VA902	365
447.600	7650	20000	0.33	2.0	3.0	2.0	BT4-8039G/HA1VA901	470
450.000	5280	13700	0.31	2.2	3.3	2.2	BT4-8023G/HA1VA919	265
	6800	16300	0.33	2.0	3.0	2.0	BT4B332773E/C725	285
	5940	16300	0.33	2.0	3.0	2.0	BT4-8044G/HA1VA902	305
	7040	19000	0.31	2.2	3.3	2.2	BT4-8024G/HA1	320
457.200	4290	10000	0.48	1.4	2.1	1.4	BT4B328827ABG/HA1VA902	190
	4900	10000	0.48	1.4	2.1	1.4	BT4B328827E2/C500	190
460.000	7500	16300	0.33	2.0	3.0	2.0	BT4B331977E/C725	290

Four row taper roller bearings
without spacer rings
d 475.000–584.200mm



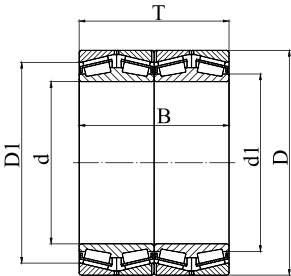
Principal dimensions (mm)								Designations
d	D	T	B	d ₁	D ₁	r _{1,2min}	r _{3,4min}	
475.000	600.000	368.000	368.000	500	554	2.0	6.0	FTWS0052
	640.000	360.000	360.000	512	568	2.0	6.0	FTWS0053
479.425	679.450	495.300	495.300	520	610	3.3	6.4	FTWS0054
	679.450	495.300	495.300	520	610	3.3	6.4	FTWS0055
482.600	615.950	330.200	330.200	512	570	3.3	6.4	FTWS0056
	615.950	330.200	330.200	505	577	1.0	6.4	FTWS0057
	615.950	330.200	330.200	505	577	1.0	6.4	FTWS0058
	615.950	330.200	419.100	505	577	1.0	6.4	FTWS0059
	615.950	330.200	419.100	505	577	1.0	6.4	FTWS0060
	615.950	330.200	330.200	505	577	1.0	6.4	FTWS0061
	615.950	330.200	330.200	512	570	6.4	6.4	FTWS0062
	615.950	330.200	419.100	512	570	3.5	6.4	FTWS0063
	615.950	420.000	420.000	505	577	2.8	4.4	FTWS0064
	635.000	421.000	421.000	512	578	3.0	6.4	FTWS0065
489.026	634.873	320.675	320.675	522	584	3.3	3.3	FTWS0066
	634.873	320.675	320.675	516	588	2.5	3.3	FTWS0067
501.650	711.200	520.700	520.700	550	655	3.3	6.4	FTWS0068
510.000	655.000	379.000	377.000	539	602	1.5	6.4	FTWS0069
514.350	673.100	422.275	422.275	537	606	3.3	6.4	FTWS0070
	673.100	422.275	422.275	545	614	3.3	6.4	FTWS0071
530.000	680.000	440.000	440.000	558	624	1.5	3.0	FTWS0072
540.000	690.000	400.000	400.000	568	635	2.0	5.0	FTWS0073
	690.000	440.000	440.000	565	636	2.0	5.0	FTWS0074
558.800	736.600	409.575	409.575	594	672	3.3	6.4	FTWS0075
	736.600	457.200	455.612	591	666	3.3	6.4	FTWS0076
584.200	730.250	349.250	342.900	601	678	1.5	3.3	FTWS1077



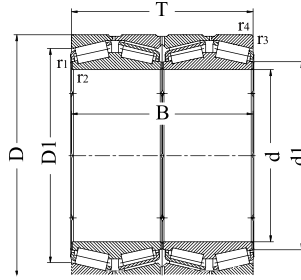
Bore (mm) d	Basic load ratings KN		Calculation factors				Ref. designations SKF	Ref. Mass Kg
	Cr	Cor	e	Y ₁	Y ₂	Y ₀		
475.000	5720	16600	0.30	2.3	3.4	2.2	BT4B328913BG/HA1C555	250
	5500	15300	0.33	2.0	3.0	2.0	BT4-8035G/HA1	335
479.425	10100	25500	0.33	2.0	3.0	2.0	BT4B330866CG/HA1	585
	9350	22400	0.33	2.0	3.0	2.0	BT4B334116BG/HA1VA901	565
482.600	6300	15300	0.33	2.0	3.0	2.0	330641E/C725	240
	6100	13700	0.33	2.0	3.0	2.0	BT4B328842E1/C725	233
	6100	13700	0.33	2.0	3.0	2.0	BT4B328842E2/C725	233
	5280	13700	0.33	2.0	3.0	2.0	BT4B334072BG/HA1VA901	240
	5280	13700	0.33	2.0	3.0	2.0	BT4B334072BG/HA1VA903	240
	5280	13700	0.33	2.0	3.0	2.0	BT4B328842ABG/HA1VA902	230
	5500	15300	0.33	2.0	3.0	2.0	332096BG3	240
	5500	15300	0.33	2.0	3.0	2.0	BT4B331626BG/HA1	250
	5500	15300	0.33	2.0	3.0	2.0	BT4-8062G/HA1VA901	280
	7370	20400	0.33	2.0	3.0	2.0	BT4B334105BG/HA1	365
489.026	6300	14600	0.35	1.9	2.9	1.8	331090E/C700	267
	5230	12500	0.37	1.8	2.7	1.8	BT4B334014AAG/HA1C300VA901	240
501.650	8090	19600	0.33	2.0	3.0	2.0	BT4-8059G/HA1VA901	610
510.000	7800	19000	0.33	2.0	3.0	2.0	BT4B331747E/C775	323
514.350	6820	19000	0.33	2.0	3.0	2.0	BT4-8045G/HA1VA901	395
	7810	21600	0.31	2.2	3.3	2.2	331157BG	405
530.000	8250	23600	0.33	2.0	3.0	2.0	BT4-8043G/HA1	405
540.000	8150	21200	0.40	1.7	2.5	1.6	BT4-8108E/C625	364
	7480	21200	0.33	2.0	3.0	2.0	BT4-8038G/HA1VA901	395
558.800	8250	22000	0.35	1.9	2.9	1.8	BT4B330993AG/HA1	480
	8580	23200	0.35	1.9	2.9	1.8	BT4-8022G/HA1VA919	515
584.200	6800	17000	0.43	1.6	2.3	1.6	BT4B331189E/C600	327

Four row taper roller bearings
without spacer rings

d 585.788–762.000mm



Principal dimensions (mm)								Designations
d	D	T	B	d ₁	D ₁	r _{1,2min}	r _{3,4min}	
585.788	711.525	479.425	479.425	622	704	3.3	6.4	FTWS0077
595.312	844.550	615.950	615.950	642	754	3.3	6.4	FTWS0078
609.600	787.400	361.950	361.950	645	735	3.3	6.4	FTWS0079
620.000	800.000	363.500	363.500	655	740	2.0	6.0	FTWS0080
625.000	815.000	480.000	480.000	656	746	3.2	6.5	FTWS0081
650.000	1040.000	610.000	610.000	740	905	15.0	10.0	FTWS0082
	1040.000	610.000	610.000	730	905	15.0	10.0	FTWS0083
660.000	1070.000	648.000	648.000	760	960	6.0	10.0	FTWS0084
660.400	812.800	365.125	365.125	698	756	3.3	6.4	FTWS0085
	812.800	365.125	365.125	692	784	2.0	6.4	FTWS0086
679.450	901.700	552.450	552.450	722	824	3.3	6.4	FTWS0087
685.800	876.000	355.600	352.425	730	805	3.3	6.4	FTWS0088
	876.300	355.600	352.425	730	818	3.3	6.4	FTWS0089
	876.300	355.600	352.425	730	818	3.3	6.4	FTWS0090
710.000	900.000	410.000	410.000	750	835	3.0	6.0	FTWS0091
750.000	950.000	410.000	410.000	800	878	3.0	6.0	FTWS0092
762.000	1066.800	736.600	723.900	825	952	8.9	12.7	FTWS0093



Bore (mm) d	Basic load ratings KN		Calculation factors				Ref. designations	
	Cr	Cor	e	Y ₁	Y ₂	Y ₀	SKF	Ref. Mass Kg
585.788	10600	30000	0.33	2.0	3.0	2.0	BT4B331093BG/HA1	620
595.312	17300	39000	0.33	2.0	3.0	2.0	BT4B331300E/C775	1180
609.600	7370	18600	0.37	1.8	2.7	1.8	BT4-8054G/HA1VA902	425
620.000	7040	18000	0.37	1.8	2.7	1.8	BT4-8055G/HA1VA902	440
625.000	13200	31000	0.33	2.0	3.0	2.0	BT4-8031E/C800	660
650.000	17600	36500	0.31	2.2	3.3	2.2	BT4-8036G/HA1	1970
	17600	36500	0.31	2.2	3.3	2.2	BT4-8037G/HA1VA901	1970
660.000	19000	38000	0.31	2.2	3.3	2.2	BT4-8060G/HA4C300VA901	2260
660.400	7210	22400	0.33	2.0	3.0	2.0	BT4B331190BG/HA1	415
	7210	20400	0.33	2.0	3.0	2.0	BT4B328977BG/HA1VA901	395
679.450	13200	36000	0.33	2.0	3.0	2.0	BT4B334015BG/HA1VA901	970
685.800	7810	22000	0.43	1.6	2.3	1.6	BT4B331089CG/HA1	525
	7650	20000	0.37	1.8	2.7	1.8	BT4B328955ABG/HA1VA902	505
	7650	20000	0.37	1.8	2.7	1.8	BT4B328955BG/HA1VA902	505
710.000	9680	27000	0.35	1.9	2.9	1.8	BT4B331351BG/HA1	620
750.000	10800	26500	0.37	1.8	2.7	1.8	BT4-8048E/C725	705
762.000	22000	58500	0.33	2.0	3.0	2.0	BT4B331907BG/HA4	2090

Double row taper roller bearings

Double row taper roller bearings

Inner ring and outer ring of taper roller bearings have conical raceway. Tapered roller is set between raceway. If tapered face is extended, it will finally gather at one point of bearing axis.

Taper roller bearings are mainly used for bearing radial and axial load joint with radial load as main load. Axial bearing capacity of bearings is decided by contact angle. The bigger angle value, the axial bearing capacity is bigger.

1. Structural type

Double row taper roller bearings mainly have two structural types:

TDO type(350000 series): a double-raceway outer ring and two inner rings; One inner spacer is set between two inner rings (or without inner spacer). Thickness of spacer ring is changed to adjust clearance of bearing.

TDI type(IDTB series): a double-raceway inner ring and two outer rings; An external spacer is set between two outer rings (or without external spacer). Thickness of spacer ring is changed to adjust clearance of bearing.

2. Cage

When nominal outside diameter of bearing D is less than or equal to 650mm, sheet pressing cage is adopted;

When nominal outside diameter of bearing D is more than 650mm, steel solid pillar cage is adopted.

3. Allowable angular error of axis

Angular error of axis for outer ring of double row taper roller bearings in relation to inner ring only can be born by strength between roller and raceway. It will cause deflected load of bearing, which should be avoided as possible.

4. Radial equivalent dynamic load

When $F_a/F_r \leq e$ $P_r = F_r + Y_1 F_a$

When $F_a/F_r > e$ $P_r = 0.67 F_r + Y_2 F_a$

5. Radial equivalent static load $P_{0r} = F_r + Y_0 F_a$

6. Axial clearance

Axial clearance of double row taper roller bearings can be obtained according to following formula:

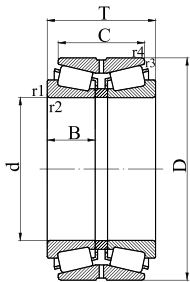
$G_a = G_r \times \text{Ctg } \alpha$ or $G_a = G_r \times 1.5/e$, in the formula:

G_a —axial clearance of bearing

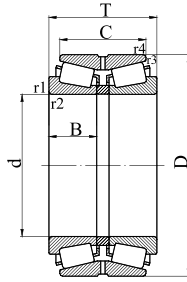
G_r —radial clearance of bearing

α —angle of raceway for outer ring

Metric double row taper roller bearings
d 100--170mm

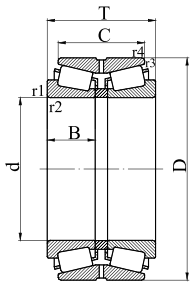


Principal dimensions (mm)							Designations	
d	D	T	B	C	r _{1,2min}	r _{3,4min}	New	Old
100	180	107	46	87	3.0	1.0	352220E	97520E
110	180	95	42	76	2.0	0.6	352122	2097722
	200	121	53	101	3.0	1.0	352222E	97522E
	200	125	56.5	102	3.0	1.0	352222X2	97522
120	200	110	48	90	2.0	0.6	352124	2097724
	215	132	58	109	3.0	1.0	352224E	97524E
	215	132	60	106	3.0	1.0	352224X2	97524
130	180	70	30	50	2.0	0.6	352926X2	2097926
	200	95	42.5	75	2.5	0.6	352026X2	2097126
	210	110	48	90	2.0	0.6	352126	2097726
	230	145	64	117.5	4.0	1.0	352226E	97526E
140	210	95	41.5	75	2.5	0.6	352028X2	2097128
	225	115	50	90	2.5	1.0	352128	2097728
	250	153	68	125.5	4.0	1.0	352228E	97528E
	250	158	73	128	4.0	1.0	352228X2	97528
150	210	80	35	62	2.5	0.6	352930X2	2097930
	250	138	60	112	2.5	1.0	352130	2097730
	270	172	80	138	4.0	1.0	352230X2	97530E
160	240	115	51	90	3.0	1.0	352032X2	2097132
	270	150	66	120	2.5	1.0	352132	2097732
	290	178	80	144	4.0	1.0	352232E	97532E
165	290	150	70	125	3.0	1.0	350633	97833
170	230	82	36	65	2.5	0.6	352934X2	2097934
	260	120	54	95	3.0	1.0	352034X2	2097134
	280	150	66	120	2.5	1.0	352134	2097734
	310	192	86	152	5.0	1.1	352234E	97534E

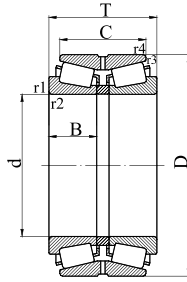


Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Cr	Cor	Grease	Oil	e	Y ₁	Y ₂	Y ₀	
100	555	925	1400	1900	0.42	1.6	2.4	1.6	10.7
110	422	840	1300	1700	0.25	2.7	4.0	2.6	10.2
	698	1210	1200	1600	0.42	1.6	2.4	1.6	15.5
	595	1120	1200	1600	0.39	1.7	2.6	1.7	16.4
120	508	910	1100	1500	0.30	2.2	3.3	2.2	12.6
	775	1360	1100	1400	0.44	1.6	2.3	1.5	18.9
	698	1340	1100	1400	0.41	1.6	2.5	1.6	19.1
130	258	565	1200	1600	0.27	2.5	3.7	2.4	4.88
	422	830	1100	1500	0.35	1.9	2.9	1.9	9.72
	540	1000	1000	1400	0.26	2.6	3.8	2.5	12.9
	895	1630	1000	1300	0.44	1.6	2.3	1.5	24.1
140	448	900	950	1300	0.37	1.8	2.7	1.8	8.35
	560	1110	950	1300	0.34	2.0	3.0	2.0	15.3
	1050	1840	850	1100	0.44	1.6	2.3	1.5	30.1
	985	1840	850	1100	0.33	2.1	3.1	2.0	30.6
150	352	790	950	1300	0.27	2.5	3.7	2.4	9.32
	778	1560	850	1100	0.30	2.2	3.3	2.2	25.8
	1070	2180	800	1100	0.39	1.7	2.6	1.7	38.9
160	608	1260	850	1100	0.37	1.8	2.7	1.8	16.5
	872	1720	800	1000	0.36	1.9	2.8	1.8	28.2
	1390	2840	700	1000	0.44	1.6	2.3	1.5	46.9
165	1100	2300	850	1100	0.37	1.8	2.7	1.8	41.1
170	395	922	850	1100	0.28	2.4	3.6	2.3	8.11
	672	1460	800	1000	0.31	2.2	3.2	2.1	20.4
	962	2000	750	950	0.38	1.8	2.6	1.7	35.6
	1580	3200	750	950	0.44	1.6	2.3	1.5	58.2

Metric double row taper roller bearings
d 180--300mm

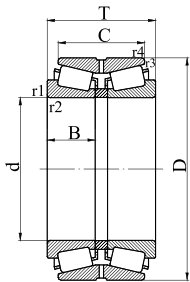


Principal dimensions (mm)							Designations	
d	D	T	B	C	r _{1,2min}	r _{3,4min}	New	Old
180	250	95	42.5	74	2.5	0.6	352936X2	2097936
	280	134	61	108	3.0	1.0	352036X2	2097136
	300	164	72	134	3.0	1.0	352136	2097736
	320	192	86	152	5.0	1.1	352236E	97536E
190	260	95	41.5	75	2.5	0.6	352938X2	2097938
	290	134	61	104	3.0	1.0	352038X2	2097138
	320	170	78	130	3.0	1.0	352138	2097738
	340	204	92	160	5.0	1.1	352238E	97538E
200	280	105	46.5	80	3.0	1.0	352940X2	2097940
	310	152	70	120	3.0	1.0	352040X2	2097140
	340	184	82	150	3.0	1.0	352140	2097740
	360	218	98	174	5.0	1.1	352240E	97540E
220	300	110	49	88	3.0	1.0	352944X2	2097944
	340	165	76	130	4.0	1.0	352044X2	2097144
	370	195	88	150	4.0	1.1	352144	2097744
240	320	110	49	90	3.0	1.0	352948X2	2097948
	360	165	76	130	4.0	1.0	352048X2	2097148
	400	210	95	163	4.0	1.1	352148	2097748
260	360	134	61	108	3.0	1.0	352952X2-1	2097952
	400	186	87	146	5.0	1.1	352052X2	2097152
	440	225	106	180	4.0	1.1	352152	2097752
280	380	134	61	108	3.0	1.0	352956X2	2097956
	420	186	85	146	5.0	1.1	352056X2	2097156
300	420	160	72	128	4.0	1.0	352960X2-1	2097960
	460	210	97	165	5.0	1.1	352060X2	2097160
	500	205	90	165	5.0	1.5	351160	1097760

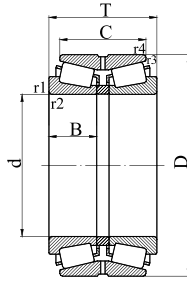


Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Cr	Cor	Grease	Oil	e	Y ₁	Y ₂	Y ₀	
180	468	1080	800	1000	0.37	1.8	2.7	1.8	13.2
	742	1540	750	950	0.28	2.4	3.6	2.4	28.5
	1100	2350	700	900	0.26	2.6	3.8	2.6	39.9
	1620	3350	670	850	0.45	1.5	2.2	1.5	63.8
190	522	1270	750	950	0.38	1.8	2.6	1.7	13.3
	742	1540	700	900	0.45	1.5	2.2	1.5	28.8
	1160	2420	670	850	0.31	2.2	3.2	2.1	52.5
	1740	3350	600	800	0.44	1.6	2.3	1.5	69.8
200	610	1520	700	900	0.39	1.8	2.6	1.7	18.1
	912	2140	670	850	0.39	1.7	2.6	1.7	39.4
	1450	2970	630	800	0.25	2.7	4.0	2.7	63.8
	2140	3950	560	700	0.41	1.7	2.5	1.6	93.3
220	660	1580	670	850	0.31	2.2	3.2	2.1	21.7
	1240	2680	600	750	0.35	1.9	2.9	1.9	49.5
	1540	3240	600	750	0.37	1.8	2.7	1.8	76.3
240	660	1580	600	750	0.32	2.1	3.1	2.1	22.2
	1240	2820	530	670	0.33	2.0	3.0	2.0	52.8
	1870	4050	500	630	0.31	2.2	3.2	2.1	98.1
260	942	2490	530	670	0.37	1.8	2.7	1.8	37.3
	1570	3600	500	630	0.30	2.3	3.3	2.2	79.3
	2210	4720	450	560	0.24	2.8	4.2	2.8	124
280	1080	2810	480	600	0.29	2.3	3.4	2.3	41.3
	1700	3880	450	560	0.37	1.8	2.7	1.8	81.5
300	1360	3610	450	560	0.28	2.4	3.6	2.3	60.8
	1830	4390	430	530	0.31	2.2	3.2	2.1	117
	2110	4460	400	500	0.32	2.1	3.2	2.1	143

Metric double row taper roller bearings
d 320--530mm

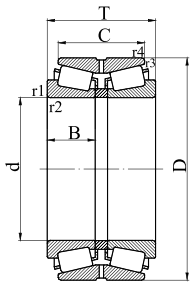


Principal dimensions (mm)							Designations	
d	D	T	B	C	r _{1,2min}	r _{3,4min}	New	Old
320	440	160	72	128	4.0	1.0	352964X2	2097964
	480	210	97	160	5.0	1.1	352064X2	2097164
340	460	160	72	128	4.0	1.0	352968X2	2097968
	520	180	82	135	5.0	1.5	351068	97168
	580	242	106	170	5.0	1.5	351168	1097768
360	480	160	72	128	4.0	1.0	352972X2	2097972
	540	185	82	140	5.0	1.5	351072	97172
	600	242	106	170	5.0	1.5	351172	1097772
380	520	145	65	105	4.0	1.1	351976	1097976
	560	190	82	140	5.0	1.5	351076	97176
	620	242	106	170	5.0	1.5	351176	1097776
400	540	150	65	105	4.0	1.1	351980	1097980
	600	206	90	150	5.0	1.5	351080	97180
420	560	145	65	105	4.0	1.1	351984	1097984
	620	206	90	150	5.0	1.5	351084	97184
	700	275	122	200	6.0	2.5	351184	1097784
440	600	170	74	125	4.0	1.1	351988	1097988
	650	212	94	152	6.0	2.5	351088	97188
460	620	174	74	130	4.0	1.1	351992	1097992
	680	230	100	175	6.0	2.5	351092	97192
480	650	180	78	130	5.0	1.5	351996	1097996
	700	240	100	180	6.0	2.5	351096	97196
	790	310	136	224	7.5	3.0	351196	1097796
500	670	180	78	130	5.0	1.5	3519/500	10979/500
	720	236	100	180	6.0	2.5	3510/500	971/500
530	710	190	82	136	5.0	1.5	3519/530	10979/530

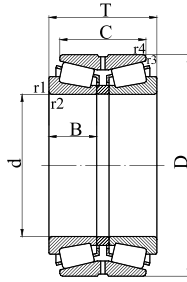


Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Cr	Cor	Grease	Oil	e	Y ₁	Y ₂	Y ₀	
320	1410	3830	430	530	0.30	2.3	3.3	2.2	67.6
	1830	4390	400	500	0.42	1.6	2.4	1.6	122
340	1450	4050	400	500	0.31	2.2	3.2	2.1	71.5
	1870	4070	380	480	0.29	2.3	3.4	2.3	128
	2870	5970	340	430	0.42	1.6	2.4	1.6	235
360	1490	4270	380	480	0.33	2.1	3.1	2.0	74.3
	2120	4910	360	450	0.30	2.3	3.3	2.2	132
	2950	6270	320	400	0.44	1.5	2.3	1.5	235
380	1210	3250	360	450	0.43	1.6	2.3	1.6	80.3
	2150	5090	340	430	0.31	2.2	3.2	2.1	146
	3310	7430	300	380	0.46	1.5	3.2	1.4	264
400	1210	3110	320	400	0.45	1.5	2.2	1.5	86.9
	2620	6380	300	380	0.40	1.7	2.5	1.7	180
420	1450	3740	300	380	0.31	2.2	3.2	2.1	88.8
	2650	6600	280	360	0.41	1.6	2.5	1.6	196
	4270	8810	240	320	0.32	2.1	3.2	2.1	392
440	1890	4860	280	360	0.39	1.8	2.6	1.7	114
	2750	7020	260	340	0.43	1.6	2.3	1.5	213
460	1910	4990	260	340	0.40	1.7	2.5	1.7	128
	3320	8160	220	300	0.31	2.2	3.2	2.1	253
480	1950	5270	240	320	0.42	1.6	2.0	1.6	133
	3330	8190	200	280	0.32	2.1	3.1	2.1	281
	5000	11990	180	240	0.41	1.6	2.5	1.6	561
500	2150	6120	220	300	0.44	1.5	2.3	1.5	129
	3390	8450	190	260	0.33	2.0	3.0	2.0	289
530	2390	6800	190	260	0.41	1.6	2.5	1.6	192

Metric double row taper roller bearings
d 560--950mm

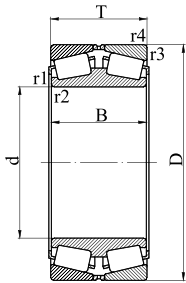


Principal dimensions (mm)							Designations	
d	D	T	B	C	r _{1,2min}	r _{3,4min}	New	Old
560	750	213	85	156	5.0	1.5	3519/560	10979/560
	820	260	115	185	6.0	2.5	3510/560	971/560
600	800	205	90	156	5.0	1.5	3519/600	10979/600
	870	270	118	198	6.0	2.5	3510/600	971/600
630	850	242	100	182	6.0	2.5	3519/630	10979/630
670	1090	410	185	295	7.5	3.0	3511/670	10977/670
710	950	240	106	175	6.0	2.5	3519/710	10979/710
	1030	315	140	220	7.5	3.0	3510/710	971/710
750	1000	264	112	194	6.0	2.5	3519/750	10979/750
800	1060	270	115	204	6.0	2.5	3519/800	10979/800
850	1120	268	118	188	6.0	2.5	3519/850	10979/850
900	1180	275	122	205	6.0	2.5	3519/900	10979/900
950	1250	300	132	220	7.5	3.0	3519/950	10979/950

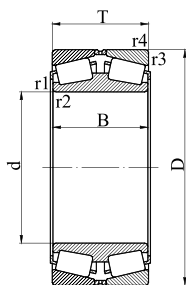


Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Cr	Cor	Grease	Oil	e	Y ₁	Y ₂	Y ₀	
560	2550	7060	170	220	0.44	1.5	2.3	1.5	235
	4340	10800	160	200	0.40	1.7	2.5	1.7	410
600	3210	9460	150	190	0.33	2.1	3.1	2.0	265
	4880	12730	130	170	0.41	1.6	2.5	1.6	500
630	3730	10390	130	170	0.40	1.7	2.5	1.7	368
670	9680	23200	90	120	0.32	2.1	3.2	2.1	1370
710	4070	12400	100	140	0.49	1.5	2.2	1.4	444
	6560	17930	90	120	0.43	1.6	2.3	1.5	810
750	5020	14480	90	120	0.40	1.7	2.5	1.6	499
800	5020	15000	80	100	0.35	1.9	2.9	1.9	604
850	5460	16860	75	95	0.46	1.5	2.2	1.5	636
900	5000	16200	70	90	0.39	1.7	2.6	1.7	730
950	6790	21100	–	–	0.33	2.0	3.0	2.0	910

Inch double row taper roller bearings
d 152.400--346.075mm

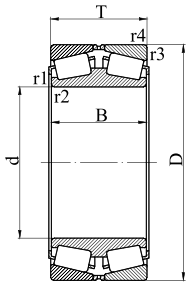


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
152.400	222.250	84.138	84.138	1.5	1.5	605	1250	IDTB0001
177.800	247.650	90.488	90.488	1.5	3.3	660	1500	IDTB0002
	288.925	123.825	123.825	1.5	3.3	1300	2280	IDTB0003
203.200	317.500	133.350	133.350	6.4	3.3	1170	2400	IDTB0004
	368.300	158.750	152.400	3.3	3.3	1870	3350	IDTB0005
206.375	282.575	87.312	87.312	0.8	3.3	704	1660	IDTB0006
	336.550	180.975	184.150	1.5	3.3	2120	4300	IDTB0007
220.000	340.000	140.000	200.000	1.5	3	1650	3350	IDTB0008
234.950	327.025	93.662	93.662	1.5	3.3	842	2120	IDTB0009
240.000	480.000	220.000	200.000	2.5	5	3360	5500	IDTB0010
254.000	358.775	130.175	130.175	1.5	3.3	1540	3550	IDTB0011
	438.150	165.100	165.100	3.3	6.4	2510	4250	IDTB0012
269.875	381.000	136.525	136.525	3.3	3.3	1650	3750	IDTB0013
279.587	380.898	117.475	117.475	1.5	3.3	1230	3200	IDTB0014
288.925	406.400	165.100	234.950	1.6	3.2	2240	4900	IDTB0015
300.038	422.275	150.812	150.812	3.3	3.3	2050	4750	IDTB0016
303.212	495.300	263.525	263.525	3.3	6.4	4570	9800	IDTB0017
317.500	422.275	128.588	128.588	1.5	3.3	1680	4150	IDTB0018
333.375	469.900	166.688	166.688	3.3	3.3	2460	5700	IDTB0019
	469.900	166.688	231.775	1.6	3.3	2460	5700	IDTB0020
342.900	533.400	139.700	146.050	3.3	3.3	2380	4400	IDTB0021
	533.400	139.700	146.050	3.3	3.3	2380	4400	IDTB1021
343.052	457.098	122.238	122.238	1.5	3.3	1510	3400	IDTB0022
346.075	488.950	104.775	95.250	1.5	6.4	1170	2750	IDTB0023
	488.950	174.625	174.625	3.3	3.3	2640	6300	IDTB0024
	488.950	174.625	174.625	3.3	3.3	2550	6000	IDTB1024

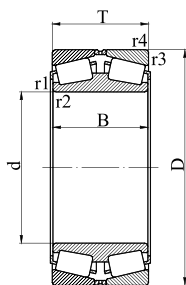


Bore (mm) d	Calculation factors				Ref. designations			Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	FAG	TIMKEN	
152.400	0.33	2.00	3.00	2.00	331387		M231649D-M231610	11.5
177.800	0.44	1.50	2.30	1.40	331814	540696	67790D-67720	13.2
	0.31	2.20	3.30	2.20	BT2B332534/HA1		94706D-94113	31.5
203.200	0.52	1.30	1.90	1.30	BT2B332799			40.5
	0.40	1.70	2.50	1.60	BT2B332683/HA1	541379		75.2
206.375	0.50	1.35	2.00	1.30	331388			17.3
	0.33	2.00	3.00	2.00	BT2B3328834		H242649D-H242610	66.5
220.000	0.43	1.60	2.30	1.60	BT2B332873/HA4			50.5
234.950	0.40	1.70	2.50	1.60	BT2B332492			25.5
240.000	0.72	0.94	1.40	0.90	BT2B332931			183
254.000	0.33	2.00	3.00	2.00	332296/HA1	511577	M249748-M249710	43.5
	0.35	1.90	2.90	1.80	BT2B332536/HA1	547757		100
269.875	0.33	2.00	3.00	2.00	331223A	517563A	M252349D-M252310	51.2
279.587	0.43	1.60	2.30	1.60	BT2B332899/HA1			41.5
288.925	0.33	2.00	3.00	2.00	BT2B332870/HA4			73.5
300.038	0.33	2.00	3.00	2.00	331951	542664	HM256849D-HM256810	70.3
303.212	0.33	2.00	3.00	2.00	BT2B332685/HA1			212
317.500	0.31	2.20	3.30	2.20	BT2B3328699G/HA1		LM528648DW-LM528610	51.5
333.375	0.33	2.00	3.00	2.00	BT2B3328695A/HA1	510687A	HM261049TD-HM261010	92.5
	0.33	2.00	3.00	2.00	BT2B332871/HA4			98.8
342.900	0.33	2.00	3.00	2.00	331713A	515956		115
	0.33	2.00	3.00	2.00	331713B			115
343.052	0.48	1.40	2.10	1.40	332240A		LM761649DW-LM761610	54.6
346.075	0.50	1.35	2.00	1.30	BT2B332913/HB1			62.5
	0.33	2.00	3.00	2.00	BT2B3328410C/HA1		HM262749TD-HM262710	113
	0.33	2.00	3.00	2.00	331527C		EE161362D-EE161925	110

Inch double row taper roller bearings
d 360.000--522.000mm

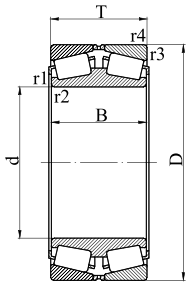


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
360.000	680.000	330.000	300.000	4.0	7.5	7210	13400	IDTB0025
368.300	523.875	185.738	185.738	3.3	6.4	3140	7500	IDTB0026
	523.875	185.738	185.738	3.3	6.4	3140	7500	IDTB1026
	596.900	165.100	158.750	6.4	6.4	3080	5850	IDTB0027
384.175	546.100	193.675	193.675	3.3	6.4	3470	8300	IDTB0028
390.000	546.100	141.288	141.288	3.3	6.4	2200	5100	IDTB0029
406.400	546.100	138.113	138.113	1.5	6.4	2200	5100	IDTB0030
408.400	546.100	120.000	98.000	1.0	3.0	1510	3450	IDTB0031
	546.100	150.000	125.000	1.5	3.3	1830	4750	IDTB0032
409.575	546.100	161.925	161.925	1.5	6.4	2510	6550	IDTB0033
415.925	590.550	209.550	209.550	3.3	6.4	3910	9650	IDTB0034
	590.550	209.550	209.550	3.3	6.4	3910	9650	IDTB1034
430.000	535.000	84.000	84.000	1.0	3.0	1080	3000	IDTB0035
447.625	635.000	223.838	223.838	3.3	6.4	4400	11000	IDTB0036
	635.000	223.838	223.838	3.3	6.4	4400	11000	IDTB1036
	635.000	223.838	223.838	3.3	6.4	4400	11000	IDTB2036
450.000	595.000	178.000	178.000	3.0	6.0	2970	8150	IDTB0037
464.000	615.950	150.000	136.000	1.5	4.0	2160	5850	IDTB0038
489.026	634.873	152.400	152.400	3.3	3.3	2750	7350	IDTB0039
491.000	635.000	148.000	128.000	1.5	3.3	1900	5300	IDTB0040
500.000	730.000	280.000	280.000	3.0	6.0	6600	15600	IDTB0041
501.650	711.200	250.825	250.825	3.2	6.4	5500	13700	IDTB0042
	673.100	184.150	184.150	3.3	6.4	3910	9650	IDTB1042
519.112	736.600	258.762	258.762	3.3	6.4	6050	15600	IDTB0043
	736.600	258.762	258.762	3.3	4.0	6050	15600	IDTB1043
522.000	690.000	180.000	160.000	1.5	6.4	2860	8300	IDTB0044

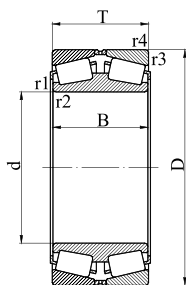


Bore (mm) d	Calculation factors				Ref. designations			Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	FAG	TIMKEN	
360.000	0.60	1.10	1.70	1.10	331729			540
368.300	0.33	2.00	3.00	2.00	BT2B331836		HM265049D-HM265010	133
	0.33	2.00	3.00	2.00	BT2B332468A/HA1		HM265049TD-HM265010	140
	0.40	1.70	2.50	1.60	331905			160
384.175	0.33	2.00	3.00	2.00	331158A	518240	HM266449DW-HM266410	152
390.000	0.48	1.40	2.10	1.40	BT2B328705/HA1			102
406.400	0.48	1.40	2.10	1.40	BT2B331840C/HA1		LM767749DW-LM767710	89.3
408.400	0.88	0.77	1.15	0.80	BT2B328874/HA1			76.5
	0.83	0.80	1.20	0.80	BT2B328466/HA1			99.4
409.575	0.43	1.60	2.30	1.60	331714B		M667947DW-M667910	110
415.925	0.33	2.00	3.00	2.00	BT2B328283/HA1		M268749DW-M268710	192
	0.33	2.00	3.00	2.00	331445			192
430.000	0.54	1.30	1.80	1.30	BT2B334013/HA1			44.5
447.625	0.33	2.00	3.00	2.00	331562	518667	M270749DW-M270710	236
	0.33	2.00	3.00	2.00	BT2B332911C/HA1		M270749TD-M270710	246
	0.33	2.00	3.00	2.00	BT2B332911B/HB1		M270749TD-M270710/CL3	246
450.000	0.33	2.00	3.00	2.00	BT2B328523/HA1		M270749DA/M270410	140
464.000	0.83	0.80	1.20	0.80	BT2B328361/HA1			125
489.026	0.35	1.90	2.90	1.80	BT2B331848		EE243193D-243250	130
491.000	1.00	0.68	1.00	0.66	BT2B328381/HA1			120
500.000	0.31	2.20	3.30	2.20	331676A			420
501.650	0.33	2.00	3.00	2.00	331182	503772	M274149D-M274110	330
	0.31	2.20	3.30	2.20	BT2B332547/HA1		M275349D-M275310	190
519.112	0.33	2.00	3.00	2.00	BT2B332662/HB1			370
	0.33	2.00	3.00	2.00	BT2B334009/HB1			370
522.000	0.79	0.85	1.25	0.80	BT2B328359/HA1			190

Inch double row taper roller bearings
d 536.575--939.800mm

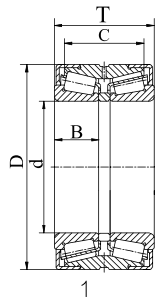


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
536.575	761.873	269.875	269.875	3.3	6.4	6270	16000	IDTB0045
558.800	736.600	196.850	196.850	3.3	6.4	4290	11600	IDTB0046
	736.600	196.850	196.850	3.3	8.0	4290	11600	IDTB1046
560.000	820.000	242.000	242.000	2.5	6.4	5010	11400	IDTB0047
571.500	812.800	285.750	285.750	3.3	6.4	7210	18000	IDTB0048
	812.800	285.750	285.750	3.3	6.0	7210	18000	IDTB1048
580.000	830.000	280.000	280.000	3.0	6.4	6820	16600	IDTB0049
609.600	787.400	171.450	171.450	3.3	6.4	4020	10600	IDTB0050
	820.000	171.450	171.450	3.3	6.4	4020	10600	IDTB0051
650.000	1030.000	270.000	270.000	15.0	10.0	8800	18300	IDTB0052
660.400	812.800	176.212	176.212	3.2	6.4	3580	11200	IDTB0053
682.625	965.200	338.138	338.138	3.3	6.4	9520	25000	IDTB0054
	965.200	338.138	338.138	3.3	6.4	9520	25000	IDTB1054
710.000	900.000	197.000	197.000	3.0	6.0	4730	13200	IDTB0055
800.000	1260.000	375.000	375.000	12.0	12.0	14700	33500	IDTB0056
863.600	1130.300	323.850	323.850	4.8	12.7	10600	31000	IDTB0057
	1130.300	323.850	323.850	4.8	12.7	10600	31000	IDTB1057
901.700	1295.400	450.850	438.150	4.8	12.7	16800	43000	IDTB0058
939.800	1333.500	463.550	463.550	4.8	12.7	17600	49000	IDTB0059

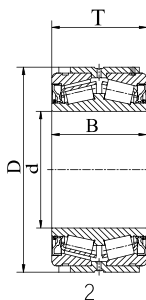


Bore (mm) d	Calculation factors				Ref. designations			Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	SKF	FAG	TIMKEN	
536.575	0.33	2.00	3.00	2.00	331682	526165	M276448DW-M276410	410
558.800	0.35	1.90	2.90	1.80	331607A	544145	LM377448DW-LM377410	235
	0.35	1.90	2.90	1.80	331607B			235
560.000	0.88	0.77	1.15	0.80	BT2B332626/HA7			425
571.500	0.33	2.00	3.00	2.00	BT2B331854/HA1	543718	M278749DW-M278710	500
	0.33	2.00	3.00	2.00	331476			500
580.000	0.31	2.20	3.30	2.20	331677			515
609.600	0.37	1.80	2.70	1.80	BT2B331858/HA1		EE649241DW-649310	218
	0.37	1.80	2.70	1.80	BT2B332424/HA3	538086		265
650.000	0.31	2.20	3.30	2.20	BT3B328306/HA4			900
660.400	0.33	2.00	3.00	2.00	331198		L281149D-L281110	195
682.625	0.33	2.00	3.00	2.00	333129/HA4		M282249D-M282210	815
	0.33	2.00	3.00	2.00	332129A/HA4			815
710.000	0.35	1.90	2.90	1.80	331581A	532828		325
800.000	0.33	2.00	3.00	2.00	BT2B334032/HA4			1850
863.600	0.33	2.00	3.00	2.00	331590			895
	0.33	2.00	3.00	2.00	331590A		LM286249DGW-LM286210	895
901.700	0.35	1.90	2.90	1.80	331306	539945	EE634356D-634510	2000
939.800	0.33	2.00	3.00	2.00	331350		LM287849DW-LM287810	2230

Sealed double row taper roller bearings
d 160.000--415.925mm



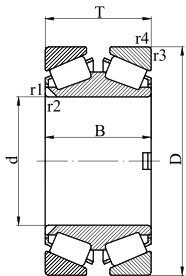
Principal dimensions (mm)							Designations	Design Type
d	D	T	B	C	r _{1,2min}	r _{3,4min}		
160.000	240.000	114.000	50.000	84.000	5.0	1.0	442212	1
	290.000	178.000	89.000	140.000	3.0	1.0	352232X1D1-2LS	1
165.000	290.000	150.000	75.000	122.000	3.0	1.0	350633-2LS	1
200.000	290.000	121.000	53.000	88.000	5.0	1.0	442214	1
247.650	406.400	247.650	115.825	200.000	6.4	1.6	3507/247.65X2-2LS	1
415.925	590.550	220.000	209.550	—	3.3	6.4	IDTB0034-2LS	2



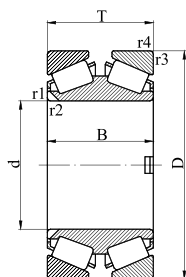
Bore(mm) d	Basic load ratings KN		Calculation factors				Ref. Mass kg
	Cr	Cor	e	Y ₁	Y ₂	Y ₀	
160.000	626	1210	0.44	1.50	2.20	1.50	16.4
	1520	2880	0.33	2.00	3.00	2.00	56.8
165.000	1100	2300	0.37	1.80	2.70	1.80	41.4
200.000	760	1600	0.43	1.60	2.30	1.60	24.6
247.650	2650	5900	0.33	2.00	3.00	2.00	147
415.925	3800	9500	0.33	2.00	3.00	2.00	188

Double row taper roller bearings
with steep contact angle

d 200--685.800mm

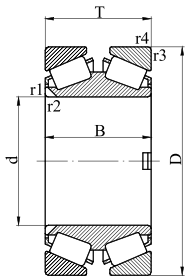


Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	$r_{1,2min}$	$r_{3,4min}$	Cr	Cor	
200	360	170	170	1.5	4.0	1250	2300	DTSA1001
220	360	120	120	4.0	3.0	1000	1920	DTSA1002
240	460	140	140	6.0	5.0	1400	2570	DTSA1003
260	459	155	155	5.0	4.0	1570	2780	DTSA1004
285	380	92	92	1.0	2.5	758	1820	DTSA1005
300	440	105	105	4.0	4.0	1010	2040	DTSA0001
305.033	560	200	200	3.3	6.4	2920	5300	DTSA0002
305.070	500	200	200	6.4	4.8	2550	5200	DTSA0003
	560	200	200	3.3	6.0	2920	5300	DTSA0004
360	560	160	160	3.0	5.0	2380	4650	DTSA0005
	600	200	200	3.0	5.0	3030	5850	DTSA0006
380	560	200	200	5.0	5.0	2810	6550	DTSA0007
	565	200	200	5.0	5.0	2810	6550	DTSA0008
386	574	220	220	3.0	5.0	2750	6550	DTSA0009
390	570	200	200	5.0	5.0	2750	6550	DTSA0010
400	650	240	240	6.4	6.4	3910	8150	DTSA0011
445	620	160	160	2.0	5.0	2120	5100	DTSA0012
460	680	180	180	2.5	6.0	3140	6950	DTSA0013
510	733.500	200.025	200.025	3.3	4.8	3580	8500	DTSA0014
510.130	800	285	285	4.8	10.0	5610	12700	DTSA0015
520	660	140	140	3.0	5.0	2050	5700	DTSA0016
635	939.800	304.800	304.800	3.3	6.4	6710	16600	DTSA0017
660	814	176.212	176.212	4.0	6.0	2690	8330	DTSA0018
685.800	939.800	228.600	235	4.0	6.0	4930	12800	DTSA0019

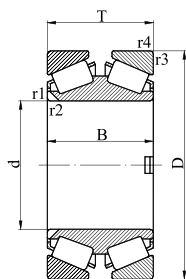


Bore (mm) d	Calculation factors						Ref. designations			Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	Y ₃	k	SKF	FAG	KOYO	
200	0.96	–	0.70	0.68	1.04	–			45T403617	73.3
220	0.87	–	0.78	0.76	1.16	–			45T443612	42.2
240	0.87	–	0.78	0.76	1.16	–			45T484614	95.5
260	0.87	–	0.78	0.76	1.16	–			45T524616	95.5
285	0.87	–	0.78	0.76	1.16	–			45T573809B	28.2
300	0.88	0.77	1.15	0.80	–	0.67	332168	531529		48.5
305.033	0.88	0.77	1.15	0.80	–	0.67	BT2B334087/HA3			205
305.070	0.88	0.77	1.15	0.80	–	0.67	332169	533062		150
	0.88	0.77	1.15	0.80	–	0.67	332068			200
360	0.72	0.94	1.40	0.90	–	0.80	BT2–8000/HA3			140
	0.94	0.72	1.07	0.70	–	0.60	BT2–8002/HA3			220
380	0.79	0.85	1.25	0.80	–	0.73	BT2–8009/HA3			165
	0.79	0.85	1.25	0.80	–	0.73	BT2–8003/HA3			170
386	0.83	0.81	1.20	0.80	–	0.71	BT2–8010/HA3VA901			185
390	0.83	0.81	1.20	0.80	–	0.71	BT2B328896/HA3			170
400	0.88	0.77	1.15	0.80	–	0.67	332167	531295A		245
445	0.83	0.81	1.20	0.80	–	0.69	BT2B334069/HA3	801317		135
460	0.99	0.70	1.00	0.70	–	0.60	BT2B328876/HA1			210
510	0.88	0.77	1.15	0.80	–	0.67	617670	524209A		265
510.130	0.88	0.77	1.15	0.80	–	0.67	332171	531530		505
520	0.68	1.00	1.50	1.00	–	0.85	BT2–8001/HA3			115
635	0.88	0.77	1.15	0.80	–	0.67	331535B			720
660	0.67	–	1.01	0.99	1.50	–			2TR660B	170
685.800	0.76	–	0.88	0.86	1.31	–			2TR686A	450

Double row taper roller bearings
with steep contact angle
d 720--900mm



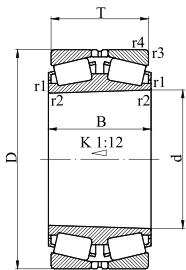
Principal dimensions (mm)						Basic load ratings KN		Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	Cr	Cor	
720	920	150	130	5.0	5.0	2550	6390	DTSA0020
785	1100	285	285	4.0	6.0	6370	16500	DTSA0021
800	1100	300	300	1.5	6.0	7650	21600	DTSA0022
900	1220	340	340	2.5	6.0	7930	23200	DTSA0023



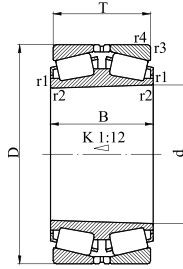
Bore (mm) d	Calculation factors						Ref. designations			Ref. Mass kg
	e	Y ₁	Y ₂	Y ₀	Y ₃	k	SKF	FAG	KOYO	
720	0.87	–	0.78	0.76	1.16	–			2TR720	226
785	0.87	–	0.78	0.76	1.16	–			2TR785	810
800	0.79	0.85	1.25	0.80	–	–				850
900	0.87	–	0.78	0.76	1.16	–			2TR900	1000

Inch double row taper roller bearings
with tapered bore (taper 1:12)

d 152.400--571.500mm



Principal dimensions (mm)						Designations
d	D	T	B	r _{1,2min}	r _{3,4min}	
152.400	254.000	120.650	120.650	1.5	3.3	IDTT0001
165.100	269.875	146.050	146.050	1.5	3.3	IDTT0002
180.975	288.925	158.750	158.750	1.5	3.3	IDTT0003
190.236	288.925	111.125	111.125	1.5	3.3	IDTT0004
190.500	365.049	158.750	152.400	3.3	3.3	IDTT0005
198.438	282.575	87.312	87.312	0.8	3.3	IDTT0006
209.550	317.500	184.150	184.150	1.5	3.3	IDTT0007
252.412	358.775	130.175	139.700	1.5	3.3	IDTT0008
266.700	355.600	107.950	109.538	1.5	3.3	IDTT0009
280.000	406.400	206.375	206.375	3.3	3.3	IDTT0010
288.925	406.400	144.462	144.462	3.3	3.3	IDTT0011
303.212	495.300	263.525	263.525	3.3	6.4	IDTT0012
333.375	469.900	166.688	166.688	3.3	3.3	IDTT0013
	523.875	185.738	185.738	3.3	6.4	IDTT0014
346.075	488.950	174.625	174.625	3.3	3.3	IDTT0015
349.250	457.200	120.650	120.650	1.5	3.3	IDTT0016
368.300	523.875	185.738	185.738	3.3	6.4	IDTT0017
384.175	546.100	193.675	193.675	3.3	6.4	IDTT0018
415.925	590.550	209.550	209.550	3.3	6.4	IDTT0019
447.675	635.000	223.838	223.838	3.3	6.4	IDTT0020
479.425	679.450	238.125	238.125	3.3	6.4	IDTT0021
501.650	711.200	250.825	250.825	3.3	6.4	IDTT0022
519.112	736.600	258.762	258.762	3.3	6.4	IDTT0023
571.500	812.800	285.750	296.862	3.3	6.4	IDTT0024



Bore(mm) d	Basic load ratings KN		Calculation factors			Ref. designations TIMKEN	Ref. Mass kg
	Cr	Cor	e	Y ₁	Y ₂		
152.400	1060	2330	0.41	1.66	2.47	99600TD-99100	26.2
165.100	1460	3210	0.33	2.03	3.02	H234649TD-H234610	36.2
180.975	1060	2340	0.47	1.44	2.15	94713TD-94113	34.3
190.236	983	2160	0.36	1.89	2.81	82785TD-82720	26.9
190.500	1880	4140	0.40	1.68	2.50	EE420750TD-421437	77.5
198.438	684	1500	0.51	1.33	1.97	67980TD-67920	19.2
209.550	1170	2580	0.52	1.29	1.92	93826TD-93125	46.9
252.412	1550	3410	0.33	2.03	3.02	M249746TD-M249710	45.8
266.700	1190	2620	0.36	1.87	2.79	LM451349TD-LM451310	31.1
280.000	1480	3260	0.39	1.75	2.60	EE128113TD-128160	78.2
288.925	2030	4470	0.34	2.00	2.97	M255449TD-M255410	62.7
303.212	4890	10800	0.33	2.03	3.02	HH258249TD-HH258210	221
333.375	2730	6000	0.33	2.02	3.00	HM261049TD-HM261010	98.5
	3370	7500	0.33	2.03	3.02	HM265032TD-HM265010	167
346.075	2940	6470	0.33	2.02	3.00	HM262749TD-HM262710	114
349.250	1600	3520	0.32	2.12	3.15	LM263145TD-LM263110	57.3
368.300	3370	7420	0.33	2.03	3.02	HM265049TD-HM265010	138
384.175	3650	8030	0.33	2.03	3.02	HM266449TD-HM266410	160
415.925	4240	9330	0.33	2.03	3.02	M268749TD-M268710	199
447.675	4870	10700	0.33	2.03	3.02	M270749TD-M270710	246
479.425	5550	12210	0.33	2.03	3.02	M272749TD-M272710	305
501.650	6020	12800	0.33	2.03	3.02	M274149TD-M274110	348
519.112	6440	14200	0.33	2.03	3.02	M275349TD-M275310	396
571.500	7880	17400	0.33	2.03	3.02	M278748TD-M278710	523

Backing bearings

Backing bearings (Sendzimir bearings)

1. Characteristics

Backing bearings are mostly used on multi-roll cold mill with thick wall of outer ring and are ideal backup bearings of multi-roll cold mill. They have the advantages of simple geometric shape, high manufacturing precision and high radial bearing capacity. Structure type without retaining side and retaining ring is not allowed to bear axial load. Axial load is born by adjusting washer at both ends or thrust bearings. Most of them are used on rolling stainless steel and Si-steel strip multi-roll mill. In recent years, because of development in eight-roll mill, common wide and thin plate rolling mill also uses backing bearings as backup bearings, which widen use scope of backing bearings. Because radial load born by backing bearings is very big, outer ring must have enough strength, to avoid fracture and deformation of race caused by rolling force.

2. Tolerance

Wall of outer ring for backing bearings is very thick, main tolerance precision requires wall thickness difference. Group according to wall thickness difference of bearing when used in group. Backing bearings produced by FV can be grouped in P5 grade, P4 grade and P2 grade according to standard of ISO492. Grouping tolerance for each group of wall thickness difference can be regulated in production protocol of user. Please consult technical service department of FV for grouping tolerance of backing bearings.

3. Lubrication

Backing bearings also can be lubricated through using oil which was for cooling roller: viscosity of oil should be $8 \sim 12 \text{ mm}^2/\text{s}$ at 40°C . Oil and water mixture also can be used for lubricating, but it must be strictly filtered, to be in accordance with requirement on cleanliness lubricating oil of bearing.

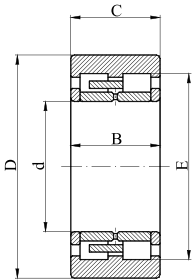
4. Maintenance and recycling

For backing bearings, because wall for outer ring is very thick, it is allowed to be reused after repaired when appearance of outer ring and raceway for bearing are fatigued.

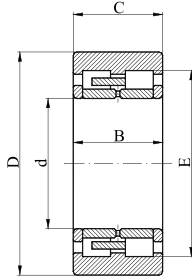
5. Equivalent dynamic load $P_r = F_r$

6. Equivalent static load $P_{or} = F_r$

Backing bearings (Sendzimir bearings)
d 70--205mm



Principal dimensions (mm)					Designations
d	D	B	C	E	
70	200	46	45	136	MCBB0017
80	180	100	100	132	MCBB0016
	260	72	70	162	MCBB0018
90	180	100	98	138.5	MCBB0019
	220	120	118	159	MCBB0020
100	225	120	119	163.5	MCBB0001
	225	120	120	167.7	MCBB0002
110	260	98	98	190	MCBB0003
	260	125	125	190	MCBB0004
120	280	160	158	201.5	MCBB0014
130	300.020	160.000	159.500	218.4	MCBB0005
	300.020	172.640	172.640	218.4	MCBB0006
	300.020	172.650	171.600	219.3	MCBB0007
	320	145	130	226	MCBB0011
180	406.400	224.000	224.000	227.4	MCBB0008
	406.420	171.000	171.000	293.4	MCBB0009
	406.420	224.000	224.000	293.4	MCBB0010
	410.000	92.500	77.500	294	MCBB0013
	410	235	220	294	MCBB0012
205	520	168	168	356.085	MCBB0015



Bore (mm)	Basic load ratings KN		Ref. designations		Ref. Mass
d	Cr	Cor	SKF	FAG	kg
70	222	265			9.01
80	547	903			14.6
	435	640			24.9
90	469	862			13.2
	684	1236			28.2
100	671	1100	BNTB322869B/HB1		28.1
	784	1300	BNTB322246/HB1		26.5
110	842	1290	BC2B322564		31.5
	1020	1660	BC2B319531		40.2
120	1060	3750			55.9
130	1610	3000	319028	528930	65.5
	1570	3000	314833BA	562739	72.5
	1380	2240	BC2B320432C	549722	69.5
	1230	2230			63.3
180	2090	4400	BNTB322891/HB2		175
	2100	3750	BC3B326277/HB1		130
	2600	5100	315515B	523247C	170
	1182	1868			56.5
	2744	5515			167
205	2352	3505			226

Spherical roller bearings

Spherical roller bearings

1. Dimensions

Dimensions of bearing listed in the dimension table are in accordance with ISO15–1998.

2. Axial angular alignment error

Because of design for spherical roller bearings, they have function of self-aligning, namely bearing themselves can adjust alignment error for angle of axis between inner ring and outer ring. Under normal load and work condition, when inner ring is rotated, alignment error value for angle of axis given in the table below can exist. Whether it fully reaches given value, it should be decided according to design of bearing configuration and sealing type and other conditions.

Bearing series	Allowable alignment error value for angle of axis (angle)
213 series	1
222 series	1.5
223 series	2
230 series	1.5
231 series	1.5
232 series	2.5
239 series	1.5
240 series	2
241 series	2.5

3. Tolerance

FV spherical roller bearings with cylindrical bore or tapered bore have common grade tolerance.

4. Radial internal clearance

FV standard spherical roller bearings have common grade radial internal clearance. Almost all bearings can be supplied at C3 grade clearance or some even can be at bigger clearance C4. Some dimensions can be smaller than common grade C2 clearance. Please consult technical service department of FV if non-standard radial clearance bearings (including C5 grade clearance) are ordered. These clearance values are used for zero-measure load and bearing which is not installed yet.

5. Radial equivalent dynamic load

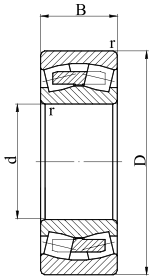
When $F_a/F_r \leq e$ $P_r = F_r + Y_1 F_a$

When $F_a/F_r > e$ $P_r = 0.67 F_r + Y_2 F_a$

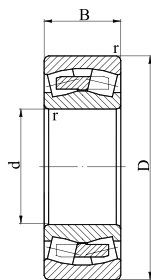
6. Radial equivalent static load

$P_{or} = F_r + Y_0 F_a$

Open-type spherical roller bearings
d 100--160mm

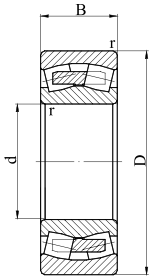


Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	B	r _{min}	Cr	Cor	Cylindrical bore	Tapered bore
100	150	50	1.5	285	415	24020CC	24020CCK
	165	52	2.0	365	490	23120CC	23120CCK
	165	65	2.0	455	640	24120CC	24120CCK
	180	46	2.0	425	490	22220E	22220EK
110	170	60	2.0	415	620	24022CC	24022CCK
	180	56	2.0	430	585	23122CC	23122CCK
	180	69	2.0	520	750	24122CC	24122CCK
	200	53	2.1	560	640	22222E	22222EK
120	180	60	2.0	430	670	24024CC	24024CCK
	200	62	2.0	510	695	23124CC	23124CCK
	200	80	2.0	655	950	24124CC	24124CCK
	215	58	2.1	630	765	22224E	22224EK
130	200	52	2.0	430	610	23026CA	23026CAK
	200	69	2.0	540	815	24026CA	24026CAK
	210	64	2.0	560	780	23126CA	23126CAK
	210	80	2.0	680	1000	24126CA	24126CAK
140	210	53	2.0	465	680	23028CA	23028CAK
	210	69	2.0	570	900	24028CA	24028CAK
	225	68	2.1	630	900	23128CA	23128CAK
	225	85	2.1	765	1160	24128CA	24128CAK
150	225	56	2.1	510	750	23030CA	23030CAK
	225	75	2.1	655	1040	24030CA	24030CAK
	250	80	2.1	830	1200	23130CA	23130CAK
	250	100	2.1	1020	1530	24130CA	24130CAK
160	240	60	2.1	585	880	23032CA	23032CAK
	240	80	2.1	950	1200	24032CA	24032CAK

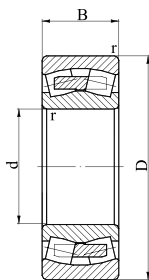


Bore (mm) d	Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Grease	Oil	e	Y_1	Y_2	Y_0	
100	2800	4000	0.28	2.40	3.60	2.50	3.15
	3000	4000	0.30	2.40	3.40	2.20	4.55
	2400	3200	0.37	1.80	2.70	1.80	5.65
	3400	4500	0.24	2.80	4.20	2.80	4.92
110	2400	3600	0.33	2.00	3.00	2.00	5.12
	2800	3600	0.30	2.30	3.40	2.20	5.75
	2200	3000	0.37	1.80	2.70	1.80	7.14
	3000	4000	0.25	2.70	4.00	2.50	7.09
120	2400	3400	0.30	2.30	3.40	2.20	5.45
	2600	3400	0.28	2.40	3.60	2.50	8.11
	1900	2600	0.37	1.80	2.70	1.80	10.3
	2800	3800	0.26	2.60	3.90	2.50	8.74
130	2800	3600	0.23	2.90	4.40	2.80	6.17
	2000	3000	0.31	2.20	3.30	2.20	8.05
	2400	3200	0.28	2.40	3.60	2.50	8.83
	1800	2400	0.35	1.90	2.90	1.80	11.2
140	2600	3400	0.22	3.00	4.60	2.80	6.55
	2000	2800	0.30	2.30	3.40	2.20	8.55
	2200	2800	0.28	2.40	3.60	2.50	10.5
	1700	2400	0.35	1.90	2.90	1.80	13.5
150	2400	3200	0.22	3.00	4.60	2.80	7.95
	1800	2600	0.30	2.30	3.40	2.20	10.5
	2000	2600	0.30	2.30	3.40	2.20	16.1
	1500	2200	0.37	1.80	2.70	1.80	20.2
160	2400	3000	0.22	3.00	4.60	2.80	9.74
	1700	2400	0.30	2.30	3.40	2.20	13.1

Open-type spherical roller bearings
d 160--220mm

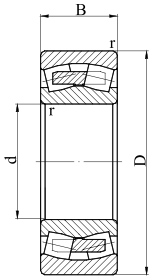


Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	B	r _{min}	Cr	Cor	Cylindrical bore	Tapered bore
160	270	86	2.1	980	1370	23132CA	23132CAK
	270	109	2.1	1180	1760	24132CA	24132CAK
170	260	67	2.1	710	1060	23034CA	23034CAK
	260	90	2.1	930	1460	24034CA	24034CAK
	280	88	2.1	1040	1500	23134CA	23134CAK
	280	109	2.1	1220	1860	23134CA	23134CAK
180	250	52	2.0	431	830	23936CA	23936CAK
	280	74	2.1	830	1250	23036CA	23036CAK
	280	100	2.1	1080	1730	24036CA	24036CAK
	300	96	3.0	1200	1760	23136CA	23136CAK
	300	118	3.0	1400	2160	24136CA	24136CAK
190	260	52	2.0	414	800	23938CA	23938CAK
	290	75	2.1	865	1340	23038CA	23038CAK
	290	100	2.1	1120	1800	24038CA	24038CAK
	320	104	3.0	1370	2080	23138CA	23138CAK
	320	128	3.0	1600	2500	24138CA	24138CAK
200	280	60	2.1	546	1040	23940CA	23940CAK
	310	82	2.1	1000	1530	23040CA	23040CAK
	310	109	2.1	1290	2120	24040CA	24040CAK
	340	112	3.0	1600	2360	23140CA	23140CAK
	340	140	3.0	1800	2800	24140CA	24140CAK
220	300	60	2.1	546	1080	23944CA	23944CAK
	340	90	3.0	1220	1860	23044CA	23044CAK
	340	118	3.0	1560	2600	24044CA	24044CAK
	370	120	4.0	1800	2750	23144CA	23144CAK
	370	150	4.0	2120	3350	24144CA	24144CAK

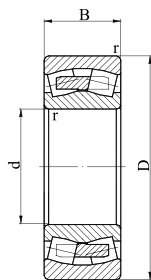


Bore (mm) d	Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Grease	Oil	e	Y ₁	Y ₂	Y ₀	
160	1900	2400	0.30	2.30	3.40	2.20	20.5
	1400	1900	0.40	1.70	2.50	1.60	25.2
170	2200	2800	0.23	2.90	4.40	2.80	13.1
	1600	2400	0.33	2.00	3.00	2.00	17.5
	1800	2400	0.30	2.30	3.40	2.20	22.2
	1300	1900	0.37	1.80	2.70	1.80	27.5
180	2200	2800	0.18	3.80	5.60	3.60	8.24
	2000	2600	0.24	2.80	4.20	2.80	17.5
	1500	2200	0.33	2.00	3.00	2.00	23.2
	1700	2200	0.30	2.30	3.40	2.20	28.1
	1300	1700	0.37	1.80	2.70	1.80	34.5
190	2200	2600	0.16	4.20	6.30	4.00	8.45
	1900	2400	0.23	2.90	4.40	2.80	18.3
	1400	2000	0.31	2.20	3.30	2.20	24.5
	1500	2000	0.31	2.20	3.30	2.20	35.2
	1200	1600	0.40	1.70	2.50	1.60	43.3
200	2000	2400	0.19	3.60	5.30	3.60	11.5
	1800	2200	0.24	2.80	4.20	2.80	23.3
	1300	1900	0.33	2.00	3.00	2.00	31.4
	1500	1900	0.31	2.20	3.30	2.20	43.2
	1100	1500	0.40	1.70	2.50	1.60	53.5
220	1900	2200	0.16	4.20	6.30	4.00	13.1
	1600	2000	0.24	2.80	4.20	2.80	30.5
	1200	1700	0.33	2.00	3.00	2.00	40.2
	1300	1700	0.30	2.30	3.40	2.20	53.5
	1000	1400	0.40	1.70	2.50	1.60	67.2

Open-type spherical roller bearings
d 240--340mm

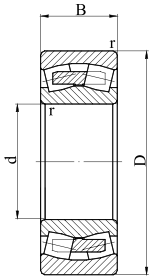


Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	B	r _{min}	Cr	Cor	Cylindrical bore	Tapered bore
240	320	60	2.1	564	1160	23948CA	23948CAK
	360	92	3.0	1290	2080	23048CA	23048CAK
	360	118	3.0	1600	2700	24048CA	24048CAK
	400	128	4.0	2080	3200	23148CA	23148CAK
	400	160	4.0	2400	3900	24148CA	24148CAK
260	360	75	2.1	880	1800	23952CA	23952CAK
	400	104	4.0	1600	2550	23052CA	23052CAK
	400	140	4.0	2040	3450	24052CA	24052CAK
	440	144	4.0	2550	3900	23152CA	23152CAK
	440	180	4.0	3000	4800	24152CA	24152CAK
280	380	75	2.1	845	1760	23956CA	23956CAK
	420	106	4.0	1730	2850	23056CA	23056CAK
	420	140	4.0	2160	3800	24056CA	24056CAK
	460	146	5.0	2650	4250	23156CA	23156CAK
	460	180	5.0	3100	5100	24156CA	24156CAK
300	420	90	3.0	1200	2500	23960CA	23960CAK
	460	118	4.0	2120	3450	23060CA	23060CAK
	460	160	4.0	2700	4750	24060CA	24060CAK
	500	160	5.0	3200	5100	23160CA	23160CAK
	500	200	5.0	3750	6300	24160CA	24160CAK
320	440	90	3.0	1430	2700	23964CA	23964CAK
	480	121	4.0	2240	3800	23064CA	23064CAK
	480	160	4.0	2850	5100	24064CA	24064CAK
	540	176	5.0	3750	6000	23164CA	23164CAK
	540	218	5.0	4250	7100	24164CA	24164CAK
340	460	90	3.0	1460	2800	23968CA	23968CAK

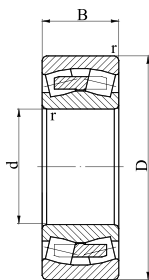


Bore (mm) d	Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Grease	Oil	e	Y ₁	Y ₂	Y ₀	
240	1700	2000	0.15	4.50	6.70	4.50	14.4
	1500	1900	0.23	2.90	4.40	2.80	33.5
	1100	1600	0.30	2.30	3.40	2.20	43.2
	1200	1600	0.30	2.30	3.40	2.20	66.5
	900	1300	0.40	1.70	2.50	1.60	83.2
260	1500	1900	0.18	3.80	5.60	3.60	24.3
	1300	1700	0.23	2.90	4.40	2.80	48.5
	1000	1400	0.33	2.00	3.00	2.00	65.5
	1100	1400	0.31	2.20	3.30	2.20	90.5
	850	1200	0.40	1.70	2.50	1.60	110
280	1400	1700	0.16	4.20	6.30	4.00	26.1
	1300	1600	0.23	2.90	4.40	2.80	52.5
	950	1400	0.31	2.20	3.30	2.20	69.5
	1000	1300	0.30	2.30	3.40	2.20	97.1
	800	1100	0.40	1.70	2.50	1.60	120
300	1300	1600	0.19	3.60	5.30	3.60	40.5
	1200	1500	0.23	2.90	4.40	2.80	71.5
	850	1200	0.33	2.00	3.00	2.00	97.1
	950	1200	0.30	2.30	3.40	2.20	125
	700	1000	0.40	1.70	2.50	1.60	160
320	1400	1500	0.17	4.00	5.90	4.00	42.1
	1100	1400	0.23	2.90	4.40	2.80	78.4
	800	1200	0.31	2.20	3.30	2.20	100
	850	1100	0.31	2.20	3.30	2.20	165
	670	900	0.40	1.70	2.50	1.60	210
340	1300	1400	0.17	4.00	5.90	4.00	45.5

Open-type spherical roller bearings
d 340--440mm

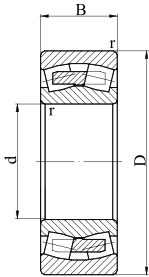


Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	B	r _{min}	Cr	Cor	Cylindrical bore	Tapered bore
340	520	133	5.0	2700	4550	23068CA	23068CAK
	520	180	5.0	3450	6200	24068CA	24068CAK
	580	190	5.0	4250	6800	23168CA	23168CAK
	580	243	5.0	5300	8650	24168CA	24168CAK
360	480	90	3.0	1400	2750	23972CA	23972CAK
	540	134	5.0	2750	4800	23072CA	23072CAK
	540	180	5.0	3550	6550	24072CA	24072CAK
	600	192	5.0	4300	6950	23172CA	23172CAK
	600	243	5.0	5600	9300	24172CA	24172CAK
380	520	106	4.0	1960	3800	23976CA	23976CAK
	560	135	5.0	2900	5000	23076CA	23076CAK
	560	180	5.0	3600	6800	24076CA	24076CAK
	620	194	5.0	4400	7100	23176CA	23176CAK
	620	243	5.0	5700	9800	24176CA	24176CAK
400	540	106	4.0	2000	3900	23980CA	23980CAK
	600	148	5.0	3250	5700	23080CA	23080CAK
	600	200	5.0	4300	8000	24080CA	24080CAK
	650	200	6.0	4650	7650	23180CA	23180CAK
	650	250	6.0	6200	10600	24180CA	24180CAK
420	560	106	4.0	2040	4150	23984CA	23984CAK
	620	150	5.0	3400	6000	23084CA	23084CAK
	620	200	5.0	4400	8300	24084CA	24084CAK
	700	224	6.0	5600	9300	23184CA	23184CAK
	700	280	6.0	7350	12600	24184CA	24184CAK
440	600	118	4.0	2450	4900	23988CA	23988CAK
	650	157	6.0	3650	6550	23088CA	23088CAK

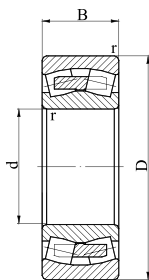


Bore (mm) d	Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Grease	Oil	e	Y_1	Y_2	Y_0	
340	1000	1300	0.24	2.80	4.20	2.80	105
	750	1100	0.33	2.00	3.00	2.00	140
	800	1000	0.31	2.20	3.30	2.20	210
	600	850	0.40	1.70	2.50	1.60	280
360	1200	1300	0.15	4.50	6.70	4.50	46.5
	950	1200	0.23	2.90	4.40	2.80	110
	700	1000	0.31	2.20	3.30	2.20	145
	750	1000	0.30	2.30	3.40	2.20	220
	560	800	0.40	1.70	2.50	1.60	280
380	1100	1200	0.17	4.00	5.90	4.00	69.2
	900	1200	0.22	3.00	4.60	2.80	115
	670	950	0.30	2.30	3.40	2.20	150
	560	1000	0.30	2.30	3.40	2.20	230
	480	850	0.37	1.80	2.70	1.80	300
400	1100	1200	0.16	4.20	6.30	4.00	71.5
	850	1100	0.23	2.90	4.40	2.80	150
	630	900	0.30	2.30	3.40	2.20	205
	530	950	0.28	2.40	3.60	2.50	265
	430	800	0.37	1.80	2.70	1.80	340
420	1000	1100	0.16	4.20	6.30	4.00	74.5
	600	1100	0.22	3.00	4.60	2.80	155
	530	900	0.30	2.30	3.40	2.20	210
	480	900	0.30	2.30	3.40	2.20	350
	400	700	0.40	1.70	2.50	1.60	445
440	950	1000	0.16	4.20	6.30	4.00	99.5
	560	1000	0.22	3.00	4.60	2.80	180

Open-type spherical roller bearings
d 440--560mm

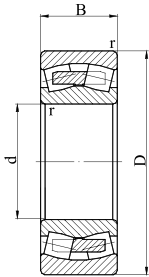


Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	B	r _{min}	Cr	Cor	Cylindrical bore	Tapered bore
440	650	212	6.0	4800	9150	24088CA	24088CAK
	720	226	6.0	6000	10000	23188CA	23188CAK
	720	280	6.0	7500	13200	24188CA	24188CAK
460	620	118	4.0	2500	5000	23992CA	23992CAK
	680	163	6.0	3900	6950	23092CA	23092CAK
	680	218	6.0	5200	10000	24092CA	24092CAK
	760	240	7.5	6400	10800	23192CA	23192CAK
	760	300	7.5	8300	14600	24192CA	24192CAK
480	650	128	5.0	2900	5700	23996CA	23996CAK
	700	165	6.0	3900	6800	23096CA	23096CAK
	700	218	6.0	5300	10400	24096CA	24096CAK
	790	248	7.5	6950	12000	23196CA	23196CAK
	790	308	7.5	9000	15600	24196CA	24196CAK
500	670	128	5.0	2900	6000	239/500CA	239/500CAK
	720	167	6.0	4150	7800	230/500CA	230/500CAK
	720	218	6.0	5500	11000	240/500CA	240/500CAK
	830	264	7.5	7650	12900	231/500CA	231/500CAK
	830	325	7.5	9800	17000	241/500CA	241/500CAK
530	710	136	5.0	3200	6700	239/530CA	239/530CAK
	780	185	6.0	5100	9300	230/530CA	230/530CAK
	780	250	6.0	6700	13200	240/530CA	240/530CAK
	870	272	7.5	8150	14000	231/530CA	231/530CAK
	870	335	7.5	10600	19000	241/530CA	241/530CAK
560	750	140	5.0	3450	7200	239/560CA	239/560CAK
	820	195	6.0	5600	10200	230/560CA	230/560CAK
	820	258	6.0	7350	14600	240/560CA	240/560CAK

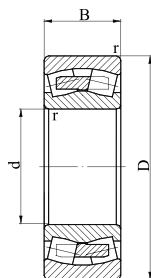


Bore (mm) d	Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Grease	Oil	e	Y_1	Y_2	Y_0	
440	500	850	0.30	2.30	3.40	2.20	245
	450	850	0.30	2.30	3.40	2.20	360
	400	700	0.37	1.80	2.70	1.80	460
460	600	1000	0.16	4.20	6.30	4.00	105
	560	950	0.22	3.00	4.60	2.80	205
	480	800	0.28	2.40	3.60	2.50	275
	430	800	0.30	2.30	3.40	2.20	440
	360	670	0.37	1.80	2.70	1.80	560
480	560	1000	0.18	3.80	5.60	3.60	125
	530	950	0.21	3.20	4.80	3.20	215
	450	750	0.28	2.40	3.60	2.50	285
	400	750	0.30	2.30	3.40	2.20	485
	340	630	0.37	1.80	2.70	1.80	605
500	530	950	0.17	4.00	5.90	4.00	130
	500	900	0.21	3.20	4.80	3.20	225
	430	700	0.26	2.60	3.90	2.50	295
	380	700	0.30	2.30	3.40	2.20	580
	320	600	0.37	1.80	2.70	1.80	745
530	500	900	0.17	4.00	5.90	4.00	155
	450	800	0.22	3.00	4.60	2.80	310
	400	670	0.28	2.40	3.60	2.50	410
	360	670	0.30	2.30	3.40	2.20	645
	300	560	0.37	1.80	2.70	1.80	830
560	450	850	0.16	4.20	6.30	4.00	175
	430	750	0.22	3.00	4.60	2.80	355
	380	630	0.28	2.40	3.60	2.50	465

Open-type spherical roller bearings
d 560--750mm

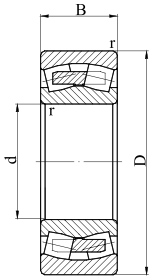


Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	B	r _{min}	Cr	Cor	Cylindrical bore	Tapered bore
560	920	280	7.5	9150	16000	231/560CA	231/560CAK
	920	355	7.5	12000	21600	241/560CA	241/560CAK
600	800	150	5.0	3900	8300	239/600CA	239/600CAK
	870	200	6.0	6000	11400	230/600CA	230/600CAK
	870	272	6.0	8150	17000	240/600CA	240/600CAK
	980	300	7.5	10200	18000	231/600CA	231/600CAK
	980	375	7.5	11500	23600	241/600CA	241/600CAK
630	850	165	6.0	4650	9800	239/630CA	239/630CAK
	920	212	7.5	6700	12500	230/630CA	230/630CAK
	920	290	7.5	8800	18000	240/630CA	240/630CAK
	1030	315	7.5	10500	20800	231/630CA	231/630CAK
	1030	400	7.5	12700	27000	241/630CA	241/630CAK
670	900	170	6.0	5000	10800	239/670CA	239/670CAK
	980	230	7.5	7650	14600	230//670CA	230/670CAK
	980	308	7.5	10000	20400	240/670CA	240/670CAK
	1090	336	7.5	10900	22400	231/670CA	231/670CAK
	1090	412	7.5	13800	29000	241/670CA	241/670CAK
710	950	180	6.0	5600	12000	239/710CA	239/710CAK
	1030	236	7.5	8300	16300	230/710CA	230/710CAK
	1030	315	7.5	9370	22800	240/710CA	240/710CAK
	1150	345	9.5	12200	26000	231/710CA	231/710CAK
	1150	438	9.5	15200	32500	241/710CA	241/710CAK
750	1000	185	6.0	6000	13200	239/750CA	239/750CAK
	1090	250	7.5	9650	18600	230/750CA	230/750CAK
	1090	335	7.5	10100	25000	240/750CA	240/750CAK
	1220	365	9.5	13800	29000	231/750CA	231/750CAK

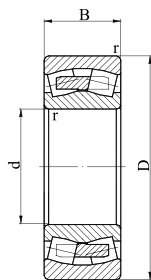


Bore (mm) d	Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Grease	Oil	e	Y ₁	Y ₂	Y ₀	
560	340	630	0.30	2.30	3.40	2.20	740
	280	500	0.35	1.90	2.90	1.80	985
600	430	750	0.17	4.00	5.90	4.00	220
	400	700	0.22	3.00	4.60	2.80	405
	340	560	0.30	2.30	3.40	2.20	540
	320	560	0.30	2.30	3.40	2.20	895
	240	480	0.37	1.80	2.70	1.80	1200
630	400	700	0.17	4.00	5.90	4.00	280
	380	670	0.21	3.20	4.80	3.20	485
	320	530	0.28	2.40	3.60	2.50	655
	260	530	0.30	2.30	3.40	2.20	1050
	220	450	0.37	1.80	2.70	1.80	1400
670	360	670	0.17	4.00	5.90	4.00	315
	340	600	0.21	3.20	4.80	3.20	600
	300	500	0.28	2.40	3.60	2.50	790
	240	500	0.30	2.30	3.40	2.20	1250
	200	400	0.37	1.80	2.70	1.80	1600
710	340	600	0.17	4.00	5.90	4.00	365
	320	560	0.21	3.20	4.80	3.20	670
	260	450	0.27	2.50	3.70	2.50	895
	240	450	0.28	2.40	3.60	2.50	1450
	190	380	0.37	1.80	2.70	1.80	1900
750	320	560	0.16	4.20	6.30	4.00	420
	300	530	0.21	3.20	4.80	3.20	795
	240	430	0.28	2.40	3.60	2.50	1065
	220	430	0.28	2.40	3.60	2.50	1700

Open-type spherical roller bearings
d 750--1000mm



Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	B	r _{min}	Cr	Cor	Cylindrical bore	Tapered bore
750	1220	475	9.5	17300	37500	241/750CA	241/750CAK
	1220	475	9.5	17300	37500	241/750CA	241/750CAK
800	1060	195	6.0	6400	14300	239/800CA	239/800CAK
	1150	258	7.5	10000	20000	230/800CA	230/800CAK
	1150	345	7.5	11100	28500	240/800CA	240/800CAK
	1280	375	9.5	14800	31500	231/800CA	231/800CAK
	1280	475	9.5	18400	40500	241/800CA	241/800CAK
850	1120	200	6.0	5980	15600	239/850CA	239/850CAK
	1220	272	7.5	9370	21600	230/850CA	230/850CAK
	1220	365	7.5	12700	31500	240/850CA	240/850CAK
	1360	400	12.0	16100	34500	231/850CA	231/850CAK
	1360	500	12.0	20200	45000	241/850CA	241/850CAK
900	1180	206	6.0	6440	17000	239/900CA	239/900CAK
	1280	280	7.5	10100	23200	230/900CA	230/900CAK
	1280	375	7.5	13600	34500	240/900CA	240/900CAK
	1420	515	12.0	21400	49000	241/900CA	241/900CAK
1000	1420	308	7.5	12700	30500	230/1000CA	230/1000CAK
	1420	412	7.5	15400	40500	240/1000CA	240/1000CAK
	1580	462	12.0	21400	48000	231/1000CA	231/1000CAK
	1580	580	12.0	26700	62000	241/1000CA	241/1000CAK



Bore (mm) d	Speed ratings (rpm)		Calculation factors				Ref. Mass kg
	Grease	Oil	e	Y_1	Y_2	Y_0	
750	180	360	0.37	1.80	2.70	1.80	2100
800	300	530	0.16	4.20	6.30	4.00	470
	280	480	0.20	3.40	5.00	3.20	895
	220	400	0.27	2.50	3.70	2.50	1200
	200	400	0.28	2.40	3.60	2.50	1920
	170	320	0.35	1.90	2.90	1.80	2300
850	260	480	0.16	4.20	6.30	4.00	560
	240	450	0.20	3.40	5.00	3.20	1050
	200	360	0.27	2.50	3.70	2.50	1410
	180	360	0.28	2.40	3.60	2.50	2200
	150	300	0.35	1.90	2.90	1.80	2710
900	240	450	0.15	4.50	6.70	4.50	605
	220	400	0.20	3.40	5.00	3.20	1200
	190	340	0.26	2.60	3.90	2.50	1570
	140	280	0.35	1.90	2.90	1.80	3350
1000	180	360	0.19	3.60	5.30	3.60	1600
	160	280	0.26	2.60	3.90	2.50	2140
	140	280	0.28	2.40	3.60	2.50	3500
	120	240	0.35	1.90	2.90	1.80	4300

Sealed spherical roller bearings

Sealed spherical roller bearings

1. Characteristics

Most guide rolls in continuous casting slab run under the situation of low speed and big load and bearing housing is exposed in spattered water steam and other pollutants. So bearings need effective space at both sides of sealing, which facilitates storing lubricant grease. Simple sealing can make some grease overflow outward from seal gap to form grease ring to increase sealing result. But lubricant grease needs to be fed continuously. Because there are many bearings, consumption of lubricant grease is high, filter is needed to prevent lubricant grease from overflowing from gap and mix with cooling water to pollute environment and blocking cooling system. To reduce consumption of lubricant grease, save cost and protect environment, FV designs and develops sealed spherical roller bearings, which have following advantages:

- ① Grease is kept at inner cavity of bearing and cannot flow outward, which can guarantee enough lubrication for very long time. Because only little grease is needed in cavity of the bearing and is required not to over flow outward, so high-quality lubricant grease is needed.
- ② Structure with seal can guarantee that lubricant grease is not added for longer time with target of one year, which is equal to production of continuous casting slab reaching one million tons. Such long time is accordance with replacement cycle of guide roll bearings.
- ③ Such structure of bearings can be popularized to other machineries similar to bad work condition of continuous casting slab.

Here two datas need to be explained:

a. Dynamic load ratings of sealed spherical roller bearings is slightly lower than that of standard spherical roller bearings with same dimension, namely non-sealed spherical roller bearings;

b.If they are expected to reach dynamic load ratings of standard spherical roller bearings, their width should be slightly bigger than those of standard spherical roller bearings.

Above decisions depend on whether bearings are to be installed in new equipments and whether as spare part of current equipment or equipment that can be modified.

2. Re-lubrication.

Sealed spherical roller bearings don't need relubrication or cannot be relubricated. They only need re-lubrication under special situation: oil groove and oil hole are set on surrounding surface of outer ring.

3. Heat stability

Because of adoption of brass solid cage, material of seal ring is high-temperature-resistant, sealed spherical roller bearings can keep dimension stable to reach 200°C. Rubber type seal ring structure has already been successfully used in other types of bearings: seal ring and bearing form an integrity, which can keep high-grade lubricant grease in inner cavity of bearing and can effectively prevent intrusion of external pollutants.

4. Axial angular alignment error

Sealed spherical roller bearings can allow 0.5° of axial angular alignment error, which are different from axial angular alignment error of non-sealed spherical roller bearings.

5. Equivalent dynamic load

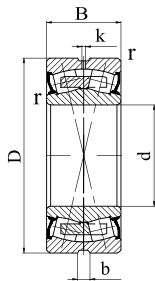
$$\text{When } F_a/F_r \leq e \quad P_r = F_r + (0.675/e)F_a \quad (\text{KN})$$

$$\text{When } F_a/F_r > e \quad P_r = 0.67F_r + (1.005/e)F_a \quad (\text{KN})$$

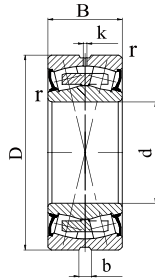
6. Equivalent static load

$$P_{or} = F_r + (0.66/e)F_a \quad (\text{KN})$$

Sealed spherical roller bearings
d 100--180mm

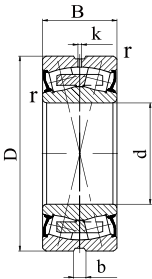


Principal dimensions (mm)				Basic load ratings KN		Speed ratings	Designations
d	D	B	r _{min}	Cr	Cor	Grease (rpm)	
100	150	50	1.5	285	415	800	24020CA/W33-2RS
	165	52	2	365	490	850	23120CA/W33-2RS
	165	65	2	380	570	570	24120CA/W33-2RS
	180	60.3	2.1	475	600	700	23220CA/W33-2RS
110	170	45	2	310	440	900	23022CA/W33-2RS
	180	56	2	430	585	800	23122CA/W33-2RS
	200	53	2.1	345	455	1100	22222CA/W33-2RS
	180	69	2	365	540	550	24122CA/W33-2RS
120	180	46	2	355	510	850	23024CA/W33-2RS
	180	60	2	400	670	880	24024CA/W33-2RS
	200	80	2	655	950	560	24124CA/W33-2RS
130	200	52	2	430	610	800	23026CA/W33-2RS
	210	64	2	480	695	930	23126CA/W33-2RS
	200	69	2	540	815	600	24026CA/W33-2RS
	210	80	2	560	930	490	24126CA/W33-2RS
	230	64	3	500	680	990	22226CA/W33-2RS
140	210	69	2	490	830	650	24028CA/W33-2RS
	225	85	2.1	765	1160	450	24128CA/W33-2RS
150	225	75	2.1	655	1040	530	24030CA/W33-2RS
	250	100	2.1	1020	1530	400	24130CA/W33-2RS
160	240	80	2.1	545	990	500	24032CA/W33-2RS
	270	86	2.1	980	1370	530	23132CA/W33-2RS
	270	109	2.1	860	1450	440	24132CA/W33-2RS
170	260	90	2.1	780	1400	520	24034CA/W33-2RS
	280	109	2.1	890	1550	400	24134CA/W33-2RS
180	280	100	2.1	780	1440	430	24036CA/W33-2RS

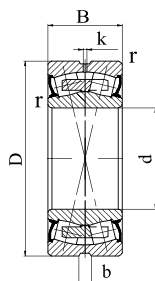


Bore (mm)	Other dimensions (mm)		Shoulder-block and chamfer dimensions (mm)			Factor	Ref. Mass
d	b	k	D _{bmax}	d _{amin}	r _{amax}	e	kg
100	5.5	3	107	108	1.5	0.28	3.15
	5.5	3	154	111	2	0.30	4.55
	5.5	3	155	110	2	0.36	5.52
	8.3	4.5	168	112	2	0.33	6.85
110	8.3	4.5	161	119	2	0.26	3.80
	8.3	4.5	169	121	2	0.29	5.75
	8.3	4.5	188	122	2	0.26	7.28
	5.5	3	170	120	2	0.36	6.64
120	5.5	3	171	129	2	0.24	4.20
	5.5	3	170	130	2	0.31	5.31
	5.5	3	203	132	2	0.38	10.5
130	8.3	4.5	191	139	2	0.25	6.00
	8.3	4.5	200	140	2	0.28	9.20
	5.5	3	191	139	2	0.33	8.05
	8.3	4.5	200	140	2	0.36	11.0
	11.1	6	216	144	2.5	0.28	11.2
140	5.5	3	200	150	2	0.31	8.40
	8.3	4.5	213	152	2	0.35	13.5
150	5.5	3	214	161	2	0.31	10.5
	8.3	4.5	238	162	2	0.37	20.0
160	8.3	4.5	229	171	2	0.25	13.2
	13.9	7.5	258	172	2	0.31	20.5
	8.3	4.5	258	172	2	0.33	25.5
170	8.3	4.5	248	182	2	0.31	17.8
	8.3	4.5	268	182	2	0.37	26.8
180	8.3	4.5	269	191	2	0.31	23.4

Sealed spherical roller bearings
d 190--220mm



Principal dimensions (mm)				Basic load ratings KN		Speed ratings	Designations
d	D	B	r _{min}	Cr	Cor	Grease (rpm)	
190	320	128	3	1260	2300	340	24138CA/W33-2RS
200	340	140	3	1800	2800	320	24140CA/W33-2RS
	360	128	4	1860	2700	430	23240CA/W33-2RS
220	300	60	2.1	546	1080	600	23944CA/W33-2RS



Bore (mm)	Other dimensions (mm)		Shoulder-block and chamfer dimensions (mm)			Factor	Ref. Mass
d	b	k	D_{bmax}	d_{amin}	r_{amax}	e	kg
190	11.1	6	306	204	2.5	0.40	42.5
200	11.1	6	326	214	2.5	0.40	53.5
	16.7	9	343	217	3	0.35	58.0
220	8.3	4.5	289	231	2	0.16	12.5

Split spherical roller bearings

Split spherical roller bearings

Split spherical roller bearings are mainly used for place where bearings are difficult to be installed such as long transmission shaft having many supporting points or crankshaft. These are also used for place of whole bearings where maintenance is difficult to be made. Split bearings provide the best solution especially for the site replacing bearings with high expense and under the situation not allowing powering off to maintain for mechanical equipment.

FV has already developed split type bearings which can be installed freely, especially when they are used for live-roll gear at cooling area of continuous casting equipment. Cast steel bearing housing is cooled through using water. Small cross-section cooling inner cavity is set at top part of bearing housing. Because standard design only allows one half of outer ring for bearing to be set on base of bearing housing, split spherical roller bearings are the best choice.

Split spherical roller bearings are developed mainly according to integrated standard spherical roller bearings and represent technical development level of current bearing.

All split type bearings are cylindrical bore diameter. Oil groove and oil hole are set on outer ring outside diameter, so that lubrication can more easily enter empty cavity of bearing.

An angle is formed between connection section of two split type inner ring of bearing and central line of bearing, to improve linked rolling condition and make rotation stable. Both outer ring and cage of the whole set of bearing are split in central line. Split spherical roller bearings have two kinds of design type: split inner ring is linked through using bolt or buckle.

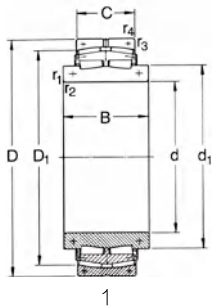
Design type 1— inner ring is connected through using bolt, two split type cage assembly pieces, brass solid cage is positioned by inner ring.

Design type 2— flange at both ends of inner ring is fastened by two split type buckles which are not fastened yet, solid cage is positioned by inner ring.

Dimensions of split type bearings are not standardized yet.

Split type bearings are self aligning. Allowable axial angular alignment error for shaft and bearing housing is $1 \sim 1.5^\circ$.

Split spherical roller bearings
d 120--850mm



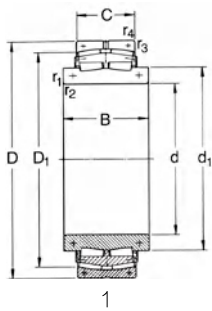
Principal dimensions (mm)						Basic load ratings KN		Designations	Design Type
d	D	B	C	r _{1,2min}	r _{3,4min}	Cr	Cor		
120	200	142	80	11 × 45°	2.0	552	900	SSRB0001	1
140	230	102	53	2.0	2.0	368	600	SSRB0002	1
148	225	142	75	2.1	2.1	535	950	SSRB0003	1
180	300	125	74	2.1	2.1	713	1200	SSRB0004	1
280	500	260	176	5.0	5.0	2710	4650	SSRB0005	2
300	500	240	160	5.0	5.0	2710	4900	SSRB0006	2
360	540	220	134	5.0	5.0	2250	4500	SSRB0007	2
400	600	240	148	5.0	5.0	2880	5850	SSRB0007	2
420	620	238	150	6.0	6.0	2880	5850	SSRB0008	2
460	700	245	165	6.0	6.0	3280	6550	SSRB0009	2
470	720	270	167	6.0	6.0	3570	7500	SSRB0010	2
560	800	230	150	5.0	5.0	3340	8150	SSRB0011	1
	870	330	200	6.0	6.0	5060	11000	SSRB0012	2
600	920	310	212	9.5	7.5	5640	12000	SSRB0013	2
	980	515	375	7.5	7.5	10400	21600	SSRB0014	2
630	920	310	212	7.5	7.5	5640	12000	SSRB0015	2
670	980	350	230	7.5	7.5	6440	14000	SSRB0016	2
710	950	375	243	6.0	6.0	5750	15300	SSRB0017	2
	1030	360	236	7.5	7.5	7020	15600	SSRB0018	2
750	1000	360	250	6.0	6.0	6330	17000	SSRB0019	2
	1090	475	335	7.5	7.5	9950	24000	SSRB0020	2
800	1060	370	258	6.0	6.0	6900	18600	SSRB0021	2
850	1120	390	272	6.0	6.0	7360	20800	SSRB0022	2
	1180	331	206	6.0	6.0	6440	17000	SSRB0023	2
	1280	430	280	7.5	7.5	10100	23200	SSRB0024	2
	1280	540	375	7.5	7.5	12400	31000	SSRB0025	2



2

Bore (mm) d	Other dimensions (mm)		Calculation factors				Ref. designations	Ref. Mass
	d ₁	D ₁	e	Y ₁	Y ₂	Y ₀	SKF	kg
120	166	169	0.37	1.8	2.7	1.8	BS2B321598	17.2
140	180	190	0.22	3.0	4.6	2.8	BS2B321606	14.5
148	180	197	0.30	2.3	3.4	2.2	BS2B321578	14.5
180	220	248	0.24	2.8	4.2	2.8	BS2B321610	30.3
280	419	439	0.35	1.9	2.9	1.9	BS2B247534	175
300	418	434	0.30	2.3	3.4	2.2	BS2B247597	150
360	476	482	0.23	2.9	4.4	2.8	BS2B247307	155
400	522	541	0.23	2.9	4.4	2.8	BS2B243256	205
420	542	562	0.22	3.0	4.6	2.8	BS2B243485	215
460	604	635	0.21	3.2	4.8	3.2	BS2B243120	340
470	646	656	0.21	3.2	4.8	3.2	BS2B242975D	375
560	669	742	0.17	4.0	5.9	4.0	BS2B247590	320
	733	786	0.22	3.0	4.6	2.8	BS2B247087	580
600	798	837	0.21	3.2	4.8	3.2	BS2B243123	690
	811	833	0.35	1.9	2.9	1.8	BS2B243266	1350
630	798	837	0.21	3.2	4.8	3.2	BS2B242989	630
670	860	890	0.21	3.2	4.8	3.2	BS2B242994	800
710	860	868	0.22	3.0	4.6	2.8	BS2B243122	700
	901	939	0.21	3.2	4.8	3.2	BS2B247181	880
750	900	916	0.22	3.0	4.6	2.8	BS2B243125	710
	938	969	0.28	2.4	3.6	2.5	BS2B243127	1300
800	955	968	0.21	3.2	4.8	3.2	BS2B243262	810
850	1008	1028	0.22	3.0	4.6	2.8	BS2B243124	830
	1070	1100	0.15	4.5	6.7	4.5	BSR-8001	880
	1120	1177	0.20	3.4	5.0	3.2	BSR-8000	1550
	1123	1147	0.26	2.6	3.9	2.5	BS2B243268	2350

Split spherical roller bearings
d 900--1120mm



Principal dimensions (mm)						Basic load ratings KN		Designations	Design Type
d	D	B	C	r _{1,2min}	r _{3,4min}	Cr	Cor		
900	1180	400	280	6.0	6.0	8170	22800	SSRB0026	2
950	1250	420	300	7.5	7.5	8970	25500	SSRB0027	2
1020	1280	352	218	6.0	6.0	5980	19600	SSRB0028	2
1060	1460	500	335	7.5	7.5	11500	33500	SSRB0029	2
1060.335	1400	490	335	7.5	7.5	11300	32000	SSRB0030	2
1120	1460	500	335	7.5	7.5	11500	33500	SSRB0031	2
	1540	525	355	7.5	7.5	14400	44000	SSRB0032	2



2

Bore (mm) d	Other dimensions (mm)		Calculation factors				Ref. designations	Ref. Mass
	d ₁	D ₁	e	Y ₁	Y ₂	Y ₀	SKF	kg
900	1058	1086	0.21	3.2	4.8	3.2	BS2B243126	1100
950	1130	1150	0.21	√3.2	4.8	3.2	BS2B243114	1300
1020	1192	1210	0.14	4.8	7.2	4.5	BS2-8001	950
1060	1330	1350	0.20	3.4	5.0	3.2	321489	2470
1060.335	1253	1284	0.21	3.2	4.8	3.2	BS2B243486A	1800
1120	1330	1350	0.20	3.4	5.0	3.2	BS2B246572	2070
	1401	1420	0.20	3.4	5.0	3.2	BS2B243487CAB	2850

Deep groove ball bearings

Deep groove ball bearings

Deep groove ball bearings are non-separable bearings, with simple structure, low friction factor and high limiting speed. They are the most widely used, mainly bear radial load as well as a certain amount of axial load. When the radial clearance increases, they have the function of bearing axial load as angular contact ball bearings.

1. Structure type

Deep groove ball bearings have a variety of structure. In addition to general open type, FV also provides bearings with bearing shield on one side, bearing shield on double sides, sealed on one side and sealed on double sides. All sealed bearings are filled with lubrication grease before leaving the factory and users need not clean and add grease. We also provide deep groove ball bearings with snap ring groove in outer ring. The structure can use snap rings to fix bearing in the bearing box. This is an advantage in application with confined assembly space.

2. Cage

Deep groove ball bearings generally adopt steel stamping ribbon cage or brass solid cage.

3. Permissible axial angular error

The bearings allow relative tilt angle error of inner ring and outer ring as listed below according to radial clearance:

Radial clearance	Permissible axial angular error
Group C0	8′
Group C3	12′
Group C4	16′

4. Radial equivalent static load (choose the greater of the two calculated value)

$$P_{or}=F_r \qquad \qquad \qquad (\text{KN})$$

$$P_{or}=0.6F_r+0.5F_a \qquad \qquad \qquad (\text{KN})$$

5. Radial equivalent dynamic load

$$P_r = X F_r + Y F_a$$

$$F_r\text{---radial load} \qquad \qquad \qquad (\text{KN})$$

Fa—axial load (KN)

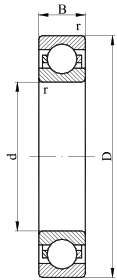
X—radial factor

Y—axial factor

6. Check the following table for the value of factor X、Y

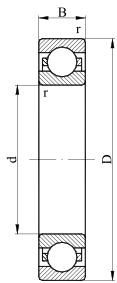
Fa/ Cor	Group C0					Group C3					Group C4				
	Fa/Fr≤e		Fa/Fr>e		e	Fa/Fr≤e		Fa/Fr>e		e	Fa/Fr≤e		Fa/Fr>e		e
	X	Y	X	Y		X	Y	X	Y		X	Y	X	Y	
0.025	1	0	0.56	2.0	0.22	1	0	0.46	1.75	0.31	1	0	0.44	1.42	0.40
0.04	1	0	0.56	1.8	0.24	1	0	0.46	1.62	0.33	1	0	0.44	1.36	0.42
0.07	1	0	0.56	1.6	0.27	1	0	0.46	1.46	0.36	1	0	0.44	1.27	0.44
0.13	1	0	0.56	1.4	0.31	1	0	0.46	1.30	0.41	1	0	0.44	1.16	0.48
0.25	1	0	0.56	1.2	0.37	1	0	0.46	1.14	0.46	1	0	0.44	1.05	0.53
0.50	1	0	0.56	1.0	0.44	1	0	0.46	1.00	0.54	1	0	0.44	1.00	0.56

Deep groove ball bearings
d 100--190mm



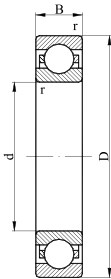
Principal dimensions (mm)				Basic load ratings KN		Speed ratings(rpm)		Ref. Mass	Designations	
d	D	B	r_{min}	Cr	Cor	Grease	Oil	kg	New	Old
100	215	47	3	225	183	3200	3700	7.00	6320	320
110	170	28	2	107	95	3800	4500	2.00	6022	122
120	180	28	2	111	103	3500	4100	2.10	6024	124
	215	40	2.1	202	170	2900	3400	5.20	6224	224
130	200	33	2	138	131	3200	3800	3.20	6026	126
140	210	33	2	143	142	3000	3500	3.40	6028	128
150	225	35	2.1	164	164	2800	3200	4.80	6030	130
	230	35	2	166	166	2800	3200	5.50	6030X1	830
160	240	38	2.1	186	187	2600	3000	5.90	6032	132
170	215	22	1.1	78	92	2700	3200	1.90	61834	1000834
	230	28	2	119	129	2600	3100	3.40	61934	1000934
	260	42	2.1	218	224	2400	2800	7.90	6034	134
	265	42	2.1	218	218	2400	2800	8.50	6034YA1	134K
	270	42	2.1	220	220	2400	2800	8.50	6034X1	134Y
180	225	22	1.1	79	95	2600	3000	2.00	61836	1000836
	250	33	2	143	155	2400	2900	5.05	61936	1000936
	259.5	52	2.1	205	155	2400	2900	8.60	61936X1	736
	259.5	33	2	191	146	2400	2900	6.00		736K
	260	42	2.1	117	145	2300	2700	7.00	62936	136Y
	280	46	2.1	246	259	2300	2700	10.5	6036	136
190	240	24	1.5	95	114	2400	2900	2.60	61838	1000838
	260	33	2	147	165	2300	2700	5.25	61938	1000938
	269.5	33	2	210	170	2300	2700	6.30	61938X1	738
	289.5	46	2.1	256	280	2100	2500	11.0	6038X1	
	290	46	2.1	256	280	2100	2500	11.0	6038	138

Deep groove ball bearings
d 200--270mm



Principal dimensions (mm)				Basic load ratings KN		Speed ratings(rpm)		Ref. Mass	Designations	
d	D	B	r _{min}	Cr	Cor	Grease	Oil	kg	New	Old
200	250	24	1.5	96	119	2300	2700	2.70	61840	1000840
	269.5	51	2.1	135	204	2200	2600	7.20	61940X3	
	279.5	38	2.1	204	218	2200	2600	7.00	61940X1	740
	280	38	2.1	204	218	2200	2600	7.10	61940	1000940
	289.5	38	2.1	204	218	2200	2600	9.00		840
	310	51	2.1	283	316	2000	2400	11.9	6040	140
220	270	24	1.5	99	127	2100	2400	3.00	61844	1000844
	300	38	2.1	208	234	2000	2300	7.70	61944	1000944
	300	60	2.1	220	248	2000	2300	13.0	63944	944
	309.5	38	3	208	234	2000	2300	9.40	61944X1	744
	340	56	3	313	376	1800	2200	18.5	6044	144
240	300	28	2	128	165	1900	2200	4.60	61848	1000848
	320	38	2.1	221	264	1800	2100	8.30	61948	1000948
	359.5	56	3	324	403	1700	2000	21.0	6048X1	748
	360	56	3	324	403	1700	2000	21.0	6048	148
	369.5	56	3	324	403	1700	2000	23.0		148K
260	320	28	2	138	181	1700	2000	5.00	61852	1000852
	360	46	2.1	289	364	1600	1900	14.5	61952	1000952
	369.5	46	2.1	204	255	1600	1900	16.5	61952X1-2	952
	369.5	60	4	310	288	1500	1800	21.6	62952X1	752
	370	46	2.1	310	288	1500	1800	16.5	61952X1	752K
	379.5	60	4	204	255	1500	1800	23.9	62952X1-2	852
	400	65	4	378	488	1500	1800	29.5	6052	152
270	399.5	60	2.1	320	300	1500	1800	25.0	62954X1	754

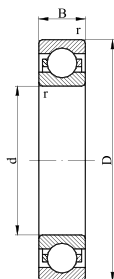
Deep groove ball bearings
d 280--360mm



Principal dimensions (mm)				Basic load ratings KN		Speed ratings(rpm)		Ref. Mass	Designations	
d	D	B	r _{min}	Cr	Cor	Grease	Oil	kg	New	Old
280	350	33	2	178	230	1600	1900	7.40	61856	1000856
	375	65	2.1	209	272	1500	1800	21.1	62956X3	956
	380	46	2.1	209	222	1500	1800	15.0	61956	1000956
	389.5	46	2.1	209	272	1500	1800	17.2	61956X1-2	756K
	389.5	65	4	209	272	1500	1800	24.8		756YS
	390	46	4	209	272	1500	1800	18.0	61956X1-1	756
	420	65	4	423	546	1400	1600	36.0	6056	156
300	380	38	2.1	211	273	1500	1700	10.5	61860	1000860
	419.5	56	3	359	488	1400	1600	24.4	61960X1	
	420	56	4	359	488	1400	1600	24.5	61960	1000960
	420	65	3	359	488	1400	1600	27.9	61960X2	
	460	74	4	462	624	1300	1500	43.8	6060	160
	479	60	4	475	504	1200	1400	45.0	16060X3	
320	400	38	2.1	218	296	1400	1600	10.9	61864	1000864
	440	56	3	371	527	1300	1500	25.5	61964	1000964
	440	65	3	470	530	1300	1500	31.0	62964X2	764
	459.5	60	4	342	544	1400	1600	34.0	61964X3	864
	480	74	4	481	689	1200	1400	49.4	6064	164
340	420	38	2.1	221	307	1300	1500	11.5	61868	1000868
	460	56	3	381	559	1200	1400	26.2	61968	1000968
	520	82	5	546	793	1100	1300	61.8	6068	168
360	440	38	2.1	243	335	1200	1400	12.3	61872	1000872
	480	56	3	390	591	1100	1300	27.5	61972	1000972
	540	82	5	572	871	1100	1200	64.7	6072	172

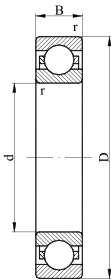
Deep groove ball bearings

d 380--530mm



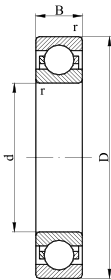
Principal dimensions (mm)				Basic load ratings KN		Speed ratings(rpm)		Ref. Mass	Designations	
d	D	B	r _{min}	Cr	Cor	Grease	Oil	kg	New	Old
380	480	46	2.1	300	442	1100	1300	19.7	61876	1000876
	520	65	4	423	663	1100	1200	39.8	61976	1000976
	560	82	5	591	943	990	1200	67.5	6076	176
400	500	46	2.1	306	455	1100	1200	20.6	61880	1000880
	540	65	4	436	696	990	1200	41.6	61980	1000980
	600	90	5	663	1073	930	1100	87.6	6080	180
420	520	46	2.1	338	527	1000	1200	21.6	61884	1000884
	560	65	4	442	728	940	1100	43.4	61984	1000984
	620	90	5	689	1164	880	1000	91.1	6084	184
440	540	46	2.1	343	546	950	1100	22.5	61888	1000888
	600	74	4	475	800	890	1000	60.0	61988	1000988
	650	94	6	550	960	750	900	107	6088	188
460	580	56	3	403	715	800	1000	34.3	61892	1000892
	620	74	4	405	720	800	950	62.6	61992	1000992
	680	100	6	605	1080	710	850	123	6092	192
480	600	56	3	410	748	800	950	35.4	61896	1000896
	650	78	5	450	815	750	900	73.5	61996	1000996
	700	100	6	605	1090	710	850	127	6096	196
500	620	56	3	416	780	750	900	40.5	618/500	10008/500
	670	78	5	460	865	710	850	82.0	619/500	10009/500
	720	100	6	630	1170	670	800	131	60/500	1/500
530	650	56	3	423	813	710	850	39.8	618/530	10008/530
	710	82	5	455	870	670	800	89.8	619/530	10009/530
	780	112	6	680	1300	600	750	184	60/530	1/530

Deep groove ball bearings
d 560--800mm



Principal dimensions (mm)				Basic load ratings KN		Speed ratings(rpm)		Ref. Mass	Designations	
d	D	B	r _{min}	Cr	Cor	Grease	Oil	kg	New	Old
560	680	56	3	429	845	670	800	41.5	618/560	10008/560
	750	85	5	525	1040	600	750	105	619/560	10009/560
	820	115	6	735	1500	560	670	210	60/560	1/560
600	730	60	3	462	956	600	710	50.9	618/600	10008/600
	800	90	5	550	1160	560	670	120	619/600	10009/600
	870	118	6	790	1640	530	630	236	60/600	1/600
630	780	69	4	546	1157	560	670	73.0	618/630	10008/630
	850	100	6	625	1350	530	630	163	619/630	10009/630
	920	128	7.5	819	1760	480	600	285	60/630	1/630
670	820	69	4	566	1255	500	630	83.5	618/670	10008/670
	900	103	6	675	1460	480	560	185	619/670	10009/670
	980	136	7.5	904	2040	450	530	351	60/670	1/670
710	870	74	4	624	1430	480	560	92.6	618/710	10008/710
	950	106	6	715	1640	450	530	220	619/710	10009/710
	1030	140	7.5	956	2200	480	560	375	60/710	1/710
750	920	78	5	685	1625	500	600	110	618/750	10008/750
	1000	112	5	761	1800	480	560	255	619/750	10009/750
	1090	150	6	995	2360	450	530	485	60/750	1/750
800	980	82	4	727	1781	450	530	130	618/800	10008/800
	1060	115	5	832	2040	430	500	275	619/800	10009/800
	1150	155	6	1010	2550	400	480	535	60/800	1/800

Deep groove ball bearings
d 850--900mm



Principal dimensions (mm)				Basic load ratings KN		Speed ratings(rpm)		Ref. Mass	Designations	
d	D	B	r _{min}	Cr	Cor	Grease	Oil	kg	New	Old
850	1030	82	4	727	1859	430	500	140	618/850	10008/850
	1120	118	6	832	2160	400	480	310	619/850	10009/850
	1220	165	7.5	1120	2900	360	430	630	60/850	1/850
900	1090	85	5	803	2080	380	450	160	618/900	10008/900
	1180	122	6	852	2280	360	430	350	619/900	10009/900
	1280	170	7.5	1140	3100	340	400	720	60/900	1/900

Four point contact ball bearings

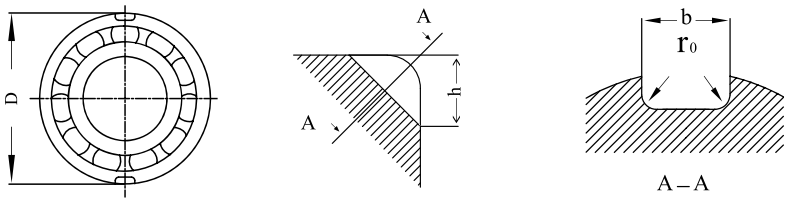
Four point contact ball bearings

1. Four point contact ball bearings with locating slot

Four point contact ball bearings are mainly used for bearing axial load and are installed in rolling bearing box being used as axial locating bearing of roll in many sites. To facilitate location and avoid rotation of outer ring, for four point contact ball bearings with outside diameter more than or equal to 160 mm, two locating slots can be set on outer ring (N2 design) according to requirement of users. See the table below for size of locating slot.

Nominal outside diameter D (mm)		QJ2 series size			QJ3 series size		
over	incl.	b	h	r ₀	b	h	r ₀
–	170	6.5	8.1	1	8.5	10.1	2
170	210	8.5	10.1	2	10.5	11.7	2
210	270	10.5	11.7	2	10.5	11.7	2
270	400	10.5	12.7	2	10.5	12.7	2

Attached figure:



2. Other series of four point contact ball bearings

Except bearings listed in dimension table, FV can also produce other series of four point contact ball bearings. Please consult technical service department of FV at that time.

3. Dimensions

Main dimensions of four point contact ball bearings listed in dimension table are in accordance with standard of ISO15–1998.

4. Axial angle alignment error

Four point contact ball bearings only can bear limited axial angle alignment error for inner ring and outer ring. It is complex to decide

relationship for each coefficient of allowable axial angle alignment error, which is same as the situation of single row deep groove ball bearings. We should remember that: any angular error will make noise of bearing being obviously increased.

If four point contact ball bearings as thrust bearings are combined with other radial bearings, radial clearance should be left when installed in bearing box; axial angle alignment error is not allowed between outer ring and inner ring.

5. Equivalent dynamic load (contact angle is 35°)

$$\text{When } F_a/F_r \leq 0.95 \quad P_r = F_r + Y_1 F_a$$

$$\text{When } F_a/F_r > 0.95 \quad P_r = X F_r + Y_2 F_a$$

When four point contact ball bearings are jointly installed with radial bearings to be used as thrust bearings to bear axial load, certain gap must be left between the bearing and housing body of bearing, the equivalent dynamic load $P_r = 1.07 F_a$.

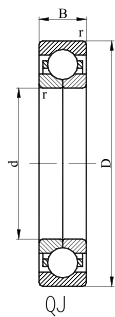
6. Equivalent static load (contact angle is 35°)

$$P_{or} = F_r + Y_0 F_a$$

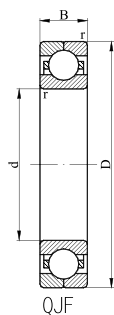
7. Calculation factors in dimension table

$$e = 0.95 \quad X = 0.6 \quad Y_1 = 0.66 \quad Y_2 = 1.07 \quad Y_0 = 0.58$$

Four point contact ball bearings
d 85--130mm

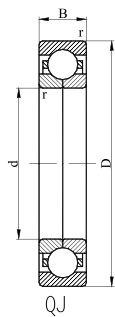


Principal dimensions (mm)				Designations			
d	D	B	r _{min}	New		Old	
85	130	22	1.1	QJ1017	QJF1017	176117	116117
	150	28	2.0	QJ217	QJF217	176217	116217
	180	41	3.0	QJ317	QJF317	176317	116317
90	140	24	1.5	QJ1018	QJF1018	176118	116118
	160	30	2.0	QJ218	QJF218	176218	116218
	190	43	3.0	QJ318	QJF318	176318	116318
95	145	24	1.5	QJ1019	QJF1019	176119	116119
	170	32	2.1	QJ219	QJF219	176219	116219
	200	45	3.0	QJ319	QJF319	176319	116319
100	149.5	24	1.5	QJ1020X1	QJF1020X1	176720	116720
	150	24	1.5	QJ1020	QJF1020	176120	116120
	180	34	2.1	QJ220	QJF220	176220	116220
	215	47	3.0	QJ320	QJF320	176320	116320
110	169	19	1.0	QJ1022X3	QJF1022X3		
	169.5	28	2.0	QJ1022X1	QJF1022X1	176722	116722
	170	28	2.0	QJ1022	QJF1022	176122	116122
	200	38	2.1	QJ222	QJF222	176222	116222
	240	50	3.0	QJ322	QJF322	176322	116322
120	179.5	28	2.0	QJ1024X1	QJF1024X1	176724	116724
	180	28	2.0	QJ1024	QJF1024	176124	116124
	215	40	2.1	QJ224	QJF224	176224	116224
	260	55	3.0	QJ324	QJF324	176324	116324
130	199.5	33	2.0	QJ1026X1	QJF1026X1	176726	116726
	200	33	2.0	QJ1026	QJF1026	176126	116126
	230	40	3.0	QJ226	QJF226	176226	116226
	280	58	4.0	QJ326	QJF326	176326	116326

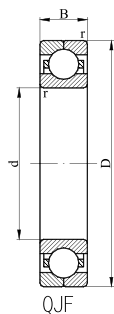


Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Ref. Mass kg
	Cr	Cor	Grease	Oil	
85	80	102	3800	5000	1.10
	146	173	3400	4800	2.20
	234	255	3000	4000	5.34
90	96	125	3400	4800	1.45
	186	200	3200	4300	2.75
	285	305	2800	3800	6.40
95	100	120	3400	4500	1.50
	212	252	3000	4000	3.35
	305	340	2600	3600	7.40
100	106	134	3200	4300	1.60
	106	134	3200	4300	1.60
	236	265	2800	3800	4.05
	345	400	2400	3400	9.30
110	92	142	3000	4000	1.63
	146	186	2800	3800	2.40
	146	186	2800	3800	2.50
	280	325	2400	3400	5.60
	390	480	2000	3000	12.5
120	133	176	2600	3600	2.60
	133	176	2600	3600	2.70
	300	365	2200	3200	6.95
	415	530	1900	2800	15.6
130	164	216	2200	3200	4.00
	164	216	2200	3200	4.10
	310	400	1900	2800	7.75
	455	610	1800	2600	19.5

Four point contact ball bearings
d 140--190mm

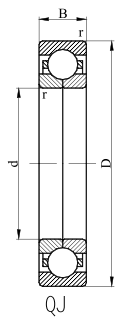


Principal dimensions (mm)				Designations			
d	D	B	r _{min}	New		Old	
140	209.5	33	2.0	QJ1028X1	QJF1028X1	176728	116728
	210	33	2.0	QJ1028	QJF1028	176128	116128
	250	42	3.0	QJ228	QJF228	176228	116228
	300	62	4.0	QJ328	QJF328	176328	116328
145	225	40	2.1			176829K	116829K
150	224.5	35	2.1	QJ1030X1	QJF1030X1	176730	116730
	225	35	2.1	QJ1030	QJF1030	176130	116130
	270	45	3.0	QJ230	QJF230	176230	116230
	320	65	4.0	QJ330	QJF330	176330	116330
160	239.5	38	2.1	QJ1032X1	QJF1032X1	176732	116732
	240	38	2.1	QJ1032	QJF1032	176132	116132
	290	48	3.0	QJ232	QJF232	176232	116232
	340	68	4.0	QJ332	QJF332	176332	116332
170	259.5	42	2.1	QJ1034X1	QJF1034X1	176734	116734
	260	42	2.1	QJ1034	QJF1034	176134	116134
	310	52	4.0	QJ234	QJF234	176234	116234
	360	72	4.0	QJ334	QJF334	176334	116334
180	259.5	52	2.1	QJ3936X1	QJF3936X1	176736	116736
	280	46	2.1	QJ1036	QJF1036	176136	116136
	320	52	4.0	QJ236	QJF236	176236	116236
	380	75	4.0	QJ336	QJF336	176336	116336
190	269.5	55	3.0	QJ3938X3	QJF3938X3	176738K	116738K
	289.5	46	2.1	QJ1038X1	QJF1038X1	176738	116738
	290	46	2.1	QJ1038	QJF1038	176138	116138
	340	55	4.0	QJ238	QJF238	176238	116238

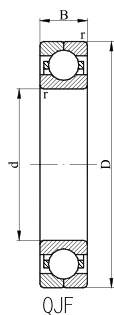


Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Ref. Mass kg
	Cr	Cor	Grease	Oil	
140	171	238	2000	3000	4.30
	171	238	2000	3000	4.30
	345	475	1800	2600	9.90
	500	695	1700	2400	24.0
145	268	270	1900	2800	7.30
150	216	305	1900	2800	5.20
	216	305	1900	2800	5.25
	400	570	1700	2400	12.5
	530	765	1600	2200	29.0
160	247	355	1800	2600	6.40
	247	355	1800	2600	6.45
	450	670	1600	2200	15.5
	570	880	1500	2000	34.5
170	287	405	1700	2400	8.60
	287	405	1700	2400	8.60
	455	720	1600	2200	19.5
	655	1040	1400	1900	41.5
180	340	514	1600	2200	9.50
	340	514	1600	2200	11.0
	475	765	1500	2000	20.5
	680	1020	1300	1800	47.5
190	241	380	1600	2200	10.5
	340	510	1600	2200	11.0
	340	510	1600	2200	11.5
	488	780	1400	1900	24.5

Four point contact ball bearings
d 200--300mm

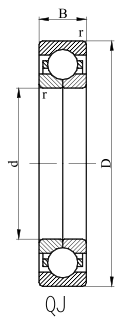


Principal dimensions (mm)				Designations			
d	D	B	r _{min}	New		Old	
200	280	51	2.1	QJ2940X2	QJF2940X2	176940	116940
	289.5	58	2.1	QJ3940X3	QJF3940X3	176740	116740
	309.5	51	2.1	QJ1040X1	QJF1040X1	176140K	116140K
	310	51	2.1	QJ1040	QJF1040	176140	116140
	360	58	4.0	QJ240	QJF240	176240	116240
220	300	60	3.0	QJ3944	QJF3944	176944	116944
	309.5	60	3.0	QJ3944X1	QJF3944X1	176744	116744
	339.5	56	3.0	QJ1044X1	QJF1044X1	176144K	116144K
	340	56	3.0	QJ1044	QJF1044	176144	116144
	400	65	4.0	QJ244	QJF244	176244	116244
240	329.5	60	3.0	QJ3948X1	QJF3948X1	176748	116748
	340	60	4.0	QJ3948X1-1	QJF3948X1-1	176748K	116748K
	359.5	56	3.0	QJ1048X1	QJF1048X1	176148K	116148K
	360	56	3.0	QJ1048	QJF1048	176148	116148
	440	72	4.0	QJ248	QJF248	176248	116248
260	359.5	65	2.1	QJ2952X3	QJF2952X3	176852X3	116852X3
	369.5	60	4.0	QJ2952X1	QJF2952X1	176752	116752
	374.5	60	4.0	QJ2952X1-1	QJF2952X1-1	176752YS	116752YS
	399.5	65	4.0	QJ1052X1	QJF1052X1	176152K	116152K
	400	65	4.0	QJ1052	QJF1052	176152	116152
	480	80	5.0	QJ252	QJF252	176252	116252
280	375	65	4.0	QJ2956X3	QJF2956X3	176956	116956
	389.5	65	4.0	QJ2956X3-1	QJF2956X3-1	176756YS	116756YS
	420	65	4.0	QJ1056	QJF1056	176156	116156
300	420	65	4.0	QJ2960X2	QJF2960X2	176760	116760
	460	74	4.0	QJ1060	QJF1060	176160	116160

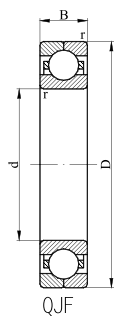


Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Ref. Mass kg
	Cr	Cor	Grease	Oil	
200	240	380	1500	2000	10.2
	263	430	1500	2000	13.2
	351	558	1500	2000	14.5
	351	558	1500	2000	15.0
	540	915	1300	1800	28.5
220	247	407	1300	1800	13.0
	277	461	1300	1800	14.8
	398	675	1300	1800	19.0
	398	675	1300	1800	19.5
	498	882	1100	1600	39.5
240	286	497	1200	1700	16.0
	303	534	1200	1700	17.6
	404	702	1200	1700	20.5
	404	702	1200	1700	21.0
	585	1080	1000	1500	53.0
260	315	574	1000	1500	21.0
	350	655	1200	1700	22.0
	360	660	1200	1700	23.0
	486	900	1000	1500	31.0
	486	900	1000	1500	31.5
	655	1287	900	1300	68.0
280	280	600	950	1400	21.0
	454	882	950	1400	33.5
	498	954	950	1400	33.5
300	414	850	900	1300	29.3
	585	1206	900	1300	47.5

Four point contact ball bearings
d 320--480mm



Principal dimensions (mm)				Designations			
d	D	B	r _{min}	New		Old	
320	479.5	74	4.0	QJ1064X1	QJF1064X1	176764K	116764K
	480	74	4.0	QJ1064	QJF1064	176164	116164
340	500	80	5.0	QJ1068X3			
	519.5	82	5.0	QJ1068X1	QJF1068X1	176768	116768
	520	82	5.0	QJ1068	QJF1068	176168	116168
360	539.5	82	5.0	QJ1072X1	QJF1072X1	176772	116772
	540	82	5.0	QJ1072	QJF1072	176172	116172
380	559.5	82	5.0	QJ1076X1	QJF1076X1	176776	116776
	560	82	5.0	QJ1076	QJF1076	176176	116176
400	599.5	90	5.0	QJ1080X1	QJF1080X1	176780	116780
	600	90	5.0	QJ1080	QJF1080	176180	116180
420	619.5	90	5.0	QJ1084X1	QJF1084X1	176784	116784
	620	90	5.0	QJ1084	QJF1084	176184	116184
440	649.5	94	6.0	QJ1088X1	QJF1088X1	176788	116788
	650	94	6.0	QJ1088	QJF1088	176188	116188
460	680	100	6.0	QJ1092	QJF1092	176192	116192
480	700	100	6.0	QJ1096	QJF1096	176196	116196



Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Ref. Mass kg
	Cr	Cor	Grease	Oil	
320	597	1260	850	1200	49.0
	597	1260	850	1200	50.0
340	452	790	800	1100	53.6
	702	1530	800	1100	66.5
	702	1530	800	1100	67.5
360	714	1620	800	1100	69.0
	714	1620	800	1100	70.5
380	737	1710	750	1000	72.0
	737	1710	750	1000	73.5
400	814	1944	700	950	94.0
	814	1944	700	950	95.5
420	831	2052	670	900	98.0
	831	2052	670	900	99.5
440	896	2250	630	850	113
	896	2250	630	850	115
460	936	2385	600	800	130
480	954	2520	560	750	135

Single row angular contact ball bearings

Single row angular contact ball bearings

1. Dimensions

Basic dimensions of single row angular contact ball bearings listed in dimension table are in accordance with ISO15–1998.

2. Axial angle alignment error

The ability that single row angular contact ball bearings bear axial angle alignment error is limited. Relationship between each influence factor is complex just like single row deep groove ball bearings.

When bearings are installed in pairs, especially when they are combined back to back, axial angle alignment error only can be born by ball and raceway and is converted into extra acting force between ball and raceway, which causes increase of load of ball, increase of stress of cage and decrease of service life of bearing.

Any axial angle alignment error will cause increasing operation noise of bearing.

3. Tolerance

FV standard single row angular contact ball bearings (suffix of B and BE) have common grade tolerance, P6 or P5 precision grade can be supplied for some bearings.

Common paired bearings (suffix of BCB and BECB) use P6 grade precision as standard tolerance, but P6 does not occur in bearing code. P5 grade precision can also be supplied in such bearings.

4. Internal clearance

Internal clearance of single row angular contact ball bearings only can be obtained after installed, which depends on relative adjustment with other bearings. The bearings provide reverse axial position.

Suffix of standard bearings used for paired installation by FV is CB, those can be matched commonly through using any mode. Also provides smaller axial internal clearance (suffix is CA) or greater clearance (suffix is CC) or common paired bearings with prepressing load(suffix of GA, GB, GC).

Two or more bearings with suffix of CA, CB or CC can be installed at neighboring position through any combination mode. Only prepressing

bearing with suffix GA, GB and GC can be pairedly installed, otherwise prepressing load will be increased.

5. Equivalent dynamic load

$$\text{When } F_a/F_r \leq e \quad P_r = F_r$$

$$\text{When } F_a/F_r > e \quad P_r = X F_r + Y F_a$$

When angular contact ball bearings are jointly installed with other radial bearings to be used as thrust bearings to bear axial load, certain gap must exist between bearing and bearing housing. The equivalent dynamical load $P_r = 1.07 F_a$.

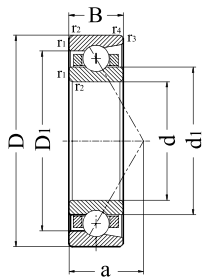
6. Equivalent static load

$$P_{or} = 0.5 F_r + Y_0 F_a$$

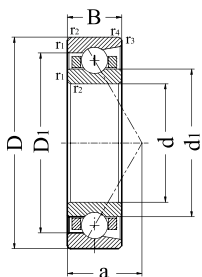
7. Calculation factors in dimension table

$$e = 1.14 \quad X = 0.35 \quad Y = 0.57 \quad Y_0 = 0.26$$

Single row angular contact ball bearings
d 90--170mm

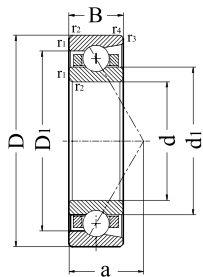


Principal dimensions (mm)						Designations	
d	D	B	r _{1,2min}	r _{3,4min}	a	New	Old
90	140	24	1.5	1.0	60.2	7018B	
	160	30	2.0	1.0	67.4	7218B	
	190	43	3.0	1.1	80.2	7318B	
100	150	24	1.5	1.0	64.4	7020B	
	180	34	2.1	1.1	75.7	7220B	
	215	47	3.0	1.1	89.6	7320B	
110	170	28	2.0	1.0	72.7	7022B	
	200	38	2.1	1.1	84.0	7222B	
	240	50	3.0	1.1	98.4	7322B	
120	180	28	2.0	1.0	77.0	7024B	66124
	215	40	2.1	1.1	90.3	7224B	
	260	55	3.0	1.1	107.2	7324B	
130	200	33	2.0	1.0	85.7	7026B	66126
	230	40	3.0	1.1	95.5	7226B	
	280	58	4.0	1.5	115.0	7326B	
140	210	33	2.0	1.0	90.0	7028B	66128
	250	42	3.0	1.1	102.8	7228B	
	300	62	4.0	1.5	123.3	7328B	
150	225	35	2.1	1.1	96.0	7030B	66130
	270	45	3.0	1.1	110.6	7230B	
	320	65	4.0	1.5	131.1	7330B	
160	240	38	2.1	1.1	103.0	7032B	66132
	290	48	3.0	1.1	118.4	7232B	
	340	68	4.0	1.5	138.9	7332B	
170	260	42	2.1	1.1	111.0	7034B	66134
	310	52	4.0	1.5	126.7	7234B	

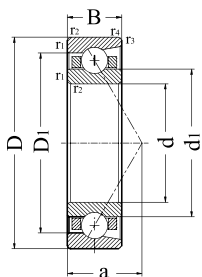


Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Ref. Mass kg
	Cr	Cor	Grease	Oil	
90	58.5	57	—	—	1.37
	102	88	—	—	2.56
	148	124	—	—	5.86
100	61	63.5	—	—	1.49
	124	107	—	—	3.70
	190	178	—	—	8.32
110	86.5	86	—	—	2.32
	147	135	—	—	5.18
	201	197	—	—	11.2
120	92	96	2600	3600	2.47
	165	162	—	—	6.26
	225	231	—	—	14.4
130	105	113	2300	3300	3.83
	171	175	—	—	7.15
	250	268	—	—	17.6
140	107	119	2000	3000	3.96
	197	213	—	—	8.94
	275	310	—	—	21.6
150	122	138	1900	2800	4.76
	225	254	—	—	11.2
	289	340	—	—	25.9
160	139	159	1800	2600	5.93
	238	279	—	—	14.2
	315	385	—	—	30.8
170	186	193	1700	2400	7.93
	266	325	—	—	17.6

Single row angular contact ball bearings
d 170--360mm

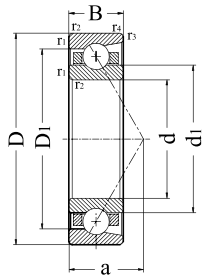


Principal dimensions (mm)						Designations	
d	D	B	r _{1,2min}	r _{3,4min}	a	New	Old
170	360	72	4.0	1.5	147.2	7334B	
180	280	46	2.1	1.1	119.0	7036B	66136
	320	52	4.0	1.5	130.9	7236B	
	380	75	4.0	1.5	155.0	7336B	
190	290	46	2.1	1.1	124.0	7038B	66138
	340	55	4.0	1.5	138.7	7238B	
	400	78	5.0	2.0	162.8	7338B	
200	310	51	2.1	1.1	132.5	7040B	66140
	360	58	4.0	1.5	146.5	7240B	
	420	80	5.0	2.0	170.1	7340B	
220	340	56	3.0	1.1	145.5	7044B	66144
	400	65	4.0	1.5	162.6	7244B	
	460	88	5.0	2.0	186.6	7344B	
240	360	56	3.0	1.1	153.9	7048B	66148
	440	72	4.0	1.5	178.6	7248B	
	500	95	5.0	2.0	202.7	7348B	
260	400	65	4.0	1.5	171.0	7052B	66152
	480	80	5.0	2.0	195.2	7252B	
280	420	65	4.0	1.5	179.3	7056B	66156
	500	80	5.0	2.0	203.6	7256B	
300	460	74	4.0	1.5	196.4	7060B	66160
320	480	74	4.0	1.5	204.8	7064B	66164
	580	92	5.0	2.0	234.8	7264B	
340	520	82	5.0	2.0	221.4	7068B	66168
360	540	82	5.0	2.0	229.9	7072B	66172
	650	95	6.0	3.0	259.4	7272B	

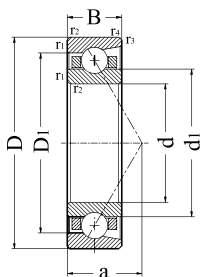


Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Ref. Mass kg
	Cr	Cor	Grease	Oil	
170	355	445	–	–	35.6
180	185	227	1600	2200	10.8
	276	350	–	–	18.4
	375	490	–	–	42.6
190	201	253	1600	2200	11.1
	284	375	–	–	22.5
	410	550	–	–	47.2
200	215	280	1600	2200	14.3
	305	410	–	–	26.6
	430	600	–	–	55.3
220	253	355	–	–	18.4
	370	530	–	–	36.1
	450	665	–	–	72.9
240	268	390	–	–	19.9
	390	600	–	–	50.3
	515	800	–	–	91.9
260	310	475	–	–	29.3
	430	680	–	–	65.5
280	325	520	–	–	31.4
	460	765	–	–	70.1
300	345	545	–	–	44.5
320	415	715	–	–	46.9
	590	1070	–	–	109
340	465	820	–	–	61.8
360	475	865	–	–	63.6
	600	1150	–	–	140

Single row angular contact ball bearings
d 380--420mm



Principal dimensions (mm)						Designations	
d	D	B	r _{1,2min}	r _{3,4min}	a	New	Old
380	520	65	4.0	1.0	222.0	466953	
	560	82	5.0	2.0	238.2	7076B	66176
400	600	90	5.0	2.0	254.8	7080B	66180
420	620	90	5.0	2.0	263.2	7084B	66184
	760	109	7.5	4.0	302.0	7284B	



Bore (mm) d	Basic load ratings KN		Speed ratings (rpm)		Ref. Mass kg
	Cr	Cor	Grease	Oil	
380	345	610	800	1000	43.5
	440	790	–	–	66.7
400	500	915	–	–	86.2
420	550	1070	–	–	90.6
	695	1460	–	–	220

Double row angular contact ball bearings

Double row angular contact ball bearings

Under severer condition, if rotation speed is extremely high or operation temperature is extremely high, lubricant grease may be leaked from inner ring. Adopt special design measures if grease leakage is not allowed for bearing configuration.

1. Dimensions

Basic dimensions of double row angular contact ball bearings listed in the dimension table are in accordance with standard of ISO15–1998, but width value for the bearings of 3200 series is an exceptional case.

2. Axial alignment angle error

Axial alignment angle error for double row angular contact ball bearings outer ring in relation to inner ring will cause extra stress of ball and raceway, so increased load will shorten service life of bearing.

3. Tolerance

FV standard double row angular contact ball bearings have common grade tolerance. The bearings of 32 series with small size also have higher precision grade (such as P6 grade and P5 grade). Firstly verify before order.

4. Internal clearance

FV standard double row angular contact ball bearings have common grade axial clearance. However, for majority of dimensions, FV can provide internal clearance bigger than or less than that of common grade. The value is suitable for zero-load bearing before installation.

5. Cage

Cage type equipped for FV standard double row angular contact ball bearings is mostly brass cage.

Glass fiber reinforced nylon 66 cage can be used for majority of application sites, operation temperature can reach 120°C. For configuration of bearing needing to continuously run under extremely high temperature or bad condition, cage can be made of pressing sheet. Verify before order if the bearings with non-standard cage are needed. Please refer to the section of “materials for rolling mill bearings and requirements” in the “guide of rolling mill bearing application technology” for relative high temperature resistance of cage and its property.

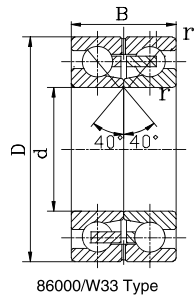
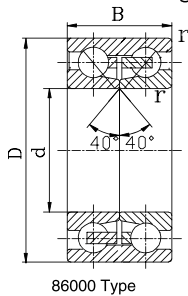
6. Equivalent dynamic load

$$\text{When } Fa/Fr \leq e \quad Pr = Fr + Y_1 Fa$$

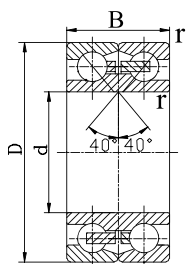
$$\text{When } Fa/Fr > e \quad Pr = XFr + Y_2 Fa$$

7. Equivalent static load $Por = Fr + Y_0 Fa$

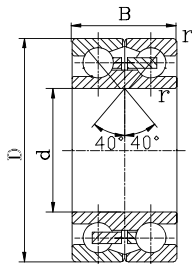
Double row angular contact ball bearings
d 100--160mm



Principal dimensions (mm)					Basic load ratings KN		Designations	
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
100	170	60.3	2.1	1.1	132	191	3220X1D/W33	4086920/W33
105	190	79	2.1	1.0	173	240	3221X2DC	156721/C2JG
110	170	56	2.0	1.0	120	154	3222X3	156822/SM
	200	83	2.1	1.1	178	260	4222X3D	86722/TG
120	180	56	2.0	1.0	120	182	4024X2D	86124H/W33
	180	60	2.0	1.0	110	183	4024D	4086124
	190	66	2.0	1.0	145	220	4024X2D	4086124K
	190	66	2.0	1.1	145	220	4024X3DC	156724
	215	80	2.1	1.1	200	293	4024X3DC-1	156724K
130	200	75	2.0	1.0	142	235	4026X2D	4086726
140	209.5	66	2.0	1.0	146	249	4028X3D	86728H
	209.5	66	2.0	1.0	146	249		156728/W33
	210	69	2.0	1.0	146	249	4028D	4086128
	210	69	2.0	1.0	146	249	4028DC	4156128/C9W33
150	210	56	2.0	1.0	111	197	4030X3DC	156730K
	225	73	2.1	1.1	160	280	4030X2D	86730
	225	73	2.1	1.1	160	280	4030X2D/W33	86730/W33
	225	73	2.0	1.1	160	280	4030X2DT/W33	
	225	75	2.1	1.1	160	280	4030D	4086130
	230	70	2.1	1.1	160	280	4030X3D	86830
	270	90	3.0	1.1	225	405	3230X2D/W33	
160	215	56	2.0	1.0	97	166	4932X2DC	156932
	239.8	76	2.1	1.1	191	340	4932X3DC	156132K
	240	58	2.1	1.1	155	268	3032X2D	3086132KH
	240	76	2.1	1.1	190	340		156132
	240	80	2.1	1.1	190	340	4032D	4086132



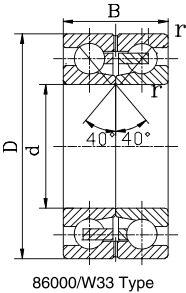
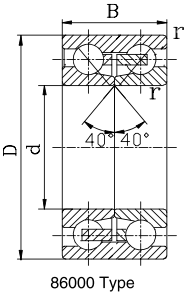
156000 Type



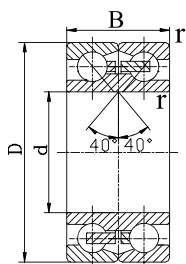
156000/W33 Type

Bore (mm) d	Installation dimensions (mm)					Speed ratings (rpm)		Ref. designations	Ref. Mass
	d _{amax}	D _{amax}	D _{bmax}	r _{amax}	r _{bmax}	Grease	Oil	SKF	kg
100	122		159	2	1	1800	2900	305397D	7.80
105	120	167	—	2	1	1800	2900		10.6
110	122	152	—	2	1	1800	2900		4.90
	136	—	183	2	1	1800	2900		12.0
120	137	—	169	2	1	1800	2900		6.00
	137	—	169	2	1	1800	2900		6.10
	140	—	177	2	1	1800	2900		7.50
	133	171	—	2	1	1800	2900		7.50
	139	188	—	2	1	1800	2900		13.2
130	150	—	187	2	1	1700	2300		9.10
140	160	—	197	2	1	1700	2300		8.40
	153	191	—	2	1	1700	2300		8.40
	160	—	197	2	1	1700	2300		8.80
	153	191	—	2	1	1700	2300		8.80
150	162	192	—	2	1	1600	2000		6.30
	172	—	211	2	1	1600	2000		9.40
	172	—	211	2	1	1600	2000		9.40
	172	—	211	2	1	1600	2000		9.40
	172	—	211	2	1	1600	2000		9.60
	174	—	216	2	1	1600	2000	305283DA	11.5
	189	—	240	2.5	1	1600	2000		23.3
160	172	199	—	2	1	1600	2000	305608A	8.60
	176	220	—	2	1	1450	1850		12.0
	184	—	226	2	1	1450	1850		9.70
	176	220	—	2	1	1450	1850	305183	13.5
	185	—	228	2	1	1450	1850		12.0

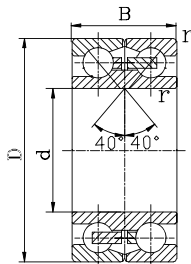
Double row angular contact ball bearings
d 160--200mm



Principal dimensions (mm)					Basic load ratings KN		Designations	
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
160	249.5	84	2.1	1.1	210	385		156832/W33
170	230	56	2.0	1.0	105	162	4934X3DC	156734H
	259.5	84	2.0	1.0	208	385	4034X3D	4086734
	260	84	2.0	1.0	208	385	4034X2DC	156134
	260	84	2.1	1.1	215	400		156134/W33
	260	90	2.1	1.1	208	385	4034D	4086134
180	250	70	2.0	1.0	166	320	4936X3DC	156936/W33
	259.5	60	2.0	1.0	134	269	4936X3D-1	86736HK
	259.5	66	2.1	1.1	180	340	4936X3D/W33	86736
	259.5	66	2.0	1.0	180	340	4936X2DC	156736/W33
	259.5	80	2.1	1.1	180	340	4036X3DC	156836
	280	92	2.1	1.1	237	450	4036X3DC-1	156136
	280	92	2.1	1.1	237	450	4036X2DT/W33	
	280	100	2.1	1.1	237	450	4036D	4086136
190	269.5	66	2.1	1.1	183	290	4938X3D	86738
	269.5	66	2.1	1.1	183	290	4938X3D/W33	86738/W33
	290	92	2.1	1.1	245	480	4038DC	156138
	290	100	2.1	1.1	245	480	4038D	4086138
200	279.5	76	2.1	1.1	206	400	4940X3D	86740
	279.5	76	2.1	1.1	206	400	4940X3D/W33	86740/W33
	280	76	2.1	1.1	206	400	4940X3DC	156740
	280	80	2.1	1.1	206	400	4940X3DC-1	156940
	289.5	76	2.1	1.1	226	458	4940X3D-1	86840
	289.5	76	2.1	1.1	226	458	4940X3D-1/W33	
	309.5	102	2.1	1.1	286	419	4040X3D	4086140K
	310	96	3.0	1.1	286	458	4040X3DC	156140



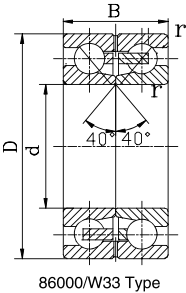
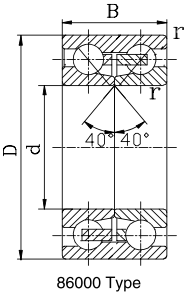
156000 Type



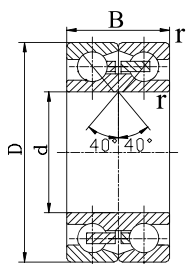
156000/W33 Type

Bore (mm) d	Installation dimensions (mm)					Speed ratings (rpm)		Ref. designations SKF	Ref. Mass kg
	d _{amax}	D _{amax}	D _{bmax}	r _{amax}	r _{bmax}	Grease	Oil		
160	178	224	—	2	1	1450	1850		15.0
170	183	212	—	2	1	1450	1850		7.00
	197	—	242	2	1	1300	1700		15.0
	188	234	—	2	1	1300	1700		15.0
	188	234	—	2	1	1300	1700		15.0
	197	—	242	2	1	1300	1700		15.5
180	193	231	—	2	1	1450	1850	305288DA	9.20
	207	—	239	2	1	1250	1600		11.0
	204	—	244	2	1	1250	1600	305262D	11.0
	196	237	—	2	1	1250	1600		11.0
	196	237	—	2	1	1250	1600		14.5
	202	271	—	2	1	1150	1500	305172B	19.7
	211	—	244	2	1	1150	1500		19.7
	211	—	262	2	1	1150	1500		24.0
190	214	—	254	2	1	1150	1500		12.5
	214	—	254	2	1	1150	1500	305338DA	12.5
	208	260	—	2	1	1100	1400	305178	23.0
	221	—	272	2	1	1100	1400		26.2
200	224	—	267	2	1	1100	1400	305428D	15.0
	224	—	267	2	1	1100	1400		15.0
	214	256	—	2	1	1100	1400	305237A	15.2
	214	256	—	2	1	1100	1400	305393	16.0
	227	—	272	2	1	1100	1400	305263DA	15.5
	227	—	272	2	1	1100	1400		15.2
	234	—	291	2	1	1000	1300		33.0
	220	277	—	2.5	1	1000	1300	305352	29.5

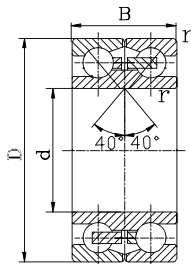
Double row angular contact ball bearings
d 200--300mm



Principal dimensions (mm)					Basic load ratings KN		Designations	
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
200	310	109	2.1	1.1	286	458	4040D	4086140
220	309.5	76	3.0	1.1	225	455	4944X3D	86744
	309.5	76	3.0	1.1	225	455	4944X3D/W33	86744/W33
	329.5	76	3.0	1.5	226	470	4044X3D	86744/W33/LG
	340	112	3.0	1.5	309	502	4044X2DC	4156144K
	340	118	3.0	1.1	310	670	4044D	4086144
230	329.5	80	3.0	1.1	242	500	4946X1D	86746
	329.5	80	3.0	1.1	242	500	4946X1D/W33	86746/W33
	329.5	80	3.0	1.1	242	500	4946X3	156746
	329.5	80	3.0	1.1	242	500	4946X3D/W33	156746/W33
240	359.5	118	3.0	1.1	315	700	4048X1D	4086148K
	360	118	3.0	1.1	315	700	4048D	4086148
	370	112	3.0	1.1	315	700	4048X3D	86748K
260	360	92	4.0	2.0	264	587	4952X2D/W33	
	369.5	92	4.0	2.0	270	600	4952X3D	86752
	369.5	92	4.0	2.1	270	600	4952X3D/W33	86752/W33
	400	130	4.0	2.0	436	735	4952X3DC	156152
	400	140	4.0	2.0	436	735	4052D	4086152
280	389.5	92	4.0	2.0	305	715	4956X3D-1	86756K
	389.5	92	4.0	2.0	305	715	4956X3D-1/W33	86756K/W33
	389.5	92	4.0	2.0	310	745	4956X3DC/W33	156756/W33
	390	92	4.0	2.0	305	715	4956X3D	86756
	390	92	4.0	2.0	340	720	4956X3D/W33	
	420	130	2.1	1.5	383	706	4056X3DC	4156156K
	420	140	4.0	2.0	410	950	4056D	4086156
300	419.5	112	3.0	1.1	360	678	4960X3D	86760



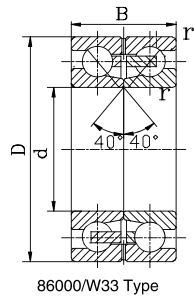
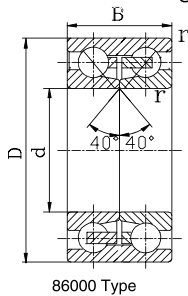
156000 Type



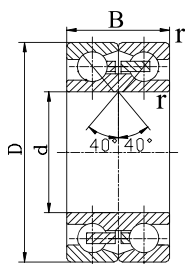
156000/W33 Type

Bore (mm) d	Installation dimensions (mm)					Speed ratings (rpm)		Ref. designations SKF	Ref. Mass kg
	d _{amax}	D _{amax}	D _{bmax}	r _{amax}	r _{bmax}	Grease	Oil		
200	234	—	291	2	1	1000	1300		33.1
220	247	—	292	2.5	1	900	1200	305272DA	22.1
	247	—	292	2.5	1	900	1200		22.1
	257	—	302	2.5	1	850	1100		21.4
	243	306	—	2.5	1	850	1100		34.6
	255	—	317	2.5	1	850	1100		33.5
230	261	—	309	2.5	1	850	1100		23.5
	261	—	309	2.5	1	850	1100		23.5
	251	300	—	2.5	1	850	1100		23.5
	251	300	—	2.5	1	850	1100		23.5
240	276	—	338	2.5	1	850	1100		44.0
	276	—	338	2.5	1	850	1100		44.0
	280	—	342	2.5	1	850	1100		46.0
260	289	—	340	3	2	850	1100	305270D	29.3
	296	—	347	3	2	850	1100		30.5
	296	—	347	3	2	850	1100		30.5
	288	359	—	3	2	800	1050	305174B	56.0
	302	—	375	3	2	800	1050		60.0
280	312	—	369	3	2	850	1100	305269D	35.0
	312	—	369	3	2	850	1100		35.0
	301	359	—	3	2	850	1100		35.0
	312	—	369	3	2	850	1100		40.0
	312	—	369	3	2	850	1100		40.0
	308	379	—	2	1	800	1050		60.1
	322	—	392	3	2	800	1050		64.2
300	335	—	397	2.5	1	750	1000		50.5

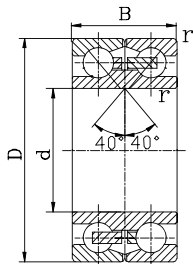
Double row angular contact ball bearings
d 300--500mm



Principal dimensions (mm)					Basic load ratings KN		Designations	
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
300	459.5	100	4.0	2.0	425	820	4960X3DC/W33	156860/W33
	459.5	112	4.0	2.0	425	820		156760/W33
	460	148	4.0	2.0	425	820	4060X2D/W33	
	460	148	2.1	1.5	425	820	4060X2DC/W33	4156160K
	460	160	4.0	2.0	425	820	4060D	4086160
320	459.5	140	4.0	2.0	400	1020	4064X3D	86764
	459.5	140	4.0	2.0	400	1020	4064X3D/W33	86764/W33
	480	160	4.0	1.5	505	1360	4064D	4086164
340	460	112	3.0	1.1	448	1060	4968X2D/W33	
	520	180	5.0	2.0	600	1720	4068D	4068168
	520	180	5.0	2.0	600	1720	4068D/W33	
360	480	112	3.0	1.1	488	1100	4972X2D/W33	
	540	164	5.0	2.0	741	1700	4072X2D/W33	
380	520	130	4.0	1.5	420	1170	4976X2D/W33	86776H/W33
	560	164	5.0	2.0	468	1520	4076X2D/W33	
400	540	130	4.0	1.5	530	1210	4980X2D/W33	
	600	180	5.0	2.0	952	2000	4080X2D/W33	
420	560	130	4.0	1.5	590	1300	4984X2D/W33	
	620	180	5.0	2.0	870	2100	4084X2D/W33	
440	650	188	6.0	3.0	720	2340	4088X2D/W33	
460	620	148	4.0	1.5	810	2000	4992X2D/W33	
	680	200	6.0	3.0	1100	2800	4092X2D/W33	
480	700	200	6.0	3.0	1000	2600	4096X2D/W33	
500	670	156	5.0	2.0	860	2400	49/500X2D/W33	
	720	200	6.0	3.0	1020	2700	40/500X2D/W33	



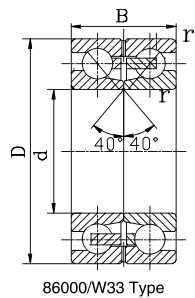
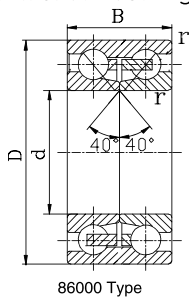
156000 Type



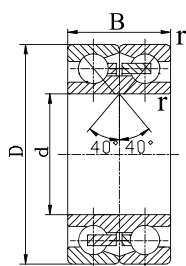
156000/W33 Type

Bore (mm) d	Installation dimensions (mm)					Speed ratings (rpm)		Ref. designations SKF	Ref. Mass kg
	d _{amax}	D _{amax}	D _{bmax}	r _{amax}	r _{bmax}	Grease	Oil		
300	329	412	—	3	2	750	1000		66.5
	329	412	—	3	2	750	1000		68.0
	350	—	425	3	2	750	1000		84.4
	335	411		2	1	750	1000		84.4
	350	—	425	3	2	750	1000		101
320	362	—	432	3	2	750	1000		80.0
	362	—	432	3	2	750	1000		80.0
	365	—	451	3	1.5	700	950		98.0
340	376	—	438	2.5	1	700	950		54.0
	391	—	488	4	2	700	950		131
	391	—	488	4	2	700	950		131
360	396	—	458	2.5	1	670	900		57.0
	414	—	508	4	2	630	850		125
380	422	—	495	3	1.5	670	900		83.0
	434	—	528	4	2	600	800		133
400	442	—	515	3	1.5	600	800		84.0
	460	—	564	4	2	560	750		170
420	462	—	532	3	1.5	560	750		89.0
	480	—	584	4	2	530	700		177
440	502	—	612	5	2.5	500	670		200
460	508	—	597	3	1.5	950	1400		116
	526	—	640	5	2.5	480	630		240
480	546	—	660	5	2.5	480	630		240
500	551	—	639	4	2	500	670		156
	566	—	680	5	2.5	450	600		260

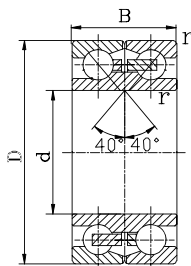
Double row angular contact ball bearings
d 530--560mm



Principal dimensions (mm)					Basic load ratings KN		Designations	
d	D	B	r _{1,2min}	r _{3,4min}	Cr	Cor	New	Old
530	760	200	6.0	3.0	815	2890	49/530X2DC/W33	1561/530/W33
	780	224	6.0	3.0	930	3380	40/530X2DC/W33	1567/530/W33
560	750	190	5.0	2.0	950	2500	49/560D/W33	
	820	230	6.0	3.0	900	2100	40/560X2D/W33	



156000 Type



156000/W33 Type

Bore (mm) d	Installation dimensions (mm)					Speed ratings (rpm)		Ref. designations SKF	Ref. Mass kg
	d _{amax}	D _{amax}	D _{bmax}	r _{amax}	r _{bmax}	Grease	Oil		
530	572	690	—	5	2.5	480	630		275
	576	704	—	5	2.5	450	600		335
560	617	—	716	4	2	450	600		230
	638	—	773	5	2.5	430	560		390

Spherical roller thrust bearings

Spherical roller thrust bearings

1. Tolerance

FV spherical roller thrust bearings belong to standard product and have common grade tolerance.

2. Influence of operation temperature on material of bearing

Special heat treatment is made on FV spherical roller thrust bearings; operation temperature can reach $+200^{\circ}\text{C}$ without change of excess dimension. Please refer to the section “materials for rolling mill bearings and requirements” in the “guide of rolling mill bearing application technology” .

3. Design of relative parts

If bearings must bear heavier load, height for shaft washer and shaft shoulder of housing ring should be equal to d_1 and D_1 . If bearings are required to bear bigger radial load, their design should be special, please consult technical service department of FV.

For E type bearings with stamped steel cage, we suggest that hole of bearing box be increased in diameter, to avoid contact between cage and bearing box caused by angular alignment error of shaft. For bearings with outside diameter not more than 380mm, suggested diameter is $D+15\text{mm}$; take $D+20\text{mm}$ for bearings with bigger dimension.

4. Lubrication

Oil lubrication is normally adopted for spherical roller thrust bearings. Under special situation, e.g., grease lubrication also can be adopted when E type bearings having stamped steel cage are used for light load or low speed.

If lubricant grease is adopted as lubricant, enough lubricant grease must be guaranteed for contact surface of roller endface and retaining side. Lubricant grease can be filled in the bearing and bearing box or grease can be regularly supplemented according to actual situation.

For E type bearings with stamped steel cage, rating speed for oil and grease lubrication listed in the dimension table is suitable for bearing configuration installed on horizontal axle. Value should be decreased by about one half for bearing configuration of vertical shaft.

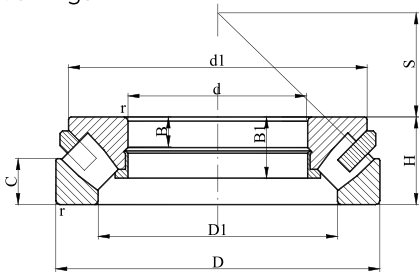
Spherical roller thrust bearings have pump-absorb action because of their internal design feature which can be adopted under certain condition and must be considered when lubrication mode and lubricant seal are selected.

5. Axial equivalent dynamic load When $Fr < 0.55Fa$ $Pa = Fa + 1.2Fr$

6. Axial equivalent static load When $Fr < 0.55Fa$ $Poa = Fa + 2.7Fr$

7. For calculation method of equivalent load when $Fr > 0.55Fa$ and detailed use rules of spherical roller thrust bearings, please consult technical service department of FV.

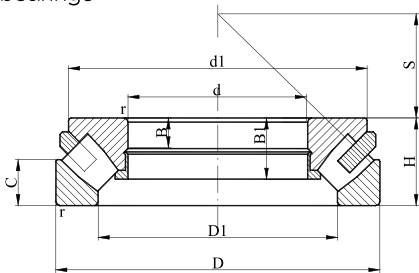
Spherical roller thrust bearings
d 100--200mm



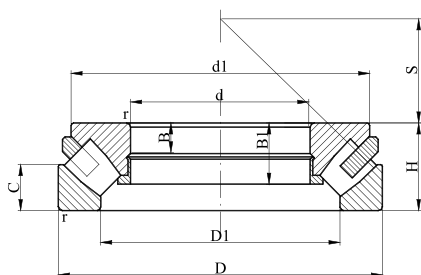
Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	H	r _{min}	Ca	Coa	New	Old
100	170	42	1.5	465	1290	29320E	
	210	67	3.0	980	2500	29420E	
110	190	48	2.0	610	1730	29322E	
	230	73	3.0	1180	3000	29422E	
120	210	54	2.1	765	2120	29324E	
	250	78	4.0	1370	3450	29424E	
130	225	58	2.1	865	2500	29326E	
	270	85	4.0	1560	4050	29426E	
140	240	60	2.1	980	2850	29328E	
	280	85	4.0	1630	4300	24928E	
150	215	39	1.5	408	1600	29230E	9039230E
	250	60	2.1	1000	2850	29330E	
	300	90	4.0	1860	5100	29430E	
160	225	39	1.5	357	1460	29232E	9039232E
	270	67	3.0	1180	3450	29332E	
	320	95	5.0	2080	5600	29432E	
170	240	42	1.5	408	1660	29234E	9039234E
	280	67	3.0	1200	3550	29334E	
	340	103	5.0	2360	6550	29434E	
180	250	42	1.5	495	2040	29236E	9039236E
	300	73	3.0	1430	4300	29336E	
	360	109	5.0	2600	7350	29436E	
190	270	48	2.0	518	2200	29238E	9039238E
	320	78	4.0	1630	4750	29338E	
	380	115	5.0	2850	8000	29438E	
200	280	48	2.0	656	2650	29240E	9039240E

Bore (mm) d	Other dimensions (mm)						Speed ratings(rpm)		Ref. Mass
	d ₁	D ₁	B	B ₁	C	s	Grease	Oil	kg
100	152.3	127.5	26.2	36.3	20.5	58	2200	3600	3.65
	182.2	141.5	43.0	57.3	32.0	62	1700	3000	10.5
110	171.1	140.0	30.3	41.7	24.8	64	1900	3200	5.34
	199.4	155.3	47.0	64.7	34.7	69	1600	2800	13.5
120	188.1	154.5	34.0	48.2	27.0	70	1700	2800	7.35
	216.8	171.0	50.5	70.3	36.5	74	1500	2600	17.5
130	203.4	165.5	36.7	50.6	30.1	76	1600	2600	9.12
	234.4	184.5	54.0	76.0	40.9	81	1300	2400	22.3
140	216.1	177.0	38.4	54.0	30.0	82	1500	2600	10.5
	245.4	194.5	54.0	75.6	41.0	86	1300	2400	23.4
150	200.4	176.0	24.0	34.3	20.5	82	1800	2800	4.55
	223.9	190.0	38.0	54.9	28.0	87	1500	2400	11.4
	262.9	207.5	58.0	80.8	43.4	92	1200	2200	28.2
160	220.0	188.0	11.0	37.0	20.0	87	—	1700	4.85
	243.5	203.0	42.0	60.0	33.0	92	1300	2200	14.5
	279.3	223.5	60.5	84.3	45.5	99	1100	2000	33.5
170	235.0	201.0	13.0	40.0	22.0	93	—	1600	5.95
	251.2	215.0	42.2	61.1	30.5	96	1300	2200	15.2
	297.7	236.0	65.5	91.2	50.0	104	1100	1900	44.5
180	234.4	208.0	26.0	36.9	22.0	97	1600	2600	6.25
	270.0	227.0	46.0	66.2	35.5	103	1200	2000	19.5
	315.9	250.0	69.5	96.4	53.0	110	1000	1800	52.5
190	255.0	226.0	14.0	45.0	25.5	103	—	1400	8.74
	285.6	243.5	49.0	71.3	36.0	110	1100	1900	23.5
	332.9	264.5	73.0	101.0	55.5	117	950	1700	60.5
200	260.5	232.5	30.0	43.4	24.0	108	1400	2200	9.33

Spherical roller thrust bearings
d 200--360mm

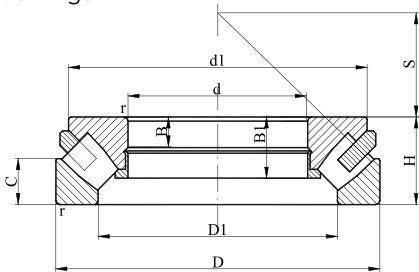


Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	H	r _{min}	Ca	Coa	New	Old
200	340	85	4.0	1860	5500	29340E	
	400	122	5.0	3200	9000	29440E	
220	300	48	2.0	690	3000	29244E	9039244E
	360	85	4.0	2000	6300	29344E	
	420	122	6.0	3350	9650	29444E	
240	340	60	2.1	799	3450	29248	9039248
	380	85	4.0	2040	6550	29348E	
	440	122	6.0	3400	10200	29448E	
260	360	60	2.1	817	3650	29252	9039252
	420	95	5.0	2550	8300	29352E	
	480	132	6.0	4050	12900	29452E	
280	380	60	2.1	863	4000	29256	9039256
	440	95	5.0	2550	8650	29356E	
	520	145	6.0	4900	15300	29456E	
300	420	73	3.0	1070	4800	29260	9039260
	480	109	5.0	3100	10600	29360E	
	540	145	6.0	4310	16600	29460E	
320	440	73	3.0	1100	5100	29264	9039264
	500	109	5.0	3350	11200	29364E	
	580	155	7.5	4950	19000	29464E	
340	460	73	3.0	1130	5400	29268	9039268
	540	122	5.0	2710	11000	29368	
	620	170	7.5	5750	22400	29468E	
360	500	85	4.0	1460	6800	29272	9039272
	560	122	5.0	2760	11600	29372	
	640	170	7.5	5350	21200	29472E	

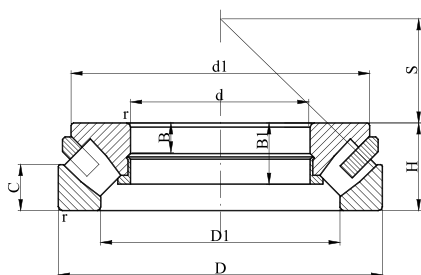


Bore (mm) d	Other dimensions (mm)						Speed ratings(rpm)		Ref. Mass kg
	d ₁	D ₁	B	B ₁	C	s	Grease	Oil	
200	304.3	257.0	53.5	76.7	40.0	116	1000	1700	29.5
	350.7	277.5	77	107.1	59.4	122	850	1600	72.5
220	280.5	251.5	30	43.4	24.5	117	1300	2200	10.6
	326.3	273.5	55	77.7	41.0	125	1000	1700	33.5
	371.6	300.0	77	107.4	58.5	132	850	1500	75.5
240	330.0	283.0	19	57.0	30.0	130	1100	1800	16.5
	345.1	295.5	54	77.8	40.5	135	1000	1600	35.5
	391.6	322	76	107.1	59.0	142	850	1500	80.3
260	350.0	302	19	57.0	30.0	139	1100	1700	18.5
	382.2	324	61	86.6	46.0	148	850	1400	49.6
	427.9	346	86	119.0	63.0	154	750	1300	105
280	370.0	323	19	57.0	30.0	150	1000	1700	19.5
	401.0	343	62	86.7	45.5	158	850	1400	53.2
	464.3	372	95	129.9	70.0	166	670	1200	135
300	405.0	353	21	69.0	38.0	162	900	1400	30.5
	434.1	372	70	98.9	51.0	168	750	1200	75.8
	485.0	392	95	130.3	70.5	175	600	1200	140
320	430.0	372	21	69.0	38.0	172	850	1400	33.3
	454.5	391	68	97.8	53.0	180	750	1200	78.4
	520.3	422	102	139.4	74.5	191	560	1100	175
340	445.0	395	21	69.0	37.0	183	850	1300	33.5
	520.0	428	41	117.0	59.0	192	600	1100	105
	557.9	445	112	151.4	84.0	201	500	1000	220
360	485	423	25	81	44.0	194	750	1200	52.2
	540	448	41	117	59.0	202	600	1100	110
	580	474	63	164	83.5	210	500	950	230

Spherical roller thrust bearings
d 380--560mm

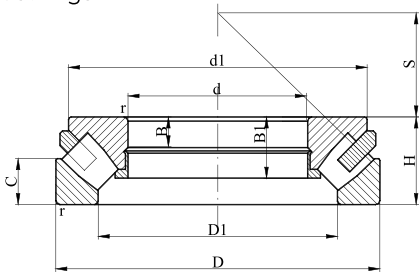


Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	H	r _{min}	Ca	Coa	New	Old
380	520	85	4.0	1580	7650	29276	9039276
	600	132	6.0	3340	14000	29376	
	670	175	7.5	5870	24000	29476E	
400	540	85	4.0	1610	8000	29280	9039280
	620	132	6.0	3450	14600	29380	
	710	185	7.5	6560	26500	29480E	
420	580	95	5.0	1990	9800	29284	9039284
	650	140	6.0	3740	16000	29384	
	730	185	7.5	6730	27500	29484E	
440	600	95	5.0	2070	10400	29288	9039288
	680	145	6.0	4490	19300	29388E	
	780	206	9.5	7820	32000	29488E	
460	620	95	5.0	2070	10600	29292	9039292
	710	150	6.0	4310	19000	29392	9039392
	800	206	9.5	7990	33500	29492E	
480	650	103	5.0	2350	11800	29296	9039296
	730	150	6.0	4370	19600	29396	
	850	224	9.5	9550	39000	29496E	
500	670	103	5.0	2390	12500	292/500	90392/500
	750	150	6.0	4490	20400	293/500	
	870	224	9.5	9370	40000	294/500E	
530	710	109	5.0	3110	15300	292/530E	90392/530E
	800	160	7.5	5230	23600	293/530	
	920	236	9.5	10500	44000	294/530E	
560	750	115	5.0	2990	16000	292/560	90392/560
	850	175	7.5	6900	31000	293/560E	

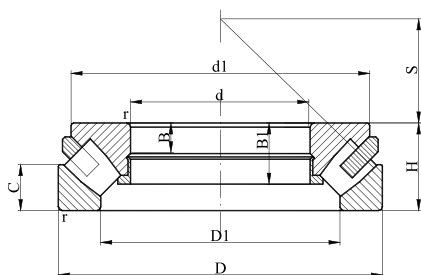


Bore (mm) d	Other dimensions (mm)						Speed ratings(rpm)		Ref. Mass kg
	d ₁	D ₁	B	B ₁	C	s	Grease	Oil	
380	505	441	27	81	42.0	202	700	1100	53.4
	580	477	44	127	63.0	216	530	1000	140
	610	494	67	168	87.5	222	480	900	260
400	526	460	27	81	42.0	212	700	1100	55.5
	596	494	43	127	64.0	225	530	950	150
	645	525	69	178	89.5	234	450	850	310
420	564	489	30	91	46.0	225	630	1000	75.5
	626	520	49	135	68.0	235	500	900	170
	665	545	70	178	90.5	244	430	850	325
440	585	508	30	91	46.0	235	630	1000	78.0
	626	540	49	140	70.5	249	480	850	180
	710	577	77	199	101.0	257	380	750	410
460	605	530	30	91	46.0	245	600	950	81.0
	685	567	50	144	72.0	257	450	800	215
	730	596	77	199	101.5	268	380	750	425
480	635	556	33	99	53.0	259	560	900	98.0
	705	591	50	144	73.5	270	450	800	220
	770	625	88	216	108	280	340	670	550
500	654	574	33	99	53	268	560	900	100
	725	611	50	144	74	280	430	800	235
	795	648	86	216	110	290	340	670	560
530	675	608	32	105	56	285	530	850	115
	772	648	53	154	76	295	400	750	270
	840	686	89	228	116	308	320	630	650
560	732	644	37	111	61	302	480	800	140
	790	677	63	169	86	320	—	360	360

Spherical roller thrust bearings
d 560--950mm



Principal dimensions (mm)				Basic load ratings KN		Designations	
d	D	H	r _{min}	Ca	Coa	New	Old
560	980	250	12.0	12000	51000	294/560E	
600	800	122	5.0	3740	18600	292/600E	90392/600E
	900	180	7.5	7530	34500	293/600	
	1030	258	12.0	13100	56000	294/600E	
630	850	132	6.0	4770	23600	292/630E	90392/630E
	950	190	9.5	8450	38000	293/630E	
	1090	280	12.0	14400	62000	294/630E	
670	900	140	6.0	4200	22800	292/670	90392/670
	1000	200	9.5	8970	41500	293/670E	
	1150	290	15.0	15400	68000	294/670E	
710	950	145	6.0	5230	27000	292/710	90392/710
	1060	212	9.5	9950	45500	293/710E	
	1220	308	15.0	17600	76500	294/710E	
750	1000	150	6.0	6100	31000	292/750E	90392/750E
	1120	224	9.5	9370	45000	293/750	
	1280	315	15.0	18700	85000	294/750E	
800	1060	155	7.5	6560	34500	292/800E	90392/800E
	1180	230	9.5	9950	49000	293/800	
	1360	335	15.0	20200	93000	294/800E	
850	1120	160	7.5	2730	36000	292/850E	90392/850E
	1440	354	15.0	23900	108000	294/850E	
900	1520	372	15.0	26700	122000	294/900E	
950	1600	390	15.0	28200	132000	294/950E	



Bore (mm) d	Other dimensions (mm)						Speed ratings(rpm)		Ref. Mass kg
	d_1	D_1	B	B_1	C	s	Grease	Oil	
560	890	727	99	241	122	328	300	560	810
600	760	688	39	117	60	321	450	700	170
	840	720	65	174	89	340	340	630	405
	940	769	99	249	128	349	280	530	845
630	810	723	50	127	62	338	400	670	210
	880	761	68	183	92	359	320	600	485
	995	815	107	270	137	365	260	500	1100
670	880	773	45	135	73	361	380	630	255
	935	804	73	193	98	379	–	300	545
	1045	864	110	280	141	387	240	450	1260
710	900	815	46	140	71	380	–	360	290
	985	855	74	205	103	404	280	500	660
	1110	917	117	298	149	415	220	430	1500
750	950	858	50	144	74	409	340	560	325
	1086	910	76	216	109	415	260	480	770
	1170	964	121	305	153	436	200	400	1650
800	1010	911	52	149	77	434	320	530	380
	1146	965	77	222	111	440	240	450	865
	1250	1034	123	324	165	462	190	360	2025
850	1060	967	47	154	82	455	300	500	425
	1315	1077	142	342	172	507	170	340	2390
900	1394	1137	147	360	186	518	160	300	2650
950	1470	1209	153	377	191	546	140	280	3065

Taper roller thrust bearings

Taper roller thrust bearings

Taper roller thrust bearings can bear bidirectional axial load, which are much more than axial load born by thrust ball bearings. There are big rigidity, they occupy small axial space, and are suitable for site with low rotation speed and are mostly used for axial location bearings of rolling mill roll.

1. Materials of cage

Most of taper roller thrust bearings adopt steel or brass cage. Roll neck should use bore diameter of cage as location dimension when assembled.

2. Allowable axial angle alignment error

Taper roller thrust bearings don't allow angular alignment error to exist for axle and casing axis. Bigger axial angle alignment error will produce additional stress and will shorten service life of bearings.

3. Minimum axial load

Rolling elements of taper roller thrust bearings bear centrifugal moment during running process, relative sliding is produced between rolling elements and raceway, to cause separation of axle and housing ring. To guarantee normal work condition of bearings, certain axial load needs to be exerted: minimum axial load is $F_{amin} > 0.01C_a$.

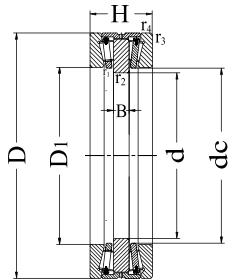
4. Axial equivalent dynamic load

$$P_a = F_a$$

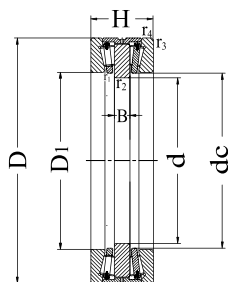
5. Axial equivalent static load

$$P_{oa} = F_a$$

Taper roller thrust bearings
d 160--380mm

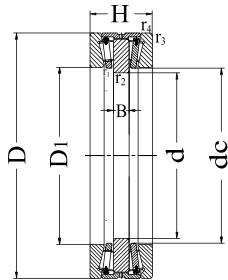


Principal dimensions (mm)								Designations
d	D	H	D ₁	B	d ₁	r _{1,2min}	r _{3,4min}	
160	300	110	190	34	187	1.0	1.5	TRTB0001
170	240	84	184	20	182	0.6	2.0	TRTB0002
180	280	90	196	20	192	1.0	2.0	TRTB0003
200	300	96	236	22	229	0.6	2.0	TRTB0004
220	300	96	236	22	231	0.6	2.0	TRTB0005
230	400	180	260	42	254	1.0	3.0	TRTB0006
240	320	96	256	22	251	0.6	2.0	TRTB0007
	380	105	270	27	267	2.0	2.0	TRTB0008
250	360	96	285	24	274	1.1	2.1	TRTB0009
	380	100	275	22	265	0.6	2.0	TRTB0010
260	360	92	285	20	276	1.0	2.0	TRTB0011
270	450	180	310	45	302	2.0	5.0	TRTB0012
	450	180	316	44	302	2.0	5.0	TRTB0013
300	420	100	330	23	326	1.5	2.5	TRTB0014
305.070	530	200	345	56	330	1.5	5.0	TRTB0015
310	490	130	350	29	340	3.0	3.0	TRTB0016
320	440	108	355	26	348	1.1	3.0	TRTB0017
	470	130	350	30	340	1.1	3.0	TRTB0018
	500	218	350	60	340	2.0	5.0	TRTB0019
	600	240	380	50	360	2.0	4.0	TRTB0020
350	490	130	390	30	382	1.1	3.0	TRTB0021
	540	135	400	30	386	1.1	4.0	TRTB0022
360	530	145	396	34	382	1.5	4.0	TRTB0023
	560	200	396	48	385	1.5	4.0	TRTB0024
380	560	130	430	32	416	1.5	2.5	TRTB0025
	560	145	430	47	411	1.5	3.0	TRTB0026

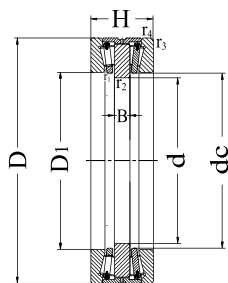


Bore (mm)	Basic load ratings KN		Ref. designations		Ref. Mass
d	Ca	Coa	SKF	FAG	kg
160	825	3000	–	515805	3.52
170	380	1430	350980C	528974	12.5
180	720	3250	353162	528294	22.2
200	570	2240	–	563400	23.4
220	570	2240	351019C	528876	20.5
230	1500	5800	–	530852	114
240	610	2600	354182C	529086	21.5
	980	5200	–	545678	42.2
250	680	3100	–	547482	30.1
	980	5200	353005	502010	43.5
260	680	3100	350981C	509352	28.2
270	2000	8500	351164C	–	120
	2000	7500	–	527907	115
300	890	4500	–	524740	45.3
305.070	2380	10600	BFDB353194	544025	200
310	1300	5000	–	524902	84.2
320	990	4900	353102A	528562	48.5
	1300	6550	350982C	509654	80.3
	2100	8360	–	540295	175
	3900	17600	–	522837	324
350	1320	6700	351100C	530739	73.5
	1800	10400	353006	522008	115
360	1500	7800	–	573320	110
	2900	12900	–	524194	180
380	1800	10800	351175C	513125	108
	1800	10800	–	567356	130

Taper roller thrust bearings
d 380--900mm



Principal dimensions (mm)								Designations
d	D	H	D ₁	B	d ₁	r _{1,2min}	r _{3,4min}	
380	650	215	450	65	446	2.0	4.0	TRTB0027
400	650	200	450	50	439	1.5	5.0	TRTB0028
410	560	160	440	40	429	2.0	5.0	TRTB0029
420	620	170	465	35	458	1.5	3.0	TRTB0030
	620	170	470	35	458	1.5	3.0	TRTB0031
	620	185	465	50	458	1.5	3.0	TRTB0032
	620	185	470	50	458	1.5	3.0	TRTB0033
440	645	167	490	50	483	3.0	4.0	TRTB0034
	660	155	505	35	485	3.0	5.0	TRTB0035
450	645	155	490	38	483	1.5	4.0	TRTB0036
	645	155	500	38	483	1.5	4.0	TRTB0037
470	720	200	535	50	519	2.0	4.0	TRTB0038
	720	200	535	60	519	2.0	4.0	TRTB0039
480	710	218	575	57	564	2.0	4.0	TRTB0040
530	710	218	575	57	564	2.0	3.0	TRTB0041
550	760	230	610	50	589	2.0	5.0	TRTB0042
600	880	290	680	70	674	5.0	6.0	TRTB0043
	910	290	680	70	670	5.0	6.0	TRTB0044
670	900	230	725	50	709	2.0	5.0	TRTB0045
900	1180	220	990	48	960	2.0	6.0	TRTB0046



Bore (mm) d	Basic load ratings KN		Ref. designations		Ref. Mass kg
	Ca	Coa	SKF	FAG	
380	3750	19300	BFDB353204	545936	275
400	2700	13700	353106	540162	250
410	2780	10200	–	524134	111
420	2420	12200	351121C	–	185
	2280	12000	–	509392	185
	2420	12200	BFDB353200/HA3	–	200
	2280	12000	–	545991	202
440	2240	12700	353152	534038	190
	2450	12300	–	523720	178
450	1980	10800	350916D	–	170
	2240	12200	–	513401	157
470	3410	19300	353151	509391	285
	3410	19300	BFDB353238/HA3	549701	305
480	2700	14000	–	547584	280
530	2700	14000	351475C	511746	245
550	2920	13200	350976C	515196	310
600	4730	21200	BFDB350824B/HA1	–	550
	4730	21200	350901C	–	655
670	3580	19000	351761A	521823	425
900	4500	22000	–	522834	580

Screw-down bearings

Screw-down bearings

(Full complement taper roller thrust bearings)

1. Characteristics

Such type of bearings are specially designed for rolling mill screwdown mechanism, without cage for bearings, roller full complement raceway. They can bear especially big unidirectional axial load.

These kinds of bearings include two structural types of TTSX with shaft washer being convex spherical shape and TTSV with shaft washer being concave spherical shape. Because shaft washer is spherical, certain inclination is produced for axis when screwdown mechanism presses down roll housing, which also can guarantee bearings be uniformly stressed.

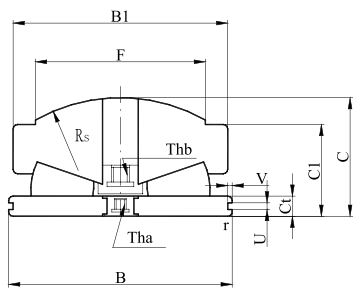
2. Equivalent dynamic load

$$P_a = F_a$$

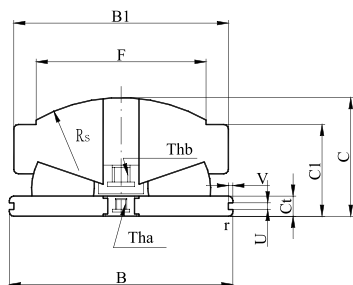
3. Equivalent static load

$$P_{0a} = F_a$$

Screw-down bearings
TTSX type
B 149.225--900.000mm

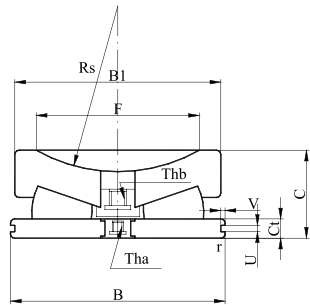


Principal dimensions (mm)				Basic load ratings KN	Designations	Ref. designations	
B	B ₁	F	C	Coa		NSK	FAG
149.225	146.860	127.000	54.97	2520	TTSX150/X1	149TFX01	536626
174.625	172.260	152.400	61.39	3650	TTSX175/X1	174TFX01	537778
203.200	200.840	177.800	75.62	4850	TTSX205/X1	203TFX01	
220.000	220.000	195.000	78.00	6100	TTSX220/X1	220TFX01	
266.700	264.340	228.600	94.41	8350	TTSX265/X1	266TFX01	
320.675	318.310	279.400	110.97	12600	TTSX320/X1	320TFX01	
377.825	375.460	330.200	129.01	17700	TTSX380/X1	377TFX01	
404.400	407.210	355.600	142.23	20500	TTSX405/X1	407TFX01	
409.575	407.210	355.600	142.23	20500	TTSX410/X1	409TFX01	
438.150	435.790	381.000	150.67	22200	TTSX440/X1	438TFX01	
495.300	492.940	431.800	170.61	31500	TTSX495/X1	495TFX01	
523.875	521.520	457.200	176.66	34500	TTSX525/X1	523TFX01	
533.400	531.010	457.000	177.80	34500	TTSX535/X1	533TFX01	
555.625	553.260	482.600	191.15	38000	TTSX555/X1	555TFX01	524340
581.025	578.660	508.000	193.78	41500	TTSX580/X1	581TFX01	
	578.660	508.000	196.65	41500	TTSX580/X2	581TFX02	
609.600	607.240	533.400	204.01	47000	TTSX610/X1	609TFX01	
641.350	638.990	558.800	212.67	51500	TTSX640/X1	641TFX01	526198
692.150	689.750	495.300	311.45	59500	TTSX695/X1	692TFX01	
710.000	710.000	480.000	260.00	54500	TTSX710/X1	710TFX01	
800.000	800.000	700.000	250.00	71500	TTSX800/X1	800TFX01	
847.600	841.000	650.000	250.00	79000	TTSX850/X1	847TFX01	
900.000	930.000	750.000	275.00	93000	TTSX900/X1	930TFX01	

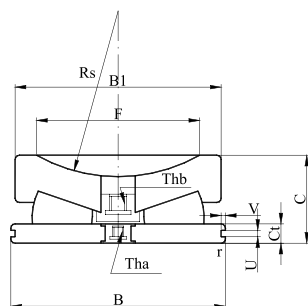


Other dimensions (mm)								Ref. Mass kg
t	r _{min}	U	V	T _{ha}	T _{hb}	C ₁	R _s	
12.70	1.6	4.8	1.2	M12	–	47.62	452.7	6.65
12.70	1.6	4.8	1.2	M12	M18	52.37	457.2	10.1
15.88	1.6	6.3	1.2	M12	M18	65.07	508.0	16.8
15.88	1.5	6.3	1.2	M12	–	66.00	550.0	20.3
19.05	1.6	7.9	2	M20	–	81.00	609.6	36.2
22.22	1.5	10.3	2.4	M24	–	95.25	762.0	61.5
25.40	1.5	10.3	2.4	M24	M30	111.12	914.4	98.7
28.57	3.3	–	–	M24	M30	122.22	1016.0	127
28.57	3.3	9.5	2.5	M24	M30	122.22	1016.0	128
31.75	3.2	13.5	3.2	M24	M36	130.18	1016.0	155
34.92	3.3	13.5	3.2	M24	M30	146.05	1066.8	225
34.92	3.3	13.5	3.2	M24	M36	153.29	1270.0	261
31.75	1.6	9.5	9.5	M24	M36	161.92	1981.2	273
38.10	3.3	12.7	3.2	M24	–	165.10	1270.0	318
38.10	3.3	13.5	3.2	M24	M42	168.28	1422.4	353
38.10	3.3	13.5	3.2	8UNC	7UNC	168.28	1308.1	358
38.10	3.3	13.5	3.2	M30	M42	177.80	1524.0	409
38.10	3.3	13.5	3.2	M24	M42	184.15	1524.0	472
38.10	3.0	13.5	3.2	M24	M42	280.00	1803.4	805
40.00	4.0	–	–	M24	M24	235.00	1400.0	706
43.00	7.0	–	–	M36	M48	206.00	1524.0	857
43.00	5.0	–	–	M42	M42	212.00	1652.0	966
60.00	4.0	–	–	M36	M48	231.00	1800.0	1270

Screw-down bearings
TTSV type
B 149.225--880.000mm



Principal dimensions (mm)				Basic load ratings KN Coa	Designations	Ref. designations	
B	B ₁	F	C			NSK	FAG
149.225	146.860	127.000	47.62	2520	TTSV150/X1	149TFV01	
174.625	172.260	152.400	52.37	3650	TTSV175/X1		
203.200	200.800	177.800	65.07	4850	TTSV205/X1	203TFV01	536716
266.700	264.340	228.600	81.00	8400	TTSV265/X1	266TFV01	524088
	264.340	228.600	86.37	8350	TTSV265/X2	266TFV02	
320.675	318.310	279.400	95.25	12600	TTSV320/X1	320TFV01	
377.825	375.460	330.200	111.12	17700	TTSV375/X1	377TFV01	524578
409.575	407.210	355.600	122.22	20500	TTSV410/X1	409TFV01	559632
438.150	435.790	381.000	130.18	22200	TTSV440/X1	438TFV01	
495.300	492.940	431.800	146.05	31500	TTSV495/X1	495TFV01	
508.000	501.650	341.300	165.10	31000	TTSV510/X1	508TFV01	
523.875	521.510	457.200	152.40	34500	TTSV525/X1	523TFV01	524105
551.600	539.750	435.500	158.75	35000	TTSV550/X1	551TFV01	
554.000	555.000	414.000	190.50	38000	TTSV550/X2	554TFV01	
	555.000	465.400	190.50	38000	TTSV550/X3	554TFV01A	
555.625	553.260	482.600	165.10	38000	TTSV555/X1	555TFV01	527795
581.025	578.660	508.000	168.28	41500	TTSV580/X1	581TFV01	
609.600	607.240	533.400	177.80	47000	TTSV610/X1	609TFV01	
641.350	638.990	558.800	184.15	51500	TTSV640/X1	641TFV01	
880.000	930.000	627.000	234.95	93000	TTSV880/X1	930TFV01	



Other dimensions (mm)							Ref. Mass Kg
t	r_{min}	U	V	T_{ha}	T_{hb}	R_s	
12.70	1.6	4.8	1.2	M12	–	228.60	5.64
12.70	1.6	4.8	1.2	M12	M18	228.60	10.3
15.88	1.6	6.3	1.2	M12	M18	254.00	14.3
19.05	1.6	7.9	2.0	M20	–	304.80	30.8
19.05	1.6	7.9	2.0	M20	–	250.00	35.5
22.22	1.5	10.3	2.4	M24	–	381.00	52.3
25.40	1.5	10.3	2.4	M24	M30	457.20	84.7
28.58	3.2	10.3	2.4	M24	M30	508.00	109
31.75	3.2	13.5	3.2	M24	M36	508.00	133
34.92	3.3	13.5	3.2	M24	M36	558.80	191
34.92	3.2	12.7	3.2	M24	M36	508.00	228
34.92	3.2	13.5	3.2	M24	M36	635.00	223
24.65	4.0	10.6	2.5	M24	M24	635.00	258
50.00	3.0	9.5	6.0	M24	–	1270.00	312
50.00	3.0	–	–	M24	M42	1270.00	312
38.10	3.2	13.5	3.2	M24	M36	635.00	272
38.10	3.2	13.5	3.2	M24	M42	711.20	303
38.10	3.3	13.5	3.2	M30	M42	762.00	353
38.10	3.2	13.5	3.2	M24	M42	762.00	405
50.00	4.0	–	–	M42	M42	1524.00	1090

Slewing bearings

Slewing bearings

Slewing bearings are required to work at low rotation speed or under non-continuous operation condition and majority of them run under eccentric load. Besides bearing axial load and radial load, they also must bear function of overturning moment. According to use frequency, concerning use grade of slewing bearings, the standard work cycle number is classified as below:

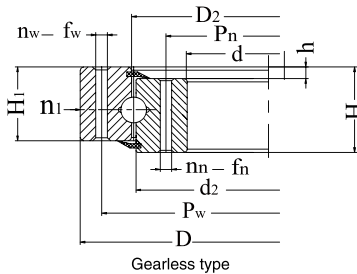
Standard work cycle sort for slewing bearings

Using frequency for slewing bearings	Cycle number of standard work Lc	Use grade for slewing bearings
Be used occasionally and idled for long term	0.063×10^6	A
Be used regularly but not be used centrally	0.2×10^6	B
Be used regularly under concentrated operation	0.63×10^6	C
Be used regularly under multi-shift system concentrated operation	2×10^6	C

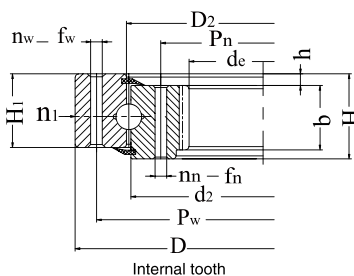
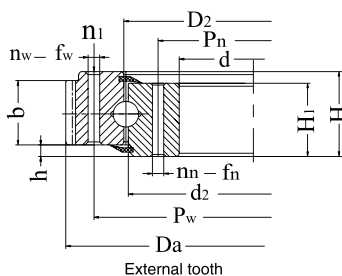
When clients use slewing bearings, please consult technical service department of FV for allowable contact stress, bearing load capacity and service life estimation for slewing bearings.

Bolt should have enough prestress when slewing bearings are installed. Bolt at standard grade of 8.8、10.9 or 12.9 should be used as possible to facilitate reliable work.

Slewing ball bearings
HZZ series

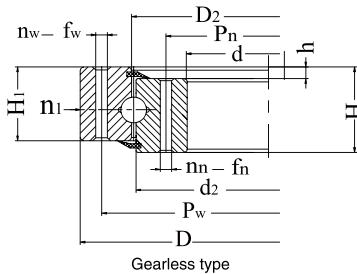


Designations			Principal dimensions (mm)			Structure dimensions (mm)				
Gearless type	External tooth	Internal tooth	D	d	H	n_1	D_2	d_2	H_1	h
		HZZ489N	562	408	60	4	490.5	487.5	50	10
		HZZ489	562	396	60	4	490.5	487.5	50	10
	HZZ500W	HZZ500N	602	398	80	4	501	498	70	10
		HZZ544	616	472	56	4	545.5	542.5	44.5	11.5
		HZZ544W	616	472	56	4	545.5	542.5	44.5	11.5
		HZZ544N	616	472	56	4	545.5	542.5	44.5	11.5
	HZZ560W	HZZ560N	662	458	80	4	561	558	70	10
		HZZ574	680	468	68	4	576	572	61	7
		HZZ575N	657	490	55	4	576	574	48	7
		HZZ596W	686	510	55	4	597	595	48	7
	HZZ625W	HZZ625N	725	525	80	4	626	624	68	12
		HZZ625W-1 HZZ625N-1	725	525	80	4	626	624	68	12
	HZZ630W	HZZ630N	732	528	80	4	631	628	70	10
		HZZ635N	722	520	59	4	636	634	52	7
		HZZ644	716	572	56	4	645.5	642.5	44.5	11.5
		HZZ644W	706	572	56	4	645.5	642.5	44.5	11.5
		HZZ644N	716	572	56	4	645.5	642.5	44.5	11.5
		HZZ680	795	565	79	4	682	678	72	7
		HZZ685W	790	577	68	4	687	683	61	7
	HZZ710W	HZZ710N	812	608	80	4	711	708	70	10
	HZZ720W	HZZ720N	820	620	80	4	721	719	68	12
		HZZ720W-1 HZZ720N-1	820	620	80	4	721	719	68	12
		HZZ744	816	672	56	4	745.5	742.5	44.5	11.5
		HZZ744W	-	672	56	4	745.5	742.5	44.5	11.5
		HZZ744N	816	-	56	4	745.5	742.5	44.5	11.5

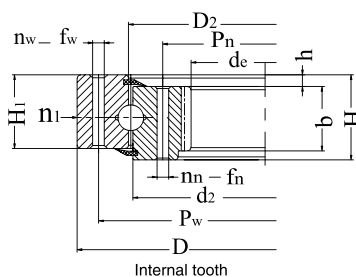
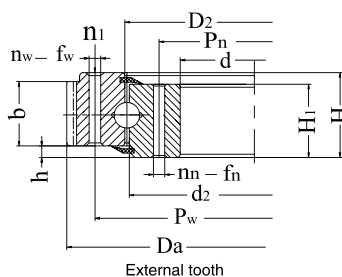


Installation dimensions (mm)						Gear factors			External tooth factors		Internal tooth factors		Ref. Mass
P _w	P _n	f _w	f _n	n _w	n _n	b	x	m	D _a	z	d _e	z	kg
538	440	13.5	13.5	24	24	43		4			388	99	44.9
538	440	13.5	13.5	24	24								44.9
536	434	18	18	20	20	60	+0.5	5	629	123	367	74	85.0
590	498	14	14	28	32								37.0
590	498	14	M12	32	32	44.5		6	640.3	105			43.0
590	498	M12	14	32	32	44.5		6			444	76	42.0
626	494	18	18	20	20	60	+0.5	5	689	135	427	86	95.0
640	508	22	22	20	20								82.0
625	525	18	18	16	16	48		6			462	79	55.0
630	542	18	18	24	24	48		6	712.2	117			62.0
645	565	18	18	18	18	60	+1.4	5	751.9	146	498.8	101	100
645	565	18	18	18	18	60	+1.15	6	755.5	122	496.7	84	100
696	564	18	18	24	24	60	+0.5	6	772.8	126	494.4	83	114
610	580	18	18	24	24	52		8			504	65	70.0
635	598	14	14	36	36	44.5							44.0
690	598	M12	14	32	36	44.5		6	742.3	122			52.0
690	605	14	M12	36	36	44.5		6			546	93	50.0
735	605	22	22	30	30								120
753	617	22	22	24	24	61		8	829.9	102			112
776	644	18	18	24	24	60	+0.5	6	850.8	139	572.4	96	120
730	660	18	18	18	18	60	+1.4	6	806.3	139	586.6	99	120
730	660	18	18	18	18	60	+1.0	8	861.1	104	582.3	74	120
735	698	14	14	40	40								52.0
735	698	M12	14	36	40	44.5		6	838.1	138			59.0
790	705	14	M12	36	40	44.5		6			648	110	58.0

Slewing ball bearings
HZB series

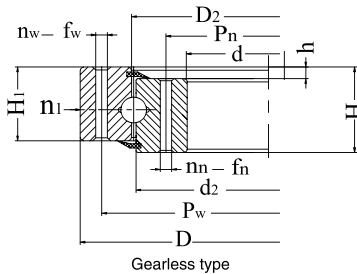


Designations			Principal dimensions (mm)			Structure dimensions (mm)				
Gearless type	External tooth	Internal tooth	D	d	H	n_1	D_2	d_2	H_1	h
HZB755			855	655	63	4	757	753	54	9
	HZB755W		855	655	80	4	757	753	71	9
		HZB755N	855	635	80	4	757	753	71	9
HZB785			900	670	86	4	787	783	79	7
HZB800	HZB800W	HZB800N	922	678	100	4	801	798	90	10
HZB820	HZB820W	HZB820N	940	705	95	4	821	818	83	12
	HZB820W-1	HZB820N-1	940	705	95	4	821	818	83	12
HZB844			916	772	56	4	845.5	842.5	44.5	11.5
	HZB844W		916	772	56	4	845.5	842.5	44.5	11.5
		HZB844N	916	772	56	4	845.5	842.5	44.5	11.5
HZB855			955	755	63	4	857	853	54	9
	HZB855W		955	755	80	4	857	853	71	9
		HZB855N	955	755	80	4	857	853	71	9
		HZB897N	976	-	60	4	898	896	43	7
HZB900	HZB900W	HZB900N	1022	778	100	6	901	898	90	10
HZB944			1016	872	56	4	945.5	942.5	44.5	11.5
	HZB944W		1016	872	56	4	945.5	942.5	44.5	11.5
		HZB944N	1016	872	56	4	945.5	942.5	44.5	11.5
HZB955			1055	855	63	4	957	953	54	9
	HZB955W		1055	855	80	4	957	953	71	9
		HZB955N	1055	855	80	4	957	953	71	9
HZB980			1090	870	79	4	982	978	72	7
	HZB980W		-	870	100	4	981	979	90	32
HZB1000	HZB1000W	HZB1000N	1122	878	100	6	1001	998	90	10
HZB1020	HZB1020W	HZB1020N	1170	875	95	4	1021	1018	80	15

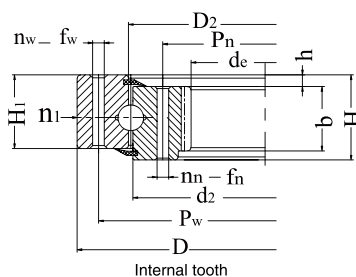
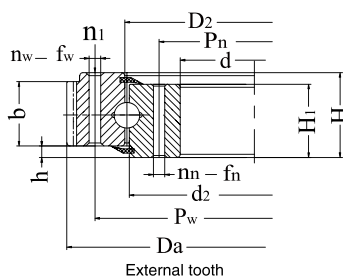


Installation dimensions (mm)						Gear factors			External tooth factors		Internal tooth factors		Ref. Mass
P _w	P _n	f _w	f _n	n _w	n _n	b	x	m	D _a	z	d _e	z	kg
815	695	22	22	24	24								90.0
816	695	M20	22	24	24	71		9	898	98			128
815	694	22	M20	24	24	71		10			610	63	119
860	710	22	22	36	36								155
878	722	22	22	30	30	80	+0.5	8	966.4	118	635.2	80	220
893	749	20	20	24	24	70	+1.4	6	980.6	159	664.5	112	210
893	749	20	20	24	24	70	+1.0	10	986.2	95	658	67	210
890	798	14	14	40	40								60.0
885	798	M12	14	36	40	44.5		8	950.1	117			71.0
890	805	14	M12	40	40	44.5		8			736	94	69.0
915	795	22	22	28	28								101
916	795	M20	22	28	28	71		9	997	109			145
915	794	22	M20	28	28	71		10			710	73	137
944	850	18	18	32	32	53		8			776	99	90.2
978	822	22	22	30	30	80	+0.5	8	1062.4	130	739.2	93	240
990	898	14	14	44	44								67.2
985	898	M12	14	40	40	44.5		8	1046.1	129			77.5
990	905	14	M12	44	44	44.5		8			840	107	76.3
1015	895	22	22	30	30								115
1016	895	M20	22	30	30	71		9	1096	120			155
1015	894	22	M20	30	30	71		10			810	83	149
1050	910	22	22	44	44								162
1050	910	22	22	36	36	68		11	1144	102			230
1078	922	22	22	36	36	80	+0.5	10	1188	116	824	83	270
1120	930	22	22	24	24	70	+1.4	8	1219.2	148	830.4	105	300

Slewing ball bearings
HZA series

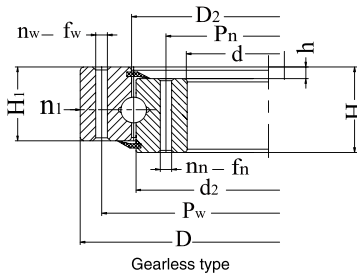


Designations			Principal dimensions (mm)			Structure dimensions (mm)				
Gearless type	External tooth	Internal tooth	D	d	H	n ₁	D ₂	d ₂	H ₁	h
	HZA1020W-1	HZA1020N-1	1170	875	95	4	1021	1018	80	15
	HZA1055		1155	955	63	4	1057	1053	54	9
	HZA1055W		1155	955	80	4	1057	1053	71	9
		HZA1055N	1155	955	80	4	1057	1053	71	9
	HZA1094		1166	1022	56	4	1096	1092.5	44.5	11.5
	HZA1094W		1166	1022	56	4	1096	1092.5	44.5	11.5
		HZA1094N	1166	1022	56	4	1096	1092.5	44.5	11.5
	HZA1120	HZA1120W	1242	998	100	6	1121	1118	90	10
	HZA1125		1194	1056	56	4	1126	1124	46	10
	HZA1220	HZA1220W	1365	1075	120	6	1221	1218	105	15
	HZA1220W-1	HZA1220N-1	1365	1075	120	6	1221	1218	105	15
	HZA1250	HZA1250W	1390	1110	110	5	1252	1248	100	10
	HZA1250-1	HZA1250W-1	1400	1090	120	6	1251	1248	105	15
	HZA1250W-2	HZA1250N-2	1400	1090	120	6	1251	1248	105	15
	HZA1270W		1374	1149	80	6	1272	1268.5	70	8
	HZA1400	HZA1400W	1540	1260	110	5	1402	1398	100	10
	HZA1435	HZA1435W	1595	1278	120	6	1436	1433	105	15
	HZA1435W-1	HZA1435N-1	1595	1278	120	6	1436	1433	105	15
	HZA1540	HZA1540W	1720	1360	140	6	1541	1538	122	18
	HZA1540W-1	HZA1540N-1	1720	1360	140	6	1541	1538	122	18
	HZA1600	HZA1600W	1740	1460	110	6	1602	1598	100	10
	HZA1700	HZA1700W	1875	1525	140	6	1701	1698	122	18
	HZA1700W-1	HZA1700N-1	1875	1525	140	6	1701	1698	122	18
	HZA1800	HZA1800W	1940	1660	110	5	1802	1798	100	10
	HZA1880	HZA1880W	2100	1665	160	6	1881	1878	140	20

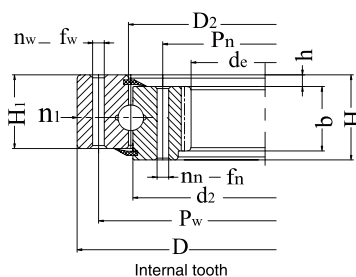
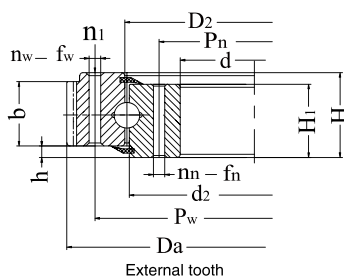


Installation dimensions (mm)						Gear factors			External tooth factors		Internal tooth factors		Ref. Mass
P _w	P _n	f _w	f _n	n _w	n _n	b	x	m	D _a	z	d _e	z	kg
1120	930	22	22	24	24	70	+1.15	10	1219.2	118	827.8	84	300
1115	995	22	22	30	30								128
1116	995	M20	22	30	30	71		10	1198	118			171
1115	994	22	M20	30	30	71		10			910	93	165
1140	1048	14	14	48	48								77.2
1135	1048	M12	14	44	48	44.5		8	1198.1	148			91.5
1140	1055	14	M12	48	48	44.5		8			984	125	91.5
1198	1042	22	22	36	36	80	+0.5	10	1298	127	944	95	300
1170	1080	14	14	80	80								71.5
1310	1130	24	24	36	36	90	+1.4	10	1424.9	138	1028	104	450
1310	1130	24	24	36	36	90	+1.0	12	1435.9	116	1017	86	450
1337	1163	26	26	40	40	90	+0.5	12	1449.6	118	1049	88	420
1350	1150	36	26	36	36	90	+0.35	10	1443	143	1037	105	520
1350	1150	36	26	36	36	90	+1.0	12	1449.6	117	1037	86	520
1344	1199	M16	M16	24	24	55		6	1410.6	252			261
1487	1313	26	26	40	40	90	+0.5	12	1605.6	131	1193	100	480
1535	1335	26	26	36	36	90	+1.15	12	1655.5	134	1221	103	610
1535	1335	26	26	36	36	90	+1.0	14	1661.2	115	1215	88	610
1660	1420	26	26	42	42	110	+1.4	12	1780.8	144	1293	109	732
1660	1420	26	26	42	42	110	+1.15	14	1791.1	124	1285	93	732
1687	1513	26	26	45	45	90	+0.5	14	1817.2	127	1392	100	550
1815	1585	29	29	42	42	110	+1.15	14	1945.4	135	1453	105	844
1815	1585	29	29	42	42	110	+1.15	16	1590.8	118	1452	92	844
1887	1713	26	26	45	45	90	+0.5	14	2013.2	141	1574	113	620
2030	1740	32	32	48	48	115	+1.4	14	2189.8	152	1593	115	1400

Slewing ball bearings
HZZ series

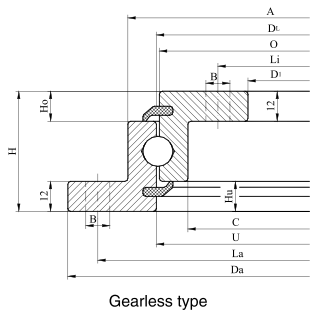


Designations			Principal dimensions (mm)			Structure dimensions (mm)				
Gearless type	External tooth	Internal tooth	D	d	H	n ₁	D ₂	d ₂	H ₁	h
	HZZ1880W-1	HZZ1880N-1	2100	1665	160	6	1881	1878	140	20
	HZZ2000	HZZ2000W	2178	1825	144	8	2002	1998	132	12
	HZZ2115	HZZ2115W	2325	1900	160	6	2116	2113	140	20
	HZZ2115W-1	HZZ2115N-1	2325	1900	160	6	2116	2113	140	20
	HZZ2240	HZZ2240W	2418	2065	144	8	2242	2238	132	12
	HZZ2370	HZZ2370W	2600	2146	180	6	2371	2368	158	22
	HZZ2370W-1	HZZ2370N-1	2600	2146	180	6	2371	2368	158	22
	HZZ2500	HZZ2500W	2678	2325	144	8	2502	2498	132	12
	HZZ2800	HZZ2800W	2978	2625	144	8	2802	2798	132	12



Installation dimensions (mm)						Gear factors			External tooth factors		Internal tooth factors		Ref. Mass
P _w	P _n	f _w	f _n	n _w	n _n	b	x	m	D _a	z	d _e	z	kg
2030	1740	32	32	48	48	115	+1.15	18	2194.6	118	1580	89	1400
2110	1891	33	33	48	48	120	+0.5	16	2268.8	139	1734	109	1100
2245	1980	32	32	48	48	115	+1.4	16	2406.5	146	1804	114	1600
2245	1980	32	32	48	48	115	+1.15	20	2418.4	117	1795	91	1600
2350	2131	33	33	48	48	120	+0.5	16	2492.8	153	1990	125	1250
2520	2220	32	32	48	48	130	+1.4	18	2707.3	146	2066	116	2100
2520	2220	32	32	48	48	130	+1.15	22	2704.4	119	2041	94	2100
2610	2391	33	33	56	56	120	+0.5	18	2768.4	151	2239	125	1400
2910	2619	33	33	56	56	120	+0.5	18	3074.4	168	2527	141	1600

Slewing ball bearings
HZBB series

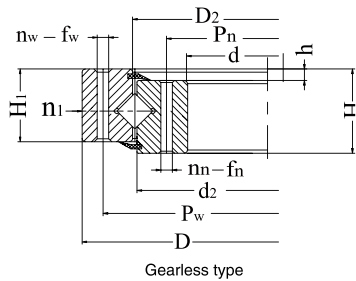


Designations	Principal dimensions (mm)												
	D _L	D _a	D _i	h	L _a	L _i	Outside screw	External bolt hole	Inside screw	Internal bolt hole	Qty of fuel holes		
							Q'ty of holes n _a	B/M	Q'ty of holes n _i	B/M	t	n ₁	o
HZBB400	414	518	304	56	490	332	8	18	12	18	–	4	412.5
HZBB500	544	648	434	56	620	462	10	18	14	18	–	4	542.5
HZBB600	644	748	534	56	720	562	12	18	16	18	–	4	642.5
HZBB700	744	848	634	56	820	662	12	18	16	18	–	4	742.5
HZBB800	844	948	734	56	920	762	14	18	18	18	–	4	842.5
HZBB900	944	1048	834	56	1020	862	16	18	20	18	–	4	942.5
HZBB1000	1094	1198	984	56	1170	1012	16	18	20	18	–	4	1092.5
HZBB400W	414	518	304	56	455	332	10	M12	12	18	20	4	412.5
HZBB500W	544	642	434	56	585	462	14	M12	14	18	20	4	542.5
HZBB600W	644	744	534	56	685	562	16	M12	16	18	20	4	642.5
HZBB700W	744	840	634	56	785	662	18	M12	16	18	20	4	742.5
HZBB800W	844	952	734	56	885	762	18	M12	18	18	20	4	842.5
HZBB900W	944	1048	834	56	985	862	20	M12	20	18	20	4	942.5
HZBB1000W	1094	1200	984	56	1135	1012	22	M12	20	18	20	4	1092.5
HZBB400N	414	518	326.5	56	490	375	8	18	12	M12	20	4	412.5
HZBB500N	544	648	445.2	56	620	505	10	18	16	M12	20	4	542.5
HZBB600N	644	748	547.2	56	720	605	12	18	18	M12	20	4	642.5
HZBB700N	744	848	649.2	56	820	705	12	18	20	M12	20	4	742.5
HZBB800N	844	948	737.6	56	920	805	14	18	20	M12	20	4	842.5
HZBB900N	944	1048	841.6	56	1020	905	16	18	22	M12	20	4	942.5
HZBB1000N	1094	1198	985.6	56	1170	1055	16	18	24	M12	20	40	1092.5

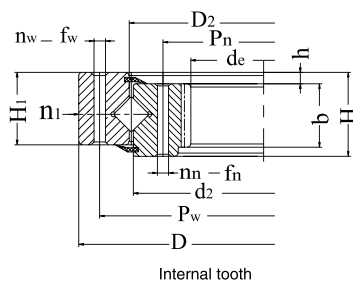
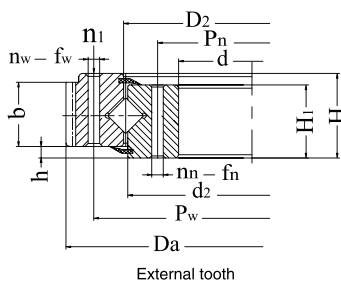


Principal dimensions (mm)					Dimensions of gear(mm)									Ref. designations	Ref. Mass
					External tooth			Internal tooth			Factors				
u	A	C	H _U	H ₀	d	B/M	m	z	d	m	z	b	K _m	Rothe Erde	kg
415.5	453	375	10.5	10.5										230.20.0400.013	23.4
545.5	583	505	10.5	10.5										230.20.0500.013	31.2
645.5	683	605	10.5	10.5										230.20.0600.013	36.4
745.5	783	705	10.5	10.5										230.20.0700.013	42.8
845.5	883	805	10.5	10.5										230.20.0800.013	47.8
945.5	983	905	10.5	10.5										230.20.0900.013	53.1
1095.5	1133	1055	10.5	10.5										230.20.1000.013	61.9
415.5	–	375	10.5	–	495	5	99					45.5	–	231.20.0400.013	29.3
545.5	–	505	10.5	–	630	6	105					45.5	–	231.20.0500.013	39.5
645.5	–	605	10.5	–	732	6	122					45.5	–	231.20.0600.013	47.6
745.5	–	705	10.5	–	828	6	138					45.5	–	231.20.0700.013	53.5
845.5	–	805	10.5	–	936	8	117					45.5	–	231.20.0800.013	65.1
945.5	–	905	10.5	–	1032	8	129					45.5	–	231.20.0900.013	69.9
1095.5	–	1055	10.5	–	1184	8	148					45.5	–	231.20.1000.013	83.2
415.5	453	–	10.5	–					335	5	67	45.5	–0.75	232.20.0400.013	27.1
545.5	583	–	10.5	–					456	6	76	45.5	–0.6	232.20.0500.013	36.9
645.5	683	–	10.5	–					558	6	93	45.5	–0.6	232.20.0600.013	43.7
745.5	783	–	10.5	–					660	6	110	45.5	–0.6	232.20.0700.013	51.1
845.5	883	–	10.5	–					752	8	94	45.5	–0.8	232.20.0800.013	61.6
945.5	983	–	10.5	–					856	8	107	45.5	–0.8	232.20.0900.013	65.8
1095.5	1133	–	10.5	–					1000	8	125	45.5	–0.8	232.20.1000.013	80.7

Slewing roller bearings
HZR series



Designations			Principal dimensions (mm)			Structure dimensions (mm)		
Gearless type	External tooth	Internal tooth	D	d	H	n_1	H_1	h
HZR500	HZR500W	HZR500N	634	366	148	4	138	32
HZR560	HZR560W	HZR560N	694	426	148	4	138	32
HZR630	HZR630W	HZR630N	764	496	148	4	138	32
HZR710	HZR710W	HZR710N	844	576	148	4	138	32
HZR800	HZR800W	HZR800N	964	636	182	4	172	40
HZR900	HZR900W	HZR900N	1064	736	182	4	172	40
HZR1000	HZR1000W	HZR1000N	1164	836	182	5	172	40
HZR1120	HZR1120W	HZR1120N	1284	956	182	5	172	40
HZR1250	HZR1250W	HZR1250N	1445	1055	220	5	210	50
HZR1400	HZR1400W	HZR1400N	1595	1205	220	5	210	50
HZR1600	HZR1600W	HZR1600N	1795	1405	220	6	210	50
HZR1800	HZR1800W	HZR1800N	1995	1605	220	6	210	50
HZR2000	HZR2000W	HZR2000N	2221	1779	231	6	219	54
HZR2240	HZR2240W	HZR2240N	2461	2019	231	6	219	54
HZR2500	HZR2500W	HZR2500N	2721	2279	231	8	219	54



Installation dimensions (mm)						Gear factors			External tooth factors		Internal tooth factors		Ref. Mass
P _w	P _n	f _w	f _n	n _w	n _n	b	x	m	D _a	z	d _e	z	kg
598	402	18	18	24	24	80	0.5	5	664	130	337	68	224
658	462	18	18	24	24	80	0.5	5	724	142	397	80	240
728	532	18	18	28	28	80	0.5	6	808.8	132	458.4	77	270
808	612	18	18	28	28	80	0.5	6	886.8	145	536.4	90	300
920	680	22	22	36	36	120	0.5	8	1006.4	123	595.2	75	500
1020	780	22	22	36	36	120	0.5	8	1102.4	135	691.2	87	600
1120	880	22	22	40	40	120	0.5	10	1218	119	784	79	680
1240	1000	22	22	40	40	120	0.5	10	1338	131	904	91	820
1393	1107	26	26	45	45	150	0.5	12	1509.6	123	988.8	83	1200
1543	1257	26	26	45	45	150	0.5	12	1665.6	136	1145	96	1300
1743	1457	26	26	48	48	150	0.5	14	1873.2	131	1336	96	1520
1943	1657	26	26	48	48	150	0.5	14	2069.2	145	1532	110	1750
2155	1845	33	33	60	60	160	0.5	16	2300.8	141	1702	107	2400
2395	2085	33	33	60	60	160	0.5	16	2556.8	157	1926	121	2700
2655	2345	33	33	72	72	160	0.5	18	2822.4	154	2185	122	3000

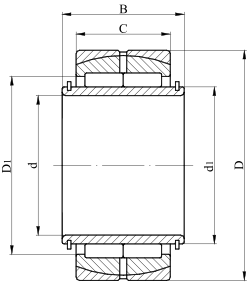
P&N bearings

P&N bearings for continuous casting machines (CCM)

Self-aligning double row full complement long cylindrical roller bearings (P&N bearings), there are no cage for such type of bearings; full complement double row cylindrical roller between inner and outer raceways consist of one concave spherical outer ring, one convex spherical outer ring and one inner ring. Inner circle of middle outer ring is external raceway without middle retaining side and only two end-retaining sides; two rows of long cylindrical rollers are axially kept abreast. There are no retaining side for inner ring and two snap rings are set at both ends, guaranteeing them not axially slide from bearing. Spherical slide contact is set between outer ring and middle outer ring and makes bearings have good aligning performance, bearings still can normally run when axle is forced and bent or misalignment angular error exists between bearing box seat and axle.

This kind of bearings only can bear radial load, when axle is expanded and contracted from heat or cold, enough axial displacement can be produced to guarantee normal rotation of axle.

The bearings can be used for machineries with bigger distance between two points and with axle easily bearing bending. Such bearings are often used for pressure roller mechanism on continuous casting and tandem rolling line for large sized iron and steel enterprise.



Dimension table

Principal dimensions (mm)					Basic load ratings KN		Designations	Ref. Mass kg
d	D	C/B	r _{1,2min}	r _{3,4min}	Cr	Cor		
150	270	96/96	2	1	785	1320	SLCB0001	22.3
170	260	90/110	2	1	693	965	SLCB0002	19.5
	310	110/110	2	1	990	1910	SLCB0003	27.2
190	320	128/128	2	1	1050	2380	SLCB0004	34.7

Spherical plain bearings

Spherical plain bearings

Spherical plain bearings consist of one external spherical outside surface inner ring and one matched inner-spherical outer ring. They are especially suitable for the place with axial angle alignment error existing between axle and bearing housing and at lower sliding speed site with reciprocating inclination and oscillation.

Spherical plain bearings can have several slide contact surface combination, namely inner ring and outer ring can be processed through using different material before assembled together. Following two kinds are used more widely: (1) Steel to steel spherical plain bearings; (2) Self-lubricating spherical plain bearings.

(1) Contact surfaces of inner ring and outer ring for steel to steel spherical plain bearings are quenched and treated through phosphating and molybdenum disulphide. Therefore bearings have very high abrasive resistance and can work under the situation of insufficient lubrication. High-strength performance of bearing can be more suitable for being used at especially large alternate load, impact load and heavy load.

(2) Self-lubricating spherical plain bearings consist of a kind of special self-lubricating graphite assembly embedded in inner ring raceway and processed into spherical outside surface. Because they don't need to be maintained and lubricated, they are the most suitable for heavy load condition difficult to maintain lubrication.

Inner ring and outer ring of spherical plain bearings are made of high-carbon chromium steel or stainless steel with high strength. Outer ring includes integrated type and split type. For integrated type of all spherical plain bearings, its outer ring and inner ring cannot be separated. To facilitate lubrication, oil groove must exist for rolling surface for inner ring and outer ring of non-self-lubricating spherical plain bearings.

Spherical plain bearings with suffix of -2RS show that: double-lip seal ring made of polyester synthetic rubber is set at both sides of its outer ring. The external sealing lip can effectively avoid intrusion of dirt and protect internal lip.

Tolerance of spherical plain bearings is processed according to standard of ISO6125-1982.

Dimensions of steel to steel spherical plain bearings are in accordance

with standard of ISO6124-1: 1987.

Allowable scope of work temperature: steel to steel spherical plain bearings are allowed to work at high temperature of +300°C. When bearings work at high temperature of more than +150°C, special heat treatment must be made on bearings (stable treatment), to avoid dimension change to cause change on internal structure of materials. If bearings work under such high temperature, the bearing load will be lowered.

For spherical plain bearings with two seal rings by suffix code -2RS, work temperature is limited at -30°C to +130°C. Applicable work scope of its lubricating oil is not listed or is not limited by this.

Internal clearance: steel to steel spherical plain bearings are processed according standard grade of clearance, which can be seen in the table below. They also can be ordered according to bigger or smaller clearance requirements.

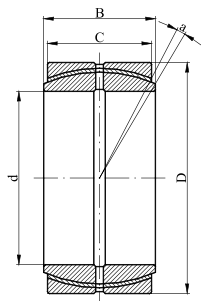
Equivalent dynamic load $P_r = F_r$

Equivalent static load $P_{or} = F_r$

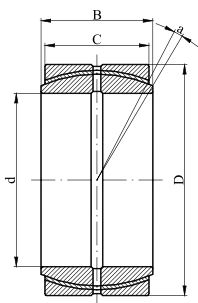
Table of Radial clearance of steel to steel spherical plain bearings

Bore diameter (mm)		Internal radial clearance (μ m)			
over	incl.	Standard group		Group 3	
90	140	85	165	165	245
140	200	100	192	192	284
200	240	110	214	214	318
240	300	125	239	239	353

Spherical plain bearings
d 100--670mm



Principal dimensions (mm)							Designations
d	D	B	C	a	r1min	r2min	
100	150	71	67	2	1.0	1.0	GE100ES
110	160	78	74	2	1.0	1.0	GE110ES
120	180	85	80	2	1.0	1.0	GE120ES
140	210	100	95	2	1.0	1.0	GE140ES
160	230	115	109	2	1.0	1.0	GE160ES
180	260	128	122	2	1.1	1.1	GE180ES
200	290	140	134	2	1.1	1.1	GE200ES
220	320	155	148	2	1.1	1.1	GE220ES
240	340	170	162	2	1.1	1.1	GE240ES
260	370	185	175	2	1.1	1.1	GE260ES
280	400	200	190	2	1.1	1.1	GE280ES
300	430	212	200	2	1.1	1.1	GE300ES
320	460	230	218	2	1.1	3.0	GE320ES
340	480	243	230	2	1.1	3.0	GE340ES
360	520	258	243	2	1.1	4.0	GE360ES
380	540	272	258	2	1.5	4.0	GE380ES
400	580	280	265	2	1.5	4.0	GE400ES
420	600	300	280	2	1.5	4.0	GE420ES
440	630	315	300	2	1.5	4.0	GE440ES
460	650	325	308	2	1.5	4.0	GE460ES
480	680	340	320	2	2.0	5.0	GE480ES
500	710	355	335	2	2.0	5.0	GE500ES
530	750	375	355	2	2.0	5.0	GE530ES
560	800	400	380	2	2.0	5.0	GE560ES
600	850	425	400	2	2.0	6.0	GE600ES
630	900	450	425	2	3.0	6.0	GE630ES
670	950	475	450	2	3.0	6.0	GE670ES



Bore(mm)	Basic load ratings KN		Ref. Mass
d	Cr	Cor	kg
100	630	920	4.51
110	720	1100	5.32
120	895	1290	7.93
140	1260	1840	12.9
160	1680	2450	16.4
180	2180	3150	24.2
200	2575	3750	33.2
220	3200	4650	45.3
240	3750	5500	53.2
260	4450	6500	68.8
280	5250	7650	88.6
300	5900	8500	108
320	6750	9850	133
340	7450	11000	148
360	8550	12500	198
380	9600	14000	217
400	10000	15000	272
420	11000	16300	297
440	12800	18900	356
460	13600	19900	376
480	15000	21600	430
500	16100	24600	495
530	17900	26000	579
560	20600	29500	722
600	23100	34500	851
630	25800	38000	1029
670	28900	42500	1197

Appendix

Appendix 1. Standard tolerance value

Basic dimension (mm)		Grade of tolerance (IT)							
		1	2	3	4	5	6	7	8
over	incl.	Standard tolerance value (μm)							
—	3	0.8	1.2	2	3	4	6	10	14
3	6	1	1.5	2.5	4	5	8	12	18
6	10	1	1.5	2.5	4	6	9	15	22
10	18	1.2	2	3	5	8	11	18	27
18	30	1.5	2.5	4	6	9	13	21	33
30	50	1.5	2.5	4	7	11	16	25	39
50	80	2	3	5	8	13	19	30	46
80	120	2.5	4	6	10	15	22	35	54
120	180	3.5	5	8	12	18	25	40	63
180	250	4.5	7	10	14	20	29	46	72
250	315	6	8	12	16	23	32	52	81
315	400	7	9	13	18	25	36	57	89
400	500	8	10	15	20	27	40	63	97
500	630	9	11	16	22	30	44	70	110
630	800	10	13	18	25	35	50	80	125
800	1000	11	15	21	29	40	56	90	140
1000	1250	13	18	24	34	46	66	105	165
1250	1600	15	21	29	40	54	78	125	195
1600	2000	18	25	35	48	65	92	150	230
2000	2500	22	30	41	57	77	110	175	280
2500	3150	26	36	50	69	93	135	210	330

Remark: For basic dimensions less than 1mm, grade of tolerance IT14~IT18 will not be applicable.

Grade of tolerance (IT)										
	9	10	11	12	13	14	15	16	17	18
				Standard tolerance value (mm)						
	25	40	60	0.10	0.14	0.26	0.40	0.60	1.00	1.40
	30	48	75	0.12	0.18	0.30	0.48	0.75	1.20	1.80
	36	58	90	0.15	0.22	0.36	0.58	0.90	1.50	2.20
	43	70	110	0.18	0.27	0.43	0.70	1.10	1.80	2.70
	52	84	130	0.21	0.33	0.52	0.84	1.30	2.10	3.30
	62	100	160	0.25	0.39	0.62	1.00	1.60	2.50	3.90
	74	120	190	0.30	0.46	0.74	1.20	1.90	3.00	4.60
	87	140	220	0.35	0.54	0.87	1.40	2.20	3.50	5.40
	100	160	250	0.40	0.63	1.00	1.60	2.50	4.00	6.30
	115	185	290	0.46	0.72	1.15	1.85	2.90	4.60	7.20
	130	210	320	0.52	0.81	1.30	2.10	3.20	5.20	8.10
	140	230	360	0.57	0.89	1.40	2.30	3.60	5.70	8.90
	155	250	400	0.63	0.97	1.55	2.50	4.00	6.30	9.70
	175	280	440	0.70	1.10	1.75	2.80	4.40	7.00	11.00
	200	320	500	0.80	1.25	2.00	3.20	5.00	8.00	12.50
	230	360	560	0.90	1.40	2.30	3.60	5.60	9.00	14.00
	260	420	660	1.05	1.65	2.60	4.20	6.60	10.50	16.50
	310	500	780	1.25	1.95	3.10	5.00	7.80	12.50	19.50
	370	600	920	1.50	2.30	3.70	6.00	9.20	15.00	23.00
	440	700	1100	1.75	2.80	4.40	7.00	11.00	17.50	28.00
	540	860	1350	2.10	3.30	5.40	8.60	13.50	21.00	33.00

Appendix 2. Hardness conversion table

Rockwell hardness C scale 1471.0N	Vickers diamond hardness	Brinell hardness		Rockwell hardness		Shore hardness
		Standard steel ball	Tungsten carbide Steel ball	A scale 588.4N	B scale 980.7N	
68	940			85.6		97
67	900			85.0		95
66	865			84.5		92
65	832		739	83.9		91
64	800		722	83.4		88
63	772		705	82.8		87
62	746		688	82.3		85
61	720		670	81.8		83
60	697		654	81.2		81
59	674		634	80.7		80
58	653		615	80.1		78
57	633		595	79.6		76
56	613		577	79.0		75
55	595		560	78.5		74
54	577		543	78.0		72
53	560		525	77.4		71
52	544	500	512	76.8		69
51	528	487	496	76.3		68
50	513	475	481	75.9		67
49	498	464	469	75.2		66
48	484	451	455	74.7		64
47	471	442	443	74.1		63
46	458	432		73.6		62
45	446	421		73.1		60
44	434	409		72.5		58
43	423	400		72.0		57
42	412	390		71.5		56
41	402	381		70.9		55
40	392	371		70.4		54
39	382	362		69.9		52
38	372	353		69.4		51
37	363	344		68.9		50

Rockwell hardness	Vickers diamond hardness	Brinell hardness		Rockwell hardness		Shore hardness
C scale 1471.0N		Standard steel ball	Tungsten carbide Steel ball	A scale 588.4N	B scale 980.7N	
36	354		336	68.4	(109.0)	49
35	345		327	67.9	(108.5)	48
34	336		319	67.4	(108.0)	47
33	327		311	66.8	(107.5)	46
32	318		301	66.3	(107.0)	44
31	310		294	65.8	(106.0)	43
30	302		286	65.3	(105.5)	42
29	294		279	64.7	(104.5)	41
28	286		271	64.3	(104.0)	41
27	279		264	63.8	(103.0)	40
26	272		258	63.3	(102.5)	38
25	266		253	62.8	(101.5)	38
24	260		247	62.4	(101.0)	37
23	254		243	62.0	100.0	36
22	248		237	61.5	99.0	35
21	243		231	61.0	98.5	35
20	238		226	60.5	97.8	34
(18)	230		219		96.7	33
(16)	222		212		95.5	32
(14)	213		203		93.9	31
(12)	204		194		92.3	29
(10)	196		187		90.7	28
(8)	188		179		89.5	27
(6)	180		171		87.1	26
(4)	173		165		85.5	25
(2)	166		158		83.5	24
(0)	160		152		81.7	24

Appendix 3. Inch-mm conversion table (1"=25.4mm)

inch		0	1	2	3	4	
Fraction	Decimal	mm					
0	0.000000	0.000	25.400	50.800	76.200	101.600	
1/64	0.015625	0.397	25.797	51.197	76.597	101.997	
1/32	0.031250	0.794	26.194	51.594	76.994	102.394	
3/64	0.046875	1.191	26.591	51.991	77.391	102.791	
1/16	0.062500	1.588	26.988	52.388	77.788	103.188	
5/64	0.078125	1.984	27.384	52.784	78.184	103.584	
3/32	0.093750	2.381	27.781	53.181	78.581	103.981	
7/64	0.109375	2.778	28.178	53.578	78.978	104.378	
1/8	0.125000	3.175	28.575	53.975	79.375	104.775	
9/64	0.140625	3.572	28.972	54.372	79.772	105.172	
5/32	0.156250	3.969	29.369	54.769	80.169	105.569	
11/64	0.171875	4.366	29.766	55.166	80.566	105.966	
3/16	0.187500	4.762	30.162	55.562	80.962	106.362	
13/64	0.203125	5.159	30.559	55.959	81.359	106.759	
7/32	0.218750	5.556	30.956	56.356	81.756	107.156	
15/64	0.234375	5.953	31.353	56.753	82.153	107.553	
1/4	0.250000	6.350	31.750	57.150	82.550	107.950	
17/64	0.265625	6.747	32.147	57.547	82.947	108.347	
9/32	0.281250	7.144	32.544	57.944	83.344	108.744	
19/64	0.296875	7.541	32.941	58.341	83.741	109.141	
5/16	0.312500	7.938	33.338	58.738	84.138	109.538	
21/64	0.328125	8.334	33.734	59.134	84.534	109.934	
11/32	0.343750	8.731	34.131	59.531	84.931	110.331	
23/64	0.359375	9.128	34.528	59.928	85.328	110.728	
3/8	0.375000	9.525	34.925	60.325	85.725	111.125	

	5	6	7	8	9	10
mm						
	127.000	152.400	177.800	203.200	223.600	254.000
	127.397	152.797	178.197	203.597	228.997	254.397
	127.794	153.194	178.594	203.994	229.394	254.794
	128.191	153.591	178.991	204.391	229.791	255.191
	128.588	153.988	179.388	204.788	230.188	255.588
	128.984	154.384	179.784	205.184	230.584	255.984
	129.381	154.781	180.181	205.581	230.981	256.381
	129.778	155.178	180.578	205.978	231.378	256.778
	130.175	155.575	180.975	206.375	231.775	257.175
	130.572	155.972	181.372	206.772	232.172	257.572
	130.969	156.369	181.769	207.169	232.569	257.969
	131.366	156.766	182.166	207.566	232.966	258.366
	131.762	157.162	182.562	207.962	233.362	258.762
	132.159	157.559	182.959	208.359	233.759	259.159
	132.556	157.956	183.356	208.756	234.156	259.556
	132.953	158.353	183.753	209.153	234.553	259.953
	133.350	158.750	184.150	209.550	234.950	260.350
	133.747	159.147	184.547	209.947	235.347	260.747
	134.144	159.544	184.944	210.344	235.744	261.144
	134.541	159.941	185.341	210.741	236.141	261.541
	134.938	160.338	185.738	211.138	236.538	261.938
	135.334	160.734	186.134	211.534	236.934	262.334
	135.731	161.131	186.531	211.931	237.331	262.731
	136.128	161.528	186.928	212.328	237.728	263.128
	136.525	161.925	187.325	212.725	238.125	263.525

Appendix 3. Inch-mm conversion table (1"=25.4mm)

inch		0	1	2	3	4	
Fraction	Decimal	mm					
25/64	0.390625	9.922	35.322	60.722	86.122	111.522	
13/32	0.406250	10.319	35.719	61.119	86.519	111.919	
27/64	0.421875	10.716	36.116	61.516	86.916	112.316	
7/16	0.437500	11.112	36.512	61.912	87.312	112.712	
29/64	0.453125	11.509	36.909	62.309	87.709	113.109	
15/32	0.468750	11.906	37.306	62.706	88.106	113.506	
31/64	0.484375	12.303	37.703	63.103	88.503	113.903	
1/2	0.500000	12.700	38.100	63.500	88.900	114.300	
33/64	0.515625	13.097	38.497	63.897	89.297	114.697	
17/32	0.531250	13.494	38.894	64.294	89.694	115.094	
35/64	0.546875	13.891	39.291	64.691	90.091	115.491	
9/16	0.562500	14.288	39.688	65.088	90.488	115.888	
37/64	0.578125	14.684	40.084	65.484	90.884	116.284	
19/32	0.593750	15.081	40.481	65.881	91.281	116.681	
39/64	0.609375	15.478	40.878	66.278	91.678	117.078	
5/8	0.625000	15.875	41.275	66.675	92.075	117.475	
41/64	0.640625	16.272	41.672	67.072	92.472	117.872	
21/32	0.656250	16.669	42.069	67.469	92.869	118.269	
43/64	0.671875	17.066	42.466	67.866	93.266	118.666	
11/16	0.687500	17.462	42.862	68.262	93.662	119.062	
45/64	0.703125	17.859	43.259	68.659	94.059	119.459	
23/32	0.718750	18.256	43.656	69.056	94.456	119.856	
47/64	0.734375	18.653	44.053	69.453	94.853	120.253	
3/4	0.750000	19.050	44.450	69.850	95.250	120.650	
49/64	0.765625	19.447	44.847	70.247	95.647	121.047	

	5	6	7	8	9	10
mm						
	136.922	162.322	187.722	213.122	238.522	263.922
	137.319	162.719	188.119	213.519	238.919	264.319
	137.716	163.116	188.516	213.916	239.316	264.716
	138.112	163.512	188.912	214.312	239.712	265.112
	138.509	163.909	189.309	214.709	240.109	265.509
	138.906	164.306	189.706	215.106	240.506	265.906
	139.303	164.703	190.103	215.503	240.903	266.303
	139.700	165.100	190.500	215.900	241.300	266.700
	140.097	165.497	190.897	216.297	241.697	267.097
	140.494	165.894	191.294	216.694	242.094	267.494
	140.891	166.291	191.691	217.091	242.491	267.891
	141.288	166.688	192.088	217.488	242.888	268.288
	141.684	167.084	192.484	217.884	243.284	268.684
	142.081	167.481	192.881	218.281	243.681	269.081
	142.478	167.878	193.278	218.678	244.078	269.478
	142.875	168.275	193.675	219.075	244.475	269.875
	143.272	168.672	194.072	219.472	244.872	270.272
	143.669	169.069	194.469	219.869	245.269	270.669
	144.066	169.466	194.866	220.266	245.666	271.066
	144.462	169.862	195.262	220.662	246.062	271.462
	144.859	170.259	195.659	221.059	246.459	271.859
	145.256	170.656	196.056	221.456	246.856	272.256
	145.653	171.053	196.453	221.853	247.253	272.653
	146.050	171.450	196.850	222.250	247.650	273.050
	146.447	171.847	197.247	222.647	248.047	273.447

Appendix 3. Inch-mm conversion table (1"=25.4mm)

inch		0	1	2	3	4	
Fraction	Decimal	mm					
25/32	0.781250	19.844	45.244	70.644	96.044	121.444	
51/64	0.796875	20.241	45.641	71.041	96.441	121.841	
13/16	0.812500	20.638	46.038	71.438	96.838	122.238	
53/64	0.828125	21.034	46.434	71.834	97.234	122.634	
27/32	0.843750	21.431	46.831	72.231	97.631	123.031	
55/64	0.859375	21.828	47.228	72.628	98.028	123.428	
7/8	0.875000	22.225	47.625	73.025	98.425	123.825	
57/64	0.890625	22.622	48.022	73.422	98.822	124.222	
29/32	0.906250	23.019	48.419	73.819	99.219	124.619	
59/64	0.921875	23.416	48.816	74.216	99.616	125.016	
15/16	0.937500	23.812	49.212	74.612	100.012	125.412	
61/64	0.953125	24.209	49.609	75.009	100.409	125.809	
31/32	0.968750	24.606	50.006	75.406	100.806	126.206	
63/64	0.984375	25.003	50.403	75.803	101.203	126.603	

	5	6	7	8	9	10
mm						
	146.844	172.244	197.644	223.044	248.444	273.844
	147.241	172.641	198.041	223.441	248.841	274.241
	147.638	173.038	198.438	223.838	249.238	274.638
	148.034	173.434	198.834	224.234	249.634	275.034
	148.431	173.831	199.231	224.631	250.031	275.431
	148.828	174.228	199.628	225.028	250.428	275.828
	149.225	174.625	200.025	225.425	250.825	276.225
	149.622	175.022	200.422	225.822	251.222	276.622
	150.019	175.419	200.819	226.219	251.619	277.019
	150.416	175.816	201.216	226.616	252.016	277.416
	150.812	176.212	201.612	227.012	252.412	277.812
	151.209	176.609	202.009	227.409	252.809	278.209
	151.606	177.006	202.406	227.806	253.206	278.606
	152.003	177.403	202.803	228.203	253.603	279.003

Appendix 3. Inch-mm conversion table (1"=25.4mm)

inch		11	12	13	14	15	
Fraction	Decimal	mm					
0	0.0000	279.400	304.800	330.200	355.600	381.000	
1/16	0.0625	280.988	306.388	331.788	357.188	382.588	
1/8	0.1250	282.575	307.975	333.375	358.775	384.175	
3/16	0.1875	284.163	309.562	334.962	360.362	385.762	
1/4	0.2500	285.750	311.150	336.550	361.950	387.350	
5/16	0.3125	287.338	312.738	338.138	363.538	388.938	
3/8	0.3750	288.925	314.325	339.725	365.125	390.525	
7/16	0.4375	290.513	315.912	341.312	366.712	392.112	
1/2	0.5000	292.100	317.500	342.900	368.300	393.700	
9/16	0.5625	293.688	319.088	344.488	369.888	395.288	
5/8	0.6250	295.275	320.675	346.075	371.475	396.875	
11/16	0.6875	296.863	322.262	347.662	373.062	398.462	
3/4	0.7500	298.450	323.850	349.250	374.650	400.050	
13/16	0.8125	300.038	325.438	350.838	376.238	401.638	
7/8	0.8750	301.625	327.025	352.425	377.825	403.225	
15/16	0.9375	303.213	328.612	354.012	379.412	404.812	

	16	17	18	19	20
mm					
	406.400	431.800	457.200	482.600	508.000
	407.988	433.388	458.788	484.188	509.588
	409.575	434.975	460.375	485.775	511.175
	411.162	436.562	461.962	487.362	512.762
	412.750	438.150	463.550	488.950	514.350
	414.338	439.738	465.138	490.538	515.938
	415.925	441.325	466.725	492.125	517.525
	417.512	442.912	468.312	493.712	519.112
	419.100	444.500	469.900	495.300	520.700
	420.688	446.088	471.488	496.888	522.288
	422.275	447.675	473.075	498.475	523.875
	423.862	449.262	474.662	500.062	525.462
	425.450	450.850	476.250	501.650	527.050
	427.038	452.438	477.838	503.238	528.638
	428.625	454.025	479.425	504.825	530.225
	430.212	455.612	481.012	506.412	531.812

Appendix 3. Inch-mm conversion table (1"=25.4mm)

inch		21	22	23	24	25	
Fraction	Decimal	mm					
0	0.0000	533.400	558.800	584.200	609.600	635.000	
1/16	0.0625	534.988	560.388	585.788	611.188	636.588	
1/8	0.1250	536.575	561.975	587.375	612.775	638.175	
3/16	0.1875	538.162	563.562	588.962	614.362	639.762	
1/4	0.2500	539.750	565.150	590.550	615.950	641.350	
5/16	0.3125	541.338	566.738	592.138	617.538	642.938	
3/8	0.3750	542.925	568.325	593.725	619.125	644.525	
7/16	0.4375	544.512	569.912	595.312	620.712	646.112	
1/2	0.5000	546.100	571.500	596.900	622.300	647.700	
9/16	0.5625	547.688	573.088	598.488	623.888	649.288	
5/8	0.6250	549.275	574.675	600.075	625.475	650.875	
11/16	0.6875	550.862	576.262	601.662	627.062	652.462	
3/4	0.7500	552.450	577.850	603.250	628.650	654.050	
13/16	0.8125	554.038	579.438	604.838	630.238	655.638	
7/8	0.8750	555.625	581.025	606.425	631.825	657.225	
15/16	0.9375	557.212	582.612	608.012	633.412	658.812	

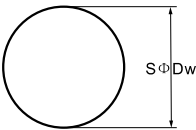
	26	27	28	29	30
mm					
	660.400	685.800	711.200	736.600	762.000
	661.988	687.388	712.788	738.188	763.588
	663.575	688.975	714.375	739.775	765.175
	665.162	690.562	715.962	741.362	766.762
	666.750	692.150	717.550	742.950	768.350
	668.338	693.738	719.138	744.538	769.938
	669.925	695.325	720.725	746.125	771.525
	671.512	696.912	722.312	747.712	773.112
	673.100	698.500	723.900	749.300	774.700
	674.688	700.088	725.488	750.888	776.288
	676.275	701.675	727.075	752.475	777.875
	677.862	703.262	728.662	754.062	779.462
	679.450	704.850	730.250	755.650	781.050
	681.038	706.438	731.838	757.238	782.638
	682.625	708.025	733.425	758.825	784.225
	684.212	709.612	735.012	760.412	785.812

Appendix 3. Inch-mm conversion table (1"=25.4mm)

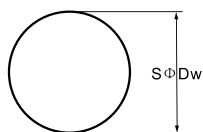
inch		31	32	33	34	35	
Fraction	Decimal	mm					
0	0.0000	787.400	812.800	838.200	868.600	889.000	
1/16	0.0625	788.988	814.388	839.788	865.188	890.588	
1/8	0.1250	790.575	815.975	841.375	866.775	892.175	
3/16	0.1875	792.162	817.562	842.962	868.362	893.762	
1/4	0.2500	793.750	819.150	844.550	869.950	895.350	
5/16	0.3125	795.338	820.738	846.138	871.538	896.938	
3/8	0.3750	796.925	822.325	847.725	873.125	898.525	
7/16	0.4375	798.512	823.912	849.312	874.712	900.112	
1/2	0.5000	800.100	825.500	850.900	876.300	901.700	
9/16	0.5625	801.688	827.088	852.488	877.888	903.288	
5/8	0.6250	803.275	828.675	854.075	879.475	904.857	
11/16	0.6875	804.862	830.262	855.662	881.062	906.462	
3/4	0.7500	806.450	831.850	857.250	882.650	908.050	
13/16	0.8125	808.038	833.438	858.838	884.238	909.638	
7/8	0.8750	809.625	835.025	860.425	885.825	911.225	
15/16	0.9375	811.212	836.612	862.012	887.412	912.812	

	36	37	38	39	40
mm					
	914.400	939.800	965.200	990.600	1016.000
	915.988	941.388	966.788	992.188	1017.588
	917.575	942.975	968.375	993.775	1019.175
	919.162	944.562	969.962	995.362	1020.762
	920.750	946.150	971.550	996.950	1022.350
	922.338	947.738	973.138	998.538	1023.938
	923.925	949.325	974.725	1000.125	1025.525
	925.512	950.912	976.312	1001.712	1027.112
	927.100	952.500	977.900	1003.300	1028.700
	928.688	954.088	979.488	1004.888	1030.288
	930.275	955.675	981.075	1006.475	1031.875
	931.862	957.262	982.662	1008.062	1033.462
	933.450	958.850	984.250	1009.650	1035.050
	935.038	960.438	985.838	1011.238	1036.638
	936.625	962.025	987.425	1012.825	1038.225
	938.212	963.621	989.012	1014.412	1039.812

Appendix 4. Dimension table for steel ball (GB/T308-2002)

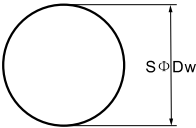


Specification		Nominal diameter Dw mm	Ref. Mass kg per ten thousand	Specification		
Metric mm	Inch inch			Metric mm	Inch inch	
0.3		0.30000	0.0011	10		
0.4		0.40000	0.0026		13/32	
0.5		0.50000	0.0051	11		
0.6		0.60000	0.0088		7/16	
	1/40	0.63500	0.0104	11.5		
0.7		0.70000	0.0140		15/32	
	1/32	0.79375	0.0204	12		
0.8		0.80000	0.0209		1/2	
1		1.00000	0.0408	13		
	3/64	1.19062	0.0688		17/32	
1.2		1.20000	0.0704	14		
1.5		1.50000	0.1376		9/16	
	1/16	1.58750	0.1631	15		
	5/64	1.98438	0.3185		19/32	
2		2.00000	0.3261		5/8	
	3/32	2.38125	0.5504	16		
2.5		2.50000	0.6369		21/32	
	7/64	2.77812	0.8740	17		
3		3.00000	1.1010		11/16	
	1/8	3.17500	1.3050	18		
3.5		3.50000	1.7480		23/32	
	9/64	3.57188	1.8580	19		
	5/32	3.96875	2.5480		3/4	
4		4.00000	2.6090		25/32	
4.5		4.50000	3.7140	20		
	3/16	4.76250	4.4030		13/16	

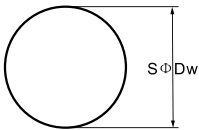


	Nominal diameter Dw mm	Ref. Mass kg per thousand	Specification		Nominal diameter Dw mm	Ref. Mass kg per ten
			Metric mm	Inch inch		
	10.00000	4.076	30		30.00000	1.101
	10.31875	4.479		1 3/16	30.16250	1.119
	11.00000	5.425		1 1/4	31.75000	1.305
	11.11250	5.594	32		32.00000	1.336
	11.50000	6.199		1 5/16	33.33750	1.510
	11.90625	6.880	34		34.00000	1.602
	12.00000	7.044		1 3/8	34.92500	1.736
	12.70000	8.350	35		35.00000	1.748
	13.00000	8.955	36		36.00000	1.902
	13.49375	10.02		1 7/16	36.51250	1.984
	14.00000	11.19	38		38.00000	2.237
	14.28750	11.89		1 1/2	38.10000	2.254
	15.00000	13.76		1 9/16	39.68750	2.548
	15.08125	13.98	40		40.00000	2.609
	15.87500	16.31		1 5/8	41.27500	2.866
	16.00000	16.70		1 11/16	42.86250	3.210
	16.66875	18.88		1 3/4	44.45000	3.580
	17.00000	20.03	45		45.00000	3.714
	17.46250	21.71		1 13/16	46.03750	3.977
	18.00000	23.77		1 7/8	47.62500	4.403
	18.25625	24.80		1 15/16	49.21250	4.858
	19.00000	27.96	50		50.00000	5.095
	19.05000	28.18		2	50.80000	5.344
	19.84375	31.85		2 1/8	53.97500	6.410
	20.00000	32.61	55		55.00000	6.782
	20.63750	35.83		2 1/4	57.15000	7.609

Appendix 4. Dimension table for steel ball (GB/T308-2002)

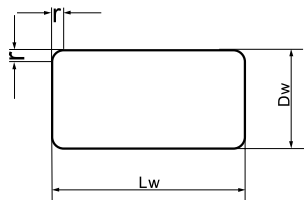


Specification		Nominal diameter Dw mm	Ref. Mass kg per ten thousand	Specification		
Metric mm	Inch inch			Metric mm	Inch inch	
5		5.00000	5.0950	21		
5.5		5.50000	6.7820		27/32	
	7/32	5.55625	7.0160	22		
	15/64	5.95312	8.6000		7/8	
6		6.00000	8.8050	23		
	1/4	6.35000	10.44		29/32	
6.5		6.50000	11.19		15/16	
	17/64	6.74688	12.52	24		
7		7.00000	13.98		31/32	
	9/32	7.14375	14.86	25		
7.5		7.50000	17.20		1	
	5/16	7.93750	20.38	26		
8		8.00000	20.87		1 1/16	
8.5		8.50000	25.03	28		
	11/32	8.73125	27.13		1 1/8	
9		9.00000	29.72			
	3/8	9.52500	35.23			

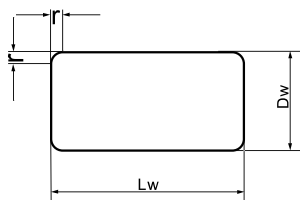


	Nominal diameter Dw mm	Ref. Mass kg per thousand	Specification		Nominal diameter Dw mm	Ref. Mass kg per ten
			Metric mm	Inch inch		
	21.00000	37.75	60		60.00000	8.805
	21.43125	40.12		2 3/8	60.32500	8.948
	22.00000	43.40		2 1/2	63.50000	10.44
	22.22500	44.75	65		65.00000	11.19
	23.00000	49.60		2 5/8	66.67500	12.08
	23.01875	49.72		2 3/4	69.85000	13.89
	23.81250	55.04		2 7/8	73.02500	15.87
	24.00000	56.35		3	76.20000	18.04
	24.60625	60.73		3 1/4	82.55000	22.93
	25.00000	63.69		3 1/2	88.90000	28.64
	25.40000	66.80		3 3/4	95.25000	35.23
	26.00000	71.64		4	101.60000	42.75
	26.98750	80.12		4 1/4	107.95000	51.28
	28.00000	89.48		4 1/2	114.30000	60.87
	28.57500	95.11				

Appendix 5. Dimension table for cylindrical roller (GB/T4661-2002)

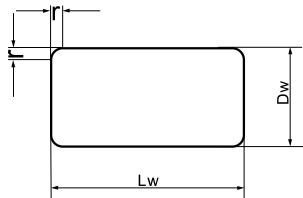


Specification (mm)	Main dimensions (mm)			Ref. Mass kg per hundred
	D_w	L_w	r_{min}	
3 X 3	3	3	0.1	0.016
3 X 5	3	5	0.1	0.027
3.5 X 5	3.5	5	0.2	0.037
4 X 4	4	4	0.2	0.039
4 X 6	4	6	0.2	0.058
4 X 8	4	8	0.2	0.078
4.5 X 4.5	4.5	4.5	0.2	0.055
4.5 X 6	4.5	6	0.2	0.073
5 X 5	5	5	0.2	0.075
5 X 8	5	8	0.2	0.121
5 X 10	5	10	0.2	0.152
5.5 X 5.5	5.5	5.5	0.2	0.100
5.5 X 8	5.5	8	0.2	0.146
6 X 6	6	6	0.2	0.130
6 X 8	6	8	0.2	0.178
6 X 12	6	12	0.2	0.261
6.5 X 6.5	6.5	6.5	0.3	0.166
6.5 X 9	6.5	8	0.3	0.230
7 X 7	7	7	0.3	0.206
7 X 10	7	10	0.3	0.296
7 X 14	7.5	14	0.3	0.415
7.5 X 7.5	7.5	7.5	0.3	0.254
7.5 X 11	7.5	11	0.3	0.375
8 X 8	8	8	0.3	0.310
8 X 12	8	12	0.3	0.465
9 X 9	9	9	0.3	0.440

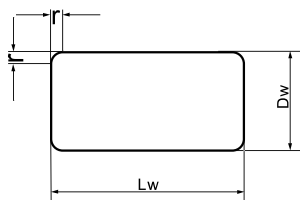


Specification (mm)	Main dimensions (mm)			Ref. Mass kg per hundred
	D_w	L_w	r_{min}	
9 X 14	9	14	0.3	0.680
10 X 10	10	10	0.3	0.600
10 X 14	10	14	0.3	0.850
11 X 11	11	11	0.3	0.810
11 X 15	11	15	0.3	1.10
12 X 12	12	12	0.3	1.04
12 X 18	12	18	0.3	1.57
13 X 13	13	13	0.3	1.33
13 X 20	13	20	0.3	2.04
14 X 14	14	14	0.3	1.66
14 X 20	14	20	0.3	2.38
15 X 15	15	15	0.5	2.04
15 X 22	15	22	0.5	3.00
16 X 16	16	16	0.5	2.48
16 X 24	16	24	0.5	3.75
17 X 17	17	17	0.5	2.97
17 X 24	17	24	0.5	4.20
18 X 18	18	18	0.5	3.55
18 X 26	18	26	0.5	5.10
19 X 19	19	19	0.6	4.16
19 X 28	19	28	0.6	6.10
20 X 20	20	20	0.6	4.85
20 X 30	20	30	0.6	7.30
21 X 21	21	21	0.6	5.60
21 X 30	21	30	0.6	8.00
22 X 22	22	22	0.6	6.40

Appendix 5. Dimension table for cylindrical roller (GB/T4661-2002)



Specification (mm)	Main dimensions (mm)			Ref. Mass kg per hundred
	D_w	L_w	r_{min}	
22 X 34	22	34	0.6	10.0
23 X 23	23	23	0.6	7.40
23 X 34	23	34	0.6	11.2
24 X 24	24	24	0.6	8.40
24 X 36	24	36	0.6	12.6
25 X 25	25	25	0.7	9.50
25 X 36	25	36	0.7	13.7
26 X 26	26	26	0.7	10.7
26 X 40	26	40	0.7	16.4
28 X 28	28	28	0.7	13.3
28 X 44	28	44	0.7	21.0
30 X 30	30	30	0.7	16.3
30 X 48	30	48	0.7	26.2
32 X 32	32	32	1	16.9
32 X 52	32	52	1	32.5
34 X 34	34	34	1	23.9
34 X 55	34	55	1	38.5
36 X 36	36	36	1	28.3
36 X 58	36	58	1	45.5
38 X 38	38	38	1	33.5
38 X 62	38	62	1	55.0
40 X 40	40	40	1	39.0
40 X 65	40	65	1	63.0
42 X 42	42	42	1	45.0
45 X 45	45	45	1	55.5
48 X 48	48	48	1	67.0



Specification (mm)	Main dimensions (mm)			Ref. Mass kg per hundred
	D_w	L_w	r_{min}	
50 X 50	50	50	1	76.0
52 X 52	52	52	1.5	85.0
54 X 54	54	54	1.5	95.5
56 X 56	56	56	1.5	107
60 X 60	60	60	1.5	131
64 X 64	64	64	1.5	159
68 X 68	68	68	1.5	191
75 X 75	75	75	2	256
80 X 80	80	80	2	310

EXAMPLE

ROLL NECK BEARING SERVICE RECORD

Name of rolling mill _____ Roll bearing _____ Lubricant _____

Bearing No. _____ Date of acceptance _____ Total rolling time _____

Boundary dimensions _____ Operation start date _____ Cumulative rolling tonnage _____

Bearing serial No. _____ Scrapping date _____

Bearing clearance _____ Reason for scrapping _____

Reassembling frequency	Assembling		Chock No.	Roll No.	Stand No.	Mounting position	Outer ring load position No.	Removal		Rolling time	Rolling tonnage	Cumulative rolling tonnage	Date of inspection		Lubricant state	Remarks
	Date	Time						Date	Time				Brg check	Brg correction		
1						T□□□ B□□□										
2						T□□□ B□□□										
3						T□□□ B□□□										
4						T□□□ B□□□										
5						T□□□ B□□□										
6						T□□□ B□□□										
7						T□□□ B□□□										
8						T□□□ B□□□										
9						T□□□ B□□□										
10						T□□□ B□□□										

Grease supply

Generally speaking, once filled, grease need not be added for a long time. Depending on the operation conditions, however, frequent grease supply or change may become necessary. Due attention must be paid to this point when designing the housing. In blooming or shape steel rolling mills with centralized lubrication of the roll neck bearing, the specified amount of grease is supplied at a set interval. When the grease filling method is employed as in the case of the roll neck bearing of a cold rolling mill, new grease is added until the old grease is pushed out slightly from the seal. The cycle of disassembly and cleaning of the sealed bearing, namely grease change, varies depending on operation and actual rolling conditions and thus cannot be set to a standard interval. In practice, determine the typical disassembly and cleaning interval schedule by checking its state periodically for about one year after initial start-up.

Typical disassembly/cleaning interval



- *1. Add a new grease amount equal to the lost amount during inspection.
- *2. This interval is determined from the inspection results of ③. If damage or wear of seals or O-rings is observed during inspection of a sealed bearing, replace it with a new one. Though the replacement interval varies depending on operating conditions, it is decided based on the conditions when checked. It is usually around 6 months.
- *3. Final disassembly/cleaning interval ⑤ is determined on the basis of the inspection result of ④. Generally, the recommended interval of disassembly for the sealed bearing of the roll neck is about 3 to 6 months though this may vary depending on the operation conditions.

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