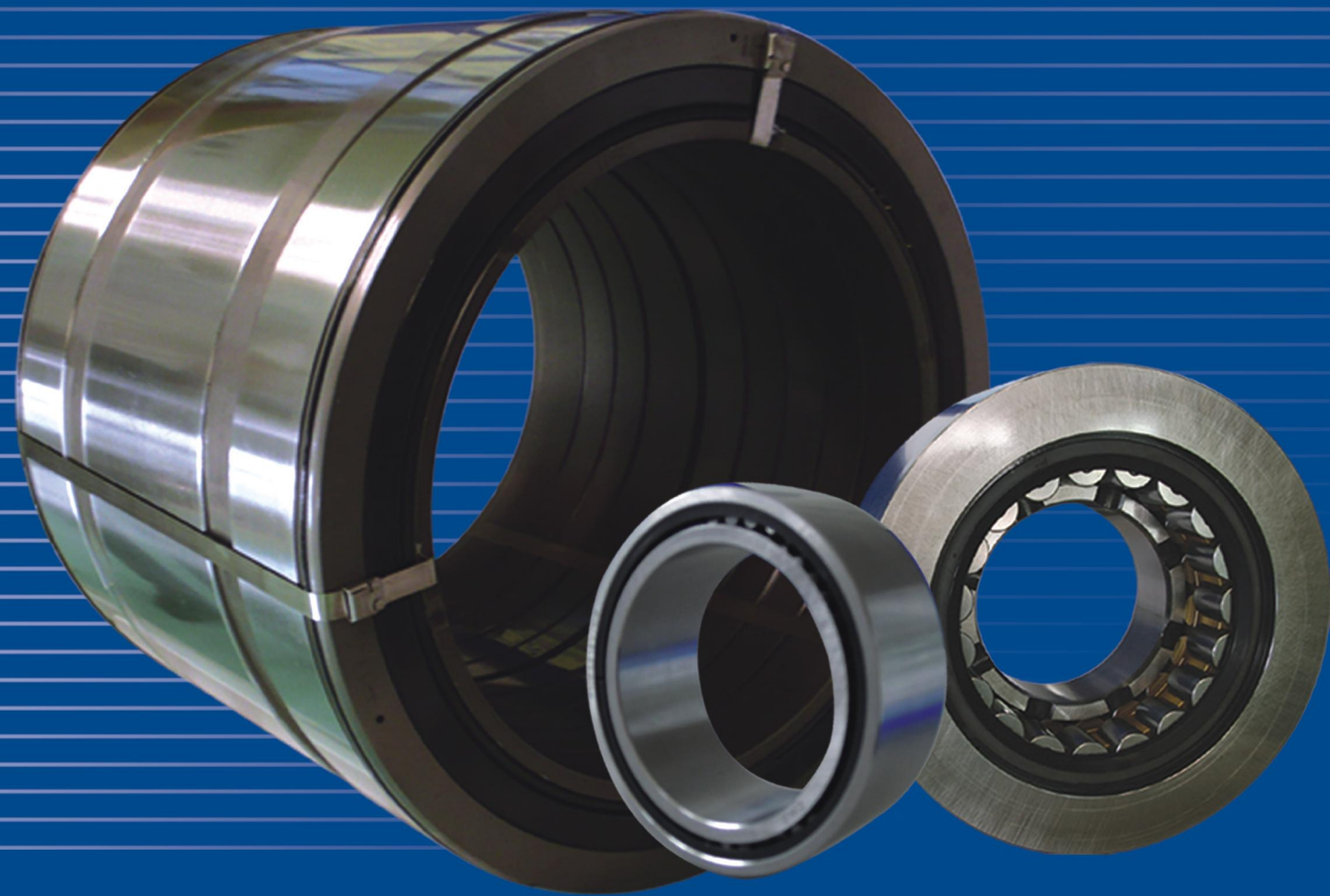


# ZWZ

## Metallurgy Bearing Catalogue





- Range of size: Can manufacture steel bearings outer diameter from  $\Phi$  30mm- $\Phi$  6300mm.
- Bearing Types: Deep groove ball bearings, single / double/ four row cylindrical roller bearings, self-aligning roller bearings, single / double/ four row tapered roller bearings, thrust self-aligning roller bearings and many kinds of bearings with different structures.
- Application Fields: wire & bar mill, hot strip mills, cold strip mills, section mill, sendzimir mill, continuous casting machine supporting bearing and mill machine and fields of bearing block for rolling mill.
- Manufacture Capacity: Can provide 400 kinds of bearing specifications and 30,000 sets of bearings to customer.
- Manufacture Period: Bearing steel products 35 days, carburizing steel products 50 days.





## Selection and Collocation of Rolling Mill Bearing

### 1 Four-rowCylindrical Roller Bearing for Rollers

#### 1.1 Characteristics

This type bearing can carry heavy radial load, whereas can not bear axial force. It has small radial dimension and higher limit rotation speed. This bearing can be installed separately with IR and OR components due to its no-rib structure of OR.

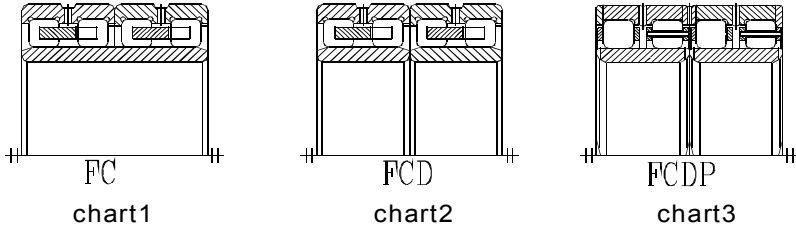
The bearing is applicable for all rolling mills which rollers are changed frequently. Its advantages of heavier radial loading, higher rotation precision and easy to disassembly, which makes it the first choice as rolling mill roller bearing.

#### 1.2 Structure Type

FC Type: One inner ring and two outer ring assembly composed by two outer rings with ribs, rollers and cages; See chart 1

FCD Type: Double inner ring and two outer ring assembly composed by two outer rings with ribs, rollers and cages;See chart 2

FCDP Type: Component composed by double outer rings with ribs, rollers and cages, double inner rings and 3 flat ribs; See chart 3



#### 1.3 Collocation of bearing with roller neck and inner house of bearing house

According to the operating requirements of hot-rolling mill and cold-rolling mill, the collocation is recommended as below:

Chart 1 The collocation of bearing ID and roller neck

| Bearing ID | Roller Dimension | Roller Geometric Accuracy                     |              | Fitting surface     | Notes                                                                                                         |
|------------|------------------|-----------------------------------------------|--------------|---------------------|---------------------------------------------------------------------------------------------------------------|
| d (mm)     | Tolerance        | Roundness                                     | Cylindricity | Roughness<br>( μ m) | Increase the tolerance value from n6 p6 r6 accroding to the incre-<br>asing carrying load form small to large |
| d<200      | n6               | Half of the dimensional tolerance range value |              | Ra1 . 6             |                                                                                                               |
| d=200-500  | p6               |                                               |              |                     |                                                                                                               |
| d>500      | r6               |                                               |              |                     |                                                                                                               |

Chart 2 The collocation of bearing OD and inner hole of bearing house

| Bearing OD | Bearing block bore size | Geometric tolerance of bearing block bore     |              | Fitting surface             |
|------------|-------------------------|-----------------------------------------------|--------------|-----------------------------|
| d (mm)     |                         | Roundness                                     | Cylindricity | Roughness ( $\mu\text{m}$ ) |
| D<500      | H7                      | half of the dimensional tolerance range value |              | 3.2a                        |
| D>500      | F7(G7)                  |                                               |              |                             |

#### 1.4 Selection of Bearing Radial Clearance

As the radial support bearing for rollers, its operating environment is badly tough. The actual clearance is related with loads, rotation speed, lubrication, temperature raise, structure, roughness of working surface and the interference of the bearing's ID. So the comprehensive actual operating environment need to be considered when select bearing type.

C3 clearance is recommended for cold-rolling mill bearings or bearings whose interference on inner ring is small. C4 clearance is recommended for hot-rolling mill bearings or bearings whose interference of ID and rollers is large. See detail information in below chart.

3 Chart 3 Radial Clearances of 4-row Cylindrical Roller Bearing

| Nominal ID d (mm) |      | Group 0 |     | Group 3 |      | Group 4 |      | Group 5 |     |
|-------------------|------|---------|-----|---------|------|---------|------|---------|-----|
| from              | to   | min     | max | min     | max  | min     | max  | min     | max |
| 80                | 100  | 50      | 85  | 75      | 110  | 105     | 140  | 155     | 190 |
| 100               | 120  | 50      | 90  | 85      | 125  | 125     | 165  | 180     | 220 |
| 120               | 140  | 60      | 105 | 100     | 145  | 145     | 190  | 200     | 245 |
| 140               | 160  | 70      | 120 | 115     | 165  | 165     | 215  | 225     | 275 |
| 160               | 180  | 75      | 125 | 120     | 170  | 170     | 220  | 250     | 300 |
| 180               | 200  | 90      | 145 | 140     | 195  | 195     | 250  | 275     | 330 |
| 200               | 225  | 105     | 165 | 160     | 220  | 220     | 280  | 305     | 365 |
| 225               | 250  | 110     | 175 | 170     | 235  | 235     | 300  | 330     | 395 |
| 250               | 280  | 125     | 195 | 190     | 260  | 260     | 330  | 370     | 440 |
| 280               | 315  | 130     | 205 | 200     | 275  | 275     | 350  | 410     | 485 |
| 315               | 355  | 145     | 255 | 255     | 305  | 305     | 385  | 455     | 535 |
| 355               | 400  | 190     | 280 | 280     | 370  | 370     | 460  | 510     | 600 |
| 400               | 450  | 210     | 310 | 310     | 410  | 410     | 510  | 565     | 665 |
| 450               | 500  | 220     | 330 | 330     | 440  | 440     | 550  | 625     | 735 |
| 500               | 560  | 240     | 360 | 360     | 480  | 480     | 600  | -       | -   |
| 560               | 630  | 260     | 380 | 380     | 500  | 500     | 620  | -       | -   |
| 630               | 710  | 285     | 425 | 425     | 565  | 565     | 705  | -       | -   |
| 710               | 800  | 310     | 470 | 470     | 630  | 630     | 790  | -       | -   |
| 800               | 900  | 350     | 520 | 520     | 690  | 690     | 860  | -       | -   |
| 900               | 1000 | 390     | 580 | 580     | 770  | 770     | 960  | -       | -   |
| 1000              | 1120 | 430     | 640 | 640     | 850  | 850     | 1060 | -       | -   |
| 1120              | 1250 | 470     | 710 | 710     | 950  | 950     | 1190 | -       | -   |
| 1250              | 1400 | 530     | 790 | 790     | 1050 | 1050    | 1310 | -       | -   |

## Selection and Collocation of Rolling Mill Bearing

### 2 Tapered Roller Bearing

#### 2.1 Characteristics

Taper roller bearing's inner raceway and outer raceway are tapered with taper rollers in between. If extend the tapered surfaces of outer raceway, inner raceway and taper rollers, they will finally gather onto one point, which enables peripheral speeds of any point on raceways are the same. During operating, the rolling elements moves only as rolling.

Taper roller bearing mainly carry the combined loads from radial and axial directions. Bearing's axial loading capacity is determined by contact angle. The bigger the contact angle, the bigger loading capacity. Bearing with bigger taper angle can bear axial load by itself.

Taper roller bearing is separable. Cones composed by rollers, cage and inner ring can be separate from outer ring.

#### 2.2 Structure Type

##### 2.2.1 Double-row Tapered Roller Bearing

350000 type : This bearing adopts a double-raceway outer ring and 2 inner rings. There is a spacer between 2 inner rings. Bearing clearance can be adjusted by changing spacer's thickness. Bearing can carry axial loads from double directions when carry radial load. It can bear axial load by itself. See chart 4 and chart 5. Detail information for selecting bearings refers to data and structures in catalogue.

370000 type : This bearing adopts a double raceway inner ring and two separate outer rings with single raceway. One spacer in between the 2 outer rings. Bearing's axial clearance can be adjusted by changing spacer's thickness. It can bear axial loads from double directions when carry radial load. It can carry axial load by itself. The structures are shown in chart 6 and chart 7. Type selecting refers to detail data and structure in catalogue.

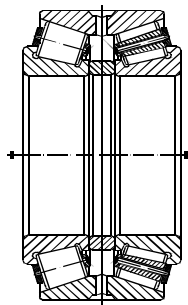


Chart 4

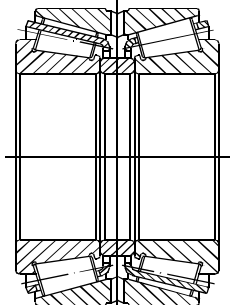


Chart 5

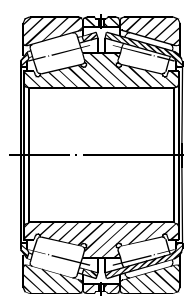


Chart 6

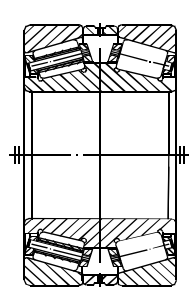


Chart 7

##### 2.2.2 Four-row Tapered Roller Bearing

380000 type : This bearing adopts 2 inner rings with double raceway, one outer ring with double raceway and 2 outer rings with single raceway. Between inner rings and outer rings, there are spacers which can adjust bearing clearance. The bearing can carry heavy radial load and certain axial load, whereas its limit rotation speed is low. It mainly is used onto back-up roller, middle roller and work roller. The structures are shown as chart 8, chart 9 and chart 10.

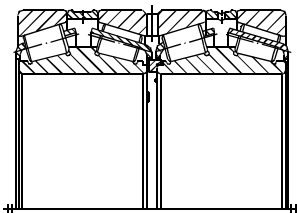


Chart 8

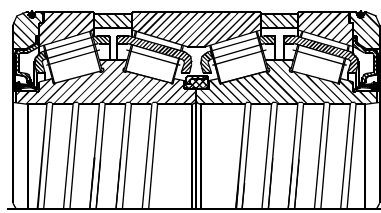


Chart 9

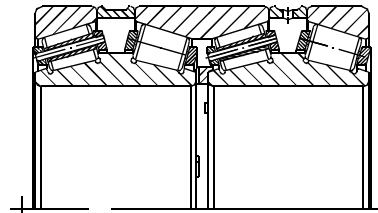


Chart 10

#### 2.3 Collocation of bearing with roller neck and inner hole of bearing house

According to the operating requirements of hot rolling mill and cold rolling mill, the collocation of bearing and roller neck and bearing house is recommended to be:

The collocation of bearing ID and roller neck is through clearance. This collocation enables bearing inner ring can slightly moving along roller neck's circle, and make the disassembly of roller easy.

The collocation of bearing OD and bore of bearing house is related to bearing OD size. When  $D \leq 500\text{mm}$ , H7 tolerance is recommended for bearing house inner hole; When  $D > 500\text{mm}$ , G7 tolerance is recommended.

#### 2.4 Selection of bearing radial clearance

As taper roller bearing carries mainly radial load and combined load from axial and radial directions, its working environment is extremely bad. The actual clearance during operation is related to loads, rotate speed, lubrication, temperature raise, structure and the contact surface roughness. The proper clearance should be determined after careful analysis based on the rolling condition of the rolling mill. See Chart 4 .

chart4

| nominal ID d mm |      | Group 1 |     | Group 2 |     | Group 0 |     | Group 3 |     | Group 4 |     | Group 5 |      |
|-----------------|------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|---------|------|
| from            | to   | 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 |         |     |         |      |

## Selection and Collocation of Rolling Mill Bearing

### 2.5 Clearance of Double-row & Four-row Tapered roller bearings and the adjustment method.

Formula 1 is for calculation of bearing axial clearance:

$$Ga=1.5Gr/e.....(1)$$

Note: Gr refers to bearing radial clearance; See chart 4; please refers to product catalogue for e value

The adjustment of bearing axial clearance is by adjusting its inner ring and outer ring spacer (except 350000D1)

#### 2.5.1 Preparation for Adjustment

Wash and clean bearing components after examination.

Adjust the clearance on work table, flat-plate or 3-4 blocks. The height difference of the 3-4 blocks should be 50% smaller than the parallel difference of inner ring's two end-faces.

#### 2.5.2 Adjustment Requirements

Before measurement, the orientation end-face of IR's lower side should be parallel.

During the measurement, put a loading block on outer ring, which ensures uniform contact of rolling elements and raceways.

Rotate each roller and ring before measurement to ensure all components are in proper positions.

Equidistance measure 4 points along circle. Choose the mean value as the actual measure dimension. When bearing OD ≤ 440mm, the difference of the 4 values should be ≤ 0.08mm; When OD>440mm, the four point measured value difference should be ≤ 0.15mm. If the four point measured value difference surpass above limit, re-rotate each roller and ring to make them in proper position.

#### 2.5.3 Adjustment of bearing clearance

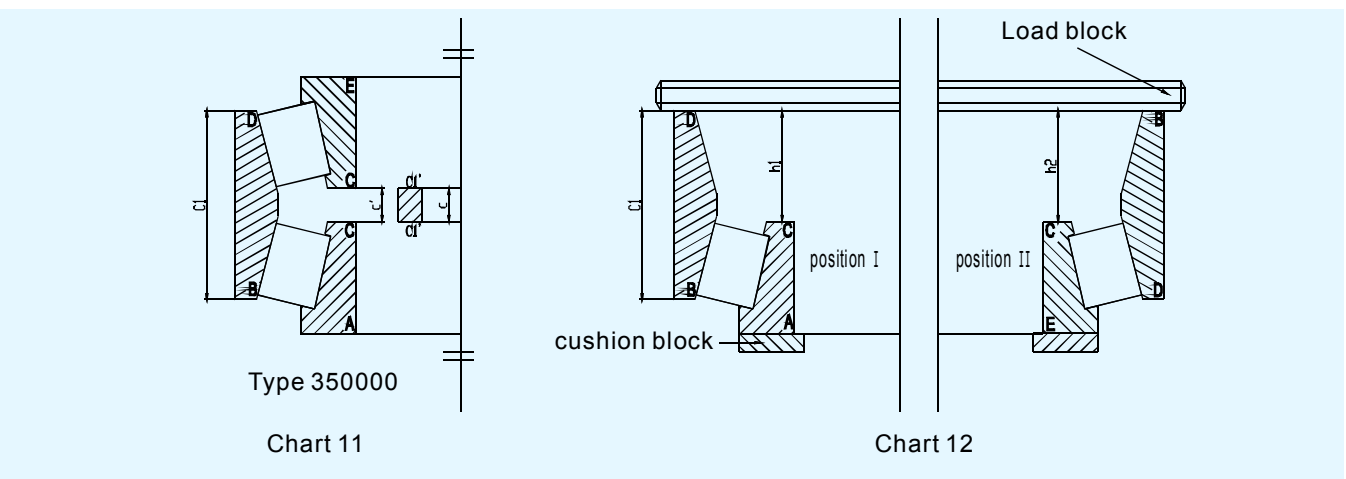
Bearing type 350000 (see chart 11)

Measure h1 on position I and h2 on position II shown in chart 12. Calculate distance c' of the 2 end-faces CC as formula (2):

$$c'=h1+h2-C1.....(2)$$

If Ga is the required axial clearance, inner ring spacer width "c" is calculate as formula (3):

$$c=c'+Ga.....(3)$$



Bearing type 350000D1 (see chart 13)

Measurements of h1 and h2 same as 5.3.1. Bearing actual axial clearance is calculated as formula (4):

$$Ga=C1-(h1+h2).....(4)$$

If bearing actual axial clearance value is different with the one from formula (1), modify rings or change components is needed.

Bearing Type 370000 (see chart 14)

Measure 11 on position I and 12 on position II as shown in chart 15. Calculate distance b' between the 2 end-faces BB

$$b'=11+12-B1.....(5)$$

If Ga is the required axial clearance, calculate width b of outer spacer as formula (6)

$$b=b'+Ga.....(6)$$

Bearing Type 380000 (see chart 16)

Inner ring spacer width "c"

Measure h1 on position I as shown in chart 17, and h2 on position II. Calculate distance c' between the 2 end-faces CC

$$c'=h1+h2-C1.....(7)$$

If Ga is the required axial clearance, calculate width c of inner ring spacer as formula (8)

$$c=c'+Ga.....(8)$$

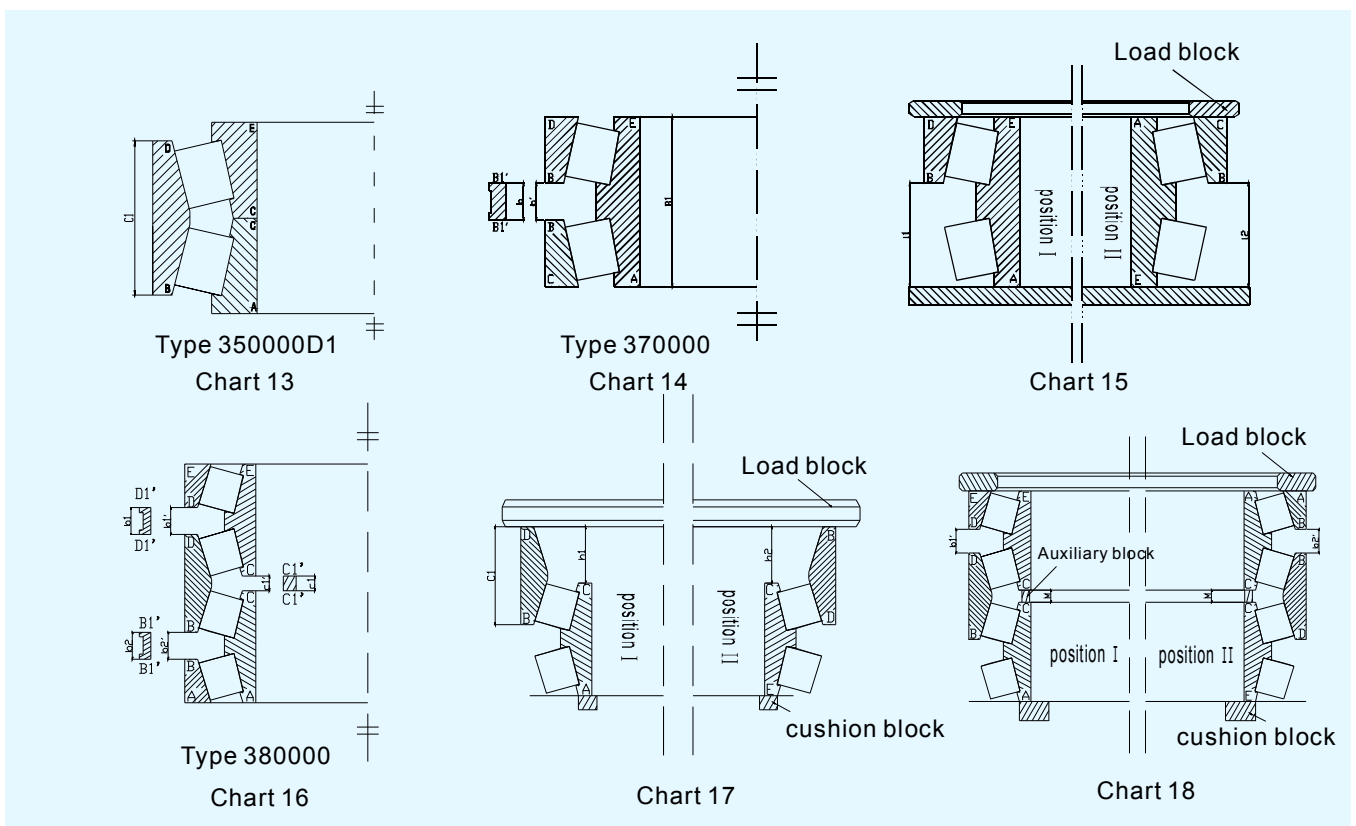
Outer ring spacer width b1 and b2

Equally space 3 supporting blocks between 2 inner rings along the peripheral direction. The height  $M \geq c' + (5 \sim 10)$  (mm). Difference of the block heights M should be smaller than 50% parallel difference of the measured bearing inner spacer.

Measure b1'on position I and b2'on position II as shown in chart 18. Calculate the width of upper and down side spacers as formula (9) and (10):

$$b1=b1'-(M-c')+Ga.....(9)$$

$$b2=b2'-(M-c')+Ga.....(10)$$



Selection and Collocation of Rolling Mill Bearing

3 Self-aligning Roller Bearing for segment

3.1 Characteristics

Sometimes shaft and bearing box are misalignment or the shaft will be bending. But this kind of bearing with self-aligning will not be influenced by misalignment. And it can adjust roundness error made by them. Except radial road, these bearings also can carry combined axial and radial load in double direction. They have heavier load carrying capacity , shock resistant ,impact resistant .

3.2 Types of bearings

3.2.1 Single row Spherical Roller Bearing

SDB0000 type: This kind of bearing have single row rollers, self-aligning capacity. And can move in axial direction. These bearings usually used on machines for steel manufacture. The major structure as shown in figure 19 and 20. The type should be chosen based on detail dates and structures in capacity.

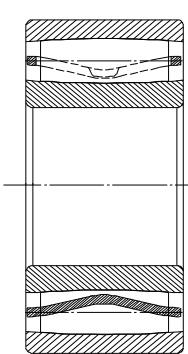


Chart 19

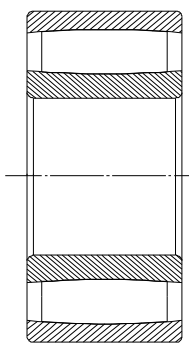


Chart 20

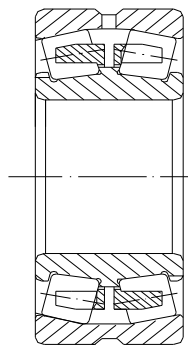


Chart 21

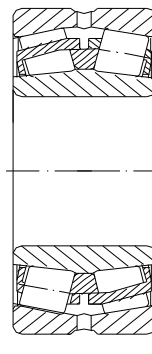


Chart 22

3.2.2 Double row self-aligning Roller Bearing

This kind of bearing with bipartite pressed steel cage or bipartite brass entity cage, will be used in segment of metallurgy. Because of self-aligning capacity and bipartite cage, these bearings can steady rotating under high temperature. Add heavier load carrying capacity, these bearings can well done in segment produce. Type of structures as figure 21,22.

3.3 The choice of radial clearance

As main product used in segment, the bearing must do better in every performance because of high-temperature working environment. We set dedicated clearance standard for SDB bearings. So that these bearings can steady turning under this environment. As shown in table 5.

Notice: Double row self-aligning roller bearing mentioned in 3.2.2 are not suitable for this standard. The radial clearance should be chosen from table 6.

Table 5

| Nominal internal diameter<br>d mm |       | Group 3 |     | Group 4 |     |
|-----------------------------------|-------|---------|-----|---------|-----|
| Over                              | Up to | min     | max | min     | max |
| 18                                | 24    | 39      | 51  | 51      | 65  |
| 24                                | 30    | 46      | 60  | 60      | 76  |
| 30                                | 40    | 55      | 73  | 73      | 93  |
| 40                                | 50    | 65      | 85  | 85      | 109 |
| 50                                | 65    | 79      | 104 | 104     | 139 |
| 65                                | 80    | 96      | 124 | 124     | 164 |
| 80                                | 100   | 120     | 158 | 158     | 206 |
| 100                               | 120   | 144     | 186 | 186     | 244 |
| 120                               | 140   | 166     | 215 | 215     | 280 |
| 140                               | 160   | 195     | 252 | 252     | 321 |
| 160                               | 180   | 217     | 280 | 280     | 361 |
| 180                               | 200   | 238     | 307 | 307     | 394 |
| 200                               | 225   | 262     | 337 | 337     | 434 |
| 225                               | 250   | 282     | 368 | 368     | 478 |
| 250                               | 280   | 307     | 407 | 407     | 519 |
| 280                               | 315   | 330     | 434 | 434     | 570 |
| 315                               | 355   | 360     | 483 | 483     | 620 |
| 355                               | 400   | 395     | 528 | 528     | 675 |
| 400                               | 450   | 435     | 577 | 577     | 745 |
| 450                               | 500   | 475     | 633 | 633     | 811 |
| 500                               | 560   | 518     | 688 | 688     | 890 |
| 560                               | 630   | 567     | 751 | 751     | 975 |

Selection and Collocation of Rolling Mill Bearing

4 Self-aligning Roller Bearing for converter

4.1 Characteristics

This kind of bearing have self-aligning capacity. Self-aligning Roller Bearing can adjust misalignment cased by bending of shaft. And these bearings can carry double direction axial load, the load combined with radial and axial road. They have heavier load carrying capacity,shock resistant , impact resistant . Besides, because of long assemble period of converter bearings, split Self-aligning Roller Bearing was designed out.

4.2 Types of Bearings

4.2.1 Common Type of Self-aligning Roller Bearing

This kind of bearing have small ribs on two ends of the inner ring, There is no rib in the middle. Cage is whole with double row claws. Or the cage with rib on middle is bipartite made of brass or carbon steel. This version is mostly used on large size and extra large size bearings.As shown in chart 23,24.

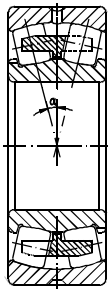


Chart 23

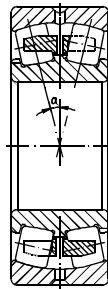


Chart 24

4.2.2 Split Type of Self-aligning Roller Bearing

This kind of bearing mostly used in position which is hard for integral bearing assembled on and demount from. For example, the middle of macroaxis. Otherwise it will take more time, manpower to maintain and incur extremely expensive fees for machine halt. These bearings have split type of inner ring and outer ring. Wide inner ring with double collars. As shown in Chart 25,26 and 27.

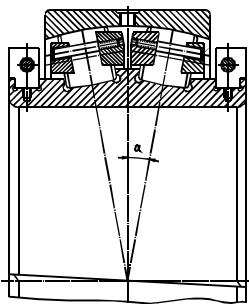


Chart 25

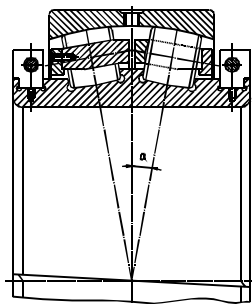


Chart 26

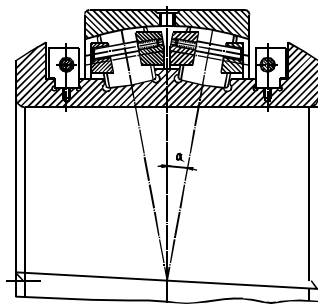


Chart 27

4.3 The choice of radial clearance

The radial clearance of cylindrical bores and split types of Self-aligning roller bearing should be chosen base on table 6. But the radial clearance chosen must consider working condition.

Table 6

| Nominal internal diameter<br>d mm |       | Group 3 |     | Group 4 |      | Group 5 |      |
|-----------------------------------|-------|---------|-----|---------|------|---------|------|
| Over                              | Up to | min     | max | min     | max  | min     | max  |
| 14                                | 18    | 35      | 45  | 45      | 60   | 60      | 75   |
| 18                                | 24    | 35      | 45  | 45      | 60   | 60      | 75   |
| 24                                | 30    | 40      | 55  | 55      | 75   | 75      | 95   |
| 30                                | 40    | 45      | 60  | 60      | 80   | 80      | 100  |
| 40                                | 50    | 55      | 75  | 75      | 100  | 100     | 125  |
| 50                                | 65    | 65      | 90  | 90      | 120  | 120     | 150  |
| 65                                | 80    | 80      | 110 | 110     | 145  | 145     | 180  |
| 80                                | 100   | 100     | 135 | 135     | 180  | 180     | 225  |
| 100                               | 120   | 120     | 160 | 160     | 210  | 210     | 260  |
| 120                               | 140   | 145     | 190 | 190     | 240  | 240     | 300  |
| 140                               | 160   | 170     | 220 | 220     | 280  | 280     | 350  |
| 160                               | 180   | 180     | 240 | 240     | 310  | 310     | 390  |
| 180                               | 200   | 200     | 260 | 260     | 340  | 340     | 430  |
| 200                               | 225   | 220     | 290 | 290     | 380  | 380     | 470  |
| 225                               | 250   | 240     | 320 | 320     | 420  | 420     | 520  |
| 250                               | 280   | 260     | 350 | 350     | 460  | 460     | 570  |
| 280                               | 315   | 280     | 370 | 370     | 500  | 500     | 630  |
| 315                               | 355   | 310     | 410 | 410     | 550  | 550     | 690  |
| 355                               | 400   | 340     | 450 | 450     | 600  | 600     | 750  |
| 400                               | 450   | 370     | 500 | 500     | 660  | 660     | 820  |
| 450                               | 500   | 410     | 550 | 550     | 720  | 720     | 900  |
| 500                               | 560   | 440     | 600 | 600     | 780  | 780     | 1000 |
| 560                               | 630   | 480     | 650 | 650     | 850  | 850     | 1100 |
| 630                               | 710   | 530     | 700 | 700     | 920  | 920     | 1190 |
| 710                               | 800   | 580     | 770 | 770     | 1010 | 1010    | 1300 |
| 800                               | 900   | 650     | 860 | 860     | 1120 | 1120    | 1440 |
| 900                               | 1000  | 710     | 930 | 930     | 1220 | 1220    | 1570 |



## Selection and Collocation of Rolling Mill Bearing

### 5 Sendzimir mill rolling bearing

#### 5.1 Characteristics

As the rolling equipments keep developing, the precision of steel rolling products are asked to increase. So sendzimir mill rolling bearings were designed. The outside of these bearings straightly touch to intermediate roll. And they can carry rolling component. The outer ring have good wear resistance, inner have enough long rolling fatigue life. Outer ring can be regrinded. And the bearing will still rotate as usual after regrinding. The bearing have high impact resistant because of soft inner part. Deep enough surface hardened. Except high rigid, can increase frequent of outer diameter repair. The bearing have high fatigue resistant because of good material. The difference in size of all bearings section height of the same shaft $\leq 0.005\text{mm}$ ,The difference between the installed wall thickness of the adjacent bearing $\leq 0.002\text{mm}$ .

#### 5.2 Types of bearings

According to working condition, installing space and the type of bearing assemble, the structure types as shown in figure 28,29,30

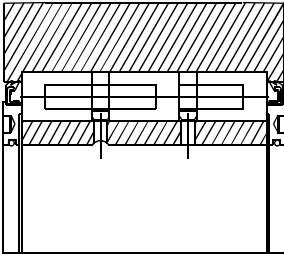


Chart 28

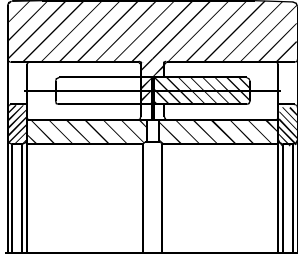


Chart 29

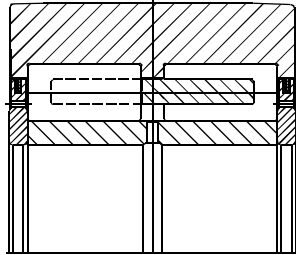


Chart 30

#### The material chosen of rolling mill bearing

Generally, bearing parts are made of high-carbon chromium steel. The parts are martensite quenched when they carry less or no impact load. Bainite quenching should be used when parts carry high impact load. The parts are not only made of carburizing steel but also according carburization and carbonitridion if they will carry high impact load.

Table 7 Examples of application for typical steel

| Class                              | Steel NO.             | Examples of application                                                                                                                                                                                       |
|------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Carbon Chromium Bearing Steel | GCr15                 | The small and medium-size bearings carry less or no impact load                                                                                                                                               |
|                                    | GCr15SiMn             | large size bearing on mill rolling, no impact load.                                                                                                                                                           |
|                                    | GCr18Mo               | According bainite quenching,the bearing used in mill rolling can carry certain impact load and sustain high temperature.                                                                                      |
|                                    | ZWZ11                 | Used in large size rolling bearing. According salt bath isothermally-quenching, the bearing can carry certain impact load and sustain high temperature.                                                       |
|                                    | ZWZ12                 | These bearings are used in heavy machine like mill rolling.Effective thickness less than 45 mm.After salt bath isothermally-quenching,the bearing can carry certain impact load and sustain high temperature. |
| Carburizing Bearing Steel          | G20CrMo G20CrNiMo     | The small and medium-size bearings carry impact load                                                                                                                                                          |
|                                    | G20CrNi2Mo G10CrNi3Mo | Medium and large size bearing carry high impact load                                                                                                                                                          |
|                                    | G20Cr2Ni4             | Extra large size bearing carry high impact load.                                                                                                                                                              |

## Bearing precision and level

Roller bearings are classified by its dimension tolerance and geometric tolerance. Tolerance grade of radial bearing (taped roller bearing excepted) are divided into 5 grades: grade 0, grade 6, grade 5, grade 4, and grade 2, the accuracy is increases in sequence. Tapered roller bearing are divided into 4 grades: grade 0, grade 6X, grade 5 and grade 4, the accuracy is increases in sequence. Thrust bearing are divided into 4 grades: grade 0, grade 6, grade 5, and grade 4, the accuracy is increases in sequence. For the specific size tolerance and geometric tolerance, see related standards.

The accuracy grade of industrial standard refer to table 8

Table 8

| Standard               | Application standard | Precision               |         |         |         |          | Bearing type                                  |
|------------------------|----------------------|-------------------------|---------|---------|---------|----------|-----------------------------------------------|
| International standard | ISO492               | Standard level Grade 6X | Grade 6 | Grade 5 | Grade 4 | Grade 2  | Radial bearing                                |
|                        | ISO199               | Standard level          | Grade 6 | Grade 5 |         | ---      | Thrust ball bearing                           |
|                        | ISO578               | Grade 4                 | ---     | Grade 3 | Grade 0 | Grade 00 | Tapered roller bearing(inch)                  |
| Germany Standard(DIN)  | DIN620               | P0                      | P6      | P5      | P4      | P2       | All types                                     |
| American standard      | ANSI/ARMA std.20     | ABEC-1                  | ABEC-3  | ABEC-5  |         |          | Radial bearing(except tapered roller bearing) |
|                        |                      | RBEC-1                  | RBEC-3  | RBEC-5  | ABEC-7  | ABEC-9   |                                               |
| SKF                    |                      | P0                      | P6      | P5      | P4      | P2       |                                               |
| Japanese standard      | JIS B 1514           | Grade 0.6               | Grade 6 | Grade 5 | Grade 4 | Grade 2  | All types                                     |

## Bearing Clearance

Bearing clarence indicates that the bearing under the circumstance with not mounted (no loading applied) , fix the inner ring or the outer ring, move the other unfixed ring, the amount of movement from one extreme position to another extreme position is called bearing clearance. According to the direction, it can be either radial clearance, or the axial clearance.

From the theoretical clearance minus the bearings are mounted on shafts or enclosures for interference rings of expansion or contraction after the clearance of known as "installation clearance".

The clarence while bearing are mounted on the machine, applied a mount of load while rotating are called "working clarence"

In general, the bearing original radial clearance is greater than the clearance while bearing working, the radial clearance have great influence to the bearing life, temperature rise, noise, vibration and other functions. In order to determine the clearance of bearing, the following elements must be considered:

Interference fit when bearing installation, Inner ring expansion and the outer contraction led to the decrease of the clearance.

Under the operation temperature, the difference temperature between bearing inner ring and the related thermal expansion of the clearance changes, that will lead to the change of clearance.

In working condition, for the ball bearings which running at working temperature, clarence of ball bearings are usually approaching 0; for the roller bearings, working at normal conditions, reserve certain amount of clarence normally.

Bearing lubrication and sealing



## The Lubrication and Seal of Metallurgy Bearing

### 1 The purpose and method of lubrication

While bearing rotating, in order to avoid direct contact of parts, reduce the internal friction and wear, improve the performance of bearing, extend bearing's life span. Lubrication is essential for bearings.

In the bearing application, choose proper lubricant and lubrication method is especially important. Bearing lubrication is divided into grease lubrication, oil lubrication and solid lubrication, etc.

The advantage of grease lubrication is , the simple structure of bearing house, bearing seal and lubrication facility, easy maintenance, and the lubricating grease is not easy to leak, and also have the capacity to prevent the bearing effected from water, gas, dust and other harmful impurity. So, in general circumstance, grease lubrication is widely used.

Oil lubrication is applied to heavy-duty, high-speed and high temperature, lubricating oil have good liquidity. In some special environment such as high temperature and vacuum circumstance, also could choose solid lubrication.

### 2 The importance of the seal and pattern

In order to maintain the bearing in good lubricate conditions and normal working environment, perform full bearing performance , the rolling bearing must have proper sealing device, in order to prevent the lubricant leakage and dust air, water or other dirt invaded to bearing. The selection of bearing sealing form should consider the following elements .

Choose bearing seal form, should consider the following factors:

Category of bearing lubricant; bearing working environment, the size of the space occupied; the shaft supporting structure characteristics, allowed angular deviation, circumferential velocity of seal surface; friction of seals and the resulting temperature rise; manufacturing cost, etc

Bearing seal generally divided into non-contacted, contacted and comprehensive type, in addition, also have the bearing with dust cap or seal ring.

Rolling mill bearing mounting and dismounting

Mill bearing mounting and dismounting involves relatively large bearing and equipment, sometime it should with the help of proper tools and lifting appliances, In order to avoid the occurrence of unexpected circumstances, Please read the content and follow our suggested methods carefully and prudently.

In addition to comply with the contents, ZWZ technical service engineer can assist you to mounting and dismounting the mill bearing, provide value-added services, sufficient express the performance of bearing, reduce unnecessary losses in downtime, guarantee the mill equipment operating safety and smoothly.

#### 1. The storage of Mill bearing

The bearing should be stored in clean and dry environment; it should control temperature and humidity during transporting and storage, the temperature and humidity should in an acceptable fixed range, and off the ground more than 30 cm.

Bearing components generally packed based on its size and in corrugated box or in wooden cases, but the bearing cone for the initial mounting, the cover and component are wrapped in plastic generally. All of the design for packing aims at provide proper protection to the bearings, against the pollution from dirt and dust.

In order to prevent the cone and plate become elliptic, the bearing should be placed in horizontal direction (vertical along with axis ). Bearing should be kept in the original box and dry environment. If the package and storage condition in a ideal environment, the bearing parts may be still have its initial working performance after more than ten years.

Bearing can not take out from the case, bearing can not storage on the open shelf and cabinet, because it may pollute by the dust.

When use the brand new bearings, it's unnecessary to remove the original dust-proof grease. Although the original grease has little lubrication ability, the original grease will not damage the new lubricating oil.

All the tools should be clean and in good condition, table and assembly working area should be clean. Assembly work cannot be done in welding area or nearby the machine, that's because the pieces and dust which from

the welding produce may enter into the bearing.

### 2 Preparing and checking before mill bearing installation

#### 2.1 Selection of installation place

Choose a clean and dry environment, working in in dust free and moisture free workplace, If can not reach the requirements, assembly operator should try their best to keep clean with screen cover and cleaning cloth, etc

In order to prevent the dust pollution, do not open the packaging of the new bearing until installation operation. In general, the rust-preventive oil on the bearing is unnecessary to be removed, but if use grease lubrication, and in extreme high or low temperature, or when the grease and rust-proof oil are not compatible, bearing must be clean up and dry up carefully, in order to prevent the harmful influence. The bearings which have shield and sealed additional cleaning is not needed.

#### 2.2 Work plan

According to different bearing size and application, can use different methods of install, however the installation must follow the basic program.

It need to know what to do first and prepare for all the tools needed, study the installation order according the drawings or specifications seriously . It can save working time, and reduce the probability of the dust stain the bearing.

#### 2.3 Tools preparation

(1) Lifting appliance: Use it when bearing components install to the bearing housing, or take out from bearing housing. According to the type of bearing, take full consideration of operation property and strength, then choose the proper lifting appliance.

(2) suitable tools: Necessary operation tools such as wrench and other tools, please use suitable tools in appropriate place.

(3) Wood tie: Used for building space in order to use sling's claw to enter into underneath of bearing.

(4) Brass rod: When the bearing mount into bearing housing or take out of bearing housing, in case of the bearing inclined and can not move, knock on the bearing with brass rod gently, for the purpose of fixing bearing position.

#### 2.4 Inspection

Before mounting bearing, prepare all the required machine parts, thoroughly cleaning all parts before mounting.

Clean up the shell hole, blow the oil hole and keep clean. Do not use the air hose to the bearing, If use the blind hole, it should use the magnetic roll to clean up the residual metal fragments.

The shaft shoulder and bushing should along with the vertical axis, the fillet between Conterminous axes and shaft must small enough and can't not contact with the fillet radius of bearing hole.

In the initial installation, should inspect all the parts dimension accuracy according to the drawings.

In the initial installation phase, checking dimensional precision to all parts with drawing. Checking and measuring the dimension and roundness of roll neck and bearing housing.

##### 2.4.1 Roll neck inspection and measurement

Measurement sketch map 31:

Before mounting the complete bearing and the bearing components to the roll neck, should make a general inspection and dimensional inspection to the roll neck.

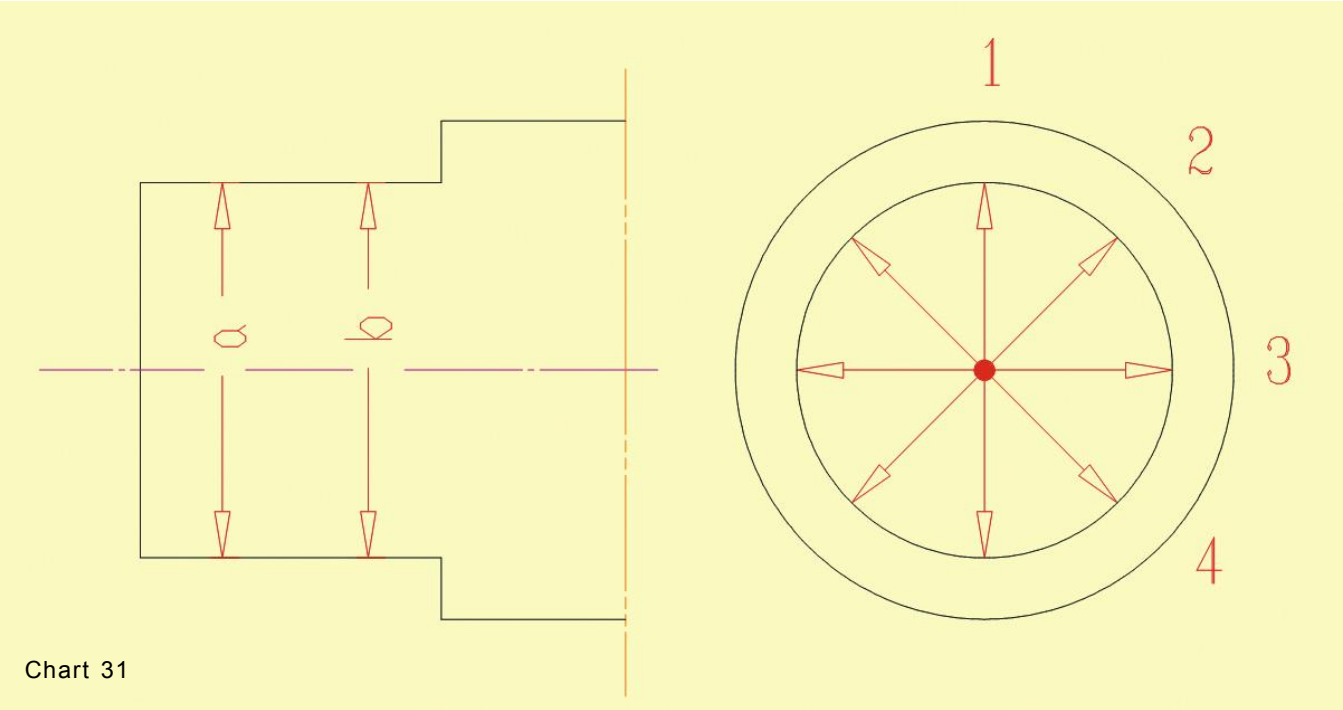
The roll neck which install the bearing, must be clean and without any scratches and burrs.

When the circumstance of bearing housing is fixed, but the roll neck is rotated, the suggested maximum roughness value of roll neck outer diameter is no more than  $Ra=1.6\mu m$ .

The Lubrication and Seal of Metallurgy Bearing

If can not grinding, in many cases, it can use the fine lathe to grind reach the surface roughness to  $Ra=3.2\mu m$ . Specific situation can consult to ZWZ technical service engineer.

Usually when in inspecting the dimension and roundness of the roll neck, measured by micrometer generally, choose two sections on the roll neck, take four points from every section and measured, the measure value should subject to the average value.



The checking and measuring records should be kept by the maintainer, checking record as per sheet 9:

Table 9

| Roll neck dimension checking record sheet |            |   |           |   |
|-------------------------------------------|------------|---|-----------|---|
| Roll neck No:                             |            |   |           |   |
| Data                                      | Drive Side |   | Work Side |   |
|                                           | a          | b | a         | b |
| 1                                         |            |   |           |   |
| 2                                         |            |   |           |   |
| 3                                         |            |   |           |   |
| 4                                         |            |   |           |   |
| Average Value                             |            |   |           |   |
|                                           |            |   |           |   |

2.4.2 Inspection and measurement of bearing housing

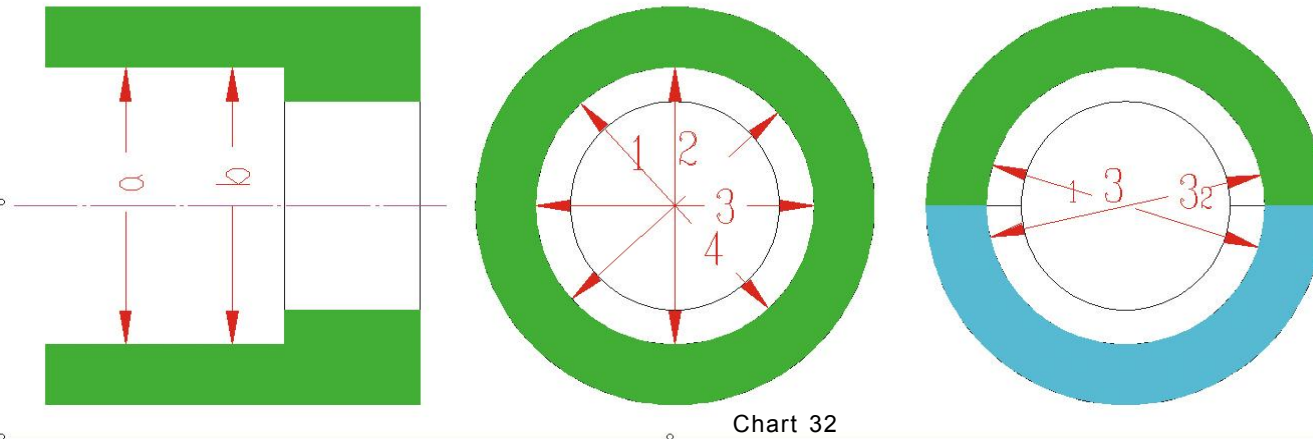
Confirm vertical guide and shaking guide are in good condition during inspection, have well gradient to allow vibrate of bearing housing, and when the roll neck in skew status, they can be formed in one row. In the rack, the gaps of the frame which between the bearing housing and window must be kept in good condition.

Using compressed air to clean the bearing block, clean up all the lubricating oil and drainage hole by compressed air. Part of the serious corrosion must be polished clean. Inspect and record the bore diameter roundness periodically.

The supporting arm of bearing block can not be rusted, because it should have a good seal with the cover. Rust can cause loose in normal working hours, and rust may enter into the bearing. Rust are also not allowed in supporting arm,at the cover plate side.

Check all the sealing, If find any serious worn or damaged been detected, it must be replaced. Seals play an important role in bearing working, so the seals of the bearing block should be well-maintained constantly.

Usually when in inspecting the dimension and roundness of the bearing block, it adopt the micrometer to measure, taking two sections on the bearing block, take four points from every section and measure them, the measure value should subject to the average value.



Checking record sheet see table 10

| bearing block size checking record sheet |   |   |
|------------------------------------------|---|---|
| Bearing Block No:                        |   |   |
| Frame No:                                |   |   |
| The poison of the Frame                  |   |   |
| Bearing No:                              |   |   |
| Data                                     | a | b |
| 1                                        |   |   |
| 2                                        |   |   |
| 3                                        |   |   |
| 4                                        |   |   |
| Average Value                            |   |   |
|                                          |   |   |

The Lubrication and Seal of Metallurgy Bearing

3 Rolling Mill Four-row Cylindrical Roller Bearing mounting and dismounting

3.1 Inner ring mounting

• The first step

Generally, bearing inner ring nominal dimension is as same as mill roll neck metric dimension, but the tolerance is different. Commonly, select r6 or s6 interference fit.Heat inner ring, expanded inner ring is easy to be mounted on roller neck. Heating inner ring by induction heater or furnace, but not exceed 120℃ . In order to avoid inner diameter overreached, the temperature must be controlled during heating. Test inner ring inner diameter expanding situation with inner ring measuring instrument.

Note: Once heating temperature exceed 150 ℃ , inner ring maybe annealed, hardness descend, bearing life will be affected.

• The second step

Mill roll neck and inner ring surface should be washed and drying treated; Before mounting inner ring, grinding mill roll neck dimension should make ensure the magnitude of interference. After inner ring meets mounting requirement, can be mounted.

Use rope and ribbon to hang and mount the inner ring.

• The third step

The inner ring must be fixed in axial direction before cooling after mounting.

• The fourth step

When mounted inner ring temperature reached environment temperature, take off axial direction clamping equipment. Repeat the second step, mount the other inner ring.

• The fifth step

During mounting inner ring, two inner rings semicircle gaps should be aligned, that helps easy mounting and dismounting for inner ring.

• The sixth step

During the second inner ring is cooling, it must be fixed in axial direction, close with the first inner ring. After inner ring temperature cool down to environment degree, take off axial direction clamping equipment, inner ring is mounted.

Grinding of inner ring outer diameter

At present, many rolling mill equipments have high precision level, especially cold rolling mills,planisher equipments and so on. In order to increase bearing usage precision, inner ring should be grinded after mounting to mill roll neck, the advantage are follows:

- Eliminate mill roll eccentricity ratio.
- Eliminate the eccentricity from inner ring wall thickness difference
- Ensure bearing radial clearance easy to control
- Ensure inner ring outer diameter dimension on each mill roll neck is uniform.

• The seventh step

Inner ring outer diameter dimension measures after grinding (on mill roll neck) as chart 33, measures the dimension 2 times at 4 positions on raceway with 90°angle after grinding.

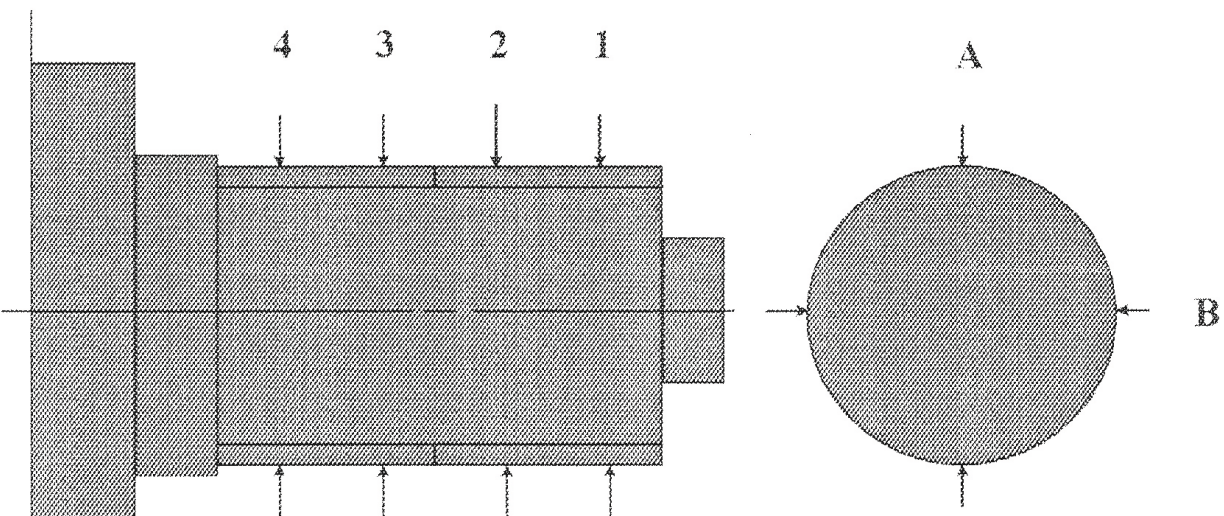


Chart 33

Following table 11 is Measure Data  
Table 11

| Back-up Roller No. |                   |   |              |   |
|--------------------|-------------------|---|--------------|---|
| Times of Read      | Transmission Side |   | Working Side |   |
|                    | A                 | B | A            | B |
| 1                  |                   |   |              |   |
| 2                  |                   |   |              |   |
| 3                  |                   |   |              |   |
| 4                  |                   |   |              |   |
| Average value      |                   |   |              |   |
|                    |                   |   |              |   |



## The Lubrication and Seal of Metallurgy Bearing

- **The eighth step**

Inner ring needs oiled after grinding, packed with paper or plastic after oiled, in order to avoid rust or damage.

### 3.2 Outer ring mounting

Each part end side (including outer ring, outer rib ring, middle rib ring, roller subassembly) there are marked sequence number A-B-C-D available, mounted according to this sequence number. Outer ring end side marked load zone.

- **The first step**

Put outer ring into bearing house. Must ensure outer ring rib completely contact shaft shoulder on bearing housing. Our suggestion is mounting D side firstly, and is opposite load zone 1.

- **The second step**

Bearing cage have hanging nut hole, screw hanging nut into cage, mount one cage assembly into CD outer ring raceway, then take cage group and outer ring into bearing house, until outer ring end side contact outer rib ring.

In order to help outer ring mount into bearing house, cover thin lubricate grease on outside surface of outer ring.

Mount outer ring into bearing house.

After mounted outer ring, demount hanging nut. Check bearing house hole damage by visual, like burr or crack and other problems.

- **The third step**

After put middle rib ring on one row cage subassembly, mount cage subassembly with middle rib into bearing house together by hanging nut.

- **The forth step**

Mounting AB outer ring and cage subassembly refer to the second step.

- **The fifth step**

Put outer rib ring on cage subassembly, hang cage subassembly with outer rib ring into bearing house with hanging nut.

- **The sixth step**

If use grease lubrication , fill 40-50% lubrication grease of whole space between cage subassembly.

- **The seventh step**

Mounting bearing house cover board, measure and mount sealing gasket.

- **The eighth step**

Mount thrust bearing (see next part) and bearing house.

The ninth step

If don't need mount bearing onto the mill roll neck immediately, please stand bearing and cover with protective cover.

### 3.3 Mount bearing house on mill roll neck

- **The first step**

Clean and dry mill roll neck, spread the same bearing lubricating oil on roll neck.

If need crane, slinging the mill roll neck horizontally.

- **The second step**

Hang bearing house horizontally with crane and transfer the bearing house in front of the mill roll neck.

- **The third step**

Put bearing house and mill roll neck in one line carefully, confirm bearing house face mill rock neck, put bearing house on mill roll neck slowly.

- **The fourth step**

Support the bearing house by hand, in order to avoid scratch or collide.

Note: If the bearing house get stuck or cylindrical roller stuck on the inner ring race way, must stop mounting, and quit the bearing house. after repaired the damaged position, realign and install again. Even the smallest damage which not been repaired on time, it may cause the bearing performance reduction.

- **The fifth step**

Continuously and smoothly mount bearing house, until the bearing house have been mounted to mill roll neck completely and the position is correct. Must confirm the roller group on inner ring raceway without damage.

Note: Be careful while mounting, not to damage seal ring.

- **The sixth step**

Mount bearing end shield and other parts according to technical requirement.

### 4 Rolling mill double-row tapered roller bearing mounting(thrust bearing)

- **The first step**

Put single raceway outer ring into bearing house.

- **The second step**

Put cone into bearing house, hoisting tools can be used if needed.

- **The third step**

Put another single raceway outer ring into bearing house.

- **The fourth step**

Mount cover board bottom on top of the bearing bearing, and fasten with 4 nuts. Mount related accessories: such as cover board, outer ring and bearing house. Turn nuts with proper torque force, ensure all springs and bracket compressed and contact completely. Rotate inner ring with hand, makes the roller with properly sealed.

## The Lubrication and Seal of Metallurgy Bearing

5 Rolling mill four-row tapered roller bearing mounting

- **The first step**

Set single raceway outer ring “A-BA” into bearing house, ensure outer ring end face contact with bearing house completely.

- **The second step**

Set outer spacer B carefully, to avoid scratches.

The third step

Put in “A-CA”, the cone assembly and accessories of double row tapered roller bearing.

- **The fourth step**

Put in double raceway outer ring “BC-CD” and inner spacer “C”.

Confirm inner spacer and inner ring rib contact completely, during putting inner spacer “C”.

- **The fifth step**

Put in “CE-E”, cone assembly and accessories of double row tapered roller bearing.

- **The sixth step**

Set single raceway outer ring “DE-E”.

Note: All load zone should be in one line, during putting all outer rings.

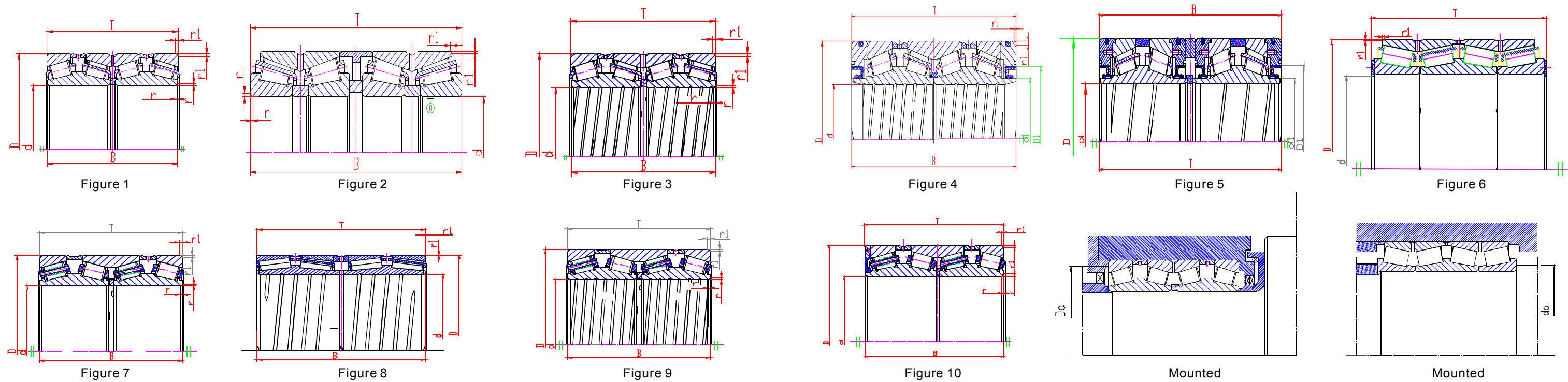
- **The seventh step**

Mount bearing end shield (not fill with adjusting shim), fasted uniformly with 4 same separation covers nuts, until cover board are pressed closely on bearing outer ring end side, measure 3 area gaps, the value should be equal to average “G”. The pad thickness must be adjusted under 0.050mm, in order that it can be nipped and filled.

- **The eighth step**

Remove bearing end shield, fill adjusting pad and fasten all cover board nuts. Nuts must be screw down the confirmed torque.

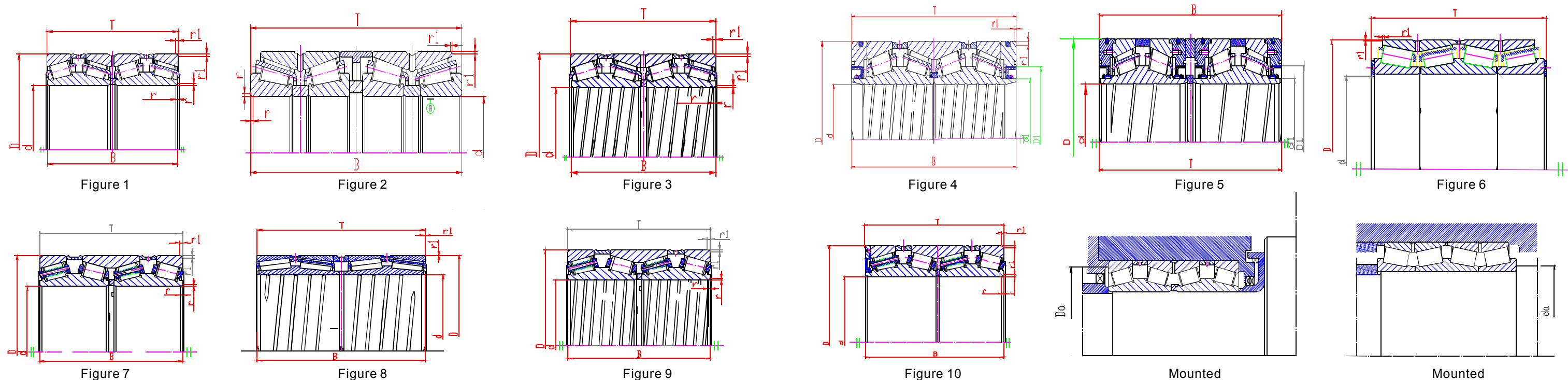
# Four-row Tapered Roller Bearings Metric Series



| Designations          | working position  | Basic Dimensions(mm) |         |     |     |      |       | Mounting Dimensions(mm) |       | Basic Load Ratings(kN) |      | Calculation Coefficient |      |      |      | Weight (kg) | Patterns |
|-----------------------|-------------------|----------------------|---------|-----|-----|------|-------|-------------------------|-------|------------------------|------|-------------------------|------|------|------|-------------|----------|
|                       |                   | d                    | D       | B   | T   | rmin | r1min | Da                      | da    | Cr                     | Cor  | e                       | Y1   | Y2   | Yo   |             |          |
| 380632/HC             | Working Roll      | 160                  | 226     | 165 | 165 | 3    | 2.5   | 214                     | 167.5 | 1070                   | 2290 | 0.29                    | 2.33 | 3.46 | 2.27 | 20.7        | Figure 1 |
| 352936X2/DF-1         | Working Roll      | 180                  | 250     | 207 | 207 | 2.5  | 0.7   | 246                     | 198   | 790                    | 2100 | 0.367                   | 1.84 | 2.74 | 1.8  | 29          | Figure 2 |
| 382936X3-1            | Working Roll      | 180                  | 260     | 200 | 200 | 2.5  | 2     | 245                     | 189.5 | 1110                   | 2700 | 0.35                    | 1.93 | 2.87 | 1.89 | 33.2        | Figure 3 |
| 380636                | Working Roll      | 180                  | 280     | 180 | 180 | 3    | 2.5   | 260.5                   | 189.5 | 835                    | 2540 | 0.499                   | 1.5  | 2.24 | 1.47 | 39.6        | Figure 1 |
| 382938X2-1/HCC9       | Working Roll      | 190                  | 260     | 200 | 200 | 2.5  | 2     | 246                     | 196.5 | 1040                   | 2780 | 0.36                    | 1.87 | 2.79 | 1.83 | 29.6        | Figure 1 |
| 380640/HCC9/W283      | Working Roll      | 200                  | 280     | 206 | 206 | 1.5  | 3     | 263.5                   | 208.5 | 1600                   | 3410 | 0.36                    | 1.87 | 2.79 | 1.83 | 38.9        | Figure 3 |
| 382040X2-1            | Working Roll      | 200                  | 310     | 200 | 200 | 3    | 2.5   | 292                     | 210.5 | 1970                   | 5520 | 0.337                   | 2    | 2.98 | 1.96 | 55.6        | Figure 1 |
| 382040                | Working Roll      | 200                  | 310     | 275 | 275 | 3    | 2.5   | 287                     | 210   | 1350                   | 4200 | 0.393                   | 1.72 | 2.56 | 1.68 | 75.1        | Figure 1 |
| 380641                | Working Roll      | 205                  | 320     | 205 | 205 | 4    | 3     | 300.5                   | 215   | 1060                   | 2850 | 0.463371                | 1.46 | 2.17 | 1.42 | 55.4        | Figure 1 |
| 380642-XRS/HCC9       | Working Roll      | 210                  | 288.925 | 262 | 262 |      | 3     | 274.5                   | 282.5 | 1510                   | 4050 | 0.264                   | 2.55 | 3.8  | 2.5  | 49.3        | Figure 4 |
| 380644/W283           | Working Roll      | 220                  | 295     | 315 | 315 | 1.5  | 3     | 278                     | 225   | 1470                   | 4350 | 0.333                   | 2.03 | 3.02 | 1.98 | 57.2        | Figure 3 |
| 380644-XRS/HCYAB      | Working Roll      | 220                  | 295     | 315 | 315 |      |       | 283.5                   | 227.5 | 1270                   | 3780 | 0.402                   | 1.68 | 2.5  | 1.64 | 56.6        | Figure 5 |
| 380644-2RS/HCEC9      | Working Roll      | 220                  | 295     | 315 | 315 |      |       | 279                     | 227.5 | 1580                   | 3950 | 0.365                   | 1.85 | 2.76 | 1.81 | 56.4        | Figure 4 |
| 382944X2/HCEP5        | Working Roll      | 220                  | 300     | 230 | 230 | 3    | 2.5   | 279                     | 228   | 1570                   | 4000 | 0.401                   | 1.69 | 2.51 | 1.65 | 47.9        | Figure 1 |
| 380644X2/HCC2H/W283   | Working Roll      | 220                  | 310     | 226 | 226 | 3    | 2.5   | 281.5                   | 229.5 | 1900                   | 4400 | 0.353                   | 1.91 | 2.85 | 1.87 | 53.1        | Figure 3 |
| 380644/HC/W283        | Intermediate Roll | 220                  | 330     | 260 | 260 | 3    | 3     | 305                     | 229.5 | 2200                   | 5300 | 0.546                   | 1.24 | 1.84 | 1.21 | 77.9        | Figure 1 |
| 382044                | Working Roll      | 220                  | 340     | 305 | 305 | 4    | 3     | 317                     | 229   | 2800                   | 5950 | 0.346                   | 1.95 | 2.9  | 1.91 | 99.5        | Figure 1 |
| 382044/HC             | Working Roll      | 220                  | 340     | 305 | 305 | 4    | 3     | 317                     | 229   | 2550                   | 5950 | 0.346                   | 1.95 | 2.9  | 1.91 | 99.5        | Figure 1 |
| 382948X2-1/HCC9/W283  | Intermediate Roll | 240                  | 320     | 250 | 250 | 1.5  | 2.5   | 300.5                   | 246.5 | 2100                   | 5350 | 0.374                   | 1.8  | 2.69 | 1.77 | 56.5        | Figure 3 |
| 382948X2-XRS/HC       | Working Roll      | 240                  | 320     | 294 | 294 |      | 4     | 300.5                   | 246   | 1550                   | 5000 | 0.335                   | 2.01 | 3    | 1.97 | 61.6        | Figure 4 |
| 380648/HCC9           | Working Roll      | 240                  | 338     | 248 | 248 | 4    | 4     | 169                     | 120   | 1850                   | 5400 |                         |      |      |      | 69          | Figure 3 |
| 380648/C9-3           | Working Roll      | 240                  | 338     | 248 | 248 | 3    | 2.5   | 319                     | 249   | 2050                   | 5650 | 0.39                    | 1.73 | 2.58 | 1.69 | 69.2        | Figure 1 |
| 380648X2-XRS/HCP59YAB | Intermediate Roll | 240                  | 338     | 340 | 340 |      | 3     | 368.5                   | 250   | 1900                   | 5160 | 0.421                   | 1.6  | 2.39 | 1.57 | 78.8        | Figure 5 |
| 380648/HCEC9-1        | Intermediate Roll | 240                  | 338     | 248 | 248 | 4    | 4     | 319                     | 249   | 2210                   | 5950 | 0.39                    | 1.73 | 2.58 | 1.69 | 69          | Figure 3 |
| 380648/HCC3-2         | Working Roll      | 240                  | 350     | 230 | 230 | 1.5  | 2     | 329                     | 252   | 2050                   | 4700 | 0.42                    | 1.61 | 2.39 | 1.57 | 72.2        | Figure 1 |
| 382048X2              | Working Roll      | 240                  | 360     | 310 | 310 | 4    | 3     | 335.5                   | 250   | 3630                   | 2210 | 0.314                   | 2.15 | 3.2  | 2.1  | 90.5        | Figure 1 |
| 380650X1-XRS/HCP59    | Working Roll      | 250                  | 365     | 270 | 270 | 5    | 3     | 337.5                   | 262   | 1950                   | 4600 | 0.4                     | 1.69 | 2.51 | 1.65 | 90.4        | Figure 4 |
| 380650/HC             | Working Roll      | 250                  | 460     | 270 | 270 |      | 4     | 427.5                   | 276   | 2250                   | 6400 | 0.317                   | 2.13 | 3.17 | 2.08 | 192         | Figure 1 |

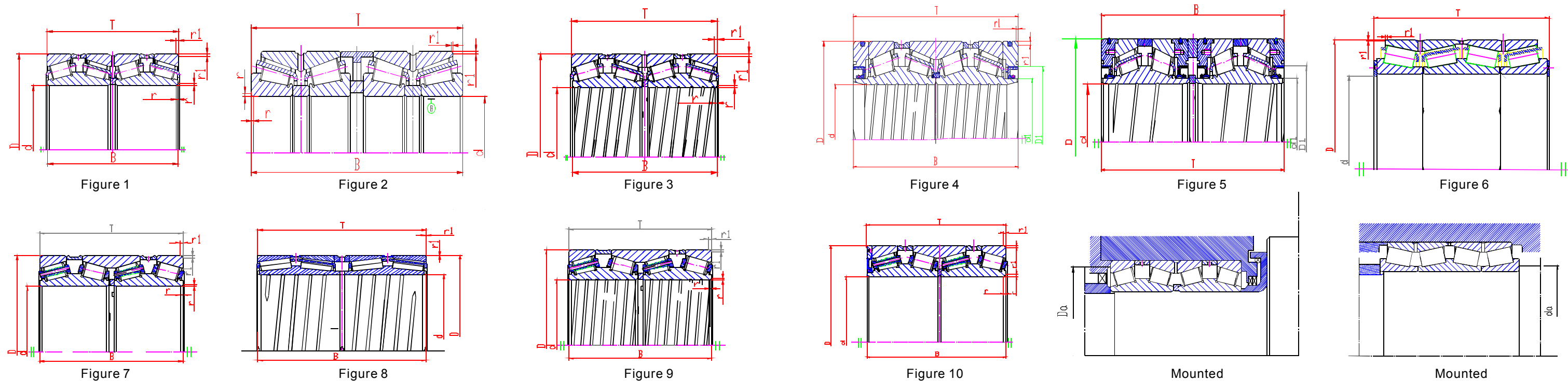


# Four-row Tapered Roller Bearings Metric Series



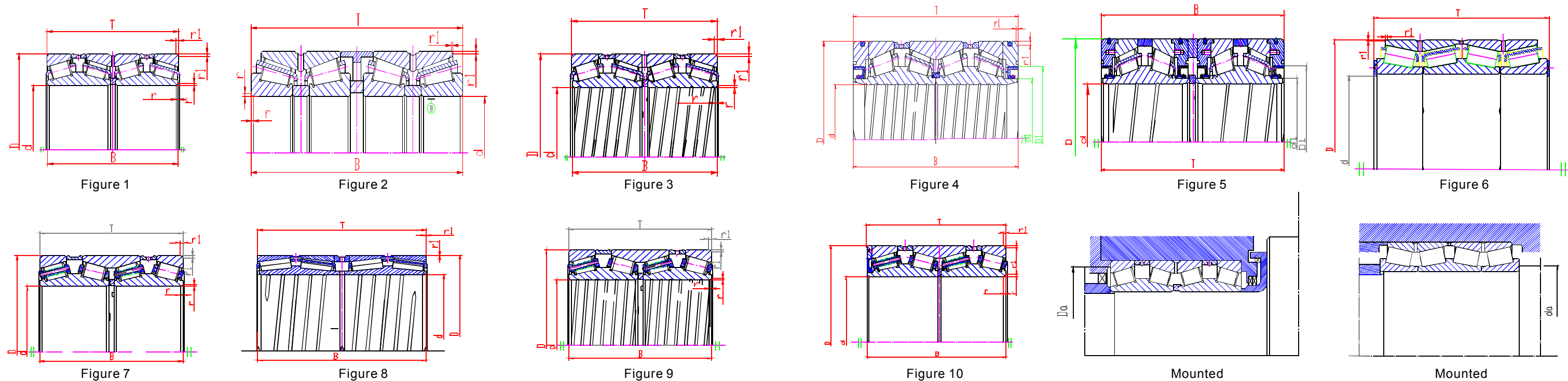
| Designations            | working position               | Basic Dimensions(mm) |         |         |         |      |       | Mounting Dimensions(mm) |       | Basic Load Ratings(kN) |       | Calculation Coefficient |       |      |       | Weight (kg) | Patterns |
|-------------------------|--------------------------------|----------------------|---------|---------|---------|------|-------|-------------------------|-------|------------------------|-------|-------------------------|-------|------|-------|-------------|----------|
|                         |                                | d                    | D       | B       | T       | rmin | r1min | Da                      | da    | Cr                     | Cor   | e                       | Y1    | Y2   | Yo    |             |          |
| 3806/254-XRS/HC         | Working Roll                   | 254                  | 358.775 | 269.875 | 269.875 | 1.5  | 3.3   | 341                     | 267.5 | 1890                   | 4950  | 0.333                   | 2.03  | 3.02 | 1.98  | 80.5        | Figure 4 |
| 382952/HC               | Working Roll                   | 260                  | 360     | 265     | 265     | 3    | 2.5   | 340                     | 270   | 1730                   | 5050  | 0.407                   | 1.66  | 2.47 | 1.62  | 77.8        | Figure 1 |
| 382952X2/HCR            | Intermediate Roll              | 260                  | 360     | 272     | 272     | 3    | 2.5   | 338.5                   | 269   | 2200                   | 6500  | 0.411                   | 1.64  | 2.44 | 1.6   | 83.1        | Figure 1 |
| 382952X2/HCC2HYA23/W283 | Intermediate Roll              | 260                  | 360     | 272     | 272     | 3    | 2.5   | 338.5                   | 269   | 2200                   | 6500  | 0.411                   | 1.64  | 2.44 | 1.6   | 83.1        | Figure 3 |
| 380652-XRS/HCC9YB2/W281 | Working Roll                   | 260                  | 365     | 340     | 340     | 3.5  | 3.5   | 343                     | 269   | 2500                   | 6650  | 0.402                   | 1.68  | 2.5  | 1.64  | 107         | Figure 4 |
| 380652X3/HC-FM          | Intermediate Roll              | 260                  | 380     | 280     | 280     | 4    | 7.5   | 355.5                   | 272   | 2400                   | 6400  | 0.43                    | 1.57  | 2.34 | 1.53  | 108         | Figure 1 |
| 380652/HC               | Intermediate Roll              | 260                  | 400     | 255     | 255     | 4    | 7.5   | 374                     | 272.5 | 2050                   | 4800  | 0.393                   | 1.72  | 2.56 | 1.68  | 117         | Figure 1 |
| 380652/HC-1             | Intermediate Roll              | 260                  | 400     | 255     | 255     | 4    | 7.5   | 374                     | 272.5 | 2050                   | 4800  | 0.393                   | 1.72  | 2.56 | 1.68  | 117         | Figure 1 |
| 380652/HG2              | Intermediate Roll              | 260                  | 400     | 255     | 255     | 5    | 4     | 374                     | 272.5 | 1910                   | 4900  | 0.393                   | 1.72  | 2.56 | 1.68  | 117         | Figure 3 |
| 382052                  | Intermediate Roll              | 260                  | 400     | 345     | 345     | 5    | 4     | 372                     | 273   | 2850                   | 7700  | 0.435                   | 1.55  | 2.31 | 1.52  | 161         | Figure 1 |
| 382152X2/HCYA6          | Intermediate Roll              | 260                  | 440     | 300     | 300     | 2    | 5     | 402.5                   | 282   | 2670                   | 5850  | 0.699                   | 0.965 | 1.44 | 0.947 | 182         | Figure 1 |
| 382956X3/C9YAD          | Intermediate Roll              | 280                  | 395     | 288     | 288     | 4    | 7     | 371.5                   | 293   | 2510                   | 7060  | 0.402                   | 1.68  | 2.5  | 1.64  | 110         | Figure 1 |
| 380656-XRS/HC-1         | Working Roll                   | 280                  | 395     | 290     | 290     | 1    | 4     | 372                     | 291.5 | 2830                   | 6550  | 0.459                   | 1.47  | 2.19 | 1.44  | 109         | Figure 4 |
| 380656                  | Working Roll                   | 280                  | 420     | 250     | 250     | 5    | 5     | 394                     | 294   | 1540                   | 5300  | 0.416                   | 1.62  | 2.42 | 1.59  | 119         | Figure 1 |
| 381156                  | Working Roll                   | 280                  | 460     | 324     | 324     | 5    | 4     | 429.5                   | 303.5 | 3350                   | 8350  | 0.333                   | 2.03  | 3.02 | 1.98  | 219         | Figure 3 |
| 382960/C9               | Working Roll                   | 300                  | 420     | 300     | 300     | 4    | 3     | 397                     | 314   | 2500                   | 7500  | 0.395                   | 1.71  | 2.54 | 1.67  | 125         | Figure 1 |
| 382960X2/HCC9YA3        | Working Roll                   | 300                  | 420     | 310     | 310     | 4    | 3     | 397.5                   | 311   | 2020                   | 8100  | 0.278                   | 1.43  | 3.61 | 2.37  | 134         | Figure 1 |
| 382160/HC               | Working Roll                   | 300                  | 460     | 390     | 390     | 5    | 4     | 429                     | 313   | 3850                   | 10200 | 0.365                   | 1.85  | 2.76 | 1.81  | 222         | Figure 1 |
| 380660/HCC9             | Working Roll                   | 300                  | 500     | 350     | 350     | 5    | 4     | 465                     | 319.5 | 2730                   | 8900  | 0.319                   | 2.12  | 3.15 | 2.07  | 280         | Figure 1 |
| 380662/HCC9             | Intermediate Roll              | 310                  | 430     | 310     | 310     | 4    | 4     | 408                     | 324.5 | 3050                   | 7900  | 0.32                    | 2.11  | 3.14 | 2.06  | 135         | Figure 1 |
| 380662-XRS/HCEC9-1/W281 | Intermediate Roll              | 310                  | 430     | 350     | 350     | 1    | 4     | 404                     | 320.5 | 3700                   | 9450  | 0.459                   | 1.47  | 2.19 | 1.44  | 154         | Figure 4 |
| 382064X2/HC             | Intermediate Roll              | 320                  | 480     | 380     | 380     | 5    | 4     | 447.5                   | 336.5 | 3000                   | 11500 | 0.459                   | 1.47  | 2.19 | 1.44  | 252         | Figure 1 |
| 382968X2/HC             | Working Roll&Intermediate Roll | 340                  | 460     | 310     | 310     | 4    | 4     | 438                     | 352   | 3000                   | 8950  | 0.302                   | 2.21  | 3.29 | 2.16  | 147         | Figure 1 |
| 382968X2/HCC9           | Working Roll&Intermediate Roll | 340                  | 460     | 310     | 310     | 4    | 4     | 438                     | 352   | 3000                   | 8950  | 0.305                   | 2.21  | 3.29 | 2.16  | 146         | Figure 1 |
| 381068                  | Working Roll&Intermediate Roll | 340                  | 520     | 325     | 325     | 5    | 4     | 489                     | 364   | 3540                   | 8200  | 0.287                   | 2.35  | 3.5  | 2.3   | 247         | Figure 1 |
| 381168                  | Working Roll&Intermediate Roll | 340                  | 580     | 425     | 425     | 5    | 4     | 535.5                   | 370.5 | 5050                   | 12300 | 0.423                   | 1.6   | 2.38 | 1.56  | 468         | Figure 1 |
| 382972X2/HCYA3          | Working Roll                   | 360                  | 480     | 375     | 375     | 4    | 4     | 454.5                   | 369   | 2550                   | 11800 | 0.333                   | 2.03  | 3.02 | 1.98  | 197         | Figure 1 |
| 381172/HCYA6            | Working Roll                   | 360                  | 600     | 420     | 420     | 4.7  | 4.7   | 555.5                   | 382   | 3950                   | 13500 | 0.442                   | 1.53  | 2.27 | 1.49  | 423         | Figure 1 |
| 380676/HC-1             | Working Roll                   | 380                  | 550     | 330     | 350     | 5    | 5     | 514                     | 394   | 2490                   | 9450  | 0.444                   | 1.52  | 2.26 | 1.49  | 273         | Figure 1 |

# Four-row Tapered Roller Bearings Metric Series



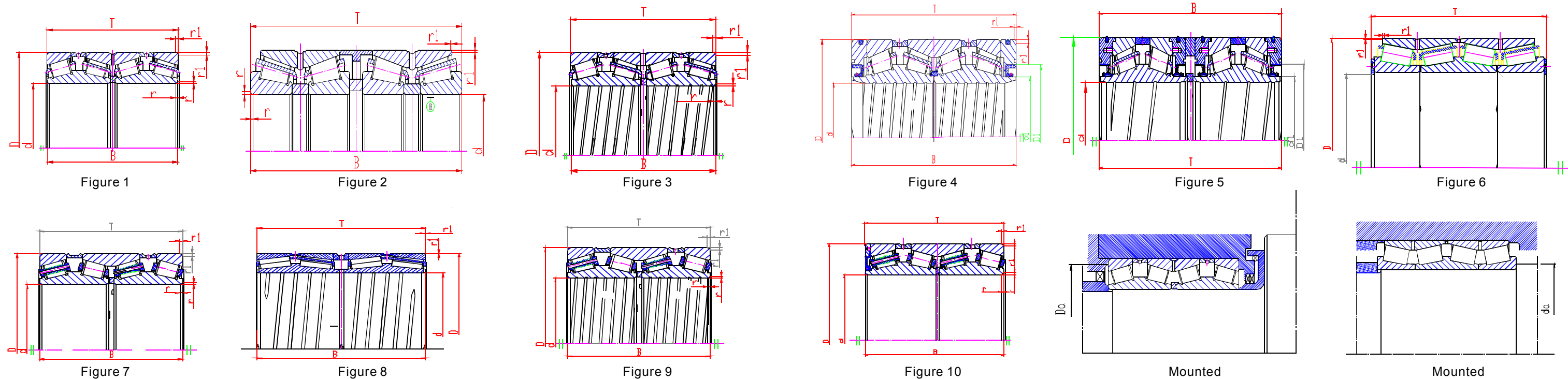
| Designations      | working position          | Basic Dimensions(mm) |     |       |        |      |       | Mounting Dimensions(mm) |       | Basic Load Ratings(kN) |       | Calculation Coefficient |      |      |      | Weight (kg) | Patterns |
|-------------------|---------------------------|----------------------|-----|-------|--------|------|-------|-------------------------|-------|------------------------|-------|-------------------------|------|------|------|-------------|----------|
|                   |                           | d                    | D   | B     | T      | rmin | r1min | Da                      | da    | Cr                     | Cor   | e                       | Y1   | Y2   | Yo   |             |          |
| 380676/HC         | Working Roll              | 380                  | 620 | 388   | 388    | 6    | 6     | 577.5                   | 403.5 | 3800                   | 11600 | 0.43                    | 1.57 | 2.34 | 1.53 | 443         | Figure 1 |
| 381176/HC         | Working Roll              | 380                  | 620 | 420   | 420    | 5    | 4     | 575                     | 400   | 5550                   | 12600 | 0.459                   | 1.47 | 2.19 | 1.44 | 485         | Figure 1 |
| 381176/HCC9       | Working Roll              | 380                  | 620 | 420   | 420    | 5    | 4     | 575                     | 400   | 5550                   | 12600 | 0.459                   | 1.47 | 2.19 | 1.44 | 485         | Figure 1 |
| 381176/HCYA2-1    | Working Roll              | 380                  | 620 | 420   | 420    | 5    | 4     | 575                     | 400   | 5550                   | 12600 | 0.459                   | 1.47 | 2.19 | 1.44 | 484         | Figure 1 |
| 381176/HCYA2      | Working Roll              | 380                  | 620 | 420   | 420    | 5    | 4     | 575                     | 400   | 5550                   | 12600 | 0.459                   | 1.47 | 2.19 | 1.44 | 484         | Figure 1 |
| 380680/HCEP59YAD  | Vertical Roll             | 390                  | 540 |       | 339.96 |      | 1.5   | 270                     | 195   | 4650                   | 11700 | 0.311                   | 2.17 | 3.24 | 2.12 | 214         | Figure 6 |
| 380679X2/HC       | Roller                    | 395                  | 545 | 268.7 | 288.7  | 4    | 7.5   | 516                     | 410   | 2340                   | 6500  | 0.445                   | 1.52 | 2.26 | 1.48 | 194         | Figure 1 |
| 380679X2/HCYA7    | Roller                    | 395                  | 545 | 268.7 | 288.7  | 4    | 7.5   | 516                     | 410   | 2340                   | 6500  | 0.445                   | 1.52 | 2.26 | 1.48 | 194         | Figure 1 |
| 380679X2/HCC9     | Roller                    | 395                  | 545 | 268.7 | 288.7  | 4    | 7.5   | 516                     | 410   | 2340                   | 6500  | 0.445                   | 1.52 | 2.26 | 1.48 | 194         | Figure 1 |
| 380679/HCYA3      | Roller                    | 395                  | 545 | 268   | 288.9  | 5    | 10    | 512.5                   | 410   | 2130                   | 6500  | 0.445                   | 1.52 | 2.26 | 1.48 | 194         | Figure 3 |
| 380680/HC-1       | Back-up Roll              | 400                  | 540 | 280   | 280    | 3.7  | 7.5   | 511.5                   | 412.5 | 2690                   | 6500  | 0.445                   | 1.52 | 2.26 | 1.48 | 187         | Figure 1 |
| 380680/HC         | Back-up Roll              | 400                  | 540 | 400   | 400    | 5    | 5     | 514.5                   | 418.5 | 6980                   | 13300 | 0.297                   | 2.28 | 3.39 | 2.23 | 262         | Figure 1 |
| 380680/HCEC9YA6-1 | Back-up Roll              | 400                  | 540 | 280   | 280    | 4    | 7.5   | 511.5                   | 412.5 | 2450                   | 6500  | 0.445                   | 1.52 | 2.26 | 1.48 | 187         | Figure 1 |
| 380680/HCC9       | Working Roll              | 400                  | 540 | 400   | 400    | 5    | 5     | 514.5                   | 418.5 | 6350                   | 13300 | 0.297                   | 2.28 | 3.39 | 2.23 | 262         | Figure 1 |
| 351080X2-2/C9     | Gear Box                  | 400                  | 600 | 185   | 185    | 6    | 2.5   | 581                     | 445   | 2700                   | 5850  | 0.37                    | 1.83 | 2.72 | 1.78 | 168         | Figure 1 |
| 381080/HC         | Back-up Roll              | 400                  | 600 | 356   | 356    | 5    | 4     | 565                     | 418   | 3740                   | 12400 | 0.38                    | 1.78 | 2.65 | 1.74 | 345         | Figure 1 |
| 380684/HC         | Working Roll&Back-up Roll | 420                  | 560 | 437   | 437    | 5    | 5     | 532.5                   | 435.5 | 7900                   | 16300 | 0.309                   | 2.18 | 3.25 | 2.13 | 298         | Figure 1 |
| 380684-XRS/HCP69  | Working Roll&Back-up Roll | 420                  | 560 | 437   | 437    | 特殊   | 6     | 532.5                   | 430   | 4800                   | 15200 | 0.31                    | 2.18 | 3.25 | 2.13 | 292         | Figure 4 |
| 381084            | Working Roll&Back-up Roll | 420                  | 620 | 356   | 356    | 5    | 4     | 583.5                   | 446   | 4560                   | 11700 | 0.411                   | 1.64 | 2.44 | 1.6  | 369         | Figure 1 |
| 381184X2J/HC      | Working Roll&Back-up Roll | 420                  | 700 | 480   | 480    | 6    | 5     | 652.5                   | 451.5 | 5610                   | 18200 | 0.319                   | 2.12 | 3.15 | 2.07 | 749         | Figure 1 |
| 381184            | Working Roll&Back-up Roll | 420                  | 700 | 480   | 480    | 6    | 5     | 651.5                   | 452.5 | 10500                  | 11900 | 0.319                   | 2.12 | 3.15 | 2.07 | 755         | Figure 1 |
| 381188X1-XRS-HC-1 | Vertical Roll             | 440                  | 590 | 480   | 480    |      |       | 561                     | 451.5 | 8000                   | 19000 | 0.278                   | 2.43 | 3.61 | 2.37 | 359         | Figure 4 |
| 380688/HCC9       | Roller                    | 440                  | 620 | 454   | 454    | 6    | 6     | 571                     | 455   | 6650                   | 18800 | 0.418                   | 1.61 | 2.4  | 1.58 | 432         | Figure 1 |
| 380688/HC-1       | Working Roll              | 440                  | 620 | 454   | 454    | 6    | 6     | 586                     | 455   | 6050                   | 18800 | 0.418                   | 1.61 | 2.4  | 1.58 | 432         | Figure 1 |
| 380688/HCC9YA8    | Working Roll              | 440                  | 620 | 454   | 454    | 6    | 6     | 582                     | 452   | 6500                   | 20200 | 0.402                   | 1.68 | 2.5  | 1.64 | 422         | Figure 1 |
| 380688-XRS/HCC9   | Working Roll              | 440                  | 620 | 454   | 454    |      | 7.5   | 588.5                   | 455   | 6750                   | 16700 | 0.333                   | 2.03 | 3.02 | 1.98 | 408         | Figure 4 |
| 380688            | Working Roll              | 440                  | 650 | 355   | 355    | 6    | 5     | 611                     | 457.5 | 4900                   | 12000 | 0.463                   | 1.46 | 2.17 | 1.42 | 385         | Figure 1 |
| 380688/HC         | Working Roll              | 440                  | 650 | 355   | 355    | 6    | 5     | 611                     | 457.5 | 3680                   | 12100 | 0.463                   | 1.46 | 2.17 | 1.42 | 385         | Figure 1 |
| 380688/HCYA7      | Working Roll              | 440                  | 650 | 355   | 355    | 6    | 6     | 611                     | 458   | 3680                   | 12100 | 0.463                   | 1.46 | 2.17 | 1.42 | 385         | Figure 1 |
| 381088X2/HG       | Working Roll              | 440                  | 650 | 355   | 355    | 6    | 5     | 611                     | 457.5 | 5000                   | 12300 | 0.463                   | 1.46 | 2.17 | 1.42 | 402         | Figure 7 |
| 380690-XRS/HC     | Working Roll              | 450                  | 595 | 368   | 368    |      | 5     | 569.5                   | 464   | 5250                   | 13400 | 0.33                    | 2.05 | 3.05 | 2    | 268         | Figure 4 |

# Four-row Tapered Roller Bearings Metric Series



| Designations         | working position          | Basic Dimensions(mm) |     |     |     |      |       | Mounting Dimensions(mm) |       | Basic Load Ratings(kN) |       | Calculation Coefficient |       |      |       | Weight (kg) | Patterns |
|----------------------|---------------------------|----------------------|-----|-----|-----|------|-------|-------------------------|-------|------------------------|-------|-------------------------|-------|------|-------|-------------|----------|
|                      |                           | d                    | D   | B   | T   | rmin | r1min | Da                      | da    | Cr                     | Cor   | e                       | Y1    | Y2   | Yo    |             |          |
| 380690/HC            | Vertical Roll             | 450                  | 595 | 390 | 390 | 6    | 1.5   | 583.5                   | 486.5 | 5350                   | 14700 | 0.333                   | 2.03  | 3.02 | 1.98  | 285         | Figure 6 |
| 370690X2/HCC9DB/W281 | Working Roll              | 450                  | 595 | 415 | 415 | 6    | 6     | 566.5                   | 467.5 | 4900                   | 16700 | 0.31                    | 2.18  | 3.24 | 2.13  | 305         | Figure 8 |
| 380692/HCEP59YAD     | Working Roll&Back-up Roll | 460                  | 590 | 360 | 360 |      |       | 567.5                   | 476.5 | 5100                   | 14400 | 0.275                   | 2.45  | 3.65 | 2.4   | 241         | Figure 1 |
| 381992X3/YA          | Working Roll&Back-up Roll | 460                  | 610 | 360 | 360 | 3    | 6     | 582.5                   | 476   | 6100                   | 16400 | 0.339                   | 1.99  | 2.96 | 1.94  | 291         | Figure 3 |
| 381992/HC            | Working Roll&Back-up Roll | 460                  | 620 | 310 | 310 | 5    | 4     | 592                     | 474.5 | 6160                   | 3450  | 0.402                   | 1.68  | 2.5  | 1.64  | 260         | Figure 1 |
| 381992/HCC9          | Working Roll&Back-up Roll | 460                  | 620 | 310 | 310 | 5    | 4     | 592                     | 474.5 | 6160                   | 3450  | 0.402                   | 0.68  | 2.5  | 1.64  | 260         | Figure 1 |
| 380692/HCC9-1        | Working Roll&Back-up Roll | 460                  | 650 | 474 | 474 | 6    | 6     | 613                     | 478   | 4950                   | 20000 | 0.338                   | 2     | 2.97 | 1.95  | 506         | Figure 1 |
| 381192X3/HC          | Working Roll&Back-up Roll | 460                  | 730 | 440 | 440 | 4    | 7.5   | 674.5                   | 491.5 | 6160                   | 14800 | 0.748                   | 0.903 | 1.34 | 0.882 | 663         | Figure 1 |
| 381192X3/HCC9        | Working Roll&Back-up Roll | 460                  | 730 | 440 | 440 | 4    | 7.5   | 674.5                   | 491.5 | 6160                   | 14800 | 0.748                   | 0.903 | 1.34 | 0.882 | 663         | Figure 1 |
| 381096               | Working Roll&Back-up Roll | 480                  | 700 | 420 | 420 | 5    | 5     | 658                     | 500.5 | 4730                   | 16900 | 0.408                   | 1.66  | 2.47 | 1.62  | 582         | Figure 1 |
| 381096/HCYA2         | Working Roll&Back-up Roll | 480                  | 700 | 420 | 420 | 6    | 5     | 658                     | 498.5 | 5880                   | 15500 | 0.408                   | 1.66  | 2.47 | 1.62  | 535         | Figure 3 |
| 380698/HC            | Working Roll              | 490                  | 625 | 385 | 385 | 7    | 4     | 559.5                   | 505   | 5390                   | 16500 | 0.319                   | 2.12  | 3.15 | 2.07  | 278         | Figure 1 |
| 380698/HCYA2         | Working Roll              | 490                  | 625 | 385 | 385 |      | 4     | 559.5                   | 505   | 4900                   | 16500 | 0.319                   | 2.12  | 3.15 | 2.07  | 278         | Figure 3 |
| 3806/510/HCC9        | Working Roll              | 510                  | 655 | 377 | 379 | 1.5  | 6.4   | 626.5                   | 525.5 | 5500                   | 16200 | 0.333                   | 2.03  | 3.02 | 1.98  | 316         | Figure 3 |
| 3810/530             | Working Roll              | 530                  | 780 | 450 | 450 | 6    | 5     | 735.5                   | 555   | 7200                   | 18200 | 0.38                    | 1.78  | 2.65 | 1.74  | 745         | Figure 9 |
| 3806/540J/HC         | Working Roll              | 540                  | 690 | 400 | 400 | 2    | 5     | 661                     | 555.5 | 6270                   | 11400 | 0.333                   | 2.03  | 3.02 | 1.98  | 375         | Figure 3 |
| 3819/560/HC          | Working Roll              | 560                  | 750 | 368 | 368 | 5    | 4     | 715.5                   | 583   | 7850                   | 15800 | 0.43                    | 1.57  | 2.34 | 1.53  | 447         | Figure 9 |
| 3811/560             | Working Roll              | 560                  | 920 | 620 | 620 | 7.5  | 6     | 855                     | 607   | 18200                  | 32000 | 0.394                   | 1.73  | 2.57 | 1.69  | 1690        | Figure 9 |
| 3806/600/HC          | Working Roll&Back-up Roll | 600                  | 800 | 365 | 365 | 5    | 5     | 766.5                   | 623   | 4000                   | 18100 | 0.33                    | 2.05  | 3.05 | 2     | 489         | Figure 1 |
| 3806/600/HCYA8       | Working Roll&Back-up Roll | 600                  | 800 | 365 | 365 | 5    | 5     | 766.5                   | 623   | 5110                   | 17200 | 0.33                    | 2.05  | 3.05 | 2     | 522         | Figure 9 |
| 3819/600/HC          | Working Roll&Back-up Roll | 600                  | 800 | 380 | 380 | 5    | 4     | 765.5                   | 622.5 | 4000                   | 18100 | 0.33                    | 2.05  | 3.05 | 2     | 497         | Figure 1 |
| 3810/600/HC          | Working Roll&Back-up Roll | 600                  | 870 | 480 | 480 | 6    | 6     | 812                     | 622.5 | 8900                   | 27500 | 0.414                   | 1.63  | 2.43 | 1.6   | 990         | Figure 9 |
| 3811/600/HC          | Working Roll&Back-up Roll | 600                  | 980 | 650 | 650 | 7.5  | 7.5   | 917.5                   | 639   | 9650                   | 37500 | 0.319                   | 2.12  | 3.15 | 2.07  | 1950        | Figure 9 |
| 3806/625/HC          | Working Roll              | 625                  | 815 | 480 | 480 | 3.5  | 6.5   | 779                     | 498.5 | 9720                   | 28900 | 0.333                   | 2.03  | 3.02 | 1.98  | 658         | Figure 1 |
| 3819/630/HC          | Backup Roll               | 630                  | 850 | 418 | 418 | 6    | 6     | 810.5                   | 650.5 | 6700                   | 22200 | 0.4                     | 1.69  | 2.52 | 1.65  | 683         | Figure 9 |
| 3806/630-XRS/HCC9    | Backup Roll               | 630                  | 860 | 615 | 615 | 5    | 5     | 816.5                   | 653   | 13300                  | 37000 | 0.346                   | 1.95  | 2.9  | 1.91  | 1034        | Figure 4 |
| 3810/630/HC          | Backup Roll               | 630                  | 920 | 515 | 515 | 7.5  | 7.5   | 866.5                   | 657   | 6550                   | 27500 | 0.425                   | 1.59  | 2.36 | 1.55  | 1190        | Figure 1 |





| Designations        | working position | Basic Dimensions(mm) |       |         |       |      |       | Mounting Dimensions(mm) |       | Basic Load Ratings(kN) |       | Calculation Coefficient |      |      |      | Weight (kg) | Patterns  |
|---------------------|------------------|----------------------|-------|---------|-------|------|-------|-------------------------|-------|------------------------|-------|-------------------------|------|------|------|-------------|-----------|
|                     |                  | d                    | D     | B       | T     | rmin | r1min | Da                      | da    | Cr                     | Cor   | e                       | Y1   | Y2   | Yo   |             |           |
| 3811/630/HC         | Backup Roll      | 630                  | 1030  | 670     | 670   | 7.5  | 6     | 960.5                   | 681.5 | 15000                  | 42000 | 0.387                   | 1.75 | 2.6  | 1.71 | 2200        | Figure 9  |
| 3806/650/HCYA7      | Backup Roll      | 650                  | 1030  | 560     | 560   | 7.5  | 12    | 970                     | 687   | 16000                  | 39300 | 0.317                   | 2.15 | 3.2  | 2.1  | 1770        | Figure 9  |
| 3806/650/HCYAD      | Backup Roll      | 650                  | 1030  | 560     | 560   | 7.5  | 12    | 970                     | 691.5 | 17600                  | 39300 | 0.314                   | 2.15 | 3.2  | 2.1  | 1735        | Figure 9  |
| 3806/650/HC         | Backup Roll      | 650                  | 1030  | 560     | 560   | 7.5  | 12    | 970                     | 697.5 | 17600                  | 39300 | 0.314                   | 2.15 | 3.2  | 2.1  | 1720        | Figure 9  |
| 3806/650/HCC9       | Backup Roll      | 650                  | 1030  | 560     | 560   | 7.5  | 12    | 970                     | 697.5 | 17600                  | 39300 | 0.314                   | 2.15 | 3.2  | 2.1  | 1723        | Figure 9  |
| 3806/650/HCC9-1     | Backup Roll      | 650                  | 1030  | 560     | 560   | 7.5  | 12    | 970                     | 697.5 | 17600                  | 39300 | 0.314                   | 2.15 | 3.2  | 2.1  | 1712        | Figure 9  |
| 3806/650/HCEC91YA3  | Backup Roll      | 650                  | 1030  | 560     | 560   | 7.5  | 12    | 970                     | 697.5 | 16000                  | 39000 | 0.314                   | 2.15 | 3.2  | 2.1  | 1720        | Figure 7  |
| 3819/670/HC         | Backup Roll      | 670                  | 900   | 412     | 412   | 6    | 6     | 857                     | 691   | 5770                   | 24600 | 0.437                   | 1.55 | 2.3  | 1.51 | 773         | Figure 1  |
| 3806/685.8-XRS/HCC9 | Backup Roll      | 685.8                | 876.3 | 352.425 | 355.6 | 6.4  | 6.4   | 844                     | 704.5 | 5800                   | 14500 | 0.417                   | 1.62 | 2.41 | 1.58 | 490         | Figure 4  |
| 3806/710/HCYA2      | Backup Roll      | 710                  | 900   | 410     | 410   | 3    | 6     | 865.5                   | 728   | 5880                   | 27500 | 0.353                   | 1.91 | 2.85 | 1.87 | 650         | Figure 9  |
| 3811/750            | Backup Roll      | 750                  | 1220  | 840     | 840   | 9.5  | 9.5   | 1141                    | 792.5 | 17700                  | 68500 | 0.323                   | 2.09 | 3.11 | 2.04 | 3985        | Figure 7  |
| 3811/750-RS/HCC9    | Backup Roll      | 750                  | 1220  | 840     | 840   | 9.5  | 9.5   | 1143                    | 805   | 24600                  | 64500 | 0.323                   | 2.09 | 3.11 | 2.04 | 3880        | Figure 10 |
| 3806/750/HCC9       | Backup Roll      | 750                  | 1220  | 840     | 840   | 6    | 13    | 1050.5                  | 768   | 21100                  | 70500 | 0.37                    | 1.83 | 2.72 | 1.78 | 3810        | Figure 7  |

# Inch Series Four-row Tapered Roller Bearings

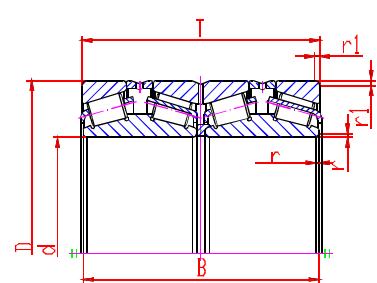


Figure 1

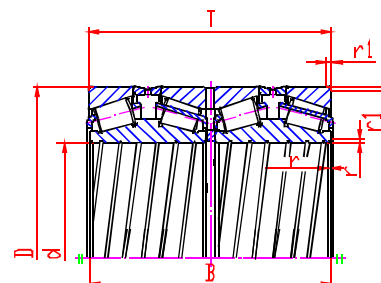


Figure 2

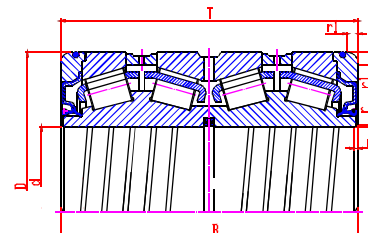


Figure 3

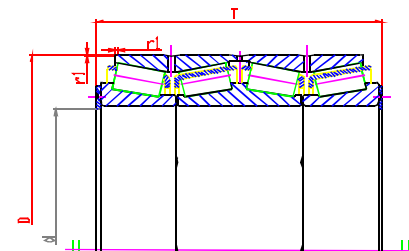


Figure 4

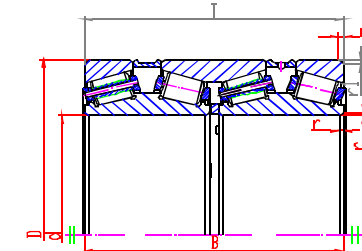


Figure 5

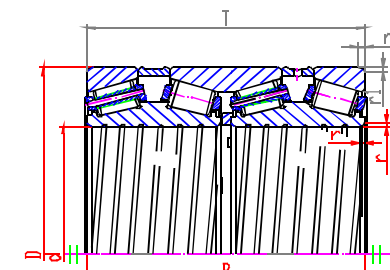


Figure 6

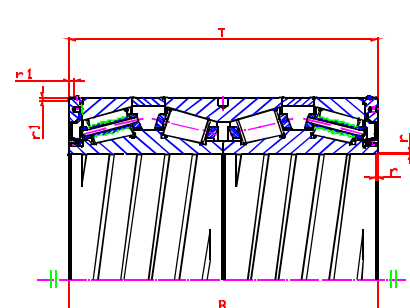


Figure 7

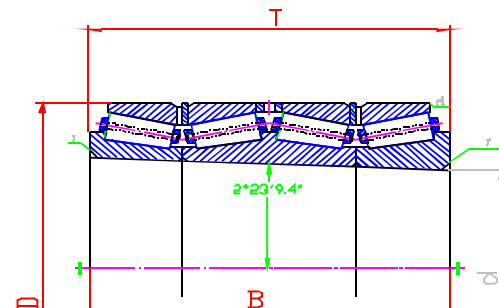
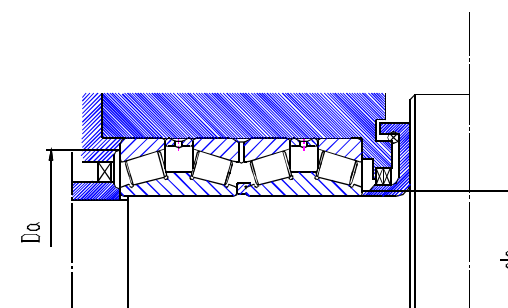
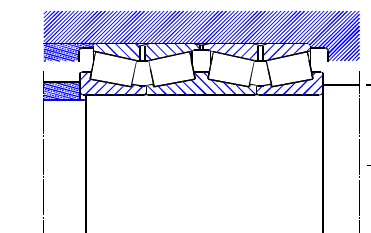


Figure 8



Mounted



Mounted

| Designations                            | Working Position  | Basic Dimensions ( mm ) |         |         |         | Mounting Dimensions ( mm ) |       | Chamfer Dimensions                    |                                        |                                        |                                         | Calculation Coefficient |      |      |       | Basic Load Ratings ( kN ) |      | Weigh ( kg ) | Patterns |
|-----------------------------------------|-------------------|-------------------------|---------|---------|---------|----------------------------|-------|---------------------------------------|----------------------------------------|----------------------------------------|-----------------------------------------|-------------------------|------|------|-------|---------------------------|------|--------------|----------|
|                                         |                   | d                       | D       | B       | T       | Da                         | da    | r <sub>min</sub><br>(Axial Direction) | r <sub>min</sub><br>(Radial Direction) | r <sub>1min</sub><br>(Axial Direction) | r <sub>1min</sub><br>(Radial Direction) | e                       | Y1   | Y2   | Yo    | Cr                        | Cor  |              |          |
| K67390D/K67322-K67322D                  | Working Roll      | 133.35                  | 196.85  | 193.675 | 193.675 | 184                        | 140   | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.344                   | 1.96 | 2.92 | 0.192 | 970                       | 2370 | 20.2         | Figure 1 |
| 3806/139.7/HCP59                        | Backup Roll       | 139.7                   | 200.025 | 157.162 | 160.338 | 187.5                      | 145   | 1.1                                   | 1.1                                    | 1.8                                    | 1.8                                     | 0.289                   | 2.33 | 3.47 | 2.28  | 695                       | 1870 | 16.2         | Figure 1 |
| 67791DGW/67720-67721D                   | Working Roll      | 177.8                   | 247.65  | 192.088 | 192.088 | 231                        | 186   | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.44                    | 1.54 | 2.29 | 1.5   | 1070                      | 3000 | 28.6         | Figure 2 |
| KM238849D/KM238810-KM238810D            | Working Roll      | 187.325                 | 269.875 | 211.138 | 211.138 | 254.5                      | 193.5 | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.331                   | 2.04 | 3.03 | 1.99  | 1570                      | 3430 | 41.5         | Figure 1 |
| M240648DW/M240611-M240611D              | Working Roll      | 198.438                 | 284.162 | 225.425 | 225.425 | 267                        | 208   | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98  | 1880                      | 4200 | 46.6         | Figure 1 |
| 67986D/67920-67921D-3                   | Working Roll      | 206.375                 | 282.575 | 190.5   | 190.5   | 264.5                      | 211   | 0.8                                   | 0.8                                    | 3.3                                    | 3.3                                     | 0.509                   | 1.33 | 1.97 | 1.3   | 1030                      | 2830 | 34.4         | Figure 1 |
| KM244249D/KM244210-KM244210D            | Working Roll      | 220.662                 | 314.325 | 239.712 | 239.712 | 296                        | 232.5 | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98  | 2090                      | 4900 | 60.2         | Figure 1 |
| M244249DGW/M244210-M244210D-XRS         | Working Roll      | 220.662                 | 314.325 | 239.712 | 239.712 | 297.5                      | 229.5 | 3.8                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98  | 1750                      | 4150 | 57.4         | Figure 3 |
| M244249D/M244210-M244210D-2/C9          | Working Roll      | 220.662                 | 314.325 | 239.712 | 239.712 | 296                        | 232.5 | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98  | 1790                      | 4900 | 58.8         | Figure 1 |
| M244249DGW/M244210-M244210D/C9          | Working Roll      | 220.662                 | 314.325 | 239.712 | 239.712 | 296                        | 232.5 | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98  | 2000                      | 4500 | 58.8         | Figure 2 |
| LM245149DGW/LM245110-LM245110D          | Intermediate Roll | 228.6                   | 311.15  | 200.025 | 200.025 | 294.5                      | 238   | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.33                    | 2.05 | 3.05 | 2     | 1560                      | 3650 | 43.9         | Figure 2 |
| 8576DW/8520-8520D-3                     | Working Roll      | 234.95                  | 327.025 | 196.85  | 196.85  | 308.5                      | 246.5 | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.407                   | 1.66 | 2.47 | 1.62  | 1660                      | 3830 | 50           | Figure 1 |
| KEE127097D/K127135-K127136D             | Working Roll      | 241.478                 | 349.148 | 228.6   | 228.6   | 328                        | 255.5 | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.353                   | 1.91 | 2.85 | 1.87  | 2050                      | 4350 | 71.9         | Figure 1 |
| KLM247748DW/KLM247710-KLM247710D        | Working Roll      | 244.475                 | 327.025 | 193.675 | 193.675 | 312                        | 254.5 | 3.3                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.326                   | 2.07 | 3.08 | 2.02  | 1740                      | 3930 | 42.7         | Figure 1 |
| LM247748DW/LM247710-LM247710D           | Working Roll      | 244.475                 | 327.025 | 193.675 | 193.675 | 312                        | 254.5 | 3.3                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.326                   | 2.07 | 3.08 | 2.02  | 1740                      | 4050 | 42.7         | Figure 1 |
| KLM247748DGW/KLM247710-KLM247710D/HG2-3 | Working Roll      | 244.475                 | 327.025 | 193.675 | 193.675 | 312                        | 254.5 | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.326                   | 2.07 | 3.08 | 2.02  | 1450                      | 4050 | 44           | Figure 2 |
| M249748D/M249710-M249710D               | Working Roll      | 254                     | 358.775 | 269.875 | 269.875 | 339                        | 267   | 3.3                                   | 3.3                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98  | 2720                      | 6050 | 88.9         | Figure 1 |
| M249748DW/M249710-M249710D              | Working Roll      | 254                     | 358.775 | 269.875 | 269.875 | 339                        | 267   | 3.3                                   | 3.3                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98  | 2720                      | 6050 | 88.9         | Figure 2 |
| K3M249748DW/K3M249710-K3M249710D-3      | Working Roll      | 254                     | 358.775 | 269.875 | 269.875 | 339                        | 267   | 3.3                                   | 3.3                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98  | 2720                      | 6050 | 88.9         | Figure 2 |
| EE134102D/134143-134144CD-3             | Working Roll      | 260.35                  | 365.125 | 228.6   | 228.6   | 344.5                      | 273   | 3.3                                   | 3.3                                    | 6.4                                    | 6.4                                     | 0.374                   | 1.8  | 1.69 | 1.76  | 1900                      | 4580 | 71.8         | Figure 1 |
| KLM451349DW/KLM451310-KLM451310D        | Working Roll      | 266.7                   | 355.6   | 230.188 | 228.6   | 338                        | 273   | 3.3                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.36                    | 1.87 | 2.79 | 1.83  | 1950                      | 5560 | 65.3         | Figure 1 |
| LM451349DW/LM451310-LM451310D           | Working Roll      | 266.7                   | 355.6   | 230.188 | 228.6   | 338                        | 273   | 3.3                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.36                    | 1.87 | 2.79 | 1.83  | 1950                      | 5800 | 63.9         | Figure 1 |
| M252349DW/M252310-M252310D              | Intermediate Roll | 269.875                 | 381     | 282.575 | 282.575 | 359.5                      | 283   | 3.3                                   | 3.3                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98  | 2930                      | 7550 | 105          | Figure 1 |

# Inch Series Four-row Tapered Roller Bearings

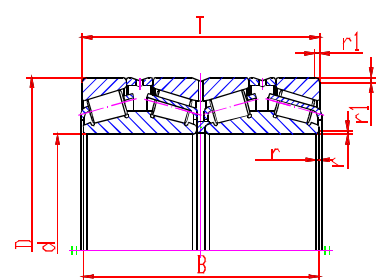


Figure 1

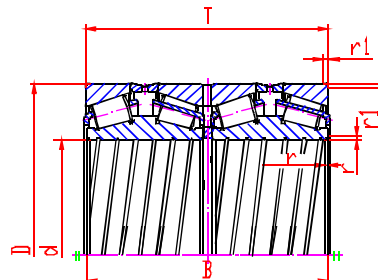


Figure 2

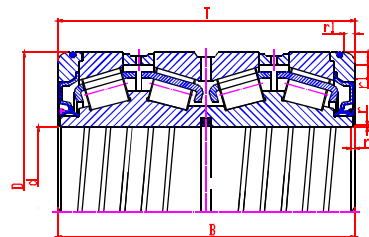


Figure 3

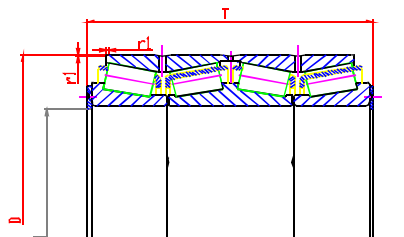


Figure 4

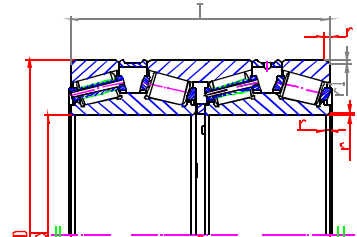


Figure 5

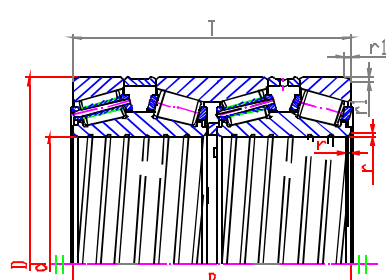


Figure 6

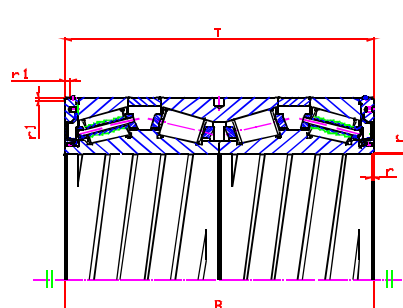


Figure 7

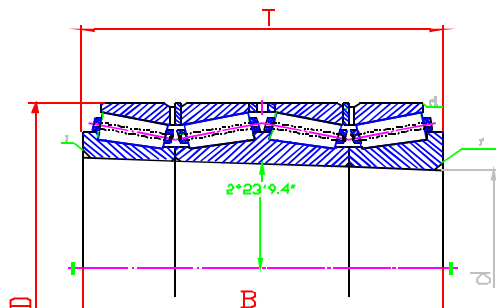
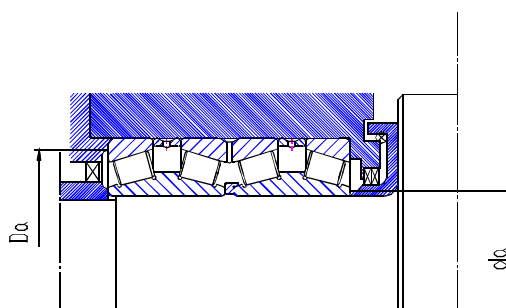
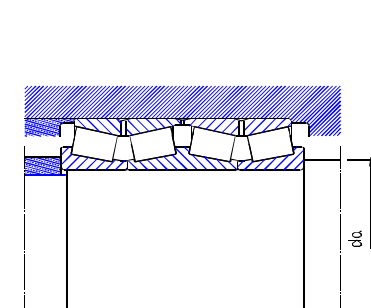


Figure 8



Mounted



Mounted

| Designations                         | Working Position               | Basic Dimensions ( mm ) |         |         |         | Mounting Dimensions ( mm ) |       | Chamfer Dimensions                    |                                        |                                        |                                         | Calculation Coefficient |      |      |      | Basic Load Ratings ( kN ) |       | Weigh ( kg ) | Patterns |
|--------------------------------------|--------------------------------|-------------------------|---------|---------|---------|----------------------------|-------|---------------------------------------|----------------------------------------|----------------------------------------|-----------------------------------------|-------------------------|------|------|------|---------------------------|-------|--------------|----------|
|                                      |                                | d                       | D       | B       | T       | Da                         | da    | r <sub>min</sub><br>(Axial Direction) | r <sub>min</sub><br>(Radial Direction) | r <sub>1min</sub><br>(Axial Direction) | r <sub>1min</sub><br>(Radial Direction) | e                       | Y1   | Y2   | Yo   | Cr                        | Cor   |              |          |
| M252349DW/M252310-M252310D-3         | Intermediate Roll              | 269.875                 | 381     | 282.575 | 282.575 | 359.5                      | 283   | 3.3                                   | 3.3                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98 | 2340                      | 7550  | 105          | Figure 1 |
| KEE135111DW/K135155-K135156D         | Intermediate Roll              | 279.4                   | 393.7   | 269.875 | 269.875 | 370.5                      | 293   | 2                                     | 1.5                                    | 6.4                                    | 6.4                                     | 0.38                    | 1.77 | 2.64 | 1.73 | 2880                      | 6200  | 103          | Figure 1 |
| EE135111D/135155-135156D             | Intermediate Roll              | 279.4                   | 393.7   | 269.875 | 269.875 | 370.5                      | 293   | 1.5                                   | 1.5                                    | 6.4                                    | 6.4                                     | 0.38                    | 1.77 | 2.64 | 1.73 | 2880                      | 6200  | 103          | Figure 1 |
| EE135111DW/135155-135156DW/HEC9      | Intermediate Roll              | 279.4                   | 393.7   | 269.875 | 269.875 | 370.5                      | 293   | 1.5                                   | 1.5                                    | 6.4                                    | 6.4                                     | 0.38                    | 1.77 | 2.64 | 1.73 | 2040                      | 6200  | 103          | Figure 1 |
| 3806/279.4-XRS/HC                    | Working Roll                   | 297.4                   | 393.7   | 320     | 320     | 370                        | 295.5 |                                       |                                        | 3.2                                    | 3.2                                     | 0.4                     | 1.69 | 2.51 | 1.65 | 2500                      | 7200  | 120          | Figure 3 |
| M255449DW/M255410-M255410D           | Working Roll                   | 288.925                 | 406.4   | 298.45  | 298.45  | 383                        | 302   | 3.3                                   | 3.3                                    | 3.3                                    | 3.3                                     | 0.338                   | 2    | 2.97 | 1.95 | 3400                      | 8150  | 125          | Figure 1 |
| M255449D/M255410-M255410D            | Working Roll                   | 288.925                 | 406.4   | 298.45  | 298.45  | 383                        | 302   | 3.3                                   | 3.3                                    | 3.3                                    | 3.3                                     | 0.338                   | 2    | 2.97 | 1.95 | 3400                      | 8150  | 125          | Figure 1 |
| M257248DW/M257210-M257210D           | Working Roll                   | 304.902                 | 412.648 | 266.7   | 266.7   | 393                        | 318   | 3.3                                   | 3.3                                    | 3.3                                    | 3.3                                     | 0.319                   | 2.12 | 3.15 | 2.07 | 2930                      | 7000  | 102          | Figure 1 |
| LM761648D/LM761610-LM761610D-3       | Working Roll                   | 341.312                 | 457.098 | 254     | 254     | 434.5                      | 355   | 2                                     | 1.5                                    | 3.3                                    | 3.3                                     | 0.47                    | 1.43 | 2.14 | 1.4  | 2490                      | 7050  | 112          | Figure 1 |
| LM761648D/LM761610-LM761610D         | Working Roll                   | 341.312                 | 457.098 | 254     | 254     | 434.5                      | 355   | 2                                     | 1.5                                    | 3.3                                    | 3.3                                     | 0.47                    | 1.43 | 2.14 | 1.4  | 2490                      | 7050  | 112          | Figure 1 |
| KEE971355DW/K972100-K972103D/HG2     | Working Roll&Intermediate Roll | 342.9                   | 533.4   | 301.625 | 307.975 | 502                        | 368.5 | 3.3                                   | 3.3                                    | 3.3                                    | 3.3                                     | 0.333                   | 2.03 | 3.02 | 1.98 | 3660                      | 8460  | 246          | Figure 1 |
| LM761649DW/LM761610-LM761610D        | Working Roll&Intermediate Roll | 343.052                 | 457.098 | 254     | 254     | 434.5                      | 351.5 | 2                                     | 1.5                                    | 3.3                                    | 3.3                                     | 0.471                   | 1.43 | 2.14 | 1.4  | 2670                      | 7350  | 110          | Figure 1 |
| LM761649D/LM761610-LM761610D-3       | Working Roll&Intermediate Roll | 343.052                 | 457.098 | 254     | 254     | 434.5                      | 351.5 | 2                                     | 1.5                                    | 3.3                                    | 3.3                                     | 0.471                   | 1.43 | 2.14 | 1.4  | 2260                      | 7000  | 110          | Figure 1 |
| LM761649DSH/LM761610SH-LM761610DSH-3 | Intermediate Roll              | 343.052                 | 457.098 | 254     | 254     | 433.5                      | 355.5 | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.471                   | 1.43 | 2.14 | 1.4  | 2800                      | 6900  | 111          | Figure 1 |
| 3806/368.3/HCEP59YAD                 | Vertical Roll                  | 368.3                   | 523.875 | 419.96  | 419.96  | 511                        | 385.5 |                                       |                                        | 1.5                                    | 1.5                                     | 0.333                   | 2.03 | 3.02 | 1.98 | 5800                      | 14900 | 284          | Figure 4 |
| EE231475D/231975-231976D             | Working Roll&Intermediate Roll | 374.65                  | 501.65  | 250.825 | 260.35  | 476.5                      | 388   | 1.5                                   | 1.5                                    | 3.3                                    | 3.3                                     | 0.446                   | 1.51 | 2.25 | 1.48 | 3120                      | 7550  | 141          | Figure 1 |
| HM266449DW/HM266410-HM266410CD       | Working Roll&Intermediate Roll | 384.175                 | 546.1   | 400.05  | 400.05  | 514.5                      | 397   | 3.3                                   | 3.3                                    | 6.4                                    | 6.4                                     | 0.333                   | 2.03 | 3.02 | 1.98 | 6120                      | 16400 | 310          | Figure 2 |
| M667947DGW/M667911-M667911D/ZP-1     | Working Roll                   | 409.575                 | 546.1   | 334.962 | 334.962 | 519                        | 425   | 1.5                                   | 1.5                                    | 6.4                                    | 6.4                                     | 0.416                   | 1.62 | 2.42 | 1.59 | 4400                      | 11500 | 213          | Figure 2 |
| 1-7016                               | Working Roll                   | 409.575                 | 546.1   | 334.962 | 334.962 | 519.5                      | 425   | 1.5                                   | 1.5                                    | 6.4                                    | 6.4                                     | 0.416                   | 1.62 | 2.42 | 1.59 | 3900                      | 11700 | 201          | Figure 1 |
| M272647D/M272610-M272610D-3/C9       | Back-up Roll                   | 482.6                   | 647.7   | 417.512 | 417.512 | 615.5                      | 495   | 3.3                                   | 3.3                                    | 6.4                                    | 6.4                                     | 0.333                   | 2.03 | 3.02 | 1.98 | 7000                      | 18700 | 383          | Figure 5 |
| M270749DGW/M270710-M270710D          | Backup Roll                    | 447.675                 | 635     | 463.55  | 463.55  | 598.5                      | 470   | 3.3                                   | 3.3                                    | 6.4                                    | 6.4                                     | 0.333                   | 2.03 | 3.02 | 1.98 | 8150                      | 21000 | 485          | Figure 2 |
| M270448DGW/M270410/DB-3              | Backup Roll                    | 449.949                 | 594.949 | 368     | 368     | 567                        | 465   | 4                                     | 4                                      | 8                                      | 8                                       | 0.333                   | 2.03 | 3.02 | 1.98 | 4900                      | 15700 | 300          | Figure 2 |
| EE425176D/425299-425299D-3           | Working Roll&Backup Roll       | 456.794                 | 761.873 | 527.05  | 527.05  | 708                        | 495   | 3.3                                   | 3.3                                    | 6.4                                    | 6.4                                     | 0.444                   | 1.52 | 2.26 | 1.49 | 10600                     | 22900 | 973          | Figure 5 |



# Inch Series Four-row Tapered Roller Bearings

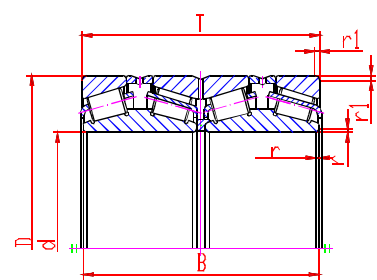


Figure 1

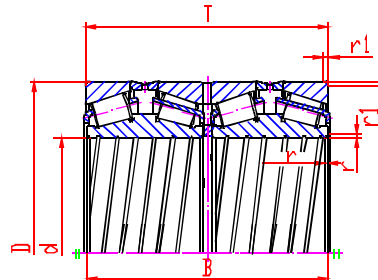


Figure 2

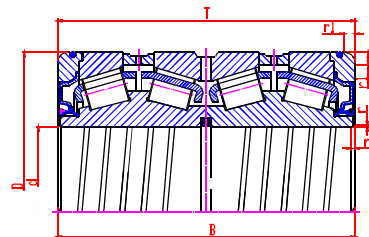


Figure 3

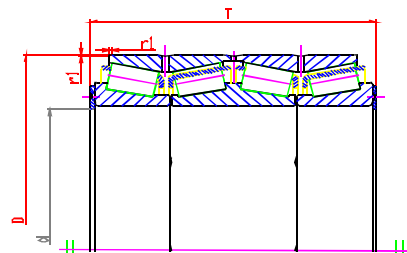


Figure 4

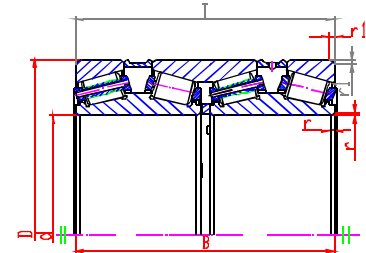


Figure 5

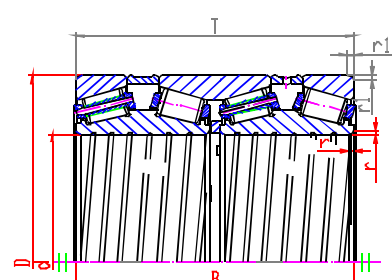


Figure 6

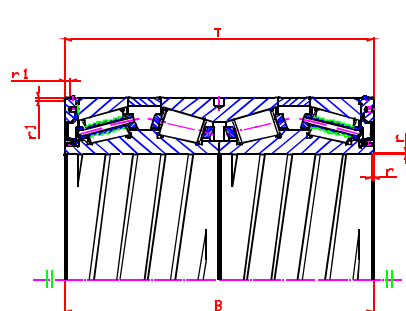


Figure 7

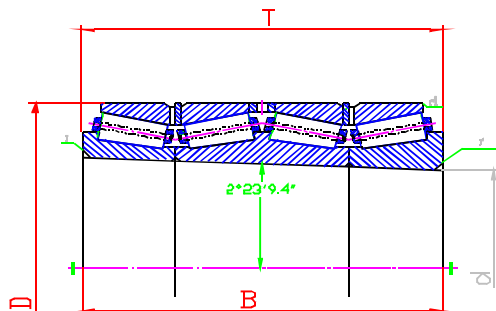
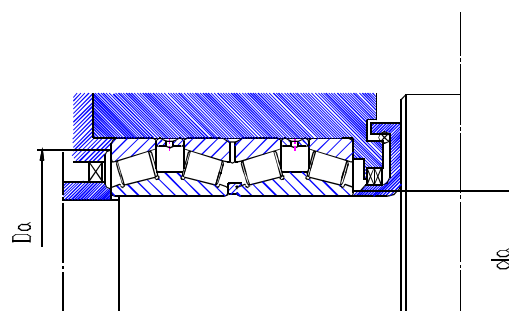
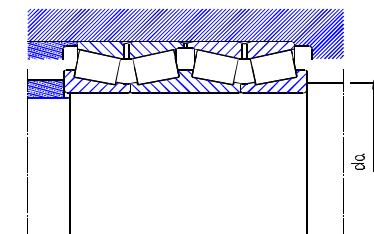


Figure 8



Mounted



Mounted

| Designations                         | Working Position                        | Basic Dimensions ( mm ) |         |         |         | Mounting Dimensions ( mm ) |       | Chamfer Dimensions        |                            |                            |                             | Calculation Coefficient |      |      |      | Basic Load Ratings ( kN ) |       | Weigh ( kg ) | Patterns |
|--------------------------------------|-----------------------------------------|-------------------------|---------|---------|---------|----------------------------|-------|---------------------------|----------------------------|----------------------------|-----------------------------|-------------------------|------|------|------|---------------------------|-------|--------------|----------|
|                                      |                                         | d                       | D       | B       | T       | Da                         | da    | rmin<br>(Axial Direction) | rmin<br>(Radial Direction) | r1min<br>(Axial Direction) | r1min<br>(Radial Direction) | e                       | Y1   | Y2   | Yo   | Cr                        | Cor   |              |          |
| LM272249DW/LM272210-LM272210D        | Working Roll&Backup Roll<br>Backup Roll | 482.6                   | 615.95  | 330.2   | 330.2   | 593                        | 494.5 | 6.4                       | 6.4                        | 6.4                        | 6.4                         | 0.333                   | 2.03 | 3.02 | 1.98 | 4860                      | 15200 | 252          | Figure 5 |
| M272647D/M272610-M272610D-3/C9       |                                         | 482.6                   | 647.7   | 417.512 | 417.512 | 615.5                      | 495   | 3.3                       | 3.3                        | 6.4                        | 6.4                         | 0.333                   | 2.03 | 3.02 | 1.98 | 7000                      | 18700 | 383          | Figure 5 |
| M274149DW/M274110-M274110D           | Working Roll&Backup Roll                | 501.65                  | 711.2   | 520.7   | 520.7   | 669.5                      | 525   | 3.3                       | 3.3                        | 6.4                        | 6.4                         | 0.352                   | 1.92 | 2.86 | 1.88 | 9690                      | 26900 | 687          | Figure 6 |
| LM274049DW/LM274010-LM274010D        | Working Roll&Backup Roll                | 508                     | 695.325 | 415.925 | 415.925 | 662                        | 531   | 3.3                       | 3.3                        | 6.4                        | 6.4                         | 0.333                   | 2.03 | 3.02 | 1.98 | 5800                      | 19600 | 464          | Figure 5 |
| 3806/558X4-2RS/HCC9-1                | Working Roll&Backup Roll                | 558.8                   | 736.6   | 409.575 | 409.575 | 705                        | 572.5 | 3.3                       | 3.3                        | 6.4                        | 6.4                         | 0.346                   | 1.95 | 2.9  | 1.91 | 6500                      | 20000 | 456          | Figure 7 |
| LM278849DGWX2/LM278810-LM278810D-XRS | Working Roll                            | 585.788                 | 771.525 | 567     | 567     | 737                        | 602   |                           |                            | 6.4                        | 6.4                         | 0.333                   | 2.03 | 3.02 | 1.98 | 8100                      | 26700 | 676          | Figure 3 |
| 3806/595X4/HCP59YAB                  | Backup Roll                             | 595.312                 | 844.55  | 615.95  | 615.95  | 799                        | 626   | 3.3                       | 3.3                        | 6.4                        | 6.4                         | 0.333                   | 2.03 | 3.02 | 1.98 | 13600                     | 36900 | 1125         | Figure 2 |
| M280249DWA6-M280210A6-M280210D       | Working Roll                            | 603.25                  | 857.25  | 622.3   | 622.3   | 808                        | 624.5 |                           |                            |                            |                             | 0.333                   | 2.01 | 3    | 1.97 | 14000                     | 38900 | 1172         | Figure 6 |
| EE649241D/649310-649311D             | Working Roll                            | 609.6                   | 787.4   | 361.95  | 361.95  | 754                        | 632.5 | 3.3                       | 3.3                        | 6.4                        | 6.4                         | 0.372                   | 1.82 | 2.7  | 1.78 | 7100                      | 22000 | 460          | Figure 1 |
| 3806/660X4/HC                        | Working Roll                            | 660.011                 | 855.015 | 319.99  | 319.99  | 816.5                      | 677   | 12                        | 12                         | 5.2                        | 5.2                         | 0.516                   | 1.31 | 1.95 | 1.28 | 4750                      | 17000 | 495          | Figure 5 |
| M282249D/M282210-M282210D            | Working Roll                            | 682.625                 | 965.2   | 701.675 | 701.675 | 911.5                      | 711   | 3.3                       | 3.3                        | 6.4                        | 6.4                         | 0.344                   | 1.96 | 2.93 | 1.92 | 17400                     | 50000 | 1714         | Figure 5 |
| 3806/707X4K/HC                       | Backup Roll                             | 707.496                 | 1079.5  | 844.55  | 844.55  | 1018                       | 811.5 | 9.7                       | 9.7                        | 3.3                        | 3.3                         | 0.333                   | 2.03 | 3.02 | 1.98 | 22500                     | 65500 | 2581         | Figure 8 |
| 1-7029                               | Backup Roll                             | 711                     | 914.4   | 390     | 420     | 880.5                      | 730.5 | 6.4                       | 6.4                        | 6.4                        | 6.4                         | 0.38                    | 1.78 | 2.65 | 1.74 | 6200                      | 19400 | 671          | Figure 8 |
| 3806/711X4-XRS                       | Backup Roll                             | 711.2                   | 914.4   | 390     | 390     | 880.5                      | 735   |                           |                            | 7.5                        | 7.5                         | 0.38                    | 1.78 | 2.65 | 1.74 | 7900                      | 20100 | 620          | Figure 3 |
| LM282847D/LM282810-LM282810D         | Working Roll                            | 717.55                  | 946.15  | 565.15  | 565.15  | 903                        | 742.5 | 3.3                       | 3.3                        | 6.4                        | 6.4                         | 0.333                   | 2.03 | 3.02 | 1.98 | 13300                     | 41000 | 1085         | Figure 5 |
| 3806/749.3/HC-JG                     | Working Roll                            | 749.3                   | 990.6   | 605     | 605     | 946.5                      | 778.5 | 4                         | 4                          | 8                          | 8                           | 0.319                   | 2.12 | 3.15 | 2.07 | 13000                     | 45300 | 1284         | Figure 6 |
| M284249DW/M284210-M284210D           | Backup Roll                             | 762                     | 1079.5  | 787.4   | 787.4   | 1018.5                     | 799   | 4.8                       | 4.8                        | 12.7                       | 12.7                        | 0.328                   | 2.06 | 3.06 | 2.01 | 20500                     | 61900 | 2340         | Figure 5 |
| LM286230T-46TD-49T/10/C9YA6          | Backup Roll                             | 803.803                 | 1130.3  | 717.551 | 717.551 | 1080.5                     | 900   | 9.7                       | 9.7                        | 3.3                        | 3.3                         | 0.333                   | 2.03 | 3.02 | 1.98 | 19500                     | 62000 | 2160         | Figure 8 |

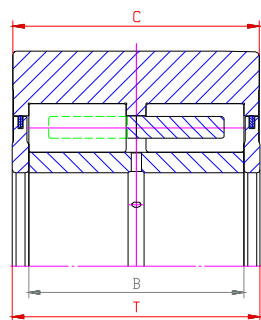


Figure 1

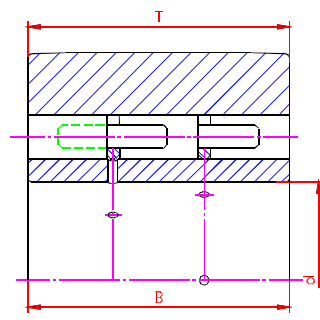


Figure 2

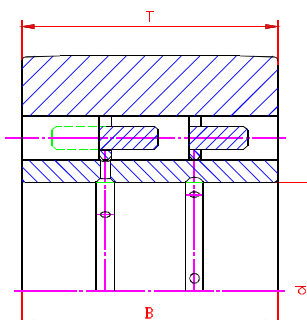


Figure 3

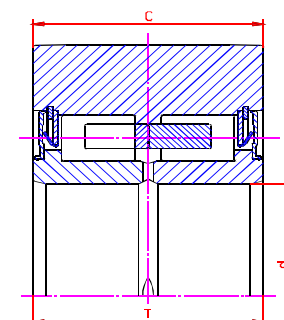


Figure 4

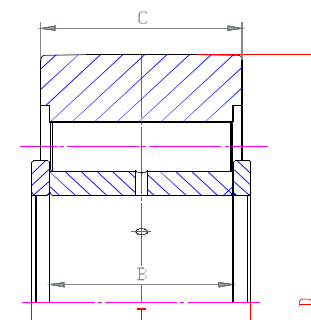


Figure 5

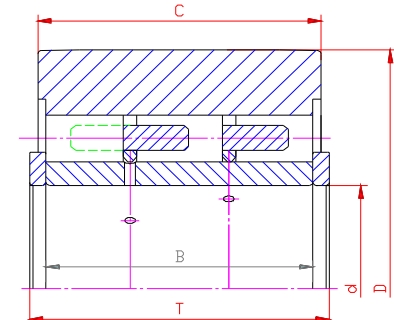


Figure 6

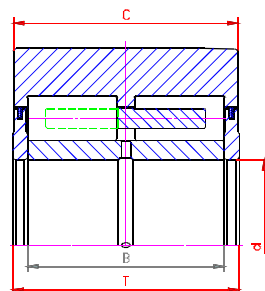


Figure 7

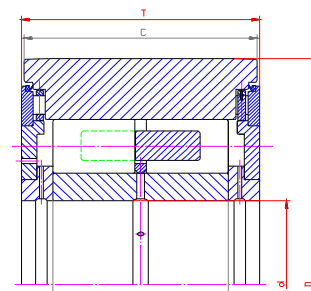


Figure 8

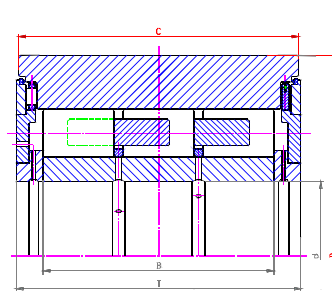


Figure 9

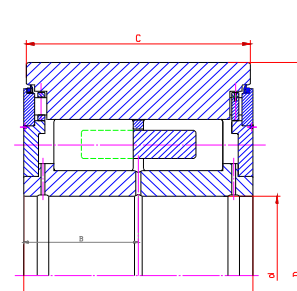


Figure 10

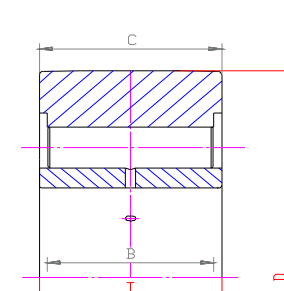


Figure 11

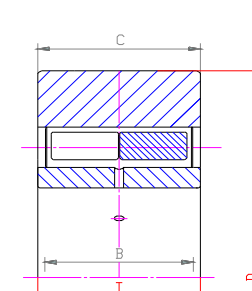


Figure 12

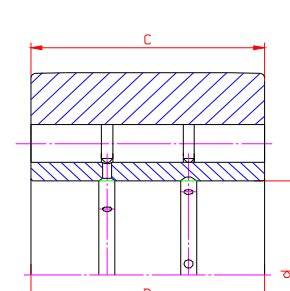


Figure 13

| Designations     | Basic Dimensions ( mm ) |        |      | Basic Load Ratings(KN) |      | Limit Speed Ratings(r/min) |                 | Weight kg | Patterns  |
|------------------|-------------------------|--------|------|------------------------|------|----------------------------|-----------------|-----------|-----------|
|                  | d                       | D      | B    | Cr                     | Cor  | Grease Lubrication         | Oil Lubrication |           |           |
| BNPF102256/2RZ   | 50                      | 110    | 56   | 194                    | 309  | 4800                       | 6000            | 2.9       | Figure 7  |
| BNPF112564X1-2RZ | 55                      | 126    | 64   | 172                    | 260  | 4800                       | 6000            | 4.53      | Figure 7  |
| BNUP112452       | 55                      | 120    | 52   | 155                    | 219  | 4800                       | 6000            | 3.4       | Figure 5  |
| BNUPA112452      | 55                      | 120    | 52   | 171                    | 237  | 4800                       | 6000            | 33.5      | Figure 6  |
| BKBF112452       | 55                      | 120    | 52.2 | 168                    | 372  | 4800                       | 6000            | 3.5       | Figure 5  |
| BNNB112460/BH1   | 55                      | 120    | 60   | 208                    | 356  | 4800                       | 6000            | 3.8       | Figure 11 |
| BNUP112464       | 55                      | 120    | 64   | 206                    | 317  | 4800                       | 6000            | 4.2       | Figure 5  |
| BNPF123075-2RZ   | 60                      | 150    | 75   | 270                    | 390  | 3800                       | 4800            | 7.85      | Figure 7  |
| BNNB123374       | 60                      | 165    | 74   | 357                    | 530  | 3800                       | 4500            | 10        | Figure 11 |
| BNBA133370       | 65                      | 165    | 70   | 361                    | 472  | 3800                       | 4500            | 9.5       | Figure 12 |
| BNUP143275       | 70                      | 160    | 75   | 190                    | 360  | 3600                       | 4500            | 9         | Figure 5  |
| BNUP143290/2RZ   | 70                      | 160    | 90   | 347                    | 550  | 3600                       | 4500            | 10        | Figure 7  |
| BNPF143290/2RZ   | 70                      | 160    | 90   | 425                    | 720  | 3600                       | 4500            | 10.5      | Figure 7  |
| BNTB143290/IS    | 70                      | 160.02 | 90   | 393                    | 695  | 3600                       | 4500            | 10        | Figure 3  |
| BNTF143290/IS    | 70                      | 160.02 | 90   | 435                    | 846  | 3600                       | 4500            | 10.5      | Figure 3  |
| BNTF143290       | 70                      | 160.02 | 90   | 435                    | 846  | 3600                       | 4500            | 10.5      | Figure 13 |
| BNBA184494       | 90                      | 220    | 94   | 690                    | 1000 | 2600                       | 3400            | 21.5      | Figure 12 |
| BNAF184494       | 90                      | 220    | 94   | 762                    | 1140 | 2600                       | 3400            | 21        | Figure 12 |
| BNTBP1844120     | 90                      | 220    | 120  | 625                    | 1110 | 2600                       | 3400            | 26.5      | Figure 6  |
| BNTPF1844120     | 90                      | 220    | 120  | 732                    | 1360 | 2600                       | 3400            | 27        | Figure 6  |
| BNTF1844120      | 90                      | 220.02 | 120  | 810                    | 1600 | 2600                       | 3400            | 27.5      | Figure 3  |
| BNUP204596       | 100                     | 225    | 96   | 543                    | 830  | 2400                       | 3000            | 22.5      | Figure 5  |
| BNUP2045120/2RZ  | 100                     | 225    | 120  | 672                    | 1090 | 2400                       | 3000            | 28        | Figure 7  |
| BNPF2045120/2RZ  | 100                     | 225    | 120  | 795                    | 1370 | 2400                       | 3000            | 28        | Figure 7  |
| BNUP2045120/BH1  | 100                     | 225    | 120  | 272                    | 1090 | 2400                       | 3000            | 28        | Figure 7  |
| BNPF2045120/BH1  | 100                     | 225    | 120  | 795                    | 1370 | 2400                       | 3000            | 28        | Figure 5  |
| BNTB2045120/IS   | 100                     | 225    | 120  | 740                    | 1410 | 2400                       | 3000            | 24.5      | Figure 3  |
| BNTF2045120      | 100                     | 225    | 120  | 850                    | 1700 | 2400                       | 3000            | 28        | Figure 3  |
| BNBA225298       | 110                     | 260    | 98   | 782                    | 1180 | 2000                       | 2400            | 31        | Figure 12 |
| BNPBF2252110     | 110                     | 260    | 110  | 849                    | 1370 | 2000                       | 2400            | 35        | Figure 5  |

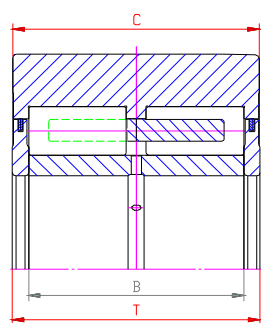


Figure 1

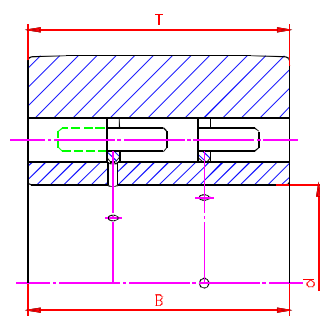


Figure 2

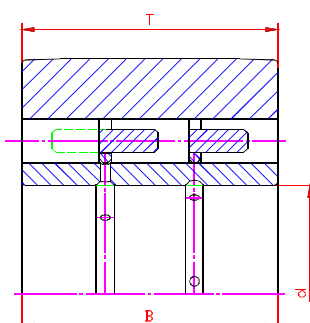


Figure 3

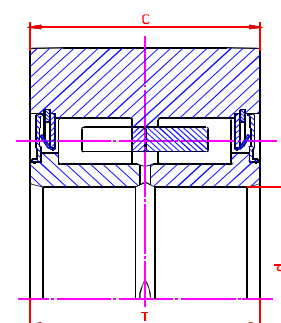


Figure 4

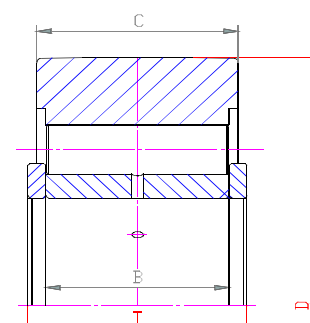


Figure 5

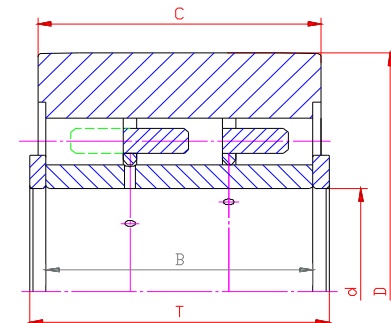


Figure 6

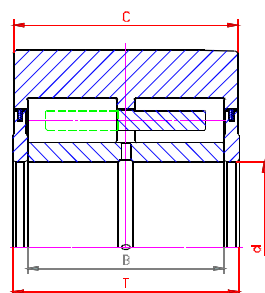


Figure 7

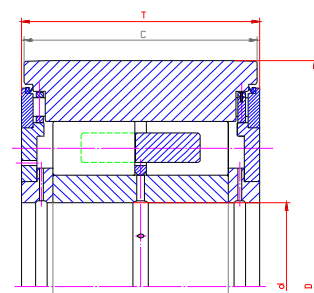


Figure 8

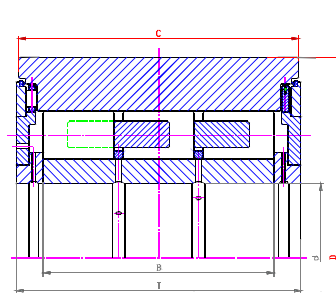


Figure 9

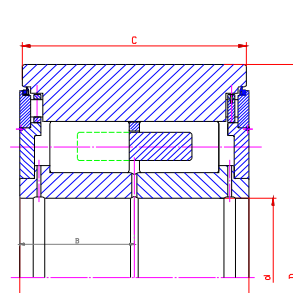


Figure 10

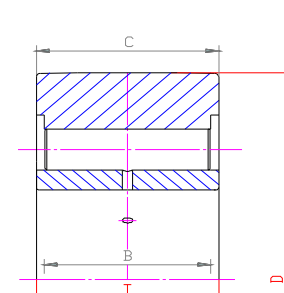


Figure 11

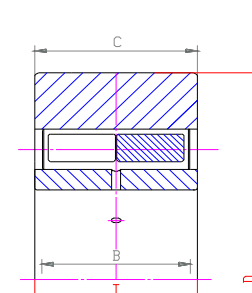


Figure 12

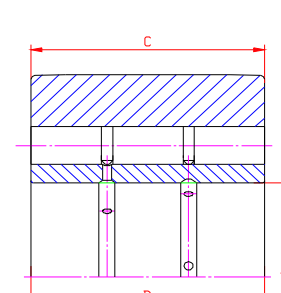
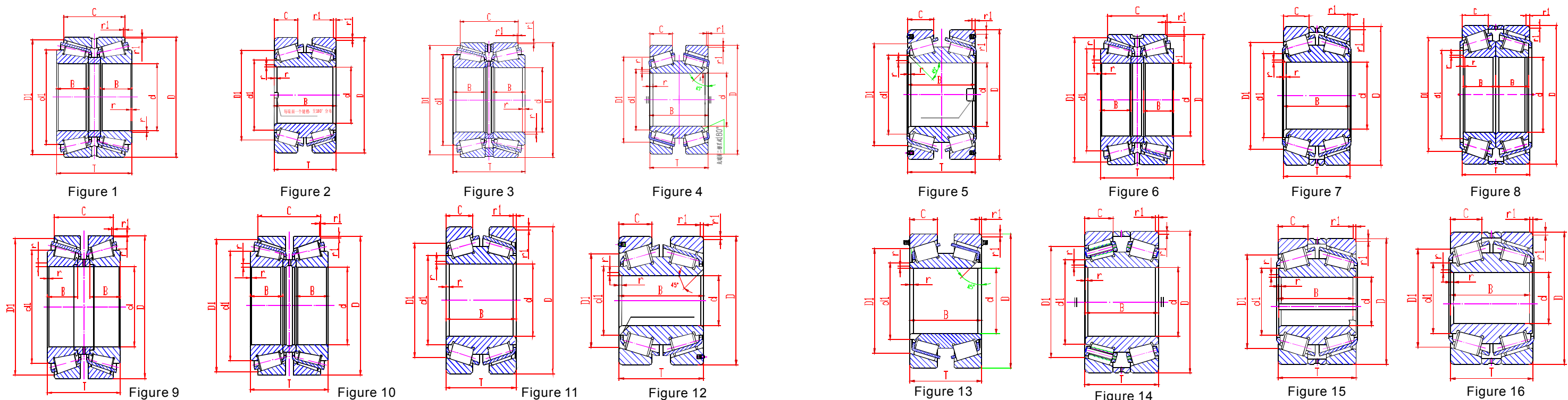


Figure 13

| Designations    | Basic Dimensions ( mm ) |        |         | Basic Load Ratings(KN) |      | Limit Speed Ratings(r/min) |                 | Weight kg | Patterns  |
|-----------------|-------------------------|--------|---------|------------------------|------|----------------------------|-----------------|-----------|-----------|
|                 | d                       | D      | B       | Cr                     | Cor  | Grease Lubrication         | Oil Lubrication |           |           |
| BNBA2252125     | 110                     | 260    | 125     | 1010                   | 1630 | 2000                       | 2400            | 40        | Figure 12 |
| SJ-NNUP130-2ZL  | 130                     | 300.02 | 150     | 1450                   | 2430 | 1800                       | 2200            | 70.1      | Figure 1  |
| SJ-TCNB130-1    | 130                     | 300    | 172.664 | 1510                   | 2790 | 1800                       | 2200            | 72.9      | Figure 2  |
| SJ-TCNB130      | 130                     | 300    | 172.64  | 1720                   | 2670 | 1800                       | 2200            | 72.3      | Figure 2  |
| SJ-TCNB130-2    | 130                     | 300    | 172.64  | 1830                   | 2900 | 1800                       | 2200            | 73.6      | Figure 2  |
| SJ-TCNB130/WN26 | 130                     | 300    | 172.64  | 1720                   | 2670 | 1800                       | 2200            | 72.2      | Figure 3  |
| BNUP2660150     | 130                     | 300.02 | 150     | 1150                   | 2150 | 1800                       | 2200            | 61.5      | Figure 5  |
| BNUPA2260160    | 130                     | 300.02 | 160     | 1250                   | 2170 | 1800                       | 2200            | 64.5      | Figure 5  |
| BNTF2260160     | 130                     | 300.02 | 160     | 1510                   | 2770 | 1800                       | 2200            | 65.5      | Figure 3  |
| BNUP2660172     | 130                     | 300.02 | 172.6   | 1480                   | 2690 | 1800                       | 2200            | 68        | Figure 5  |
| BNTB2660172     | 130                     | 300.02 | 172.6   | 1570                   | 2910 | 1800                       | 2200            | 72.5      | Figure 3  |
| BNTF2660172     | 130                     | 300.02 | 172.6   | 1670                   | 3230 | 1800                       | 2200            | 71.5      | Figure 3  |
| BNUP2660172/2RZ | 130                     | 300.02 | 172.6   | 1320                   | 2100 | 1800                       | 2200            | 70        | Figure 7  |
| BNUP2660172     | 130                     | 300.02 | 172.6   | 1320                   | 2100 | 1800                       | 2200            | 70        | Figure 5  |
| SJ-NNJ180-2RS   | 180                     | 406.42 | 85.52   | 1450                   | 2770 | 1200                       | 1500            | 125       | Figure 4  |
| SJ-NP180        | 180                     | 410    | 67.5    | 1250                   | 2050 | 1200                       | 1500            | 58.5      | Figure 5  |
| SJ-TCNB180      | 180                     | 406.42 | 171.04  | 2360                   | 4050 | 1200                       | 1500            | 130       | Figure 3  |
| SJ-TCNP180      | 180                     | 410    | 210     | 2500                   | 4950 | 1200                       | 1500            | 170       | Figure 6  |
| BNPF3697212     | 180                     | 485    | 145.7   | 2740                   | 3680 | 1000                       | 1300            | 230       | Figure 8  |
| BNPF3697344     | 180                     | 485    | 278     | 4550                   | 7050 | 1000                       | 1300            | 380       | Figure 9  |
| BNUP3681171     | 180                     | 406.4  | 171     | 1860                   | 3120 | 1200                       | 1500            | 130       | Figure 5  |
| BNUP3681224/2RZ | 180                     | 406.4  | 224     | 2360                   | 4250 | 1200                       | 1500            | 170       | Figure 7  |
| BNUP3681224/BH1 | 180                     | 406.4  | 224     | 2360                   | 4520 | 1200                       | 1500            | 170       | Figure 5  |
| BNTPA3681171    | 180                     | 406.42 | 171     | 1760                   | 3270 | 1200                       | 1500            | 130       | Figure 6  |
| BNTB3681171/IS  | 180                     | 406.42 | 171     | 1910                   | 3640 | 1200                       | 1500            | 130       | Figure 3  |
| BNTF3681171/BH1 | 180                     | 406.42 | 171     | 2020                   | 3700 | 1200                       | 1500            | 130       | Figure 3  |
| BNTB3681217     | 180                     | 406.42 | 217     | 2440                   | 4370 | 1200                       | 1500            | 165       | Figure 3  |
| BNTB3681224     | 180                     | 406.42 | 224     | 2440                   | 4730 | 1200                       | 1500            | 170       | Figure 3  |
| BNTB3681224/BH2 | 180                     | 406.42 | 224     | 2440                   | 4730 | 1200                       | 1500            | 170       | Figure 3  |
| BNPF3897212X2   | 190                     | 485    | 157.7   | 2950                   | 3850 | 1000                       | 1300            | 233       | Figure 8  |
| BNPF3897350X2   | 190                     | 485    | 154     | 4700                   | 7000 | 1000                       | 1300            | 381       | Figure 10 |
| BNUP4092171     | 200                     | 460    | 171     | 1880                   | 3340 | 1000                       | 1300            | 166       | Figure 7  |
| BNUP4092241     | 200                     | 460    | 241     | 2660                   | 5250 | 1000                       | 1300            | 239       | Figure 7  |





| Designations                           | Working Position   | Basic Dimensions ( mm ) |         |         |        |         |      |       | Other Dimensions ( mm ) |       | Basic Load Ratings ( kN ) |      | Calculation Coefficient |      |      |      | Weight ( kg ) | Patterns |
|----------------------------------------|--------------------|-------------------------|---------|---------|--------|---------|------|-------|-------------------------|-------|---------------------------|------|-------------------------|------|------|------|---------------|----------|
|                                        |                    | d                       | D       | T       | B      | C       | rmin | r1min | Da                      | da    | Cr                        | Cor  | e                       | Y1   | Y2   | Yo   |               |          |
| 352217X2-2                             | Working Roll       | 85                      | 150     | 85      | 36.5   | 66      | 2.5  | 0.5   | 145                     | 100   | 390                       | 620  | 0.42                    | 1.61 | 2.39 | 1.57 | 5.96          | Figure 1 |
| 3706/101X4/HC/W281                     | Working Roll       | 101.6                   | 250.825 | 145     | 145    | 50.5    | 1.5  | 3.3   | 215                     | 120   | 1050                      | 1490 | 0.7                     | 0.96 | 1.44 | 0.94 | 35.1          | Figure 2 |
| KJHM522649/KJHM522610T103/DB           | Gear Box           | 110                     | 180     | 103     | 46     | 85      | 3    | 0.6   | 175                     | 127.5 | 545                       | 1020 | 0.4                     | 1.69 | 2.51 | 1.65 | 9.81          | Figure 3 |
| 352124                                 | Working Roll       | 120                     | 200     | 110     | 48     | 90      | 2    | 0.6   | 193                     | 139   | 600                       | 1060 | 0.3                     | 2.25 | 3.35 | 2.2  | 12.6          | Figure 1 |
| KHM926747/KHM926710D                   | Gear Box           | 127                     | 228.6   | 115.888 | 49.428 | 84.138  | 3.5  | 2.3   | 221.5                   | 155   | 720                       | 1350 | 0.74                    | 0.91 | 1.36 | 0.89 | 19.1          | Figure 1 |
| 74525/74851CD                          | Gear Box           | 133.35                  | 215.9   | 106.362 | 47.625 | 80.962  | 3.5  | 1.5   | 208.5                   | 153.5 | 550                       | 1090 | 0.32                    | 2.11 | 3.14 | 2.06 | 13.7          | Figure 6 |
| 352028/HC                              | Working Roll       | 140                     | 210     | 104     | 45     | 82      | 2.5  | 0.6   | 205                     | 158   | 658                       | 1170 | 0.46                    | 1.47 | 2.18 | 1.43 | 12.1          | Figure 1 |
| 32028T100/DBYB2                        | Gear Box           | 140                     | 210     | 100     | 45     | 78      | 2.5  | 0.5   | 205                     | 158   | 580                       | 1170 | 0.46                    | 1.47 | 2.18 | 1.43 | 12.4          | Figure 3 |
| 370628D/HCYA3/W283                     | Working Roll       | 140                     | 270     | 120     | 120    | 41      | 3    | 3     | 241.5                   | 152.5 | 1100                      | 1600 | 0.7                     | 0.96 | 1.44 | 0.94 | 29.5          | Figure 4 |
| HM231149/HM231111CD                    | Gear Box           | 149.225                 | 236.538 | 131.762 | 56.642 | 106.362 | 3.5  | 1.5   | 228                     | 169   | 815                       | 1540 | 0.32                    | 2.11 | 3.14 | 2.06 | 20.1          | Figure 6 |
| 370632D/HC/W281                        | Intermediate Roll  | 160                     | 343     | 160     | 160    | 53.975  | 3.3  | 3.3   | 298                     | 181.5 | 1520                      | 2290 | 0.81                    | 0.83 | 1.24 | 0.81 | 65.3          | Figure 5 |
| 370634-1/P59                           | Intermediate Roll  | 170                     | 295     | 100     | 100    | 35      | 2.5  | 4     | 267.5                   | 188   | 860                       | 1360 | 0.87                    | 0.78 | 1.16 | 0.76 | 27.8          | Figure 7 |
| KEE222070/K222127CD                    | Gear Box           | 177.8                   | 320.675 | 185.738 | 85.725 | 138.112 | 3.5  | 1.5   | 307.5                   | 214   | 1400                      | 2760 | 0.4                     | 1.69 | 2.51 | 1.65 | 61.5          | Figure 6 |
| 32936/DF                               | Straightening Roll | 180                     | 250     | 90      | 45     | 34      | 0.6  | 2     | 234                     | 199   | 590                       | 1430 | 0.48                    | 1.41 | 2.09 | 1.38 | 13.5          | Figure 8 |
| 352036                                 | Gear Box           | 180                     | 280     | 142     | 64     | 110     | 3    | 1     | 272.5                   | 205.5 | 1070                      | 2220 | 0.42                    | 1.61 | 2.39 | 1.57 | 29.8          | Figure 1 |
| 352136                                 | Vertical Roll      | 180                     | 300     | 164     | 72     | 134     | 3    | 1     | 287                     | 206.5 | 1090                      | 2350 | 0.26                    | 2.6  | 3.87 | 2.54 | 39.9          | Figure 1 |
| 370636D/HCYA3                          | Intermediate Roll  | 180                     | 330     | 190     | 190    | 76      | 1.5  | 5     | 291                     | 194   | 1800                      | 3700 | 0.58                    | 1.16 | 1.73 | 1.14 | 71.6          | Figure 4 |
| H239649NA/239612D(KH239649/KH239612CD) | Working Roll       | 187.325                 | 320.675 | 185.738 | 85.725 | 138.112 | 5.5  | 1.5   | 309                     | 216   | 1590                      | 2830 | 0.32                    | 2.11 | 3.14 | 2.06 | 55.4          | Figure 6 |
| 93787/93127D                           | Working Roll       | 200.025                 | 317.5   | 146.05  | 63.5   | 111.125 | 4.3  | 1.5   | 304.5                   | 230   | 940                       | 2270 | 0.52                    | 1.3  | 1.93 | 1.27 | 40.8          | Figure 1 |
| KEE420801/K421451CD                    | Gear Box           | 203.2                   | 368.3   | 193.675 | 88.897 | 136.525 | 3.3  | 1.5   | 347.5                   | 238   | 1530                      | 2900 | 0.4                     | 1.69 | 2.51 | 1.65 | 78.8          | Figure 6 |
| 352940                                 | Gear Box           | 200                     | 280     | 116     | 51     | 92      | 3    | 1     | 274                     | 221.5 | 750                       | 1770 | 0.4                     | 1.69 | 2.51 | 1.65 | 21            | Figure 1 |

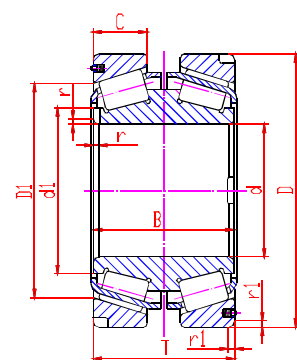


Figure 17

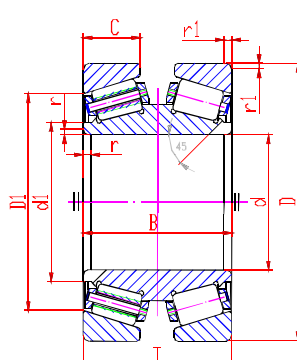


Figure 18

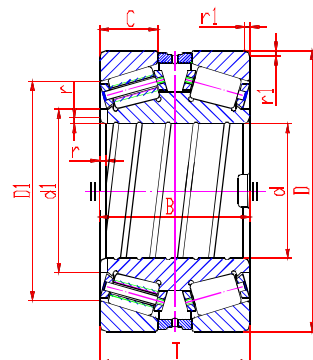


Figure 19

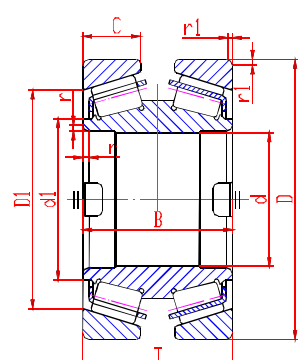


Figure 20

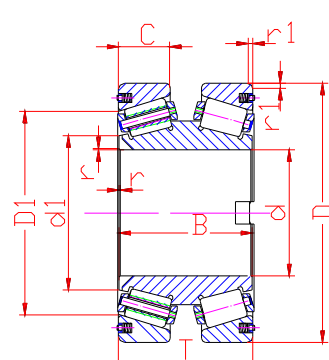


Figure 21

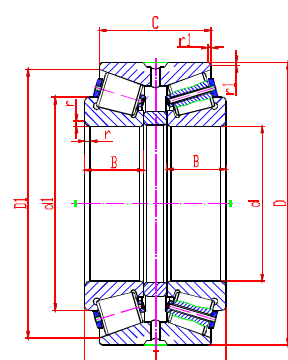


Figure 22

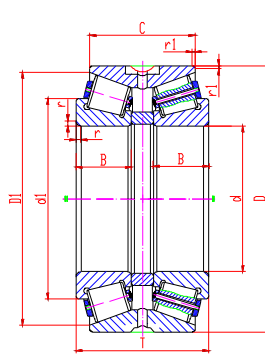
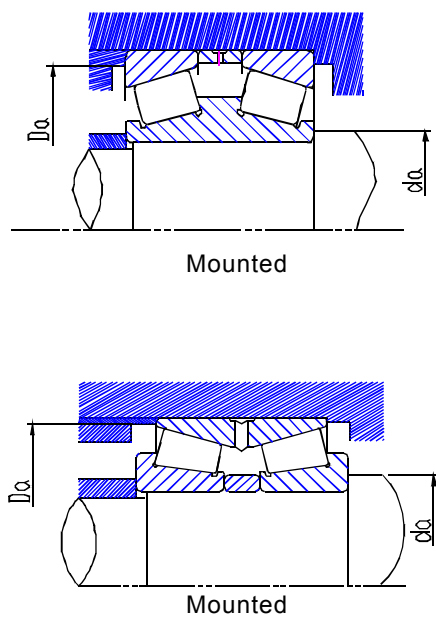
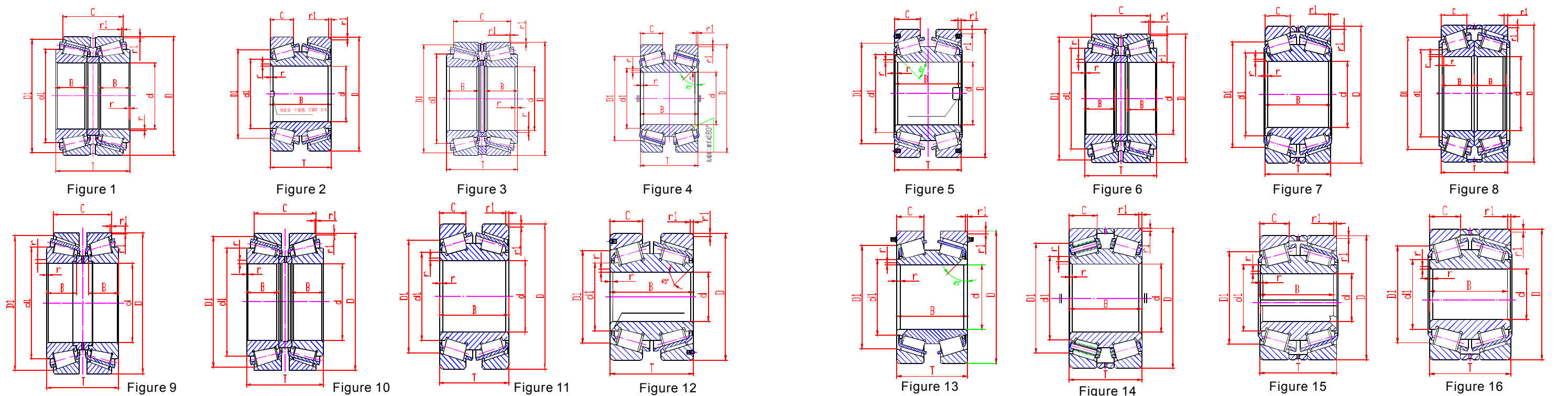


Figure 23



| Designations                                                                           | Working Position                   | Basic Dimensions ( mm ) |         |         |         |         |      |       | Other Dimensions ( mm ) |       | Basic Load Ratings ( kN ) |      | Calculation Coefficient |      |      |      | Weight ( kg ) | Patterns  |
|----------------------------------------------------------------------------------------|------------------------------------|-------------------------|---------|---------|---------|---------|------|-------|-------------------------|-------|---------------------------|------|-------------------------|------|------|------|---------------|-----------|
|                                                                                        |                                    | d                       | D       | T       | B       | C       | rmin | r1min | Da                      | da    | Cr                        | Cor  | e                       | Y1   | Y2   | Yo   |               |           |
| 370642-FM                                                                              | Back-up Roll                       | 210                     | 300     | 100     | 100     | 38      | 2    | 3     | 279                     | 218   | 760                       | 1780 | 0.57                    | 1.18 | 1.76 | 1.16 | 23.2          | Figure 7  |
| 352044X2<br>370644/P59                                                                 | Vertical Roll<br>Intermediate Roll | 220                     | 340     | 164     | 72      | 130     | 4    | 1.1   | 329.5                   | 247.5 | 1530                      | 2980 | 0.35                    | 1.93 | 2.87 | 1.89 | 47.7          | Figure 1  |
|                                                                                        |                                    | 220                     | 360     | 120     | 120     | 39      | 3    | 4     | 327                     | 235.5 | 1000                      | 2000 | 0.87                    | 0.78 | 1.16 | 0.76 | 47.5          | Figure 7  |
| 370646/HG2                                                                             | Working Roll                       | 230                     | 350     | 92      | 92      | 33      | 3    | 4     | 325.5                   | 245.5 | 795                       | 1640 | 0.54                    | 1.25 | 1.86 | 1.22 | 31.9          | Figure 7  |
| KRM249736/M249710CD                                                                    | Gear Box                           | 237.33                  | 358.775 | 152.4   | 71.438  | 117.475 | 6.4  | 1.5   | 349.5                   | 351   | 1530                      | 3090 | 0.33                    | 2.05 | 3.05 | 2    | 53            | Figure 6  |
| 32248/HCC9DBYAB<br>30648/HCC9DBY<br>352048X2/HC-XRBL                                   | Working Roll                       | 240                     | 440     | 270     | 120     | 216     | 5    | 1.5   | 425.5                   | 426.5 | 3200                      | 6300 | 0.43                    | 1.57 | 2.34 | 1.53 | 168           | Figure 9  |
|                                                                                        | Vertical Roll                      | 240                     | 420     | 205     | 87.5    | 155     | 5    |       | 404.5                   | 404.5 | 2550                      | 4100 | 0.44                    | 1.53 | 2.28 | 1.5  | 105           | Figure 9  |
|                                                                                        | Gear Box                           | 240                     | 360     | 165     | 72      | 130     | 4    | 1.1   | 347                     | 348   | 1400                      | 3050 | 0.31                    | 2.18 | 3.24 | 2.13 | 53.2          | Figure 1  |
| KEE923095/923176<br>306/242/HCC9/DB<br>352052X2/HCYAD-XRBL<br>370652D/HC<br>352952X2-3 | Working Roll                       | 241.3                   | 444.5   | 209.55  | 100.012 | 158.75  | 6.4  | 1.5   | 423.5                   | 425   | 2480                      | 4650 | 0.34                    | 1.99 | 2.96 | 1.94 | 135           | Figure 1  |
|                                                                                        | Vertical Roll                      | 242                     | 406     | 206     | 92      | 162     | 4    | 1     | 393.5                   | 394.5 | 2680                      | 5000 | 0.43                    | 1.57 | 2.34 | 1.53 | 101           | Figure 10 |
|                                                                                        | Gear Box                           | 260                     | 400     | 186     | 82      | 146     | 5    | 1.5   | 387.5                   | 389   | 1850                      | 4100 | 0.43                    | 1.57 | 2.34 | 1.53 | 80.7          | Figure 1  |
|                                                                                        | Backup Roll                        | 260                     | 420     | 170     | 170     | 70      | 5    | 5     | 386.5                   | 386.5 | 1970                      | 4050 | 0.48                    | 1.41 | 2.09 | 1.38 | 88.4          | Figure 11 |
|                                                                                        | Back-up Roll                       | 260                     | 360     | 92      | 40      | 62      | 3    | 1     | 350.5                   | 351.5 | 630                       | 1370 | 0.7                     | 0.96 | 1.44 | 0.94 | 25.5          | Figure 1  |
| HM252348/HM252310CD                                                                    | Vertical Roll                      | 260.35                  | 422.275 | 178.592 | 79.771  | 139.7   | 6.8  | 1.5   | 409                     | 298   | 1800                      | 3750 | 0.33                    | 2.05 | 3.05 | 2    | 89.1          | Figure 6  |
| KEE275108/K275156CD                                                                    | Gear Box                           | 273.05                  | 393.7   | 157.162 | 69.85   | 109.538 | 6.4  | 1.5   | 384                     | 305   | 1170                      | 2830 | 0.4                     | 1.69 | 2.51 | 1.65 | 56.3          | Figure 6  |
| EE722110/722186D                                                                       | Working Roll                       | 279.4                   | 469.9   | 200.025 | 93.662  | 149.225 | 9.7  | 1.5   | 449.5                   | 325.5 | 2490                      | 5000 | 0.38                    | 1.78 | 2.64 | 1.74 | 132           | Figure 1  |
| 352056X2<br>370656                                                                     | Backup Roll                        | 280                     | 420     | 186     | 82      | 146     | 5    | 1.3   | 408                     | 312.5 | 1720                      | 4000 | 0.37                    | 1.82 | 2.72 | 1.78 | 81.5          | Figure 1  |
|                                                                                        | Backup Roll                        | 280                     | 389.5   | 92      | 92      | 30      | 4    | 4     | 365.5                   | 292.5 | 870                       | 1880 | 0.82                    | 0.82 | 1.23 | 0.8  | 33.3          | Figure 7  |
| M255449/M255410CD                                                                      | Gear Box                           | 288.925                 | 406.4   | 165.1   | 77.788  | 130.175 | 6.4  | 1     | 395.5                   | 311.5 | 1620                      | 4100 | 0.34                    | 1.99 | 2.96 | 1.94 | 64.1          | Figure 1  |
| 370658D/HCEYAT                                                                         | Intermediate Roll                  | 290                     | 450     | 180     | 180     | 65      | 3    | 4     | 404                     | 302.5 | 2150                      | 4300 | 0.87                    | 0.78 | 1.16 | 0.76 | 103           | Figure 12 |
| 370660D/HCYAD-1<br>350660/C9<br>352060X2/HC<br>370660D/HCYAT<br>351160X2-1/HC-XRBL     | Backup Roll                        | 300                     | 440     | 104.749 | 105     | 35      | 4    | 4     | 408.5                   | 317   | 980                       | 2050 | 0.88                    | 0.77 | 1.14 | 0.75 | 55.4          | Figure 2  |
|                                                                                        | Backup Roll                        | 300                     | 460     | 140     | 62      | 100     | 5    | 1.5   | 436.5                   | 322   | 1450                      | 3000 | 0.41                    | 1.65 | 2.45 | 1.61 | 63.2          | Figure 1  |
|                                                                                        | Backup Roll                        | 300                     | 460     | 210     | 95      | 165     | 5    | 1.3   | 446                     | 337.5 | 2280                      | 4890 | 0.36                    | 1.88 | 2.79 | 1.83 | 118           | Figure 1  |
|                                                                                        | Backup Roll                        | 300                     | 440     | 105     | 105     | 35      | 4    | 4     | 408.5                   | 317   | 1000                      | 2050 | 0.88                    | 0.77 | 1.14 | 0.75 | 48.5          | Figure 13 |
|                                                                                        | Gear Box                           | 300                     | 500     | 203     | 91      | 152     | 5    | 1.5   | 480                     | 346   | 3000                      | 4950 | 0.4                     | 1.69 | 2.51 | 1.65 | 148           | Figure 1  |



| Designations                                    | Working Position         | Basic Dimensions ( mm ) |         |         |         |         |      |       | Other Dimensions ( mm ) |       | Basic Load Ratings ( kN ) |      | Calculation Coefficient |      |      |      | Weight ( kg ) | Patterns  |
|-------------------------------------------------|--------------------------|-------------------------|---------|---------|---------|---------|------|-------|-------------------------|-------|---------------------------|------|-------------------------|------|------|------|---------------|-----------|
|                                                 |                          | d                       | D       | T       | B       | C       | rmin | r1min | Da                      | da    | Cr                        | Cor  | e                       | Y1   | Y2   | Yo   |               |           |
| 370660/HCC9                                     | Backup Roll              | 300                     | 560     | 170     | 170     | 50      | 5    | 5     | 506.5                   | 327.5 | 3520                      | 3800 | 0.81                    | 0.83 | 1.24 | 0.81 | 197           | Figure 14 |
| HM256849/HM256810CD/YA1                         | Gear Box                 | 300.038                 | 422.275 | 174.625 | 82.55   | 136.525 | 6.4  | 1.5   | 410.5                   | 329   | 1560                      | 4050 | 0.34                    | 1.99 | 2.96 | 1.94 | 69.7          | Figure 6  |
| 3706/305X4D/HCEYAD                              | Backup Roll              | 305.034                 | 499.948 | 200.025 | 200.025 | 63.5    | 3.3  | 6.4   | 452.5                   | 329   | 2630                      | 4850 | 0.88                    | 0.77 | 1.14 | 0.75 | 143           | Figure 15 |
| 3706/305X4<br>3706/305X4D/HCYA3-2               | Working Roll&Backup Roll | 305.07                  | 500     | 200     | 200     | 70      | 6.4  | 4.8   | 451.5                   | 322.5 | 1870                      | 3550 | 0.79                    | 0.85 | 1.27 | 0.84 | 122           | Figure 15 |
|                                                 | Working Roll&Backup Roll | 305.07                  | 500     | 200     | 200     | 67      | 6.4  | 4.8   | 451.5                   | 321   | 2350                      | 5020 | 0.88                    | 0.77 | 1.14 | 0.75 | 155           | Figure 2  |
| 3706/305.2D                                     | Working Roll&Backup Roll | 305.2                   | 500     | 200     | 200     | 70      | 6.4  | 4.8   | 451.5                   | 322.5 | 1870                      | 3550 | 0.79                    | 0.85 | 1.27 | 0.84 | 115           | Figure 15 |
| HM259049/HM259010CD<br>KEE291250/K291751CD      | Gear Box                 | 317.5                   | 447.675 | 180.975 | 85.725  | 146.05  | 3.5  | 1.5   | 435                     | 350.5 | 1800                      | 4650 | 0.33                    | 2.05 | 3.05 | 2    | 85.4          | Figure 6  |
|                                                 | Gear Box                 | 317.5                   | 444.5   | 146.05  | 61.912  | 98.425  | 8    | 1.5   | 427.5                   | 344   | 1240                      | 2770 | 0.38                    | 1.78 | 2.64 | 1.74 | 59            | Figure 6  |
| 350664/HCE<br>352064X2-1                        | Back-up Roll             | 320                     | 480     | 151     | 66.5    | 121     | 5    | 1.5   | 464.5                   | 355   | 2090                      | 3500 | 0.32                    | 2.11 | 3.14 | 2.06 | 88.9          | Figure 1  |
|                                                 | Gear Box                 | 320                     | 480     | 215     | 100     | 163     | 5    | 1.1   | 469                     | 360   | 2500                      | 5700 | 0.46                    | 1.47 | 2.18 | 1.43 | 129           | Figure 1  |
| HM261049/HM261010CD/YA1<br>KHM261049D/KHM261010 | Intermediate Roll        | 333.375                 | 469.9   | 190.5   | 90.488  | 152.4   | 6.4  | 1.5   | 457.5                   | 366.5 | 2070                      | 5080 | 0.33                    | 2.05 | 3.05 | 2    | 97.7          | Figure 6  |
|                                                 | Working Roll             | 333.375                 | 469.9   | 166.688 | 166.688 | 71.438  | 3.3  | 3.3   | 443                     | 348   | 2470                      | 5900 | 0.33                    | 2.05 | 3.05 | 2    | 91.5          | Figure 7  |
| 352968X2A/HG2                                   | Back-up Roll             | 340                     | 460     | 160     | 72      | 128     | 4    | 1.5   | 450.5                   | 370   | 1600                      | 4000 | 0.4                     | 1.69 | 2.51 | 1.65 | 70.5          | Figure 1  |
| KLM961548/KLM961511D                            | Gear Box                 | 342.9                   | 457.098 | 142.875 | 63.5    | 101.6   | 3.3  | 1.5   | 449                     | 376.5 | 1180                      | 3550 | 0.7                     | 0.96 | 1.44 | 0.94 | 4.8           | Figure 1  |
| 351072                                          | Working Roll             | 360                     | 540     | 185     | 82      | 140     | 5    | 1.5   | 522.5                   | 400   | 2620                      | 6300 | 0.37                    | 1.82 | 2.72 | 1.78 | 120           | Figure 1  |
| 371976<br>JM966741DW/JM966711W/ZP               | Back-up Roll             | 380                     | 520     | 145     | 145     | 56      | 4    | 4     | 494.5                   | 394   | 2050                      | 4950 | 0.38                    | 1.78 | 2.64 | 1.74 | 89.2          | Figure 16 |
|                                                 | Working Roll             | 380                     | 576.5   | 180     | 180     | 70      | 2    | 4     | 530                     | 405   | 2450                      | 6220 | 0.73                    | 0.92 | 1.38 | 0.9  | 155           | Figure 17 |
| M268730/M268710DC                               | Gear Box                 | 381                     | 590.55  | 244.475 | 114.3   | 193.675 | 6.4  | 1.5   | 574.5                   | 442   | 3550                      | 8800 | 0.33                    | 2.05 | 3.05 | 2    | 245           | Figure 6  |
| HM266448/HM266410CD                             | Gear Box                 | 384.175                 | 546.1   | 222.25  | 104.775 | 177.8   | 6.4  | 1.5   | 531                     | 422.5 | 2910                      | 8200 | 0.33                    | 2.05 | 3.05 | 2    | 160           | Figure 6  |
| 3706/385                                        | Working Roll             | 385                     | 530     | 180     | 180     | 65      | 2    | 4     | 501                     | 400   | 2220                      | 5700 | 0.38                    | 1.78 | 2.64 | 1.74 | 116           | Figure 16 |
| LM665949/LM665910CD                             | Working Roll             | 385.762                 | 514.35  | 177.8   | 82.55   | 139.7   | 6.4  | 1.5   | 503                     | 418.5 | 2050                      | 5600 | 0.42                    | 1.61 | 2.39 | 1.57 | 100           | Figure 6  |



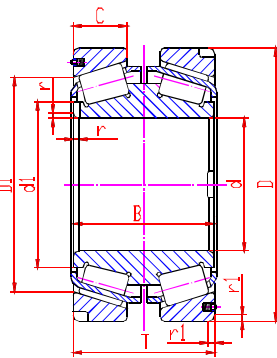


Figure 17

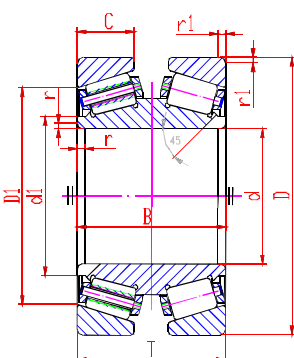


Figure 18

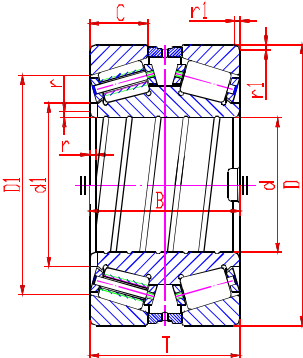


Figure 19

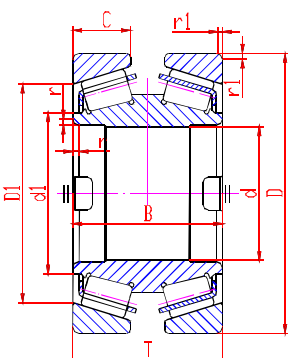


Figure 20

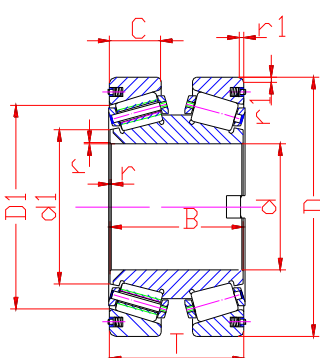


Figure 21

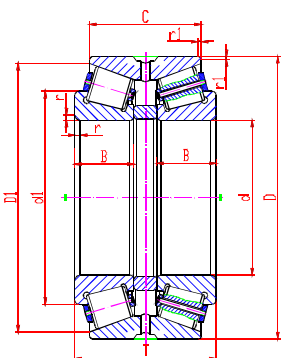


Figure 22

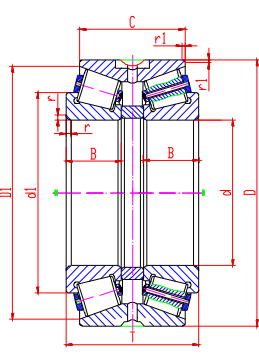
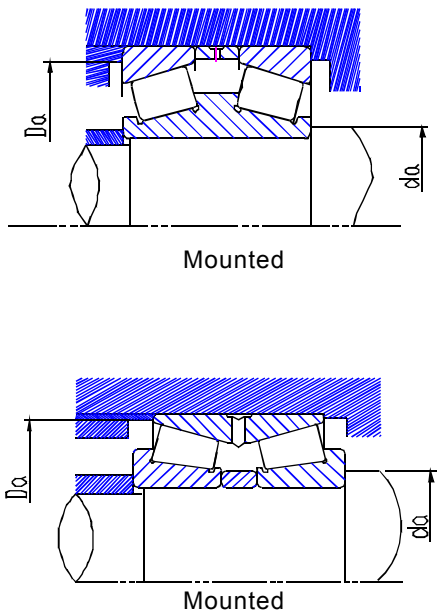
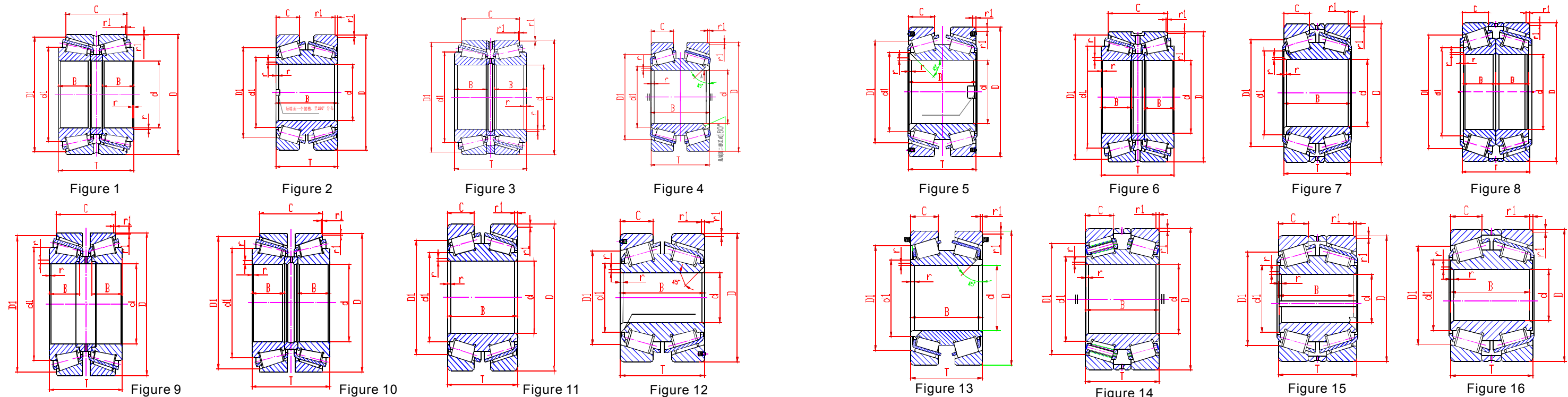


Figure 23



| Designations          | Working Position         | Basic Dimensions ( mm ) |        |         |         |         |      |       | Other Dimensions ( mm ) |       | Basic Load Ratings ( kN ) |       | Calculation Coefficient |      |      |      | Weight ( kg ) | Patterns  |
|-----------------------|--------------------------|-------------------------|--------|---------|---------|---------|------|-------|-------------------------|-------|---------------------------|-------|-------------------------|------|------|------|---------------|-----------|
|                       |                          | d                       | D      | T       | B       | C       | rmin | r1min | Da                      | da    | Cr                        | Cor   | e                       | Y1   | Y2   | Yo   |               |           |
| JM966748DWA/JM966711W | Back-up Roll             | 390                     | 567.5  | 180     | 180     | 70      | 2    | 4     | 525.5                   | 410   | 2450                      | 6220  | 0.73                    | 0.92 | 1.38 | 0.9  | 147           | Figure 17 |
| 351980/HC             | Back-up Roll             | 400                     | 540    | 150     | 65      | 105     | 4    | 1.1   | 526.5                   | 433   | 1650                      | 3850  | 0.45                    | 1.5  | 2.23 | 1.47 | 84.5          | Figure 1  |
| 1-7017                | Back-up Roll             | 400                     | 650    | 240     | 240     | 80      | 6    | 6     | 591                     | 427.5 | 3740                      | 8400  | 0.87                    | 0.78 | 1.16 | 0.76 | 299           | Figure 18 |
| 351080X2-2/C9         | Gear Box                 | 400                     | 600    | 185     | 80      | 148     | 6    | 2.5   | 578.5                   | 445   | 2700                      | 5850  | 0.37                    | 1.82 | 2.72 | 1.78 | 168           | Figure 6  |
| 370680D/HCEYAB        | Back-up Roll             | 400                     | 650    | 240     | 240     | 80      | 6.4  | 6.4   | 591                     | 414   | 3450                      | 8200  | 0.87                    | 0.78 | 1.16 | 0.76 | 289           | Figure 2  |
| 370680D/HCEYAD        | Back-up Roll             | 400                     | 650    | 240     | 240     | 77      | 6    | 6     | 593.5                   | 425   | 3550                      | 7300  | 0.87                    | 0.78 | 1.16 | 0.76 | 279           | Figure 4  |
| 370680D/HCEP6YAD-1    | Back-up Roll             | 400                     | 650    | 240     | 240     | 80      | 6    | 6     | 591                     | 425   | 3400                      | 8400  | 0.87                    | 0.78 | 1.16 | 0.76 | 299           | Figure 18 |
| 370680X2-2/HCC9YAB    | Backup Roll              | 400                     | 650    | 200     | 200     | 60      | 6    | 6     | 592.5                   | 427.5 | 2900                      | 6250  | 1.05                    | 0.64 | 0.96 | 0.63 | 264           | Figure 19 |
| 370680X2D/HCYAB-1     | Back-up Roll             | 400                     | 650    | 200     | 200     | 70      | 6    | 6     | 596                     | 432.5 | 2940                      | 6450  | 0.87                    | 0.78 | 1.16 | 0.76 | 244           | Figure 20 |
| 370680D/HCYA36        | Backup Roll              | 400                     | 650    | 240     | 240     | 80      | 2    | 6     | 591                     | 425   | 3400                      | 8400  | 0.87                    | 0.78 | 1.16 | 0.76 | 299           | Figure 18 |
| 370680D/HCYA3         | Backup Roll              | 400                     | 650    | 240     | 240     | 80      | 6    | 6     | 591                     | 427.5 | 3400                      | 8400  | 0.87                    | 0.78 | 1.16 | 0.76 | 299           | Figure 18 |
| 3706/406.4/HCYAD      | Working Roll             | 406.4                   | 762    | 330     | 330     | 116.5   | 3.3  | 6.4   | 679                     | 450.5 | 6000                      | 13100 | 0.75                    | 0.9  | 1.34 | 0.88 | 660           | Figure 21 |
| EE911600/912401D      | Gear Box                 | 406.4                   | 609.6  | 187.325 | 84.138  | 123.825 | 6.8  | 1.5   | 587.5                   | 452.5 | 2500                      | 5500  | 0.38                    | 1.78 | 2.64 | 1.74 | 169           | Figure 22 |
| KM667947D/KM667910    | Working Roll             | 409.575                 | 546.1  | 161.925 | 161.925 | 66.675  | 1.5  | 6.4   | 519                     | 422   | 2800                      | 6550  | 0.41                    | 1.65 | 2.45 | 1.61 | 104           | Figure 16 |
| M268749/M268710DC     | Gear Box                 | 415.925                 | 590.55 | 244.475 | 114.3   | 193.675 | 6.4  | 1.5   | 574.5                   | 460   | 2820                      | 8050  | 0.33                    | 2.05 | 3.05 | 2    | 205           | Figure 6  |
| 351988                | Backup Roll              | 440                     | 600    | 170     | 74      | 125     | 4    | 1.1   | 584.5                   | 476.5 | 2300                      | 5300  | 0.39                    | 1.73 | 2.58 | 1.69 | 123           | Figure 1  |
| 371092                | Backup Roll              | 460                     | 680    | 230     | 230     | 85      | 4    | 4     | 629.5                   | 475.5 | 3910                      | 9400  | 0.61                    | 1.11 | 1.65 | 1.08 | 293           | Figure 14 |
| 351092                | Working Roll             | 460                     | 680    | 230     | 100     | 175     | 6    | 2.5   | 656.5                   | 508.5 | 3400                      | 7450  | 0.31                    | 2.18 | 3.24 | 2.13 | 253           | Figure 1  |
| KM272749/KM272710D    | Working Roll             | 479.425                 | 679.45 | 276.225 | 128.588 | 222.25  | 6.4  | 1.5   | 662.5                   | 528   | 3800                      | 10900 | 0.33                    | 2.05 | 3.05 | 2    | 307           | Figure 1  |
| 351096                | Backup Roll              | 480                     | 700    | 240     | 100     | 180     | 6    | 2.5   | 677.5                   | 529   | 3100                      | 8200  | 0.41                    | 1.65 | 2.45 | 1.61 | 272           | Figure 1  |
| EE640192/640261CD     | Working Roll             | 488.95                  | 660.4  | 206.375 | 94.458  | 158.75  | 6.4  | 1.5   | 644.5                   | 528.5 | 3000                      | 7600  | 0.31                    | 2.18 | 3.24 | 2.13 | 181           | Figure 6  |
| 3519/500/HC           | Working Roll             | 500                     | 670    | 180     | 78      | 130     | 5    | 1.5   | 653                     | 541.5 | 1340                      | 6200  | 0.43                    | 1.57 | 2.34 | 1.53 | 158           | Figure 1  |
| 3706/500-1/P59        | Backup Roll              | 500                     | 720    | 218     | 185     | 80      | 6    | 6     | 665.5                   | 526   | 3000                      | 7400  | 0.7                     | 0.96 | 1.44 | 0.94 | 288           | Figure 16 |
| 3510/500X2            | Working Roll&Backup Roll | 500                     | 720    | 209     | 94      | 167     | 6    | 3     | 695.5                   | 550   | 3250                      | 7700  | 0.37                    | 1.82 | 2.72 | 1.78 | 256           | Figure 1  |
| M274149/M274110DC     | Gear Box                 | 501.65                  | 711.2  | 292.1   | 136.525 | 231.775 | 6.4  | 1.5   | 693                     | 550.5 | 4500                      | 13400 | 0.35                    | 1.93 | 2.87 | 1.89 | 355           | Figure 23 |



| Designations        | Working Position         | Basic Dimensions ( mm ) |         |         |         |         |      |       | Other Dimensions ( mm ) |       | Basic Load Ratings ( kN ) |       | Calculation Coefficient |      |      |      | Weight ( kg ) | Patterns  |
|---------------------|--------------------------|-------------------------|---------|---------|---------|---------|------|-------|-------------------------|-------|---------------------------|-------|-------------------------|------|------|------|---------------|-----------|
|                     |                          | d                       | D       | T       | B       | C       | rmin | r1min | Da                      | da    | Cr                        | Cor   | e                       | Y1   | Y2   | Yo   |               |           |
| 3706/509X4D/HCP5YAT | Backup Roll              | 509.948                 | 733.425 | 200.025 | 200.025 | 68      | 3.3  | 4.8   | 683.5                   | 537.5 | 3850                      | 8400  | 0.87                    | 0.78 | 1.16 | 0.76 | 265           | Figure 21 |
| M275349D/M275310    | Vertical Roll            | 519.112                 | 736.6   | 258.762 | 258.762 | 111.125 | 3.3  | 6.4   | 694.5                   | 538   | 5200                      | 13300 | 0.33                    | 2.05 | 3.05 | 2    | 352           | Figure 16 |
| EE626210/626321D    | Gear Box                 | 533.4                   | 812.8   | 269.875 | 123.825 | 187.325 | 9.7  | 3.3   | 784                     | 604   | 4650                      | 11100 | 0.44                    | 1.53 | 2.28 | 1.5  | 470           | Figure 22 |
| LM377449/LM377410CD | Gear Box                 | 558.8                   | 736.6   | 225.425 | 104.775 | 177.8   | 6.4  | 1.5   | 720                     | 600   | 4400                      | 12800 | 0.35                    | 1.93 | 2.87 | 1.89 | 256           | Figure 23 |
| 3510/560            | Working Roll             | 560                     | 820     | 260     | 115     | 185     | 6    | 2.5   | 794.5                   | 619   | 2920                      | 5700  | 0.42                    | 1.61 | 2.39 | 1.57 | 449           | Figure 22 |
| 3706/570/HC         | Working Roll             | 570                     | 750     | 240     | 240     | 100     | 6    | 6     | 706.5                   | 584   | 3500                      | 11800 | 0.5                     | 1.35 | 2.01 | 1.32 | 287           | Figure 16 |
| M278749/M278710D    | Gear Box                 | 571.5                   | 812.8   | 333.375 | 155.575 | 263.525 | 6.4  | 1.5   | 793.5                   | 630   | 7700                      | 18000 | 0.33                    | 2.05 | 3.05 | 2    | 529           | Figure 22 |
| 3719/600X2          | Working Roll&Backup Roll | 600                     | 800     | 190     | 190     | 68      | 5    | 4     | 757                     | 614.5 | 3470                      | 9200  | 0.61                    | 1.11 | 1.65 | 1.08 | 270           | Figure 14 |
| 3710/600            | Working Roll&Backup Roll | 600                     | 870     | 270     | 270     | 98      | 6    | 6     | 809.5                   | 619.5 | 5670                      | 14300 | 0.61                    | 1.11 | 1.65 | 1.08 | 726           | Figure 14 |
| 1-7031              | Backup Roll              | 635                     | 939.8   | 304.8   | 304.8   | 110     | 3.3  | 6.4   | 862.5                   | 670   | 5400                      | 9400  | 0.82                    | 0.82 | 1.23 | 0.8  | 721           | Figure 14 |
| 3706/635/HC         | Backup Roll              | 635                     | 939.8   | 304.8   | 304.8   | 110     | 3.3  | 6.4   | 862.5                   | 655   | 5400                      | 9400  | 0.82                    | 0.82 | 1.23 | 0.8  | 721           | Figure 14 |
| 3706/635D/HC        | Backup Roll              | 635                     | 939.8   | 304.8   | 305.105 | 110     | 3.3  | 6.4   | 862.5                   | 670   | 5800                      | 17000 | 0.82                    | 0.82 | 1.23 | 0.8  | 697           | Figure 18 |
| 3706/635/HC-1       | Backup Roll              | 635                     | 940     | 305     | 305     | 107.95  | 3.3  | 6.4   | 858                     | 663.5 | 5800                      | 17000 | 0.88                    | 0.77 | 1.14 | 0.75 | 762           | Figure 14 |
| KL281148/KL281110CD | Gear Box                 | 660.4                   | 812.8   | 203.2   | 95.25   | 158.75  | 6.4  | 1.5   | 798.5                   | 698.5 | 3080                      | 9900  | 0.33                    | 2.05 | 3.05 | 2    | 212           | Figure 6  |
| 3706/724/HC         | Working Roll&Backup Roll | 724                     | 915     | 187     | 187     | 70      | 5    | 5     | 878                     | 747   | 3450                      | 11600 | 0.38                    | 1.78 | 2.64 | 1.74 | 293           | Figure 16 |
| 3519/750            | Working Roll&Backup Roll | 750                     | 1000    | 264     | 112     | 194     | 6    | 2.5   | 974                     | 810   | 4900                      | 15100 | 0.45                    | 1.5  | 2.23 | 1.47 | 542           | Figure 22 |
| 3519/750X2          | Working Roll&Backup Roll | 750                     | 1000    | 255     | 112     | 190     | 6    | 2.5   | 975                     | 810   | 4900                      | 15100 | 0.45                    | 1.5  | 2.23 | 1.47 | 530           | Figure 22 |
| 3706/800/HCC9       | Working Roll&Backup Roll | 800                     | 1100    | 300     | 300     | 112     | 1.5  | 6     | 1025.5                  | 825.5 | 7000                      | 20700 | 0.8                     | 0.84 | 1.26 | 0.83 | 862           | Figure 14 |
| 3706/900/HCYA6      | Working Roll&Backup Roll | 900                     | 1220    | 300     | 300     | 108     | 3.3  | 12.7  | 1140                    | 932.5 | 9100                      | 23000 | 0.81                    | 0.83 | 1.24 | 0.81 | 997           | Figure 18 |

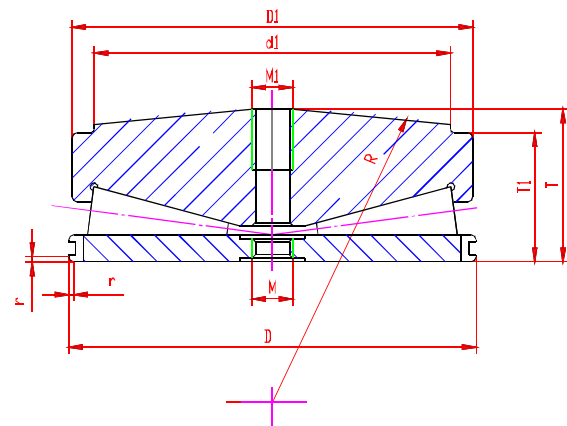


Figure 1

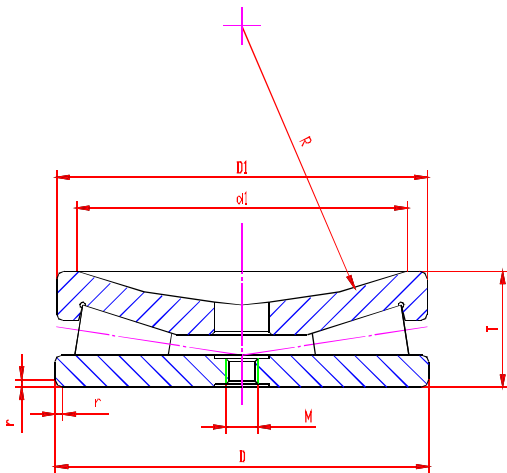
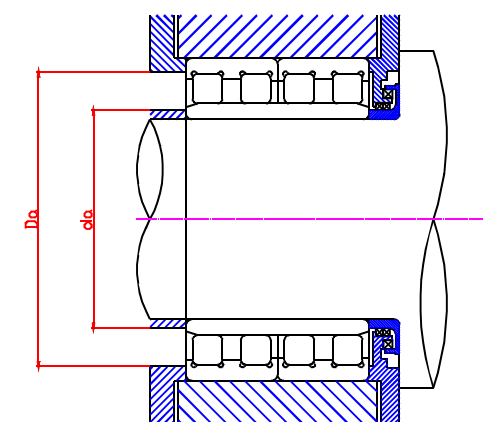
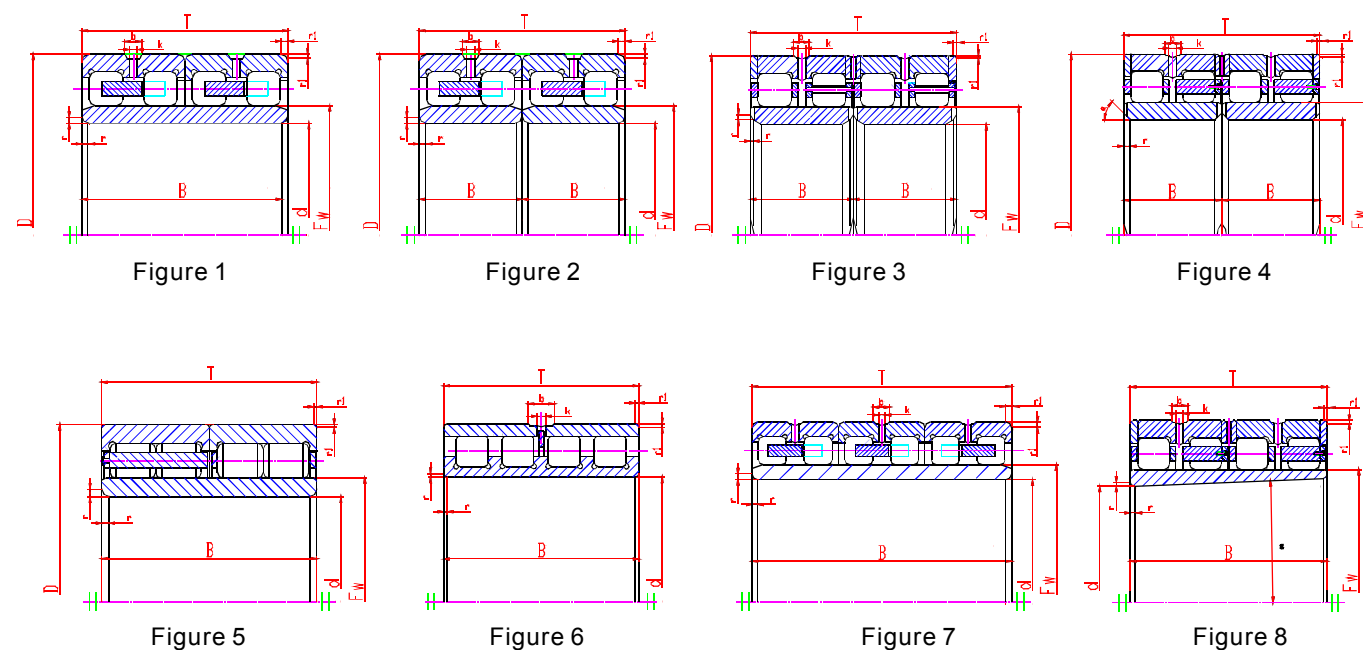


Figure 2

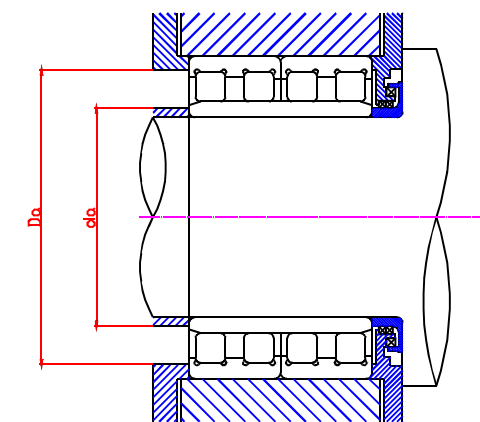
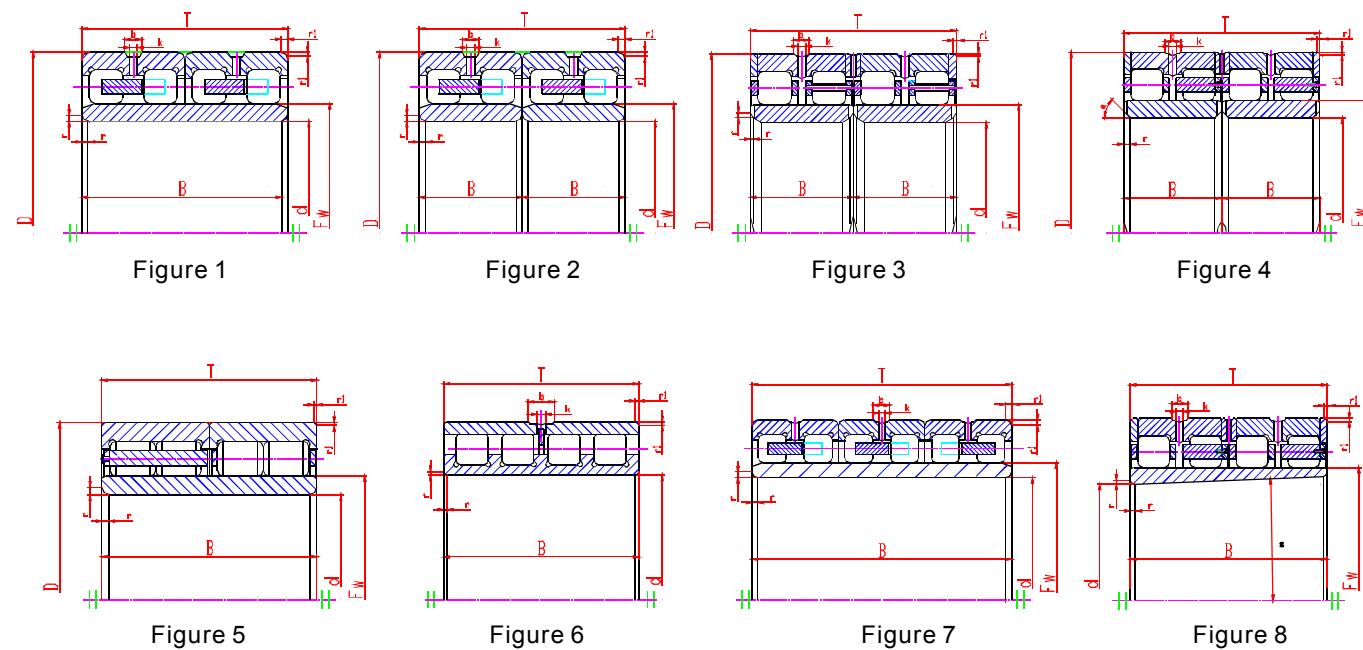
| Designations            |                      | Dimensions ( mm ) |            |              |         |            | Outer Diameter<br>( mm ) | Dimensions ( mm ) |            |            |            | Axial Static Load | Weight<br>( kg ) |
|-------------------------|----------------------|-------------------|------------|--------------|---------|------------|--------------------------|-------------------|------------|------------|------------|-------------------|------------------|
| Old Designations        | Current Designations | D                 | D1         | T            | T1      | d1         |                          | R                 | M          | M1         | rmin       |                   |                  |
| 4397/265/HC<br>4297/265 | TTSX265<br>TTSV265   | 265<br>265        | 263<br>263 | 95<br>81     | 81      | 229<br>229 | 265                      | 609<br>304.8      | M20<br>M20 |            | 2.1<br>2.4 | 7750              | 33.9             |
| 4297/330K               | TTSV330K             | 330               | 328        | 95           |         | 280        | 330                      | 381               | M20        |            | 2.4        | 11500             | 51.4             |
| 4297/440                | TTSV440              | 440               | 438        | 130          |         | 380        | 440                      | 508               | M24        | M36        | 3          | 23300             | 137              |
| 4397/525<br>4297/525    | TTSX525<br>TTSV525   | 525<br>525        | 522<br>522 | 180<br>155   | 155     | 460<br>460 | 525<br>525               | 1270<br>635       | M24<br>M24 | M36<br>M36 | 3<br>3     | 36200             | 266              |
| 4297/580                | TTSV580              | 580               | 577        | 165          |         | 510        | 580                      | 710               | M24        | M42        | 3          | 41600             | 301              |
|                         | THR581XY             | 581.025           | 578.663    | 193.777      | 168.275 | 508        | 581                      | 1422.4            | M24        | M42        | 3.2        | 39000             | 338              |
| 4397/610<br>4297/610    | TTSX610<br>TTSV610   | 610<br>610        | 607<br>607 | 205<br>178   | 178     | 533<br>533 | 610<br>610               | 1524<br>762       | M30<br>M30 | M42<br>M42 | 3<br>3     |                   |                  |
| 4397/640/HC<br>4297/640 | TTSX640<br>TTSV640   | 640<br>640        | 637<br>637 | 214.5<br>185 | 185     | 550<br>550 | 640                      | 1520<br>762       | M30<br>M30 | M42<br>M42 | 3<br>3     | 48600<br>49200    | 454<br>418       |
| 4397/750/HC/A1          | TTSX750              | 750               | 745        | 260          | 225     | 650        | 750                      | 1600              | M30        | M42        | 4          | 63900             | 747              |
| 4397/800                | TTSX800              | 800               | 795        | 270          | 245     | 700        | 800                      | 1700              | M30        | M48        | 5          |                   |                  |
| 4397/900/HC             | TTSX900              | 900               | 896        | 280          | 236     | 750        | 900                      | 1800              | M36        | M48        | 6          | 94000             | 1150             |





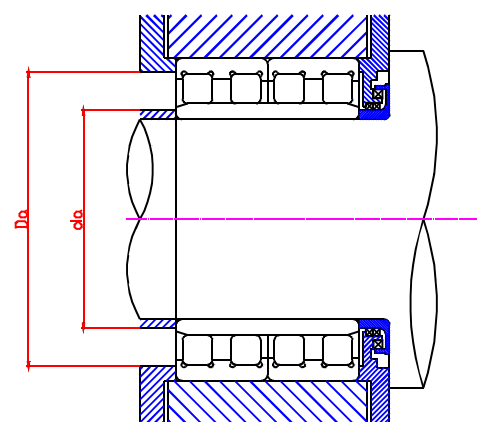
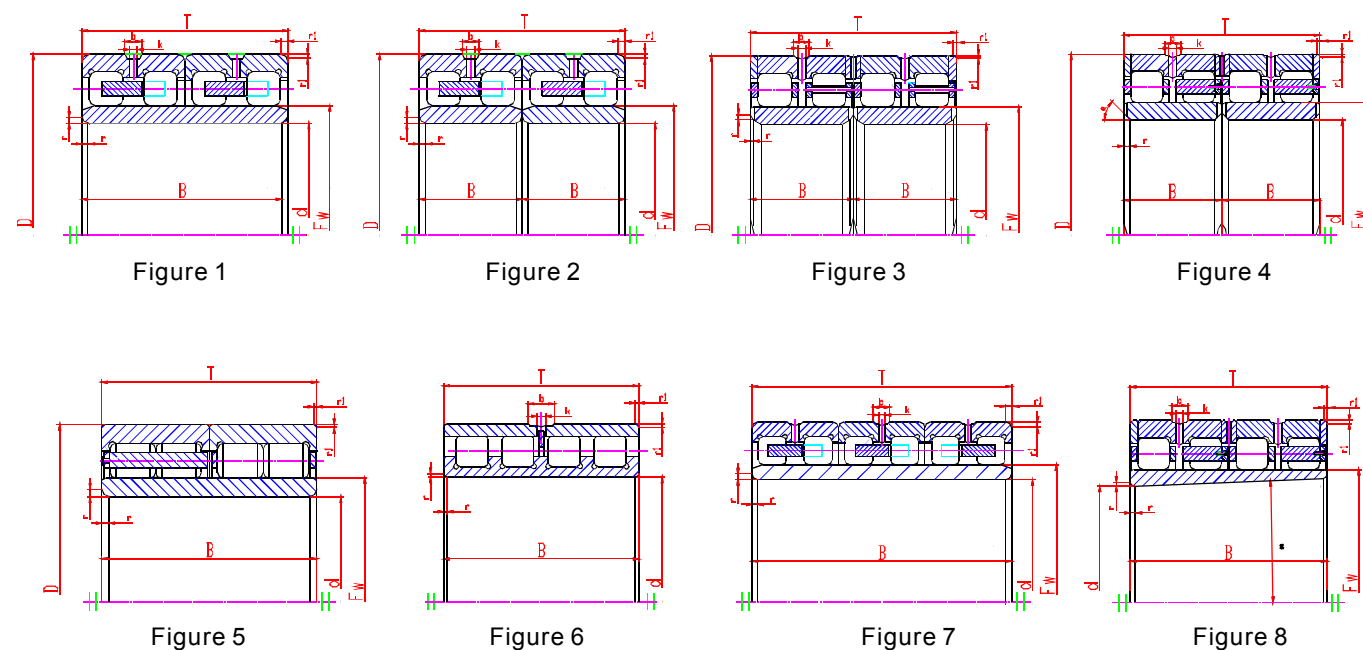
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| Designations     | Working Position | Basic Dimensions ( mm ) |     |     |     |      |       |     | Other related dimensions ( mm ) |       |       |       | Basic Load Ratings ( kN ) |      | Weight ( kg ) | Patterns |
|------------------|------------------|-------------------------|-----|-----|-----|------|-------|-----|---------------------------------|-------|-------|-------|---------------------------|------|---------------|----------|
|                  |                  | d                       | D   | B   | C   | rmin | r1min | Fw  | Da                              | da    | b max | k max | Cr                        | Cor  |               |          |
| FC182870         | Working Roll     | 90                      | 140 | 70  | 70  | 1.5  | 1.1   | 105 | 130                             | 99    | 6.5   | 4     | 253                       | 425  | 3.78          | Figure 1 |
| FC182870A        | Working Roll     | 90                      | 140 | 70  | 70  | 1.1  | 1.5   | 105 | 130                             | 99    | 6.5   | 4     | 275                       | 425  | 3.78          | Figure 1 |
| FC202870/YA3     | Working Roll     | 100                     | 140 | 70  | 70  | 1.5  | 1.1   | 111 | 131                             | 107   |       |       | 209                       | 435  | 3.10          | Figure 1 |
| FC202870A/YA3    | Working Roll     | 100                     | 140 | 70  | 70  | 1.1  | 1.5   | 111 | 131                             | 107   |       |       | 209                       | 435  | 3.62          | Figure 1 |
| FC2028104        | Working Roll     | 100                     | 140 | 104 | 104 | 1.5  | 1.1   | 111 | 131                             | 107   | 8     | 4     | 330                       | 775  | 4.99          | Figure 1 |
| FC2028104A       | Working Roll     | 100                     | 140 | 104 | 104 | 1.1  | 1.5   | 111 | 131                             | 107   | 8     | 4     | 396                       | 870  | 4.99          | Figure 1 |
| FC2234120A       | Working Roll     | 110                     | 170 | 120 | 120 | 2    | 2     | 127 | 157                             | 120   | 6.5   | 4     | 583                       | 1110 | 10.1          | Figure 1 |
| FC2234120        | Working Roll     | 110                     | 170 | 120 | 120 | 2    | 2     | 127 | 157                             | 120   | 6.5   | 4     | 534                       | 1110 | 10.1          | Figure 1 |
| FC2436105        | Working Roll     | 120                     | 180 | 105 | 105 | 2    | 2     | 135 | 168                             | 129   | 6.5   | 4     | 413                       | 770  | 9.13          | Figure 1 |
| FC2436105A       | Working Roll     | 120                     | 180 | 105 | 105 | 2    | 2     | 135 | 167                             | 129   | 6.5   | 4     | 561                       | 1100 | 9.13          | Figure 1 |
| FC2640125        | Working Roll     | 130                     | 200 | 125 | 125 | 2    | 2     | 149 | 184                             | 141.5 | 6.5   | 4     | 583                       | 1200 | 14.6          | Figure 1 |
| FC2640125A       | Working Roll     | 130                     | 200 | 125 | 125 | 2    | 2     | 149 | 184                             | 141.5 | 6.5   | 4     | 638                       | 1200 | 14.6          | Figure 1 |
| FC2842125        | Working Roll     | 140                     | 210 | 125 | 125 | 2    | 2     | 158 | 196.5                           | 151   | 9.5   | 5     | 594                       | 1160 | 14.7          | Figure 1 |
| FC2842125A       | Working Roll     | 140                     | 210 | 125 | 125 | 2    | 2     | 158 | 196                             | 151   | 9.5   | 5     | 594                       | 1050 | 14.7          | Figure 1 |
| FC2842155K/C9YA3 | Working Roll     | 140                     | 210 | 155 | 155 | 2    | 2     | 166 | 198.5                           | 151   |       |       | 693                       | 1610 | 18.1          | Figure 1 |
| FC2942155/YA3    | Working Roll     | 145                     | 210 | 155 | 155 | 2    | 2     | 166 | 198.5                           | 158   |       |       | 752                       | 1610 | 18.3          | Figure 1 |
| FC2942155A/YA3   | Working Roll     | 145                     | 210 | 155 | 155 | 2    | 2     | 166 | 198                             | 158   |       |       | 754                       | 1800 | 18            | Figure 1 |
| FC2945156/C3     | Working Roll     | 145                     | 225 | 156 | 78  | 2    | 2     | 169 | 208.5                           | 159   | 9.5   | 5     | 913                       | 1800 | 23.6          | Figure 1 |
| FC3045120        | Working Roll     | 150                     | 225 | 120 | 120 | 2    | 2     | 169 | 210                             | 161.5 | 9     | 4     | 710                       | 1450 | 16.7          | Figure 1 |
| FC3045120ZW/C9   | Working Roll     | 150                     | 225 | 120 | 120 | 2    | 2     | 169 | 211                             | 161.5 | 9     | 4     | 809                       | 1620 | 17.9          | Figure 1 |
| FC3045120A       | Working Roll     | 150                     | 225 | 120 | 120 | 2    | 2     | 169 | 209.5                           | 161.5 | 9     | 4     | 781                       | 1450 | 16.7          | Figure 1 |
| FC3045120A/YA3   | Working Roll     | 150                     | 225 | 120 | 120 | 2    | 2     | 169 | 209.5                           | 161.5 | 9     | 4     | 710                       | 1450 | 16.7          | Figure 1 |
| FC3045150/HCYA34 | Working Roll     | 150                     | 225 | 150 | 150 | 2    | 2     | 169 | 209.5                           | 161.5 | 9.5   | 4     | 900                       | 1950 | 20.9          | Figure 1 |
| SC3045180/C4     | Working Roll     | 150                     | 225 | 180 | 180 | 2    | 2     | 169 | 209.5                           | 161.5 | 9     | 4     | 1010                      | 2250 | 25            | Figure 7 |
| FC3046156        | Working Roll     | 150                     | 230 | 156 | 156 | 2    | 2     | 174 | 214                             | 164.5 | 9.5   | 5     | 852                       | 1790 | 23.6          | Figure 1 |
| FC3046156A       | Working Roll     | 150                     | 230 | 156 | 156 | 2    | 2     | 174 | 213.5                           | 164.5 | 9.5   | 5     | 1010                      | 2090 | 23.6          | Figure 1 |
| FC3246130        | Working Roll     | 160                     | 230 | 130 | 130 | 1.5  | 1.5   | 180 | 218                             | 172   |       |       | 742                       | 1705 | 16.9          | Figure 1 |
| FC3246130A/YA3   | Working Roll     | 160                     | 230 | 130 | 130 | 1.5  | 1.5   | 180 | 218                             | 172   |       |       | 770                       | 1620 | 17.3          | Figure 1 |
| FC3246168/YA3    | Working Roll     | 160                     | 230 | 168 | 168 | 2.1  | 2.1   | 180 | 215.5                           | 172   |       |       | 852                       | 2170 | 22.1          | Figure 1 |



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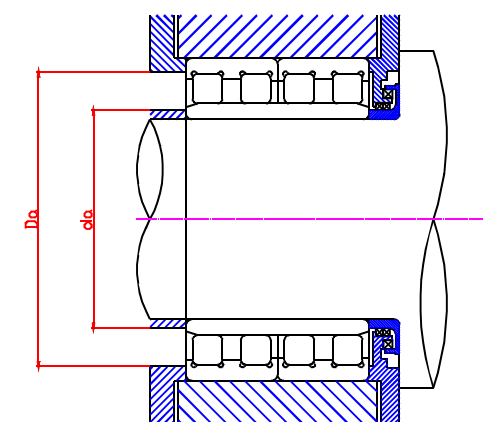
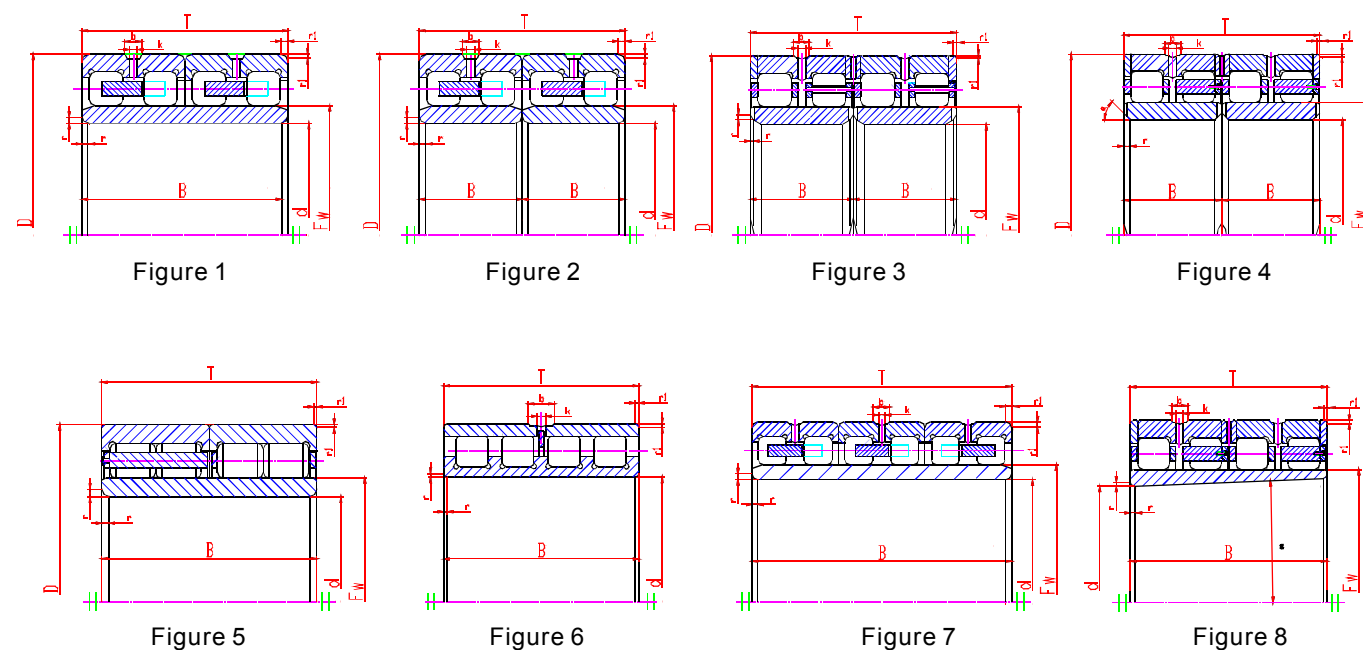
| Designations       | Working Position | Basic Dimensions ( mm ) |         |         |         |      |       |       | Other related dimensions ( mm ) |       |       |       | Basic Load Ratings ( kN ) |      | Weight ( kg ) | Patterns |
|--------------------|------------------|-------------------------|---------|---------|---------|------|-------|-------|---------------------------------|-------|-------|-------|---------------------------|------|---------------|----------|
|                    |                  | d                       | D       | B       | C       | rmin | r1min | Fw    | Da                              | da    | b max | k max | Cr                        | Cor  |               |          |
| FC3246168A/YA3     | Working Roll     | 160                     | 230     | 168     | 168     | 2.1  | 2.1   | 180   | 215                             | 172   | —     | —     | 897                       | 2200 | 2200          | Figure 1 |
| FC3246168/HCC9YA34 | Working Roll     | 160                     | 230     | 168     | 168     | 2    | 2     | 179   | 214                             | 171.5 | 8.5   | 4     | 1070                      | 2250 | 2250          | Figure 1 |
| FC3248124A/YA3     | Working Roll     | 160                     | 240     | 124     | 124     | 2.1  | 2.1   | 183   | 225                             | 174   | 9     | 4     | 685                       | 1530 | 1530          | Figure 1 |
| FC3248124/C9       | Working Roll     | 160                     | 240     | 124     | 124     | 2.1  | 2.1   | 183   | 225.5                           | 174   | 9     | 4     | 810                       | 1530 | 1530          | Figure 1 |
| FC3248124          | Working Roll     | 160                     | 240     | 124     | 124     | 2.1  | 2.1   | 183   | 225.5                           | 174   | 9     | 4     | 810                       | 1530 | 1530          | Figure 1 |
| FC3248124A         | Working Roll     | 160                     | 240     | 124     | 124     | 2.1  | 2.1   | 183   | 225                             | 174   | 9     | 4     | 810                       | 1530 | 1530          | Figure 1 |
| FC3248124A/YA31    | Working Roll     | 160                     | 240     | 124     | 124     | 2.1  | 2.1   | 183   | 225                             | 174   | 9     | 4     | 810                       | 1530 | 1530          | Figure 1 |
| FC3248124/YA31     | Working Roll     | 160                     | 240     | 124     | 124     | 2.1  | 2.1   | 183   | 225                             | 174   | 9     | 4     | 810                       | 1530 | 1530          | Figure 1 |
| FC3248168          | Working Roll     | 160                     | 240     | 168     | 168     | 2.1  | 2.1   | 183   | 225.5                           | 174   | 10    | 5     | 1060                      | 2350 | 2350          | Figure 1 |
| NNQD6032X2/C4      | Working Roll     | 160                     | 240     | 168     | 84      | 2.1  | 2.1   | 183   | 225                             | 174   | 10    | 5     | 1240                      | 2560 | 2560          | Figure 5 |
| FC3248168A         | Working Roll     | 160                     | 240     | 168     | 168     | 2.1  | 2.1   | 183   | 225                             | 174   | 10    | 5     | 1060                      | 2350 | 2350          | Figure 1 |
| FCD3345168X4/YA3   | Working Roll     | 165.1                   | 225.425 | 168.275 | 168.275 | 1.5  | 1.5   | 181   | 213                             | 175   |       |       | 785                       | 1950 | 1950          | Figure 2 |
| FCD3446160         | Working Roll     | 170                     | 230     | 160     | 160     | 2    | 2     | 185.5 | 218.5                           | 179   | 7.5   | 3     | 1210                      | 2360 | 2360          | Figure 2 |
| FC3450170          | Working Roll     | 170                     | 250     | 170     | 170     | 2.1  | 2.1   | 192   | 235                             | 183   | 12    | 6     | 1280                      | 2500 | 2500          | Figure 1 |
| FC3450170Q1/HG2YA4 | Working Roll     | 170                     | 250     | 170     | 170     | 2.1  | 2.1   | 192   | 235                             | 183   | 9.5   | 5     | 1280                      | 2590 | 2590          | Figure 1 |
| FC3450170A         | Working Roll     | 170                     | 250     | 170     | 170     | 2.1  | 2.1   | 192   | 234                             | 183   | 12    | 6     | 1380                      | 2550 | 2550          | Figure 1 |
| FC3452120          | Working Roll     | 170                     | 260     | 120     | 120     | 2.1  | 2.1   | 195   | 240.5                           | 185   | 9.5   | 5     | 867                       | 1790 | 1790          | Figure 1 |
| FC3452120A         | Working Roll     | 170                     | 260     | 120     | 120     | 2.1  | 2.1   | 195   | 240                             | 185   | 9.5   | 5     | 867                       | 1790 | 1790          | Figure 1 |
| NNQ6936X2V/YA7     | Working Roll     | 180                     | 250     | 133     | 133     | 2    | 2     | 234   | 240                             | 212.5 | 12    | 6     | 1050                      | 1870 | 1870          | Figure 6 |
| FC3650156/C4YA4    | Working Roll     | 180                     | 250     | 156     | 156     | 2.1  | 2.1   | 200   | 253.5                           | 192   | 9.5   | 6.5   | 1210                      | 1770 | 1770          | Figure 1 |
| FC3650156/YA34     | Working Roll     | 180                     | 250     | 156     | 78      | 2    | 2     | 200   | 236                             | 192   |       |       | 1210                      | 2315 | 2315          | Figure 1 |
| FC3650156/YA3      | Working Roll     | 180                     | 256     | 156     | 156     | 2    | 2     | 198   | 238                             | 191   |       |       | 1220                      | 1950 | 1950          | Figure 1 |
| FC3652124          | Working Roll     | 180                     | 260     | 124     | 124     | 2.1  | 2.1   | 202   | 244.5                           | 193   | 9.5   | 5     | 809                       | 1730 | 1730          | Figure 1 |
| FC3652168          | Working Roll     | 180                     | 260     | 168     | 168     | 2.1  | 2.1   | 202   | 244.5                           | 193   | 12    | 6     | 1180                      | 2790 | 2790          | Figure 1 |
| FC3652168/YA3      | Working Roll     | 180                     | 260     | 168     | 168     | 2.1  | 2.1   | 202   | 244.5                           | 193   | 12    | 6     | 1180                      | 2790 | 2790          | Figure 1 |
| FC3652168Q1/HG2YA4 | Working Roll     | 180                     | 260     | 168     | 168     | 2.1  | 2.1   | 202   | 244.5                           | 193   | 9.5   | 5     | 1530                      | 2790 | 2790          | Figure 1 |
| FC3652168/C4YAD    | Working Roll     | 180                     | 260     | 168     | 84      | 2.1  | 2.1   | 202   | 243                             | 193   |       |       | 1180                      | 2790 | 2790          | Figure 1 |
| FC3652168A         | Working Roll     | 180                     | 260     | 168     | 168     | 2.1  | 2.1   | 202   | 244                             | 193   | 12    | 6     | 1180                      | 2790 | 2790          | Figure 1 |
| FC3652168A/YA3     | Working Roll     | 180                     | 260     | 168     | 168     | 2.1  | 2.1   | 202   | 244                             | 193   | 12    | 6     | 1180                      | 2790 | 2790          | Figure 1 |
| FC3652168/YA31     | Working Roll     | 180                     | 260     | 168     | 168     | 2.1  | 2.1   | 202   | 246.5                           | 193   | 9.5   | 5     | 1180                      | 2790 | 2790          | Figure 1 |
| FC3652180          | Working Roll     | 180                     | 260     | 180     | 180     | 2.1  | 2.1   | 202   | 244.5                           | 193   | 12    | 6     | 1250                      | 3000 | 3000          | Figure 1 |
| FC3852168A         | Working Roll     | 190                     | 260     | 168     | 168     | 2.1  | 2.1   | 212   | 246.5                           | 203   | 9.5   | 5     | 1450                      | 2600 | 2600          | Figure 1 |
| FC3852168/HCYA34   | Working Roll     | 190                     | 260     | 168     | 168     | 2.1  | 2.1   | 212   | 246.5                           | 203   | 8     | 4     | 1000                      | 2600 | 2600          | Figure 1 |



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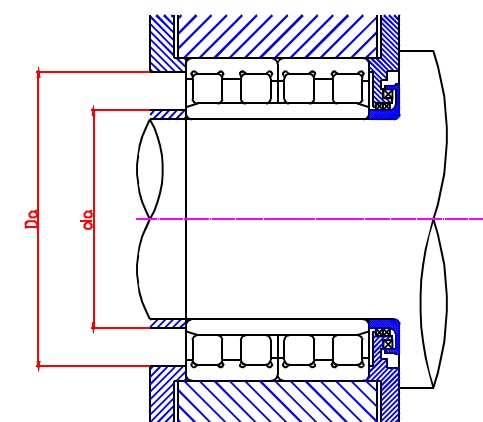
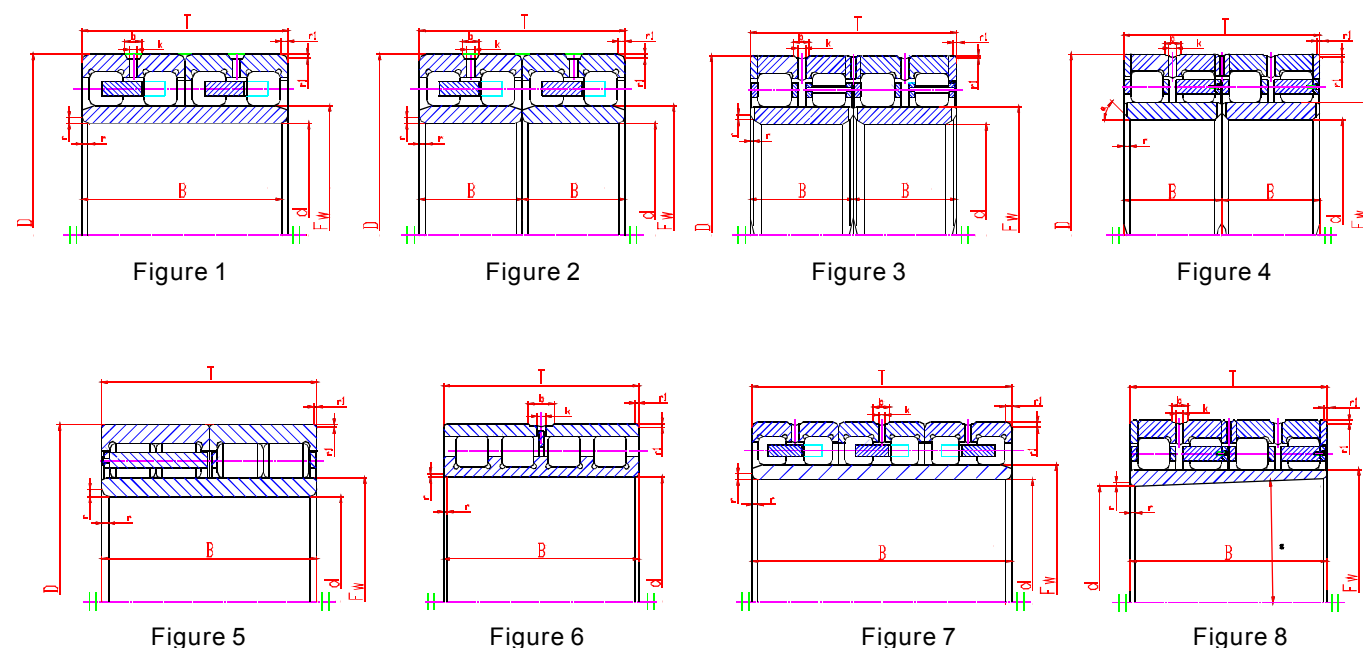
| Designations          | Working Position | Basic Dimensions ( mm ) |     |     |     |      |       |     | Other related dimensions ( mm ) |       |       |       | Basic Load Ratings ( kN ) |      | Weight ( kg ) | Patterns |
|-----------------------|------------------|-------------------------|-----|-----|-----|------|-------|-----|---------------------------------|-------|-------|-------|---------------------------|------|---------------|----------|
|                       |                  | d                       | D   | B   | C   | rmin | r1min | Fw  | Da                              | da    | b max | k max | Cr                        | Cor  |               |          |
| FC3854200/YA5         | Working Roll     | 190                     | 270 | 200 | 200 | 2.1  | 2.1   | 212 | 254                             | 203   | 15    | 5     | 1280                      | 3150 | 33.4          | Figure 1 |
| FC3854168             | Working Roll     | 190                     | 270 | 168 | 168 | 2.1  | 2.1   | 212 | 255                             | 203   | 9.5   | 5     | 1420                      | 2430 | 30.2          | Figure 1 |
| FC3854168/YA3         | Working Roll     | 190                     | 270 | 168 | 168 | 2.1  | 2.1   | 212 | 255                             | 203   | 9.5   | 5     | 1420                      | 2430 | 29.9          | Figure 1 |
| FC3854168Q1/HG2C9YA4  | Working Roll     | 190                     | 270 | 168 | 168 | 2.1  | 2.1   | 212 | 255                             | 203   | 9.5   | 5     | 1420                      | 2430 | 30.8          | Figure 1 |
| FC3854168A            | Working Roll     | 190                     | 270 | 168 | 168 | 2.1  | 2.1   | 212 | 254                             | 203   | 9.5   | 5     | 1420                      | 2430 | 31.9          | Figure 1 |
| FC3854168A/YA3        | Working Roll     | 190                     | 270 | 168 | 168 | 2.1  | 2.1   | 212 | 254                             | 203   | 9.5   | 5     | 1420                      | 2430 | 31            | Figure 1 |
| FC3854168AQ1/HG2C9YA4 | Working Roll     | 190                     | 270 | 168 | 168 | 2.1  | 2.1   | 212 | 254                             | 203   | 9.5   | 5     | 1420                      | 2430 | 30.8          | Figure 1 |
| FC3854170/YA3         | Working Roll     | 190                     | 270 | 170 | 170 | 2.1  | 2.1   | 212 | 255                             | 203   | 9.5   | 5     | 1430                      | 2430 | 30.2          | Figure 1 |
| FC3854170A/YA3        | Working Roll     | 190                     | 270 | 170 | 170 | 2.1  | 2.1   | 212 | 254                             | 203   | 9.5   | 5     | 1430                      | 2650 | 31.8          | Figure 1 |
| FC3854200             | Working Roll     | 190                     | 270 | 200 | 200 | 2.1  | 2.1   | 212 | 255                             | 203   | 15    | 7     | 1520                      | 3180 | 35.0          | Figure 1 |
| FC3854200A            | Working Roll     | 190                     | 270 | 200 | 200 | 2.1  | 2.1   | 212 | 254                             | 203   | 15    | 7     | 1580                      | 3275 | 35            | Figure 1 |
| FC4054170Q1/YA3       | Working Roll     | 200                     | 270 | 170 | 170 | 2.1  | 2.1   | 222 | 255.5                           | 213   | 9.5   | 5     | 1120                      | 2270 | 28.7          | Figure 1 |
| FC4054170Q1/HG2C4Y    | Working Roll     | 200                     | 270 | 170 | 170 | 2.1  | 2.1   | 222 | 255.5                           | 213   |       |       | 1120                      | 2270 | 28.7          | Figure 1 |
| FC4054170A/C4YA3      | Working Roll     | 200                     | 270 | 170 | 170 | 2.1  | 2.1   | 222 | 256.5                           | 213   | 9.5   | 5     | 1120                      | 2740 | 28.7          | Figure 1 |
| FC4054170/YAD         | Working Roll     | 200                     | 270 | 170 | 170 | 2.1  | 2.1   | 222 | 254.5                           | 213   | 9     | 4     | 950                       | 2780 | 29.2          | Figure 1 |
| FC4056170/C4          | Working Roll     | 200                     | 280 | 170 | 170 | 2.1  | 2.1   | 222 | 264                             | 213   | 9.5   | 5     | 1110                      | 3000 | 33.3          | Figure 1 |
| FC4056200/YA3         | Working Roll     | 200                     | 280 | 200 | 200 | 2.1  | 2.1   | 222 | 264                             | 213   | 9.5   | 5     | 1340                      | 3400 | 38.8          | Figure 1 |
| FC4056188             | Working Roll     | 200                     | 280 | 188 | 188 | 2.1  | 2.1   | 222 | 265                             | 213   | 9.5   | 5     | 1430                      | 2580 | 35.7          | Figure 1 |
| FC4056188A            | Working Roll     | 200                     | 280 | 188 | 188 | 2.1  | 2.1   | 222 | 264                             | 213   | 9.5   | 5     | 1560                      | 3000 | 35.9          | Figure 1 |
| FC4056200/P6YA34      | Working Roll     | 200                     | 280 | 200 | 200 | 2.1  | 2.1   | 222 | 264                             | 213   | 9.5   | 5     | 1340                      | 3400 | 38.8          | Figure 1 |
| FC4058192             | Working Roll     | 200                     | 290 | 192 | 192 | 2.1  | 2.1   | 226 | 273                             | 216   | 15    | 6     | 1460                      | 3250 | 40.9          | Figure 1 |
| FC4058192/YA4         | Working Roll     | 200                     | 290 | 192 | 192 | 2.1  | 2.1   | 226 | 272.5                           | 216   | 15    | 6     | 1490                      | 3300 | 40.9          | Figure 1 |
| FC4058192A            | Working Roll     | 200                     | 290 | 192 | 192 | 2.1  | 2.1   | 226 | 272.5                           | 216   | 15    | 6     | 1460                      | 3695 | 40.9          | Figure 1 |
| FC4058192A/YA4        | Working Roll     | 200                     | 290 | 192 | 192 | 2.1  | 2.1   | 226 | 272.5                           | 216   | 15    | 6     | 1460                      | 3350 | 41.3          | Figure 1 |
| FC4062175/YA3         | Back-up Roll     | 200                     | 310 | 175 | 175 | 2.1  | 2.1   | 229 | 286                             | 217.5 | 9.5   | 5     | 1420                      | 3050 | 49.8          | Figure 1 |
| FC4260210             | Working Roll     | 210                     | 300 | 210 | 210 | 2.1  | 2.1   | 234 | 282.5                           | 224.5 | 9.5   | 5     | 1560                      | 3950 | 48.3          | Figure 1 |
| FC4260210/C9YA4       | Working Roll     | 210                     | 300 | 210 | 210 | 2.1  | 2.1   | 234 | 282.5                           | 224.5 | 9.5   | 5     | 1560                      | 3950 | 48.3          | Figure 1 |
| FC4260210A            | Working Roll     | 210                     | 300 | 210 | 210 | 2.1  | 2.1   | 234 | 281                             | 224.5 | 9.5   | 5     | 1780                      | 4140 | 48.3          | Figure 1 |
| FC4260210A/C9YA4      | Working Roll     | 210                     | 300 | 210 | 210 | 2.1  | 2.1   | 234 | 281                             | 224.5 | 9.5   | 5     | 1780                      | 4140 | 48.3          | Figure 1 |
| FC4460192/C4YA4-1     | Working Roll     | 220                     | 300 | 192 | 192 | 2.5  | 2.5   | 242 | 283                             | 233   | 9.5   | 5     | 1280                      | 3390 | 39.8          | Figure 1 |
| FC4462192/YA3         | Working Roll     | 220                     | 310 | 192 | 192 | 2.1  | 2.1   | 246 | 293.5                           | 236   | 15    | 6     | 1600                      | 1910 | 45.8          | Figure 1 |
| FC4462192             | Working Roll     | 220                     | 310 | 192 | 192 | 2.1  | 2.1   | 246 | 293.5                           | 236   | 15    | 6     | 1600                      | 1910 | 45.8          | Figure 1 |
| FC4462192A            | Working Roll     | 220                     | 310 | 192 | 192 | 2.1  | 2.1   | 246 | 292.5                           | 236   | 15    | 6     | 1600                      | 3600 | 46.2          | Figure 1 |
| FC4462192A/YA3        | Working Roll     | 220                     | 310 | 192 | 192 | 2.1  | 2.1   | 246 | 292.5                           | 236   | 15    | 6     | 1600                      | 3600 | 46.1          | Figure 1 |





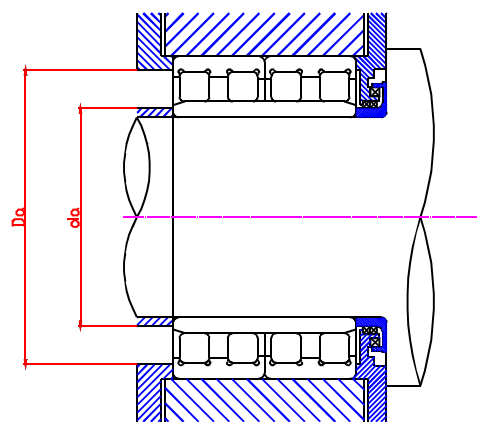
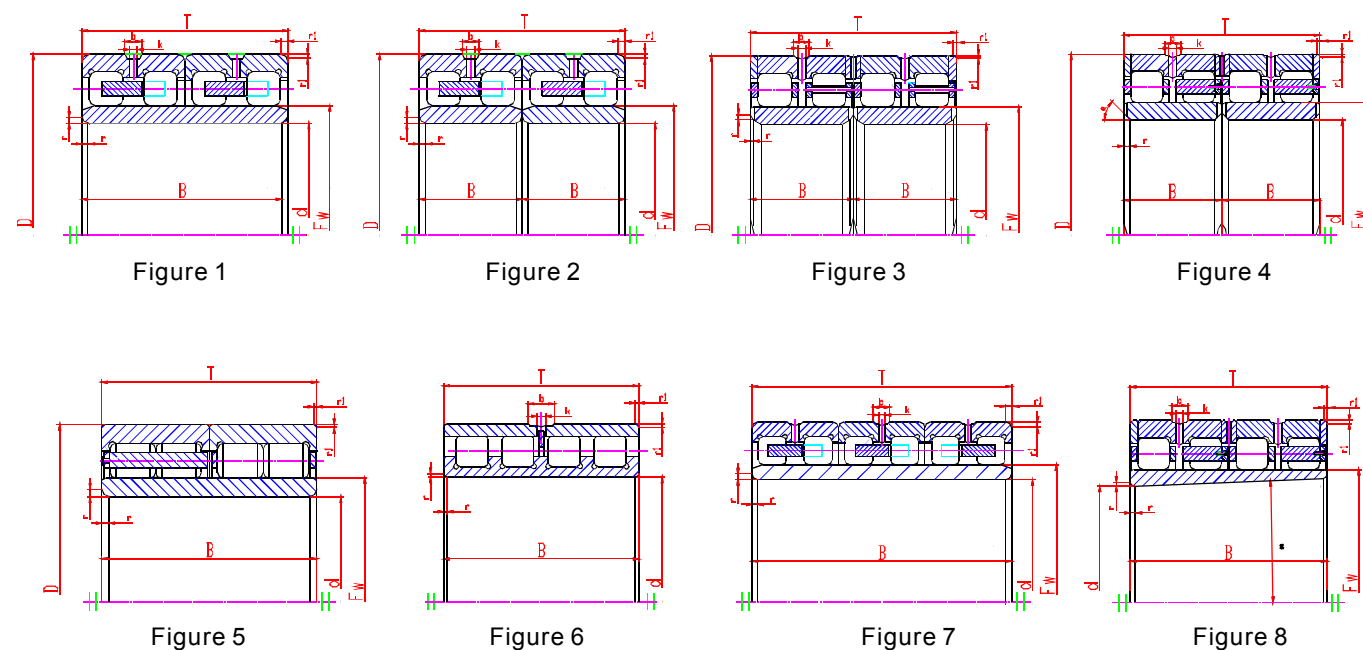
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| Designations        | Working Position | Basic Dimensions ( mm ) |     |     |     |      |       |     | Other related dimensions ( mm ) |       |       |       | Basic Load Ratings ( kN ) |      | Weight ( kg ) | Patterns |
|---------------------|------------------|-------------------------|-----|-----|-----|------|-------|-----|---------------------------------|-------|-------|-------|---------------------------|------|---------------|----------|
|                     |                  | d                       | D   | B   | C   | rmin | r1min | Fw  | Da                              | da    | b max | k max | Cr                        | Cor  |               |          |
| FC4462225           | Working Roll     | 220                     | 310 | 225 | 225 | 0.6  | 2.1   | 244 | 292                             | 234.5 | —     | —     | 1850                      | 4050 | 53.9          | Figure 1 |
| FC4462225F3/YA3     | Working Roll     | 220                     | 310 | 225 | 225 | 2.1  | 2.1   | 246 | 290.5                           | 236   | 5.5   | 3.5   | 1500                      | 4000 | 54            | Figure 1 |
| FC4464210/YA3W33    | Working Roll     | 220                     | 320 | 210 | 210 | 2.1  | 2.1   | 248 | 299.5                           | 237   | 12.5  | 5     | 1500                      | 4000 | 57.6          | Figure 1 |
| FC4464210/YA3       | Working Roll     | 220                     | 320 | 210 | 210 | 2.1  | 2.1   | 248 | 300                             | 237   |       |       | 1900                      | 3800 | 56.5          | Figure 1 |
| FC4464210A/YA3      | Working Roll     | 220                     | 320 | 210 | 210 | 2.1  | 2.1   | 248 | 299.5                           | 237   |       |       | 1900                      | 4000 | 58.2          | Figure 1 |
| FC4468200/YB2       | Working Roll     | 220                     | 340 | 200 | 200 | 4    | 4     | 250 | 320.5                           | 238   | 15    | 6     | 1950                      | 3550 | 63.4          | Figure 1 |
| FC4468192/YA3       | Back-up Roll     | 220                     | 340 | 192 | 192 | 2.1  | 2.1   | 250 | 314.5                           | 238   | 9.5   | 5     | 1620                      | 3390 | 64.6          | Figure 1 |
| FC4666206/YA3       | Working Roll     | 230                     | 330 | 206 | 206 | 2.1  | 2.1   | 260 | 309.5                           | 248   | 9.5   | 5     | 1780                      | 3800 | 56.5          | Figure 1 |
| FC4666206/C4YAD     | Working Roll     | 230                     | 330 | 206 | 103 | 2.1  | 2.1   | 258 | 307.8                           | 247   |       |       | 1880                      | 4350 | 59.1          | Figure 1 |
| FC4666206A/YA3      | Working Roll     | 230                     | 330 | 206 | 206 | 2.1  | 2.1   | 260 | 309                             | 248   | 9.5   | 5     | 1880                      | 4350 | 57.8          | Figure 1 |
| FC4668260/HCYA3-SY  | Working Roll     | 230                     | 340 | 260 | 260 | 2.1  | 2.1   | 261 | 317.5                           | 249   | 9.5   | 5     | 2120                      | 5350 | 82.1          | Figure 1 |
| FC4668260/HCYA3     | Working Roll     | 230                     | 340 | 260 | 260 | 2.1  | 2.1   | 261 | 317.5                           | 249   | 9.5   | 5     | 2120                      | 5350 | 82.1          | Figure 1 |
| FC4866220/YA3       | Working Roll     | 240                     | 330 | 220 | 220 | 2.1  | 2.1   | 264 | 312.5                           | 254.5 | 9.5   | 5     | 1780                      | 4850 | 56.5          | Figure 1 |
| FC4866220           | Working Roll     | 240                     | 330 | 220 | 220 | 2.1  | 2.1   | 264 | 312.5                           | 254.5 |       |       | 1780                      | 4850 | 56.7          | Figure 1 |
| FC4866220A          | Working Roll     | 240                     | 330 | 220 | 220 | 2.1  | 2.1   | 264 | 311                             | 254.5 |       |       | 1960                      | 5335 | 57.1          | Figure 1 |
| FC4866220A/HG2      | Working Roll     | 240                     | 330 | 220 | 220 | 2.1  | 2.1   | 264 | 311                             | 254.5 |       |       | 1960                      | 5335 | 57.1          | Figure 1 |
| FC4866220A/YA3      | Working Roll     | 240                     | 330 | 220 | 220 | 2.1  | 2.1   | 264 | 311                             | 254.5 |       |       | 1960                      | 5335 | 56.8          | Figure 1 |
| FCD4866220          | Working Roll     | 240                     | 330 | 220 | 220 | 2.1  | 2.1   | 264 | 311                             | 254.5 | 9.5   | 5     | 1780                      | 4850 | 57.1          | Figure 2 |
| FC4868192A1         | Working Roll     | 240                     | 340 | 192 | 192 | 2.1  | 2.1   | 265 | 320.5                           | 255   | 9.5   | 5     | 1440                      | 3380 | 52.8          | Figure 1 |
| FC4868192A          | Working Roll     | 240                     | 340 | 192 | 192 | 2.1  | 2.1   | 265 | 319                             | 255   | 9.5   | 5     | 1540                      | 3650 | 54.7          | Figure 1 |
| FC4870224/HG2YAD    | Working Roll     | 240                     | 350 | 224 | 224 | 3    | 3     | 270 | 326                             | 258   | 9.5   | 6     | 1850                      | 4600 | 75.1          | Figure 1 |
| FC4872220           | Working Roll     | 240                     | 360 | 200 | 200 | 2.1  | 2.1   | 272 | 334.5                           | 259   | 12    | 6     | 1870                      | 4410 | 78.0          | Figure 1 |
| FC4872220A/C4YA3    | Working Roll     | 240                     | 360 | 220 | 220 | 2.5  | 2.5   | 272 | 336                             | 259   |       |       | 1870                      | 4410 | 78.0          | Figure 1 |
| FC4872220Q1/HG2YA4  | Working Roll     | 240                     | 360 | 220 | 220 | 2.1  | 2.1   | 272 | 336                             | 259   | 9.5   | 5     | 2430                      | 4410 | 78.4          | Figure 1 |
| FC4872220A          | Working Roll     | 240                     | 360 | 220 | 220 | 2.1  | 2.1   | 272 | 334                             | 259   | 12    | 6     | 1930                      | 4600 | 79.1          | Figure 1 |
| FC4872220AQ1/HG2YA4 | Working Roll     | 240                     | 360 | 220 | 220 | 2.1  | 2.1   | 272 | 334                             | 259   | 12    | 6     | 2530                      | 4850 | 79.1          | Figure 1 |
| FCD5068230/HCO4YA34 | Working Roll     | 250                     | 340 | 230 | 230 | 3.5  | 3.5   | 276 | 323                             | 266   | 9.5   | 5     | 1750                      | 4700 | 60.8          | Figure 2 |
| FC5070220/YA3       | Working Roll     | 250                     | 350 | 220 | 220 | 3    | 3     | 278 | 329.5                           | 267   | 9.5   | 5     | 1740                      | 4980 | 65.5          | Figure 1 |
| FC5070220A/YA3      | Working Roll     | 250                     | 350 | 220 | 220 | 3    | 3     | 278 | 329.5                           | 267   | 9.5   | 5     | 1840                      | 4980 | 67.5          | Figure 1 |
| FC5072220/YA3       | Working Roll     | 250                     | 360 | 220 | 220 | 3    | 3     | 282 | 336                             | 269   | 9.5   | 5     | 1650                      | 4250 | 76.9          | Figure 1 |
| FC5072220A/YA3      | Working Roll     | 250                     | 360 | 220 | 220 | 3    | 3     | 282 | 336                             | 269   | 9.5   | 5     | 1710                      | 4670 | 76.8          | Figure 1 |
| FC5272200/YA3B2     | Working Roll     | 260                     | 360 | 200 | 200 | 3    | 3     | 288 | 340.5                           | 277   | 9.5   | 5     | 2000                      | 4650 | 63.0          | Figure 1 |
| FC5272200A/YA3B2    | Working Roll     | 260                     | 360 | 200 | 200 | 3    | 3     | 288 | 339.5                           | 277   | 9.5   | 5     | 2000                      | 4650 | 63            | Figure 1 |



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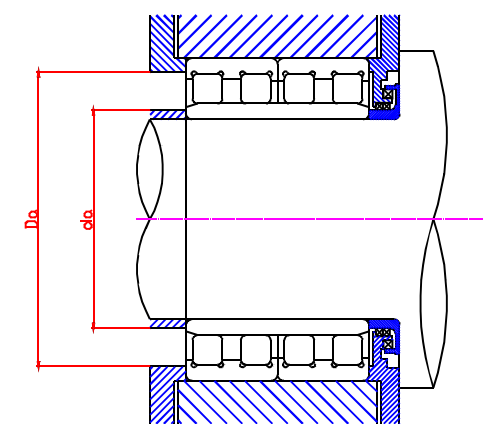
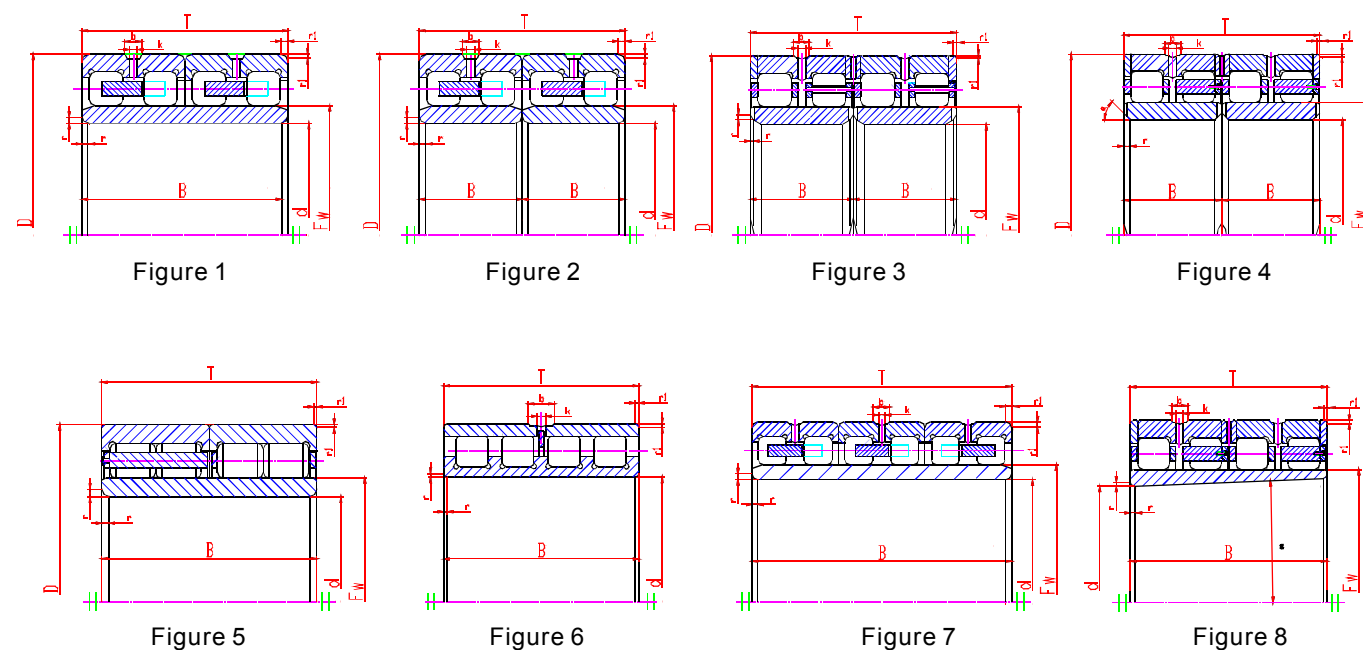
| Designations       | Working Position               | Basic Dimensions ( mm ) |     |     |     |      |       |     | Other related dimensions ( mm ) |     |       |       | Basic Load Ratings ( kN ) |      | Weight ( kg ) | Patterns |
|--------------------|--------------------------------|-------------------------|-----|-----|-----|------|-------|-----|---------------------------------|-----|-------|-------|---------------------------|------|---------------|----------|
|                    |                                | d                       | D   | B   | C   | rmin | r1min | Fw  | Da                              | da  | b max | k max | Cr                        | Cor  |               |          |
| FCD5274200/C4YAB   | Working Roll                   | 260                     | 370 | 100 | 100 | 3    | 3     | 290 | 347                             | 278 | —     | —     | 1710                      | 4100 | 73            | Figure 2 |
| FC5274200          | Working Roll                   | 260                     | 370 | 200 | 200 | 3    | 3     | 292 | 349                             | 279 | 15    | 6     | 2050                      | 4250 | 73.0          | Figure 1 |
| FC5274200A         | Working Roll                   | 260                     | 370 | 200 | 200 | 3    | 3     | 292 | 348                             | 279 | 15    | 6     | 2150                      | 4250 | 73.8          | Figure 1 |
| FC5274220/YA3      | Working Roll                   | 260                     | 370 | 220 | 220 | 3    | 3     | 292 | 349                             | 279 | 9.5   | 5     | 2100                      | 4900 | 79.2          | Figure 1 |
| FC5274220          | Working Roll                   | 260                     | 370 | 220 | 220 | 3    | 3     | 292 | 349                             | 279 | 9.5   | 5     | 2100                      | 4900 | 80.0          | Figure 1 |
| FC5274220A         | Working Roll                   | 260                     | 370 | 220 | 220 | 3    | 3     | 292 | 348                             | 279 | 9.5   | 5     | 2150                      | 4900 | 80.4          | Figure 1 |
| FC5274220A/YA4     | Working Roll                   | 260                     | 370 | 220 | 220 | 3    | 3     | 292 | 346                             | 279 | 9.5   | 5     | 2100                      | 4800 | 78.7          | Figure 1 |
| FC5274220/YA4-1    | Working Roll                   | 260                     | 370 | 220 | 220 | 3    | 3     | 292 | 346                             | 279 | 9.5   | 5     | 1810                      | 4800 | 78.7          | Figure 1 |
| FC5276280/HCYA3-SY | Intermediate Roll              | 260                     | 380 | 280 | 280 | 3    | 3     | 294 | 353                             | 280 | 9.5   | 5     | 2640                      | 6050 | 111           | Figure 1 |
| FC5276280/HCYA3    | Intermediate Roll              | 260                     | 380 | 280 | 280 | 3    | 3     | 294 | 353                             | 280 | 9.5   | 5     | 2640                      | 6050 | 111           | Figure 1 |
| FC5276220/C4YA4    | Working Roll&Intermediate Roll | 260                     | 380 | 220 | 220 | 3    | 3     | 290 | 351                             | 278 | 9.5   | 5     | 2150                      | 4750 | 87.9          | Figure 1 |
| FCD5280290/P63YA3  | Working Roll&Intermediate Roll | 260                     | 400 | 145 | 145 | 4    | 4     | 296 | 371                             | 282 | 9.5   | 5     | 1800                      | 1720 | 136           | Figure 2 |
| FC5476230/YA3      | Working Roll&Intermediate Roll | 270                     | 380 | 230 | 230 | 3    | 3     | 298 | 359.5                           | 287 | 9.5   | 5     | 1890                      | 4800 | 80.2          | Figure 1 |
| FC5476230A         | Working Roll&Intermediate Roll | 270                     | 380 | 230 | 230 | 3    | 3     | 298 | 357.5                           | 287 | 9.5   | 5     | 1970                      | 4800 | 82.1          | Figure 1 |
| FC5476230A/YA3     | Working Roll&Intermediate Roll | 270                     | 380 | 230 | 230 | 3    | 3     | 298 | 357.5                           | 287 | 9.5   | 5     | 1970                      | 4800 | 81.9          | Figure 1 |
| FC5478236          | Working Roll&Intermediate Roll | 270                     | 390 | 236 | 236 | 3    | 3     | 312 | 0.67                            | 295 | 9.5   | 5     | 2310                      | 5950 | 97.8          | Figure 1 |
| FC5478236A         | Working Roll&Intermediate Roll | 270                     | 390 | 236 | 236 | 3    | 3     | 312 | 366                             | 295 | 9.5   | 5     | 2310                      | 5950 | 98.3          | Figure 1 |
| FC5675200/YA3      | Working Roll&Intermediate Roll | 280                     | 375 | 200 | 200 | 3    | 3     | 306 | 354.5                           | 296 | 9.5   | 5     | 1700                      | 4800 | 62.9          | Figure 1 |
| FCD5678275         | Working Roll&Intermediate Roll | 280                     | 390 | 275 | 275 | 3    | 3     | 308 | 364.5                           | 297 | 9.5   | 5     | 2360                      | 6650 | 105           | Figure 2 |
| FC5678220          | Working Roll&Intermediate Roll | 280                     | 390 | 220 | 220 | 3    | 3     | 312 | 369                             | 299 | 12    | 6     | 2130                      | 5150 | 86.5          | Figure 1 |
| FC5678220A         | Working Roll&Intermediate Roll | 280                     | 390 | 220 | 220 | 3    | 3     | 312 | 366                             | 299 | 12    | 6     | 2130                      | 5200 | 89            | Figure 1 |
| FC5678220/YA3      | Working Roll&Intermediate Roll | 280                     | 390 | 220 | 220 | 3    | 3     | 312 | 369                             | 299 | 12    | 6     | 2680                      | 5000 | 86.6          | Figure 1 |
| FC5678220A/YA3     | Working Roll&Intermediate Roll | 280                     | 390 | 220 | 220 | 3    | 3     | 312 | 366                             | 299 | 12    | 6     | 2130                      | 5200 | 88.6          | Figure 1 |
| FC5678240/C4YA34   | Working Roll&Intermediate Roll | 280                     | 390 | 240 | 240 | 3    | 3     | 312 | 368.5                           | 299 | 12    | 6     | 2570                      | 5850 | 89.6          | Figure 1 |
| FCDP5678275        | Working Roll&Intermediate Roll | 280                     | 390 | 275 | 275 | 1.5  | 1.1   | 308 | 368.5                           | 297 | 9.5   | 5     | 2930                      | 6250 | 102           | Figure 4 |
| FCD5678275/C3YA34  | Working Roll&Intermediate Roll | 280                     | 390 | 275 | 275 | 3    | 3     | 308 | 367.5                           | 297 | 9.5   | 5     | 2930                      | 6250 | 102           | Figure 2 |
| FCD5680244F3/YAD   | Working Roll&Intermediate Roll | 280                     | 400 | 244 | 244 | 4    | 7.5   | 312 | 374                             | 299 | 15    | 8     | 2300                      | 6000 | 102           | Figure 2 |
| FC5684280          | Working Roll&Intermediate Roll | 280                     | 420 | 280 | 280 | 4    | 4     | 318 | 391.5                           | 303 | 12    | 6     | 3500                      | 7000 | 139           | Figure 1 |
| FC5882240/C4YA3    | Back-up Roll                   | 290                     | 410 | 240 | 120 | 4    | 4     | 320 | 384.5                           | 308 | 15    | 8     | 2340                      | 5900 | 102           | Figure 1 |
| FCD5884300         | Back-up Roll                   | 290                     | 420 | 300 | 300 | 4    | 4     | 327 | 391                             | 312 | 12    | 6     | 2800                      | 7850 | 144           | Figure 2 |
| FC6084240          | Working Roll                   | 300                     | 420 | 240 | 240 | 4    | 4     | 332 | 397                             | 319 | 15    | 8     | 3450                      | 6300 | 111           | Figure 1 |
| FC6084240YA3       | Working Roll                   | 300                     | 420 | 240 | 240 | 4    | 4     | 332 | 397                             | 319 | 15    | 8     | 3450                      | 6300 | 111           | Figure 1 |
| FC6084240A         | Working Roll                   | 300                     | 420 | 240 | 240 | 4    | 4     | 332 | 396                             | 319 | 15    | 8     | 3450                      | 6300 | 111           | Figure 1 |



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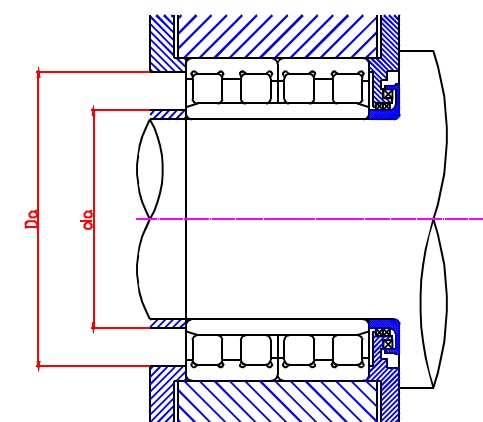
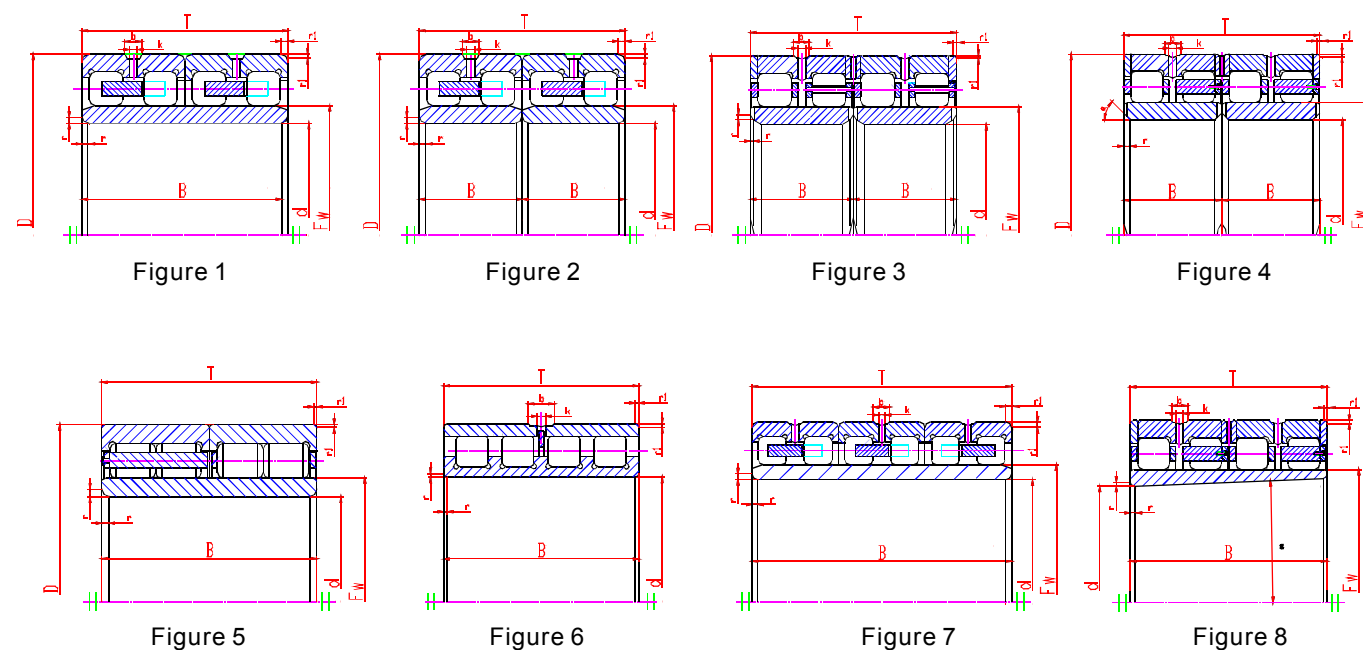
| Designations          | Working Position          | Basic Dimensions ( mm ) |     |     |     |          |       |       | Other related dimensions ( mm ) |       |       |       | Basic Load Ratings ( kN ) |       | Weight ( kg ) | Patterns |
|-----------------------|---------------------------|-------------------------|-----|-----|-----|----------|-------|-------|---------------------------------|-------|-------|-------|---------------------------|-------|---------------|----------|
|                       |                           | d                       | D   | B   | C   | rmin     | r1min | Fw    | Da                              | da    | b max | k max | Cr                        | Cor   |               |          |
| FC6084240A/YA3        | Working Roll              | 300                     | 420 | 240 | 240 | 4        | 4     | 332   | 396                             | 319   | 15    | 8     | 3450                      | 6300  | 111           | Figure 1 |
| FCD6084300/YA34       | Working Roll              | 300                     | 420 | 300 | 300 | 3        | 3     | 332   | 397                             | 319   | 12    | 6     | 3550                      | 6800  | 129           | Figure 2 |
| FC6084218/C4YA4       | Working Roll              | 300                     | 420 | 218 | 218 | 4        | 4     | 332   | 396                             | 319   | 9.5   | 5     | 2270                      | 5700  | 94.3          | Figure 1 |
| FCD6084300/HCYA4      | Working Roll              | 300                     | 420 | 300 | 300 | 3        | 3     | 332   | 397                             | 319   | 12    | 6     | 2650                      | 6950  | 129           | Figure 2 |
| FCDP6084300F3/YAD     | Back-up Roll              | 300                     | 420 | 300 | 300 | 7 × 20°  | 3     | 332   | 403                             | 319   | 12    | 6     | 3750                      | 8800  | 133           | Figure 2 |
| FCD6092350ZW/F3/HCYAD | Back-up Roll              | 300                     | 460 | 350 | 350 | 5        | 4     | 340   | 423                             | 324   | 20    | 10    | 4100                      | 10500 | 226           | Figure 5 |
| FCD6488240            | Back-up Roll              | 320                     | 440 | 240 | 240 | 4        | 4     | 351   | 415                             | 339   | 12    | 6     | 2550                      | 6700  | 110           | Figure 2 |
| FC6490240/YA3         | Working Roll&Back-up Roll | 320                     | 450 | 240 | 240 | 4        | 4     | 355   | 427                             | 341   | 12    | 6     | 2760                      | 6720  | 119           | Figure 1 |
| FC6490240/C4YA3       | Working Roll&Back-up Roll | 320                     | 450 | 240 | 240 | 4        | 4     | 355   | 425.5                           | 341   | 12    | 6     | 2970                      | 6720  | 120           | Figure 1 |
| FCD6492240ZW/YA34     | Working Roll              | 320                     | 460 | 240 | 240 | 3        | 3     | 364   | 434                             | 346.5 | 12    | 6     | 2700                      | 7050  | 141           | Figure 5 |
| FCD6496350F3/HCYA34   | Working Roll              | 320                     | 460 | 350 | 350 | 4        | 4     | 364   | 440                             | 346.5 | 16    | 8     | 5150                      | 10500 | 230           | Figure 2 |
| FCD6692340            | Working Roll&Back-up Roll | 330                     | 460 | 340 | 340 | 4        | 4     | 365   | 433.5                           | 351   | 12    | 6     | 2780                      | 9950  | 210           | Figure 2 |
| FCD6890250/C3YA4      | Back-up Roll              | 340                     | 450 | 250 | 125 | 4        | 4     | 371   | 429.5                           | 359   | 12    | 6     | 2420                      | 7240  | 115           | Figure 2 |
| FC6890250/YA4-2       | Back-up Roll              | 340                     | 450 | 250 | 250 | 4        | 4     | 366   | 424.5                           | 356   | 12    | 6     | 2460                      | 7250  | 112           | Figure 1 |
| FCD6890250/C9YA4-1    | Working Roll              | 340                     | 450 | 250 | 125 | 4        | 4     | 371   | 426                             | 359   | 12    | 6     | 2420                      | 7500  | 109           | Figure 2 |
| FC6890250/C3YAD       | Working Roll              | 340                     | 460 | 250 | 250 | 4        | 4     | 369   | 433                             | 357   | 12    | 6     | 2430                      | 6820  | 105           | Figure 1 |
| FCDSP70100380/HC      | Working Roll              | 350                     | 500 | 380 | 380 | 6        | 3     | 388   | 470                             | 373   | 12    | 6     | 4030                      | 10200 | 225           | Figure 2 |
| FCD7296340/HCC4YB2    | Working Roll&Back-up Roll | 360                     | 480 | 340 | 340 | 4        | 4     | 392   | 456.5                           | 379   | 12    | 6     | 3700                      | 11300 | 172           | Figure 2 |
| FCD72102370           | Working Roll&Back-up Roll | 360                     | 510 | 370 | 370 | 4        | 4     | 397   | 480                             | 382   | 12    | 6     | 4950                      | 11400 | 220           | Figure 2 |
| FCD72102370/YA4       | Working Roll&Back-up Roll | 360                     | 510 | 370 | 370 | 4        | 4     | 399.5 | 481                             | 384   | 12    | 6     | 4950                      | 11300 | 241           | Figure 2 |
| FCDP74104380          | Working Roll              | 370                     | 520 | 380 | 380 | 1.5      | 1.5   | 409   | 492                             | 393   | 12    | 6     | 5230                      | 12000 | 296           | Figure 4 |
| FCDP74106400/HCG2IC4  | Working Roll              | 370                     | 570 | 400 | 400 | 4        | 4     | 413   | 523.5                           | 396   | 12    | 6     | 4650                      | 12600 | 299           | Figure 4 |
| FCDP75120440/P63      | Backup Roll               | 375                     | 600 | 440 | 440 | 2        | 2     | 470   | 570                             | 432   | 15    | 6     | 5350                      | 15600 | 527           | Figure 4 |
| FCD76104340/HCYA3     | Working Roll              | 380                     | 520 | 340 | 340 | 4        | 4     | 416   | 488.5                           | 402   | 12    | 6     | 4300                      | 10700 | 211           | Figure 2 |
| FCDP78108320/YA3      | Working Roll              | 390                     | 540 | 320 | 320 | 10 × 20° | 2     | 431   | 520                             | 415   | 15    | 8     | 3800                      | 10100 | 230           | Figure 4 |
| FC80110300            | Back-up Roll              | 400                     | 550 | 300 | 300 | 5        | 5     | 442   | 526                             | 421   | 12    | 6     | 4460                      | 5050  | 223           | Figure 1 |
| FC80110300A           | Back-up Roll              | 400                     | 550 | 300 | 300 | 5        | 5     | 442   | 524.5                           | 421   | 12    | 6     | 4640                      | 5450  | 225           | Figure 1 |





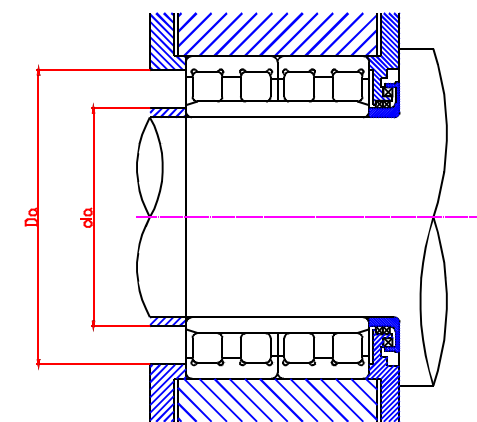
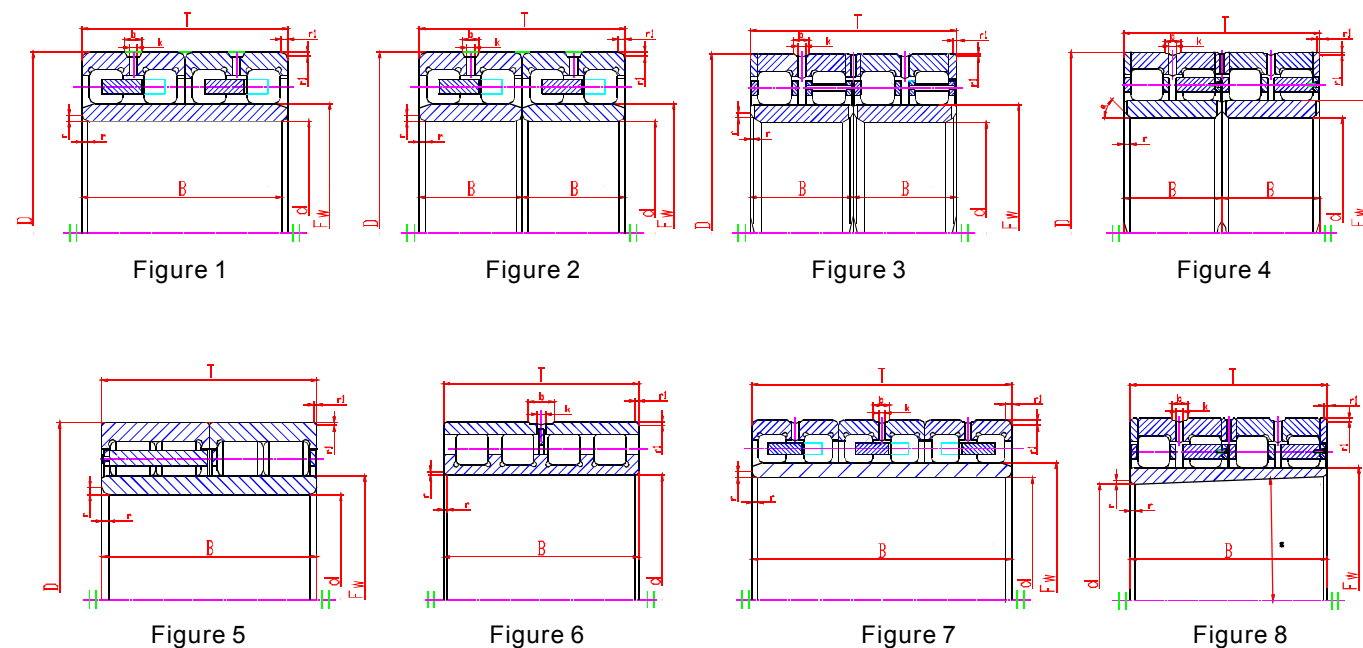
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| Designations               | Working Position          | Basic Dimensions ( mm ) |     |     |     |            |        |       | Other related dimensions ( mm ) |       |       |       | Basic Load Ratings ( kN ) |       | Weight ( kg ) | Patterns |
|----------------------------|---------------------------|-------------------------|-----|-----|-----|------------|--------|-------|---------------------------------|-------|-------|-------|---------------------------|-------|---------------|----------|
|                            |                           | d                       | D   | B   | C   | r min      | r1 min | Fw    | Da                              | da    | b max | k max | Cr                        | Cor   |               |          |
| FCD80112410/HCYA34         | Back-up Roll              | 400                     | 560 | 410 | 410 | 12 × 20°   | 5      | 445   | 534.5                           | 422.5 | 13    | 7     | 5200                      | 15000 | 320           | Figure 2 |
| FCDP82112400/HCYAD         | Backup Roll               | 410                     | 560 | 400 | 400 | 11 × 20°   | 2      | 450   | 541                             | 430   | 16.7  | 9     | 5600                      | 14400 | 286           | Figure 4 |
| FCDP82120440-ZH            | Back-up Roll              | 410                     | 600 | 440 | 440 | 5          | 5      | 460   | 575                             | 435   | 20    | 10    | 6450                      | 18300 | 432           | Figure 3 |
| FCDP84120440/HCP6YA34      | Working Roll&Back-up Roll | 420                     | 600 | 440 | 440 | 5          | 5      | 470   | 577                             | 445   | 22    | 10    | 7100                      | 19500 | 416           | Figure 3 |
| FCD84124400/HCC4           | Working Roll&Back-up Roll | 420                     | 620 | 400 | 400 | 5          | 5      | 473   | 585                             | 446.5 | 15    | 8     | 5800                      | 15400 | 423           | Figure 2 |
| FCDP88124450               | Working Roll&Back-up Roll | 440                     | 620 | 450 | 450 | 5          | 5      | 487   | 591.5                           | 463.5 | 15    | 8     | 7420                      | 15800 | 452           | Figure 4 |
| FCDP88124450/YA6           | Working Roll&Back-up Roll | 440                     | 620 | 450 | 450 | 5          | 5      | 487   | 591.5                           | 463.5 | 15    | 8     | 7420                      | 15800 | 452           | Figure 3 |
| FC88132340ZW/HCC4YA3       | Working Roll&Back-up Roll | 440                     | 660 | 340 | 340 | 6          | 6      | 492   | 621                             | 466   |       |       | 6380                      | 13500 | 425           | Figure 5 |
| FCDP92130470/HCYAD/W283    | Back-up Roll              | 460                     | 650 | 470 | 470 | 12 × 20°   | 3      | 509   | 627.5                           | 484.5 | 22    | 12    | 8750                      | 21500 | 492           | Figure 5 |
| FCD96130450                | Working Roll&Back-up Roll | 480                     | 650 | 450 | 450 | 6          | 6      | 525   | 621.5                           | 502.5 | 15    | 8     | 7840                      | 15400 | 419           | Figure 4 |
| FCDP96136500/P54           | Working Roll&Back-up Roll | 480                     | 680 | 500 | 500 | 6          | 6      | 532   | 656                             | 506   | 15    | 9     | 7980                      | 23400 | 599           | Figure 3 |
| FCDP97148540K/HCE          | Backup Roll               | 485                     | 740 | 540 | 540 | 5          | 5      | 572.3 | 710                             | 529   | 22.3  | 12    | 9520                      | 28600 | 814           | Figure 8 |
| FC100134450/P69            | Working Roll&Back-up Roll | 500                     | 670 | 450 | 450 | 6          | 6      | 540   | 642.5                           | 520   | 15    | 7     | 7840                      | 20100 | 446           | Figure 1 |
| FCD100134450/P69HCYA3      | Working Roll&Back-up Roll | 500                     | 670 | 450 | 450 | 6          | 6      | 540   | 643.5                           | 520   | 15    | 8     | 8640                      | 23700 | 460           | Figure 3 |
| FCDP100134450/HCEC9YAD     | Working Roll              | 500                     | 670 | 485 | 450 | 5          | 5      | 540   | 650                             | 520   | 18    | 10    | 8400                      | 22700 | 463           | Figure 3 |
| FCDP100134450/HCC9YAD      | Back-up Roll              | 500                     | 670 | 450 | 450 | 12.5 × 20° | 5      | 540   | 650                             | 520   | 18    | 10    | 8400                      | 22700 | 454           | Figure 3 |
| FCDP100144530/HCYAD-1/W283 | Back-up Roll              | 500                     | 720 | 530 | 530 | 15 × 20°   | 6      | 568   | 694                             | 534   | 15    | 8     | 8550                      | 28100 | 751           | Figure 3 |
| FCDP102136500/HCYAD        | Backup Roll               | 510                     | 680 | 500 | 500 | 5          | 5      | 560   | 622                             | 535   | 22    | 12    | 8300                      | 25200 | 522           | Figure 3 |
| FCDP102146520/HCC4YB2      | Working Roll              | 510                     | 730 | 520 | 520 | 6          | 6      | 565   | 705.5                           | 538   | 18    | 8     | 11000                     | 27000 | 724           | Figure 3 |
| FCDP104147535/HCYAD        | Back-up Roll              | 520                     | 735 | 535 | 535 | 20 × 20°   | 5      | 574.5 | 708.5                           | 547   | 22    | 12    | 11000                     | 27800 | 757           | Figure 3 |
| FCDP106142520/HCC3         | Working Roll&Back-up Roll | 530                     | 710 | 520 | 520 | 6          | 6      | 578   | 688                             | 554   | 22    | 10    | 9450                      | 26500 | 597           | Figure 3 |
| FCDP106152520/HCRG2YAD     | Backup Roll               | 530                     | 760 | 520 | 520 | 3          | 5      | 587   | 733.5                           | 558.5 | 22.3  | 12    | 11100                     | 27000 | 788           | Figure 3 |
| FCDP106156570/HCEYAD       | Back-up Roll              | 530                     | 780 | 570 | 570 | 6          | 6      | 595   | 747.5                           | 562.5 | 19    | 10    | 13000                     | 32000 | 971           | Figure 3 |
| FCDP110160560/HCYAD-1/W283 | Back-up Roll              | 550                     | 800 | 560 | 560 | 6          | 6      | 610   | 775                             | 580   | 24    | 12    | 13600                     | 32500 | 952           | Figure 3 |
| FCDP110160520              | Back-up Roll              | 550                     | 800 | 520 | 520 | 6          | 6      | 612   | 771                             | 581   | 18    | 10    | 10300                     | 28500 | 887           | Figure 3 |



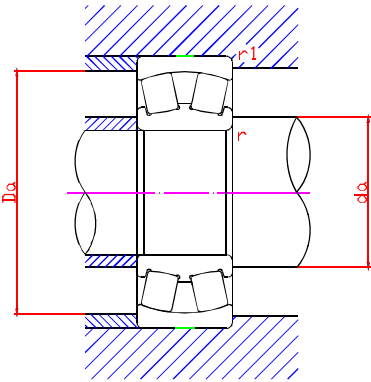
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| Designations                | Working Position          | Basic Dimensions ( mm ) |      |     |     |          |       |       | Other related dimensions ( mm ) |       |       |       | Basic Load Ratings ( kN ) |       | Weight ( kg ) | Patterns |
|-----------------------------|---------------------------|-------------------------|------|-----|-----|----------|-------|-------|---------------------------------|-------|-------|-------|---------------------------|-------|---------------|----------|
|                             |                           | d                       | D    | B   | C   | rmin     | r1min | Fw    | Da                              | da    | b max | k max | Cr                        | Cor   |               |          |
| FCDP112160600/HCP5YAD       | Back-up Roll              | 560                     | 800  | 600 | 600 | 6        | 6     | 620   | 766                             | 590   | 18    | 8     | 12500                     | 32000 | 1010          | Figure 4 |
| FCDP112164630/HCC4YA3       | Back-up Roll              | 560                     | 820  | 630 | 630 | 6        | 6     | 625   | 787.5                           | 592.5 | 18    | 10    | 11100                     | 36000 | 1164          | Figure 3 |
| FC114150530/HCYA3           | Working Roll&Back-up Roll | 570                     | 750  | 530 | 530 | 6        | 6     | 622   | 720                             | 596   | 18    | 8     | 9000                      | 26600 | 625           | Figure 1 |
| FCDP114163594/HCYA3         | Working Roll&Back-up Roll | 570                     | 815  | 594 | 594 | 6        | 6     | 628   | 781.5                           | 599   | 18    | 10    | 11100                     | 33300 | 1030          | Figure 3 |
| FCDP120164575/HCYA6-1       | Back-up Roll              | 600                     | 820  | 575 | 575 | 3        | 6     | 660   | 794                             | 630   | 18    | 9     | 12300                     | 35000 | 945           | Figure 3 |
| FCDP120164575/HCYA6         | Back-up Roll              | 600                     | 820  | 575 | 575 | 6        | 3     | 660   | 794                             | 630   | 18    | 9     | 9750                      | 35000 | 948           | Figure 3 |
| FCDP120164575/HCRYA6        | Back-up Roll              | 600                     | 820  | 575 | 575 | 6        | 3     | 660   | 794                             | 630   | 18    | 9     | 9750                      | 35000 | 948           | Figure 3 |
| FCDP120174540/HCYAD-FSDT    | Back-up Roll              | 600                     | 870  | 540 | 540 | 6        | 6     | 672   | 841                             | 636   | 18    | 10    | 12500                     | 35700 | 1107          | Figure 3 |
| FCDP120174640/HCYAD/W283    | Back-up Roll              | 600                     | 870  | 640 | 640 | 6        | 6     | 672   | 841                             | 636   | 18    | 10    | 15700                     | 41000 | 1337          | Figure 3 |
| FCDP120174640/HCYA34        | Back-up Roll              | 600                     | 870  | 640 | 640 | 6        | 6     | 669   | 839.5                           | 634.5 | 18    | 10    | 13200                     | 38500 | 1347          | Figure 3 |
| FCDP122174660/HCYA34        | Back-up Roll              | 610                     | 870  | 660 | 660 |          | 6     | 680   | 842                             | 645   | 20    | 12    | 16900                     | 44000 | 1310          | Figure 3 |
| FCDP126184600X4/HCEYAD      | Backup Roll               | 628                     | 922  | 600 | 600 | 17.5×20° | 6     | 702   | 892                             | 665   | 24    | 12    | 16800                     | 39000 | 1403          | Figure 3 |
| FCD126184515/HC             | Back-up Roll              | 630                     | 920  | 515 | 515 | 7.5      | 7.5   | 700   | 872.5                           | 665   | 25    | 12    | 13700                     | 17160 | 1182          | Figure 2 |
| FCDP130180650/HC            | Back-up Roll              | 650                     | 900  | 650 | 650 | 20×20°   | 7.5   | 704   | 870                             | 677   | 30    | 12    | 16200                     | 42000 | 1252          | Figure 3 |
| FCDP130184670/HCYAD-1       | Back-up Roll              | 650                     | 920  | 670 | 670 | 7.5      | 7.5   | 723   | 889.5                           | 686.5 | 18    | 10    | 14300                     | 44500 | 1456          | Figure 3 |
| FCDP130184670/HCYA3         | Back-up Roll              | 650                     | 920  | 670 | 370 | 17×20°   | 4     | 723   | 889.5                           | 686.5 | 18    | 10    | 14300                     | 44500 | 1454          | Figure 3 |
| FCDP130184690/HCYAD         | Back-up Roll              | 650                     | 920  | 690 | 690 | 18×20°   | 6     | 723   | 883.5                           | 686.5 | 24    | 12    | 15700                     | 47500 | 1536          | Figure 3 |
| FCDP136184600/HCG2IYAD      | Back-up Roll              | 680                     | 920  | 600 | 600 | 18×20°   | 6     | 743   | 889.5                           | 711.5 | 22    | 12    | 12400                     | 41600 | 1178          | Figure 3 |
| FCDP136196640/HCC4YAD       | Back-up Roll              | 680                     | 980  | 640 | 640 | 20×20°   | 4     | 760   | 942                             | 720   | 22    | 12    | 17700                     | 46000 | 1680          | Figure 3 |
| FCDP138196715/HCP69YAD      | Back-up Roll              | 690                     | 980  | 715 | 715 | 20×20°   | 4     | 767.5 | 943.5                           | 729   | 22    | 12    | 18800                     | 51500 | 1805          | Figure 3 |
| FCDP138196750/HCC9YA6       | Back-up Roll              | 690                     | 980  | 750 | 750 |          | 7.5   | 766   | 943                             | 728   | 45    | 13    | 16100                     | 51500 | 1881          | Figure 3 |
| FCDP138196750/HCEP59YAD     | Back-up Roll              | 690                     | 980  | 750 | 750 | 7.5      | 7.5   | 766   | 943                             | 728   | 27    | 15    | 16100                     | 51500 | 1873          | Figure 3 |
| FCDP138196715/HCP69YAD/W283 | Backup Roll               | 690                     | 980  | 715 | 715 | 20×20°   | 4     | 767.5 | 943.5                           | 729   | 22    | 12    | 16200                     | 51500 | 1814          | Figure 3 |
| FCDP140186620/HCEC9YAD      | Back-up Roll              | 700                     | 930  | 620 | 620 | 18×20°   | 3     | 763   | 903.5                           | 731.5 | 22.3  | 12    | 15100                     | 44000 | 1208          | Figure 3 |
| FCDP142200715/HCYAD/W283    | Back-up Roll              | 710                     | 1000 | 715 | 715 | 17×20°   | 7.5   | 787.5 | 963.5                           | 749   | 22.3  | 12    | 20100                     | 55500 | 1851          | Figure 3 |
| FCDP146192620/HCC4YA6       | Back-up Roll              | 730                     | 960  | 620 | 620 | 6        | 6     | 790   | 933                             | 760   | 23.5  | 12    | 15000                     | 44000 | 1254          | Figure 3 |



Mounted

| Designations               | Working Position          | Basic Dimensions ( mm ) |        |       |       |        |       |      | Other related dimensions ( mm ) |       |       |       | Basic Load Ratings ( kN ) |        | Weight ( kg ) | Patterns |
|----------------------------|---------------------------|-------------------------|--------|-------|-------|--------|-------|------|---------------------------------|-------|-------|-------|---------------------------|--------|---------------|----------|
|                            |                           | d                       | D      | B     | C     | rmin   | r1min | Fw   | Da                              | da    | b max | k max | Cr                        | Cor    |               |          |
| FCDP146206750/HF-FY/W283   | Back-up Roll              | 730                     | 1030   | 750   | 750   | 21×20° | 6     | 809  | 911.5                           | 770   | 22    | 12    | 21000                     | 58000  | 2082          | Figure 3 |
| FCDP146206750/HCEYAD/W281  | Back-up Roll              | 730                     | 1030   | 750   | 750   | 21×20° | 6     | 809  | 911.5                           | 770   | 22    | 12    | 21000                     | 58000  | 2082          | Figure 3 |
| FCDP146200700/HCEYAD       | Back-up Roll              | 730                     | 1000   | 700   | 700   | 20×20° | 4     | 802  | 971                             | 766   | 45    | 13    | 16600                     | 54500  | 1681          | Figure 3 |
| FCDP150200670/HCYAD/W283   | Back-up Roll              | 750                     | 1000   | 670   | 670   |        | 3     | 813  | 972.5                           | 781.5 | 23.5  | 12    | 18000                     | 52000  | 1496          | Figure 3 |
| FCDP152215787X4/HCP5       | Back-up Roll              | 761.425                 | 1079.6 | 787.4 | 787.4 |        | 5     | 846  | 1069.5                          | 804   | 23.5  | 12    | 26600                     | 64000  | 2376          | Figure 3 |
| FCDP156214780/HCYAD        | Back-up Roll              | 780                     | 1070   | 780   | 780   | 7.5    | 7.5   | 849  | 1032.5                          | 814.5 | 23.5  | 12    | 21400                     | 65700  | 2170          | Figure 3 |
| FCDP160216700/HF           | Back-up Roll              | 800                     | 1080   | 700   | 700   | 3      | 3     | 878  | 1042.5                          | 830   | 23.5  | 12    | 12600                     | 48500  | 1850          | Figure 3 |
| FCDP160216700/HCP64YAD     | Back-up Roll              | 800                     | 1080   | 700   | 700   | 5      | 5     | 878  | 1056                            | 830   | 30    | 12    | 19030                     | 59500  | 1918          | Figure 3 |
| FCDP164226800/HCP6YA3-SY   | Back-up Roll              | 820                     | 1130   | 800   | 800   |        | 4     | 903  | 1100.5                          | 851.5 | 23.5  | 12    | 19700                     | 67000  | 2534          | Figure 3 |
| FCDP164226800/HCYA3/W283   | Back-up Roll              | 820                     | 1130   | 800   | 800   |        | 4     | 903  | 1100.5                          | 851.5 | 23.5  | 12    | 19700                     | 67000  | 2512          | Figure 3 |
| FCDP164226800/HCYA3        | Back-up Roll              | 820                     | 1130   | 800   | 800   |        | 4     | 903  | 1100.5                          | 851.5 | 23.5  | 12    | 19700                     | 67000  | 2512          | Figure 3 |
| FCDP170230840/HCYAD/W283   | Back-up Roll              | 850                     | 1150   | 840   | 840   |        | 6     | 928  | 1126                            | 880   | 23.5  | 12    | 24000                     | 75000  | 2550          | Figure 3 |
| FCDP170230840/HCE          | Back-up Roll              | 850                     | 1150   | 840   | 840   |        | 4     | 928  | 1122.5                          | 880   | 23.5  | 12    | 25000                     | 75500  | 2595          | Figure 3 |
| FCDP180244840/HCYAD        | Working Roll&Back-up Roll | 900                     | 1220   | 840   | 840   |        | 4     | 989  | 1189                            | 934   | 22.3  | 12    | 2000                      | 8000   | 2975          | Figure 3 |
| FCDP190260850/C9HCYA3      | Back-up Roll              | 950                     | 1300   | 850   | 850   | 7.5    | 7.5   | 1044 | 1255                            | 986   | 30    | 14    | 32200                     | 85000  | 3390          | Figure 3 |
| FCDP190260850/HCC9         | Back-up Roll              | 950                     | 1300   | 850   | 850   | 10     | 10    | 1044 | 1255                            | 986   | 30    | 16    | 28600                     | 80500  | 3390          | Figure 3 |
| FCDP190260850/HCP69YAD     | Back-up Roll              | 950                     | 1300   | 850   | 850   | 10     | 10    | 1044 | 1256.5                          | 986   | 32    | 12    | 21500                     | 64000  | 3360          | Figure 3 |
| FCDP190260850E/C9HCYA3     | Back-up Roll              | 950                     | 1300   | 850   | 850   | 7.5    | 7.5   | 1044 | 1274.5                          | 986   | 30    | 14    | 33300                     | 90500  | 3550          | Figure 3 |
| FCDP1902721000/HCEYAD/W281 | Backup Roll               | 950                     | 1360   | 1000  | 1000  |        | 5     | 1075 | 1323.5                          | 997.5 | 30    | 18    | 41500                     | 113000 | 5027          | Figure 3 |



Mounted

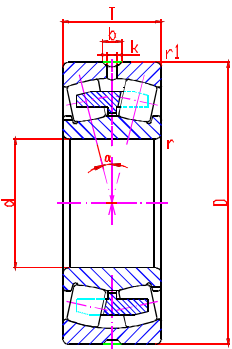


Figure 1

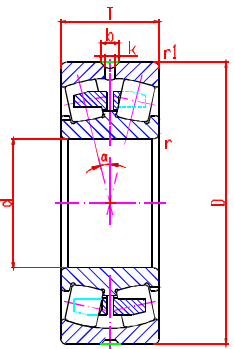


Figure 2

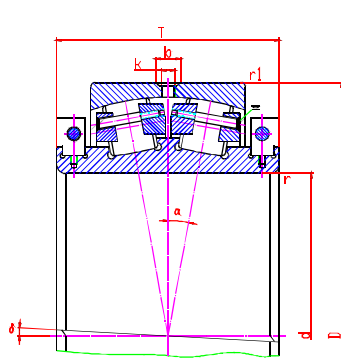


Figure 3

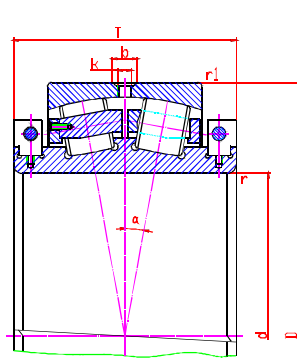


Figure 4

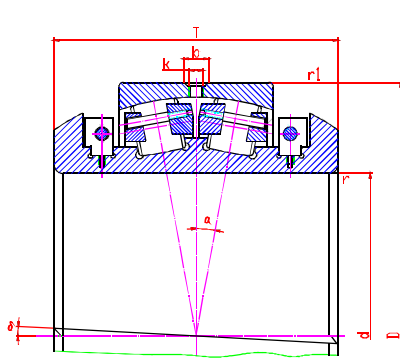
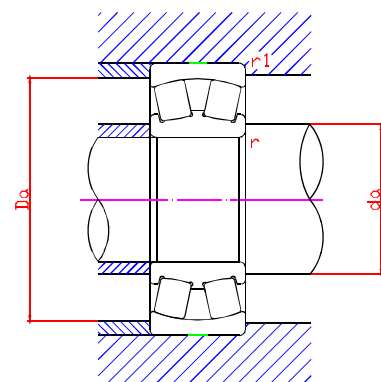


Figure 5

| Designations      | Basic Dimensions ( mm ) |      |     |      |       | Mounting Dimensions ( mm ) |        |      |    | e Value | Basic Load Ratings ( kN ) |       | Weight ( kg ) | Patterns |
|-------------------|-------------------------|------|-----|------|-------|----------------------------|--------|------|----|---------|---------------------------|-------|---------------|----------|
|                   | d                       | D    | T   | rmin | r1min | Da                         | da     | b    | k  |         | Cr                        | Cor   |               |          |
| 230/628CAF3/W33   | 628                     | 920  | 212 | 7.5  | 7.5   | 875.5                      | 674.5  | 22.3 | 9  | 0.208   | 5900                      | 12800 | 481           | Figure 1 |
| 240/884/HCC9YA1   | 884                     | 1320 | 365 | 7.5  | 7.5   | 1251.5                     | 961    | 24   | 12 | 0.28    | 12900                     | 28900 | 1811          | Figure 2 |
| 240/884F3/HCC9YA1 | 884                     | 1320 | 365 | 7.5  | 7.5   | 1251.5                     | 961    | 24   | 12 | 0.28    | 12900                     | 28900 | 1811          | Figure 2 |
| 240/900X3/HCC9-1  | 900                     | 1320 | 365 | 7.5  | 7.5   | 1249                       | 960.5  | 24   | 12 | 0.264   | 10500                     | 27600 | 1730          | Figure 2 |
| 240/900X3/W33     | 900                     | 1270 | 365 | 7.5  | 7.5   | 1204                       | 953.5  | 24   | 12 | 0.28    | 10800                     | 26600 | 1440          | Figure 2 |
| 240/1000/C3W33    | 1000                    | 1420 | 412 | 7.5  | 7.5   | 1346                       | 1064   | 22.3 | 12 | 0.27    | 15600                     | 40000 | 2150          | Figure 2 |
| 240/1060F3/C4W33X | 1060                    | 1500 | 438 | 9.5  | 9.5   | 1419.5                     | 1122.5 | 22.3 | 12 | 0.273   | 17000                     | 44100 | 2500          | Figure 2 |
| 240/1060CAF1/W33  | 1060                    | 1500 | 438 | 9.5  | 9.5   | 1419.5                     | 1125   | 22.3 | 12 | 0.256   | 17200                     | 45000 | 2540          | Figure 1 |
| 230/1120CAF3/W33X | 1120                    | 1580 | 345 | 9.5  | 9.5   | 1511                       | 1202.5 | 40   | 25 | 0.192   | 15000                     | 38100 | 2210          | Figure 1 |
| 249/1180CAF1/W33X | 1180                    | 1540 | 355 | 7.5  | 7.5   | 1481                       | 1235   | 22.3 | 12 | 0.197   | 12100                     | 40000 | 1772          | Figure 1 |
| 240/1320CAF3/W33T | 1320                    | 1850 | 530 | 12   | 12    | 1755.5                     | 1402.5 | 40   | 25 | 0.254   | 23200                     | 63300 | 4540          | Figure 1 |





Mounted

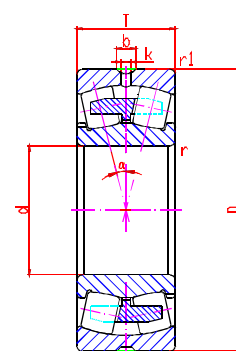


Figure 1

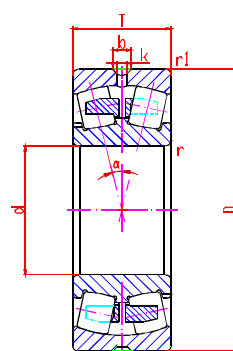


Figure 2

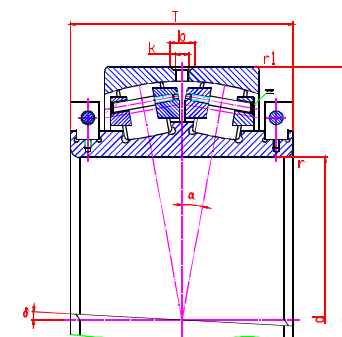


Figure 3

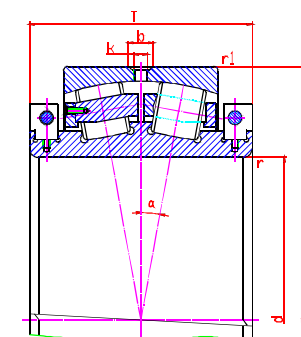


Figure 4

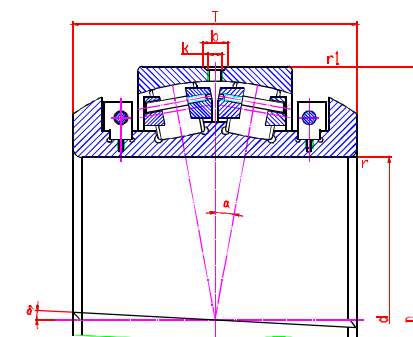


Figure 5

| Designations      | Basic Dimensions ( mm ) |      |       |          |       | Other Dimensions ( mm ) |        |      |    | e Value | Basic Load Ratings ( kN ) |       | Weight ( kg ) | Patterns |
|-------------------|-------------------------|------|-------|----------|-------|-------------------------|--------|------|----|---------|---------------------------|-------|---------------|----------|
|                   | d                       | D    | T     | rmin     | r1min | Da                      | da     | b    | k  |         | Cr                        | Cor   |               |          |
| 230/530D          | 530                     | 780  | 265   | 6        | 6     | 742                     | 561    | 22.3 | 12 | 0.211   | 3400                      | 8100  | 389           | Figure 4 |
| 230/750D          | 750                     | 1090 | 340   | 7.5      | 7.5   | 1040.5                  | 794.5  | 20   | 12 | 0.205   | 6810                      | 15230 | 961           | Figure 3 |
| 230/800D          | 800                     | 1150 | 358   | 7.5      | 7.5   | 1097                    | 843    | 20   | 12 | 0.197   | 6850                      | 15600 | 1087          | Figure 3 |
| 249/800D          | 800                     | 1060 | 370   | 6        | 6     | 1019                    | 836    | 23.5 | 12 | 0.211   | 6000                      | 15300 | 819           | Figure 3 |
| 230/800WD         | 800                     | 1150 | 540   | 7.5      | 7.5   | 1097                    | 850    | 20   | 12 | 0.197   | 6850                      | 15600 | 1367          | Figure 5 |
| 240/850WD         | 850                     | 1220 | 660   | 18 × 45° | 7.5   | 1156                    | 889.5  | 27   | 18 | 0.27    | 10900                     | 25800 | 1931          | Figure 5 |
| 240/850WBD        | 850                     | 1220 | 540   | 7.5      | 7.5   | 1156                    | 882.5  | 27   | 18 | 0.27    | 10900                     | 25800 | 1781          | Figure 3 |
| 240/884D/HC       | 884                     | 1320 | 478   | 9.5      | 9.5   | 1239.5                  | 951    | 22   | 18 | 0.246   | 11000                     | 24900 | 2457          | Figure 3 |
| 240/900X3D/HCC9-2 | 900                     | 1320 | 478   | 9.5      | 9.5   | 1249                    | 965    | 22   | 18 | 0.238   | 9850                      | 24100 | 2050          | Figure 3 |
| 240/900X3D-1      | 900                     | 1270 | 470   | 9.5      | 9.5   | 1200                    | 955    | 22   | 18 | 0.247   | 9800                      | 24600 | 1970          | Figure 3 |
| 240/900X3D-2      | 900                     | 1270 | 470   | 8.5      | 8.5   | 1200                    | 955    | 22   | 18 | 0.247   | 9800                      | 24600 | 1970          | Figure 3 |
| 240/900X2D/HC     | 900                     | 1280 | 498   | 9.5      | 9.5   | 1205                    | 955    | 22   | 18 | 0.247   | 9800                      | 24600 | 2064          | Figure 3 |
| 240/900X3D-3      | 900                     | 1270 | 470   | 9.5      | 9.5   | 1200                    | 955    | 22   | 18 | 0.247   | 9800                      | 24600 | 1879          | Figure 3 |
| 230/950D          | 950                     | 1360 | 420   | 20       | 7.5   | 1297                    | 1003   | 27   | 18 | 0.197   | 9100                      | 21000 | 1956          | Figure 3 |
| 230/950D-1        | 950                     | 1360 | 640   | 55 × 45° | 7.5   | 1297                    | 1000   | 27   | 18 | 0.197   | 9100                      | 21000 | 2338          | Figure 5 |
| 240/1000D         | 1000                    | 1420 | 556   | 32 × 45° | 7.5   | 1347                    | 1054.5 | 22   | 18 | 0.251   | 13300                     | 34500 | 2633          | Figure 3 |
| 240/1060D         | 1060                    | 1500 | 585   | 9.5      | 9.5   | 1422.5                  | 1120   | 22   | 18 | 0.251   | 15000                     | 40000 | 3083          | Figure 3 |
| 240/1060D-2       | 1060                    | 1500 | 575   | 9.5      | 9.5   | 1422.5                  | 1112   | 22   | 18 | 0.251   | 15000                     | 40000 | 3354          | Figure 3 |
| 240/1060D-1       | 1060                    | 1500 | 611.5 | 70 × 45° | 9.5   | 1422.5                  | 1120   | 22   | 18 | 0.251   | 15000                     | 40000 | 3089          | Figure 3 |
| 249/1180D         | 1180                    | 1540 | 500   | 7.5      | 7.5   | 1484                    | 1227   | 22.3 | 18 | 0.197   | 10000                     | 31000 | 2254          | Figure 3 |

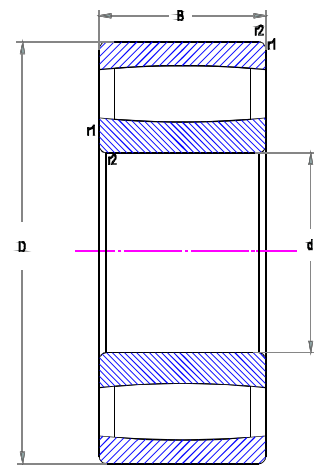


Figure 1

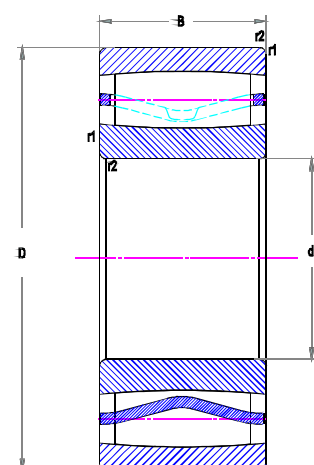
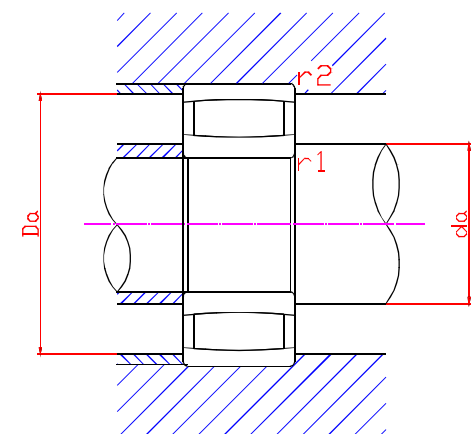


Figure 2



Mounted

| Designations | Basic Dimensions ( mm ) |     |    |       |       | Other Dimensions ( mm ) |       | Basic Load Ratings ( kN ) |      | Limit Speed Ratings<br>r/min | Weight<br>( kg ) | Patterns |
|--------------|-------------------------|-----|----|-------|-------|-------------------------|-------|---------------------------|------|------------------------------|------------------|----------|
|              | d                       | D   | B  | r1min | r2min | Da                      | da    | Cr                        | Cor  |                              |                  |          |
| SDB5915V     | 75                      | 105 | 40 | 1     | 1     | 100                     | 79.5  | 204                       | 325  | 1900                         | 1.1              | Figure 1 |
| SDB6915V     | 75                      | 105 | 54 | 1     | 1     | 99                      | 80    | 178                       | 325  | 1600                         | 1.35             | Figure 1 |
| SDB5917V     | 85                      | 120 | 46 | 1.1   | 1.1   | 145                     | 90    | 275                       | 465  | 1700                         | 1.52             | Figure 1 |
| SDB5918V     | 90                      | 125 | 46 | 1.1   | 1.1   | 119                     | 96    | 200                       | 400  | 1600                         | 1.71             | Figure 1 |
| SDB5020V     | 100                     | 150 | 67 | 1.5   | 1.5   | 142                     | 107.5 | 510                       | 865  | 1100                         | 4.3              | Figure 1 |
| SDB4024V     | 120                     | 180 | 60 | 2     | 2     | 172                     | 130   | 530                       | 880  | 1100                         | 5.5              | Figure 1 |
| SDB4026V     | 130                     | 200 | 69 | 2     | 2     | 190                     | 140   | 720                       | 1120 | 850                          | 8.05             | Figure 1 |
| SDB4030V     | 150                     | 225 | 75 | 2.1   | 2.1   | 214                     | 162   | 780                       | 1320 | 750                          | 10.5             | Figure 1 |
| SDB3044      | 220                     | 340 | 90 | 3     | 3     | 325                     | 239   | 1320                      | 2040 | 2200                         | 29               | Figure 2 |

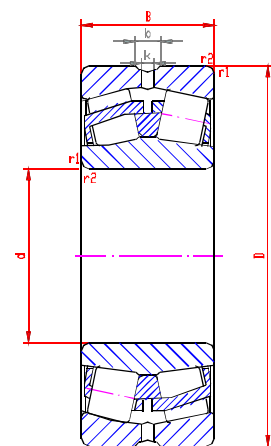


Figure 1

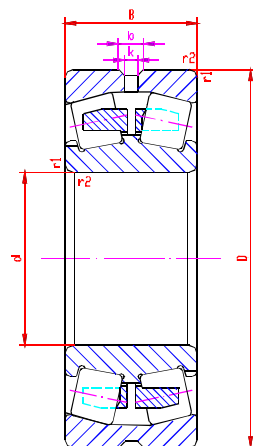
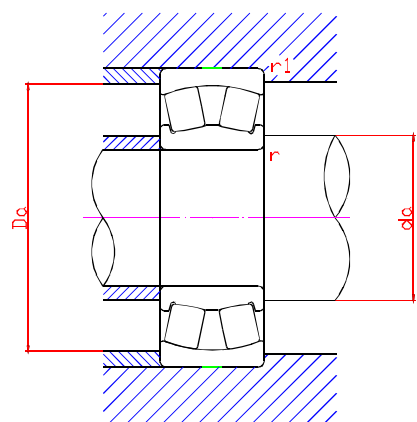
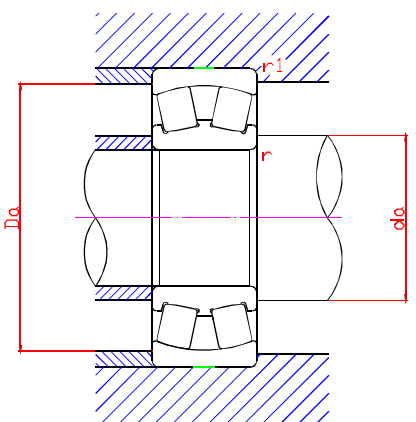


Figure 2



Mounted



Mounted

| Designations | Basic Dimensions ( mm ) |     |      |       |       | Mounting Dimension |       |      |     | Basic Load Ratings ( kN ) |      | Limit Speed Ratings<br>r/min | Weight<br>( kg ) | Patterns |
|--------------|-------------------------|-----|------|-------|-------|--------------------|-------|------|-----|---------------------------|------|------------------------------|------------------|----------|
|              | d                       | D   | B    | r1min | r2min | Da                 | da    | b    | k   | Cr                        | Cor  |                              |                  |          |
| 22211C/W33   | 55                      | 100 | 25   | 1.5   | 1.5   | 93.5               | 60    | 5.5  | 2   | 119                       | 126  | 4500                         | 0.856            | Figure 1 |
| 22212CB/W33  | 60                      | 110 | 28   | 1.5   | 1.5   | 102.5              | 67.5  | 5.5  | 3   | 156                       | 166  | 4300                         | 1.15             | Figure 2 |
| 24013CB/W33  | 65                      | 100 | 35   | 1.1   | 1.1   | 93                 | 69    | 5.5  | 3   | 110                       | 165  | 2600                         | 0.966            | Figure 2 |
| 22313CB/W33  | 65                      | 140 | 48   | 2.1   | 2.1   | 128                | 76.5  | 8.3  | 4.5 | 340                       | 360  | 2600                         | 3.75             | Figure 2 |
| 22314CB/W33  | 70                      | 150 | 51   | 2.1   | 2.1   | 137.5              | 83    | 8.3  | 4.5 | 400                       | 430  | 2200                         | 4.55             | Figure 2 |
| 24015CB/W33  | 75                      | 115 | 40   | 1.1   | 1.1   | 107.5              | 81.5  | 5.5  | 3   | 158                       | 240  | 2600                         | 1.48             | Figure 2 |
| 22315CB/W33  | 75                      | 160 | 55   | 2.1   | 2.1   | 146.5              | 88    | 8.3  | 4   | 440                       | 475  | 2100                         | 5.55             | Figure 2 |
| 22216C/W33   | 80                      | 140 | 33   | 2     | 2     | 131                | 89.5  | 5.5  | 2.5 | 165                       | 225  | 3200                         | 2.06             | Figure 1 |
| 22317CB/W33  | 85                      | 180 | 60   | 3     | 3     | 165                | 100   | 8.5  | 4   | 550                       | 620  | 1900                         | 7.65             | Figure 2 |
| 23218CB/W33  | 90                      | 160 | 52.4 | 2     | 2     | 148                | 100.5 | 5.7  | 3   | 300                       | 440  | 1900                         | 4.5              | Figure 2 |
| 22219CB/W33  | 95                      | 170 | 43   | 2.1   | 2.1   | 159                | 107.5 | 8.4  | 4.5 | 275                       | 370  | 1750                         | 4.29             | Figure 2 |
| 22319CB/W33  | 95                      | 200 | 67   | 3     | 3     | 183.5              | 111   | 8.3  | 5   | 670                       | 765  | 1750                         | 10.5             | Figure 2 |
| 23220CB/W33  | 100                     | 180 | 60.3 | 2.1   | 2.1   | 166                | 112.5 | 8.4  | 4.5 | 400                       | 570  | 1700                         | 6.44             | Figure 2 |
| 22320CB/W33  | 100                     | 215 | 73   | 3     | 3     | 196.5              | 119   | 11.1 | 5   | 815                       | 950  | 1700                         | 13.5             | Figure 2 |
| 23121C/W33   | 105                     | 175 | 56   | 2     | 2     | 163                | 112.5 | 5.5  | 3   | 365                       | 560  | 1500                         | 5.36             | Figure 1 |
| 22322CB/W33  | 110                     | 240 | 80   | 3     | 3     | 218.5              | 130.5 | 13.9 | 6   | 950                       | 1120 | 1500                         | 18.4             | Figure 2 |
| 24124C/W33   | 120                     | 200 | 80   | 2     | 2     | 183                | 133   | 5.5  | 3   | 655                       | 950  | 1400                         | 10.3             | Figure 1 |
| 22224CB/W33  | 120                     | 215 | 58   | 2.1   | 2.1   | 201                | 135   | 11.1 | 4   | 630                       | 765  | 1900                         | 8.7              | Figure 2 |
| 24126C/W33   | 130                     | 210 | 80   | 2     | 2     | 194                | 138   | 8.3  | 4   | 680                       | 1000 | 1300                         | 11               | Figure 1 |

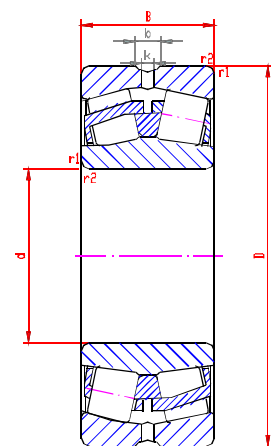


Figure 1

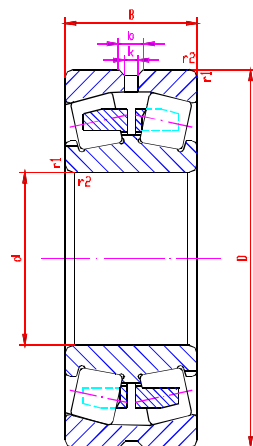
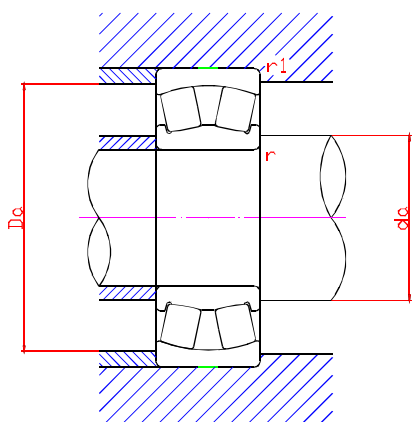
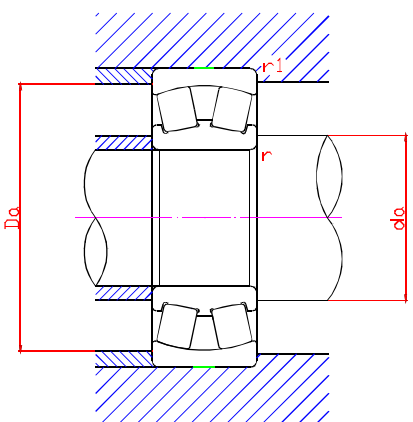


Figure 2



Mounted



Mounted

| Designations | Basic Dimensions ( mm ) |     |     |       |       | Mounting Dimension |       |      |     | Basic Load Ratings ( kN ) |      | Limit Speed Ratings<br>r/min | Weight<br>( kg ) | Patterns |
|--------------|-------------------------|-----|-----|-------|-------|--------------------|-------|------|-----|---------------------------|------|------------------------------|------------------|----------|
|              | d                       | D   | B   | r1min | r2min | Da                 | da    | b    | k   | Cr                        | Cor  |                              |                  |          |
| 22226CB/W33  | 130                     | 230 | 64  | 3     | 3     | 215                | 146   | 11.1 | 6   | 735                       | 930  | 1800                         | 11               | Figure 2 |
| 24128CB/W33  | 140                     | 225 | 85  | 2.1   | 2.1   | 208.5              | 152.5 | 8.3  | 4.5 | 765                       | 1160 | 1100                         | 13.5             | Figure 1 |
| 24130C/W33   | 150                     | 250 | 100 | 2.1   | 2.1   | 229                | 165   | 8.3  | 4.5 | 1020                      | 1530 | 1000                         | 20               | Figure 1 |
| 24132C/W33   | 160                     | 270 | 109 | 2.1   | 2.1   | 247                | 170.5 | 8.3  | 4   | 1180                      | 1760 | 950                          | 25               | Figure 1 |
| 24134CB/W33  | 170                     | 280 | 109 | 2.1   | 2.1   | 258.5              | 186.5 | 8.3  | 5   | 1220                      | 1860 | 900                          | 27.5             | Figure 1 |
| 24136CB/W33  | 180                     | 300 | 118 | 3     | 3     | 275.5              | 198   | 11.1 | 6   | 1400                      | 2160 | 900                          | 34.5             | Figure 1 |
| 24138CB/W33  | 190                     | 320 | 128 | 3     | 3     | 293                | 208   | 11.1 | 6   | 1600                      | 2500 | 850                          | 43               | Figure 1 |
| 24140CB/W33  | 200                     | 340 | 140 | 3     | 3     | 311.5              | 221   | 11.1 | 6   | 1800                      | 2800 | 800                          | 53.5             | Figure 1 |
| 24144CB/W33  | 220                     | 370 | 150 | 4     | 4     | 341.5              | 241   | 11.1 | 6   | 2120                      | 3350 | 750                          | 67               | Figure 1 |
| 24148CB/W33  | 240                     | 400 | 160 | 4     | 4     | 368                | 262.5 | 11.1 | 6   | 2400                      | 3900 | 700                          | 83               | Figure 1 |
| 24152CB/W33  | 260                     | 440 | 180 | 4     | 4     | 405.5              | 285.5 | 13.9 | 8   | 3000                      | 4800 | 650                          | 110              | Figure 1 |
| 24156CB/W33  | 280                     | 460 | 180 | 5     | 5     | 426.5              | 306.5 | 13.9 | 8   | 3100                      | 5100 | 600                          | 120              | Figure 1 |
| 24060C/W33   | 300                     | 460 | 160 | 4     | 4     | 429.5              | 323.5 | 13.9 | 7   | 2700                      | 4750 | 550                          | 97               | Figure 1 |





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