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Ball Bearings

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Introduction

About NSK Ball Bearings

- Radial Ball Bearings
- Angular Contact Bearings
- Double Row Bearings
- Self-Aligning Ball Bearings
- Maximum Capacity Bearings
- Mast Guide Bearings
- Integral Shaft Bearings
- Special Bearings

NSK ball bearings can be categorized as Deep Groove Bearings or Angular Contact Bearings. Deep groove bearings are further identified as single or double row, and Conrad type or filling slot type. Specific characteristics of each type are identified by the bearing number.

Radial ball bearings will accommodate moderate to heavy radial loads and low to moderate thrust loads in either direction.

Deep groove radial bearings are manufactured as open type bearings for oil or grease lubrication. They are also available with metal shields and/or seals for use where moderate contamination is present in the operation.

Angular contact bearings are single row types used where radial and thrust loads are combined in the same application. They provide sufficient internal clearances to assume a specific contact angle under thrust loading and are available with angles of 15°, 30° and 40°.

Double row bearings are manufactured both as filling slot and Conrad types, in light and medium series. The filling slot type has higher load capacity but the Conrad type provides a quieter operation and should be used when noise is a consideration.

Self-Aligning bearings are manufactured with two rows of balls and one continuous spherical raceway in the outer ring. This allows for limited misalignment of the shaft and housing.

Maximum capacity bearings are filling slot type bearings used in applications involving heavy radial loads and low speeds where thrust loads are comparatively low. They incorporate filling slots in the inner and outer rings so they can be loaded with additional balls for greater capacity.

Mast Guide bearings are bearings with a high load capacity, specially designed for use in fork lift trucks. These bearings are similar to single row or double row deep groove bearings but the outer race has a very thick cross-section which performs as a wheel or tire. Mast guide bearings can withstand heavy radial loads and occasional thrust loads. Mounted on the fork carriage they provide smooth action as the forks are raised and lowered.

Integral shaft bearings include a shaft with bearing races machined on its O.D. The outer bearing ring, cage and rolling elements are mounted directly on the shaft and an inner ring is not required. These are commonly referred to as water pump bearings since that is a major application for them.

Special bearings include Inch Series bearings, bearings made specifically for automotive air compressor applications and bearings made with special bore, width, or O.D.
### Nomenclature — Single Row Deep Groove Ball Bearings

**Basic Type & Series**

- **R:** Inch
- **600:** Metric, extra small
- **6000:** Metric, extra light
- **6200:** Metric, light
- **6300:** Metric, medium
- **6800:** Metric, extra thin section
- **6900:** Metric, very thin section
- **63200:** Metric, light cartridge
- **63300:** Metric, medium cartridge
- **BL 200:** Metric, maximum capacity, light
- **BL 300:** Metric, maximum capacity, medium

**Features**

- **V:** Single non-contact seal
- **VV:** Double non-contact seal
- **Z:** Single shield
- **ZZ:** Double shield
- **DDU:** Double contact seal
- **NR:** Snap ring and groove
- **M:** Brass cage
- **blank:** Steel cage

**Internal Clearance**

- **C2:** Tight
- **blank:** Normal
- **C3:** Loose
- **C4:** Extra Loose

**Noise Level**

- **E:** Electric Motor Grade

**Grease Fill**

- **S:** Standard
- **L:** Light
- **H:** Heavy

**Grease Type:**

- **AKC:** Andok C
- **AV2:** Alvania #2
- **B32:** Beacon 325
- **SRI:** Chevron SRI-2
- **EEM:** Polyrex EM

---

### Interchange — Single Row Deep Groove Ball Bearings

#### DESCRIPTION

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<td>G</td>
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The competitive manufacturers are provided for a convenient source of unit substitution. They can be considered interchangeable in most instances, but for special applications, please consult NSK Engineering. NSK assumes no liability with respect to errors or omissions.
Nomenclature — Angular Contact Ball Bearings (ABEC 1&3)

Basic Type & Series
7200: Metric, angular contact, light
7300: Metric, angular contact, medium
7400: Metric, angular contact, heavy

Retainer
M: Machined Brass, Land Riding
Y: Pressed Brass
W: Steel

Bore Size
(04 and up: multiply last two numbers by 5 to get bore in mm)
- 00: 10mm
- 01: 12mm
- 02: 15mm
- 03: 17mm
- 04: 20mm
- 05: 25mm
- 06: 30mm
- 07: 35mm
- 08: 40mm
- 09: 45mm
- 10: 50mm

Contact Angle
- B: 40°
- C: 15°
- A: 30°

Other Features
- G: Flush ground on both sides for use in universal duplex mounting
- PC: Combination of flush ground faces, normal axial clearance and ABEC3 (ISO Class 6) tolerance

Please refer to the bearing tables for exact part number options.

Interchange — Angular Contact Ball Bearings (ABEC 1&3)

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<th>INTERCHANGE</th>
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The competitive manufacturers are provided for a convenient source of unit substitution. They can be considered interchangeable in most instances, but for special applications, please consult NSK Engineering. NSK assumes no liability with respect to errors or omissions. *PumpPac is a registered trademark of SKF USA.
Nomenclature — Double Row Ball Bearings

Basic Type & Series
1200: Metric, self-aligning, extra narrow
1300: Metric, self-aligning, narrow
2200: Metric, self-aligning, wide
2300: Metric, self-aligning, extra wide
3200: Metric, maximum compliment, light
3300: Metric, maximum compliment, medium
5200: Metric, Conrad, light
5300: Metric, Conrad, medium

Internal Clearance
C2: Tight
blank: Normal
C3: Loose
C4: Extra Loose

Cage Material
TNG: Polyamide
J: Pressed Steel

Grease Fill
S: Standard
L: Light
H: Heavy

52 06 2RS TNG C3 AVS S

Suffixes
ZZ: Double shield
2RS: Double contact seal
K: Taper bore 1:12
E: Extra Capacity
NR: Snap Ring

Bore Size
(04 and up: multiply last two numbers by 5 to get bore in mm)
00: 10mm 04: 20mm
01: 12mm 05: 25mm
02: 15mm 12: 60mm
03: 17mm 20: 100mm

Suffixes
52 06 2RS TNG C3 AVS S

Part Number
SELF-ALIGNING, EXTRA NARROW
SELF-ALIGNING, NARROW
SELF-ALIGNING, WIDE
SELF-ALIGNING, EXTRA WIDE
DOUBLE ROW, MAXIMUM CAPACITY, LIGHT
DOUBLE ROW, MAXIMUM CAPACITY, MEDIUM
DOUBLE ROW, CONRAD, LIGHT
DOUBLE ROW, CONRAD, MEDIUM

Part Number Suffix
TWO SEALS
TWO SHIELDS
SNAP RING
POLYAMIDE CAGE
STEEL CAGE
TAPERED BORE
EXTRA CAPACITY
TIGHT CLEARANCE
NORMAL CLEARANCE
LOOSE CLEARANCE
EXTRA LOOSE CLEARANCE

Grease Type
AV3: Shell Alvania #3
AVS: Shell Alvania S
SRI: Chevron SRI-2

Please refer to the bearing tables for exact part number options.

Interchange — Double Row Ball Bearings

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>INTERCHANGE</th>
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Ball Bearing Applications

General ball bearing applications are listed below. The size and style of the bearing is dependent on the loads applied and the speeds that the application requires. When appropriate, the bearing style will be indicated in parenthesis for an exclusive application, but for most applications listed, a variety of ball bearing styles may be used.

Deep Groove Ball Bearings
- Transmissions
- Electric Motors & Generators
- Electrical Appliances
- Pumps & Compressors
- Blowers & Fans
- Speed Changers
- Gear Boxes & Drives
- Woodworking Machinery
- Lawn & Garden Equipment
- Turbines
- Farm Machinery
- Construction Machinery
- Oil Field Machinery
- Elevators
- Conveying Equipment
- Hoists & Cranes
- Power Hand Tools
- Industrial Valves
- Rolling Mill Machinery
- Textile Machinery
- Paper Machinery
- Printing Machinery
- Food Products Machinery
- Packaging Machinery
- Medical & Dental Equipment (Extra Small)
- Robotics Equipment (Thin)
- Industrial Clutches
- Slip Joints
- Skate Boards (608ZZ)
- Inline Skates (608ZZ)

Angular Contact (Standard)
- Metal Rolling Mills
- Oil Field Equipment
- Gear Boxes & Drives
- Deep Well Pumps
- Centrifugal Pumps
- Electric Motors & Generators
- Blowers and Fans
- Gear Reducers

Double Row
- Petrochemical Equipment
- Centrifugal Pumps (Conrad)
- Electric Motors (Conrad)
- Transmissions
- Worm Drives
- Blowers & Fans
- Film Processing Equipment (Self-Aligning)
- Vertical Spinning Equipment (Self-Aligning)
- Vertical Weaving Equipment (Self-Aligning)
- Paper Making – Fourdrinier (Self-Aligning)
- Industrial Countershafts (Self-Aligning)
# Ball Bearings

## R Series

Single Row, Inch Dimension

### Nominal Bearing Dimensions

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<th>D</th>
<th>B</th>
<th>r*</th>
<th>Shaft</th>
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Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

---

*Maximum fillet which corner radius of bearing will clear.*

**Correlations**

- **C_r = Dynamic Radial Load Rating**
- **C_or = Static Radial Load Rating**

---

**Application Data**

- Radial Internal Clearance — Table 10.35 page 330
- Bearing Tolerances — Table 10.12 thru Table 10.16 pages 314-17
- Snap Ring Dimensions — Table 10.9 page 310
- Shaft & Housing Fits — Table 10.31 and Table 10.33 pages 328-29
# Ball Bearings

**600 Series**

**Single Row, Extra Small**

## Introduction

- **Ball Bearings**
- **Spherical Roller Bearings**
- **Tapered Roller Bearings**
- **Thrust Bearings**
- **Split Pillow Blocks**
- **Super Precision Bearings**
- **Rolling Mill Bearings**
- **Linear Motion**

## Bearing Numbers

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**Table 10.35 on page 330**

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**Table 10.12 thru Table 10.16 on pages 314-17**

---

**Table 10.31 and Table 10.33 on pages 328-29**

---

**Radial Internal Clearance** — Table 10.35 on page 330

**Bearing Tolerances** — Table 10.12 thru Table 10.16 on pages 314-17

**Shaft & Housing Fits** — Table 10.31 and Table 10.33 on pages 328-29

---

### Application Data

- **Maximum fillet which corner radius of bearing will clear.**
- **C<sub>r</sub>** = Dynamic Radial Load Rating
- **C<sub>cor</sub>** = Static Radial Load Rating

---

**Notes:**

- Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

---

**Specifications:**

- NSK NSK NSK NSK NSK NSK NSK

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**Contact Details:**

Contact NSK Engineering for more information.
# Cylindrical Roller Bearings

## Introduction Ball Bearings

Spherical Roller Bearings

Tapered Roller Bearings

Thrust Bearings

Split Pillow Blocks

Super Precision Bearings

Rolling Mill Bearings

Linear Motion Engineering

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### Table 10.35 page 330

### Table 10.12 thru Table 10.16 pages 314-17

### Table 10.9 page 310

### Table 10.31 and Table 10.33 pages 328-29

---

### Ball Bearings

**6000 Series**

Single Row, Deep Groove, Conrad Type

---

### Nominal Bearing Dimensions Preferred Shoulder Diameters

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
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† Not shown in part number
†† Not available on small sizes, Consult NSK for availability.

Cr = Dynamic Radial Load Rating
Cor = Static Radial Load Rating

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
# Cylindrical Roller Bearings

## Introduction

- Ball Bearings
- Spherical Roller Bearings
- Tapered Roller Bearings
- Thrust Bearings
- Split Pillow Blocks
- Super Precision Bearings
- Rolling Mill Bearings
- Linear Motion

## Engineering Section

### 6200 Series

**Single Row, Deep Groove, Conrad Type**

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
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Cr = Dynamic Radial Load Rating  
Cor = Static Radial Load Rating

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

Common Options
- V : One Non-Contact Seal
- VV : Two Non-Contact Seals
- Z : One Shield
- ZZ : Two Shields
- DU : One Contact Seal
- DDU : Two Contact Seals
- NR : Snap Ring
- M†† : Brass Cage
- CO† : Normal Internal Clearance
- C3 : Greater Than Normal
- E : Electric Motor Quality

† Not shown in part number  
†† Not available on small sizes, consult NSK for availability.

C0 = Dynamic Radial Load Rating  
C0r = Static Radial Load Rating  
Cr = Dynamic Radial Load Rating  
Cor = Static Radial Load Rating
**Ball Bearings**

6300 Series

Single Row, Deep Groove, Conrad Type

### Table 10.35 page 330

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
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**Note:** Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
## Ball Bearings

### 6800 Series

Single Row, Deep Groove, Conrad Type

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

### Application Data

- **Radial Internal Clearance** — Table 10.35 page 330
- **Bearing Tolerances** — Table 10.12 thru Table 10.16 pages 314-17
- **Snap Ring Dimensions** — Table 10.9 page 310
- **Shaft & Housing Fits** — Table 10.31 and Table 10.33 pages 328-29
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*C<sub>r</sub> = Dynamic Radial Load Rating
Cor = Static Radial Load Rating

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
### Ball Bearings

6900 Series

Single Row, Deep Groove, Conrad Type

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*Maximum fillet which corner radius of bearing will clear.

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**Application Data**

- Radial Internal Clearance: Table 10.35 page 330
- Bearing Tolerances: Table 10.12 thru Table 10.16 pages 314-17
- Snap Ring Dimensions: Table 10.9 page 310
- Shaft & Housing Fits: Table 10.31 and Table 10.33 pages 328-29
# Cylindrical Roller Bearings

## Introduction

- Ball Bearings
- Spherical Roller Bearings
- Tapered Roller Bearings
- Thrust Bearings
- Split Pillow Blocks
- Super Precision Bearings
- Rolling Mill Bearings
- Linear Motion Engineering

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- **Cr** = Dynamic Radial Load Rating
- **Cor** = Static Radial Load Rating

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
Ball Bearings
63200 Series
Single Row, Deep Groove, Cartridge

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*Maximum fillet which corner radius of bearing will clear. C r = Dynamic Radial Load Rating
C or = Static Radial Load

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
# Ball Bearings

63300 Series
Single Row, Deep Groove, Cartridge

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*Maximum fillet which corner radius of bearing will clear. Cr = Dynamic Radial Load Rating
Cor = Static Radial Load

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
## Ball Bearings

**1200/1300 Series**  
Double Row, Self-Aligning

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
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\( C_r \) = Dynamic Radial Load Rating  
\( C_{or} \) = Static Radial Load Rating  

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

Common Options
- E : Extra Capacity
- K : Tapered Bore
- CO† : Normal Internal Clearance
- C3 : Looser than Normal

† Not shown in part number
Ball Bearings

2200/2300 Series
Double Row, Self-Aligning

### Nominal Bearing Dimensions

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
### Cylindrical Roller Bearings

**Introduction**

- Ball Bearings
- Spherical Roller Bearings
- Tapered Roller Bearings
- Thrust Bearings
- Split Pillow Blocks
- Super Precision Bearings
- Rolling Mill Bearings
- Linear Motion Engineering

### Basic Load Ratings (lbs)

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- $C_r$ = Dynamic Radial Load Rating
- $C_{or}$ = Static Radial Load Rating

**Common Options**

- E : Extra Capacity
- K : Tapered Bore
- CO† : Normal Internal Clearance
- C3 : Looser than Normal

† Not shown in part number
†† Load ratings are lower, please consult NSK

**Note:** Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
# Ball Bearings

## 3200/3300 Series

Double Row, Maximum Capacity

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

## Application Data

Bearing Tolerances — Table 10.12 thru Table 10.16 pages 314-17
Snap Ring Dimensions — Table 10.9 page 310
Shaft & Housing Fits — Table 10.31 and Table 10.33 pages 328-29
### Common Options

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† Not shown in part number

---

**Cylindrical Roller Bearings**

**Introduction**

**Ball Bearings**

**Spherical Roller Bearings**

**Tapered Roller Bearings**

**Thrust Bearings**

**Split Pillow Blocks**

**Super Precision Bearings**

**Rolling Mill Bearings**

**Linear Motion**

---

#### Basic Load Ratings (lbs)

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\(C_r\) = Dynamic Radial Load Rating  
\(C_{or}\) = Static Radial Load Rating

---

**Note:** Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
## Ball Bearings

### 5200/5300 Series

**Double Row, Conrad Type**

Bore Sizes: 10mm to 40mm

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### Nominal Bearing Dimensions

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Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

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Application Data

- Bearing Tolerances — Table 10.12 thru Table 10.16 pages 314-17
- Snap Ring Dimensions — Table 10.9 page 310
- Shaft & Housing Fits — Table 10.31 and Table 10.33 pages 328-29
### Basic Load Ratings (lbs)

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Cr = Dynamic Radial Load Rating  
$C_{or}$ = Static Radial Load Rating

**Common Options**

- 2RS††: Two Seals
- ZZ: Two Shields
- NR: Snap Ring
- J: Steel Cage
- TNG: Polyamide Cage
- CO†: Normal Internal Clearance
- C3: Looser Than Normal

† Not shown in part number
†† Available with TNG only

**Note:** Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
### Ball Bearings

#### 5200/5300 Series (Continued)

**Double row, Conrad Type**

Bore Sizes: 45mm to 85mm

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
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$C_r = $ Dynamic Radial Load Rating  
$C_{r0} = $ Static Radial Load Rating

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
### Ball Bearings

#### 7200 Series
Angular Contact, 40° Contact Angle

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

---

**Application Data**

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<th>Table 10.12 thru Table 10.16 pages 314-17</th>
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<td>Shaft &amp; Housing Fits</td>
<td>Table 10.31 and Table 10.33 pages 328-29</td>
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C<sub>r</sub> = Dynamic Radial Load Rating
C<sub>Cor</sub> = Static Radial Load Rating

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
**Cylindrical Roller Bearings**

**Spherical Roller Bearings**

**Tapered Roller Bearings**

**Thrust Bearings**

**Split Pillow Blocks**

**Super Precision Bearings**

**Rolling Mill Bearings**

**Linear Motion Engineering Section**

---

**Ball Bearings**

**7300 Series**

Angular Contact, 40° Contact Angle

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

---

**Application Data**

Bearing Tolerances — Table 10.12 thru Table 10.16 pages 314-17
Shaft & Housing Fits — Table 10.31 and Table 10.33 pages 328-29
### Cylindrical Roller Bearings

#### Introduction

- **Ball Bearings**
- **Spherical Roller Bearings**
- **Tapered Roller Bearings**
- **Thrust Bearings**
- **Split Pillow Blocks**
- **Super Precision Bearings**
- **Rolling Mill Bearings**
- **Linear Motion**

#### Basic Load Ratings (lbs)

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**Cr** = Dynamic Radial Load Rating

**C_{or}** = Static Radial Load Rating

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
### Bearing Number Table

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

^1NSK part number 7420 conforms to ISO and ABMA standards. Part number 7420 of other manufacturers may be equivalent to NSK A7420.
Cylindrical Roller Bearings

Introduction

Ball Bearings

Spherical Roller Bearings

Tapered Roller Bearings

Thrust Bearings

Split Pillow Blocks

Super Precision Bearings

Rolling Mill Bearings

Linear Motion

Engineering Section

**Basic Load Ratings (lbs)**

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$C_r$ = Dynamic Radial Load Rating

$C_{or}$ = Static Radial Load Rating

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

†† NSK part number 7420 conforms to ISO and ABMA standards. Part number 7420 of other manufacturers may be equivalent to NSK A7420.
# Ball Bearings

## BL200/300 Series

### Maximum Capacity Type

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*Maximum fillet which corner radius of bearing will clear.

Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

## Application Data

- Radial Internal Clearance — Table 10.35 page 330
- Bearing Tolerances — Table 10.12 thru Table 10.16 pages 314-17
- Snap Ring Dimensions — Table 10.9 page 310
- Shaft & Housing Fits — Table 10.31 and Table 10.33 pages 328-29
### Cylindrical Roller Bearings

#### Introduction

- **Ball Bearings**
- **Spherical Roller Bearings**
- **Tapered Roller Bearings**
- **Thrust Bearings**
- **Split Pillow Blocks**
- **Super Precision Bearings**
- **Rolling Mill Bearings**
- **Linear Motion**

### Basic Load Ratings (lbs)

<table>
<thead>
<tr>
<th>Bearing Number</th>
<th>Basic Load Ratings (lbs)</th>
<th>Limiting Speeds (1000 RPM)</th>
<th>Bearing Weight (Approx.)</th>
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<tr>
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<td>$C_r$</td>
<td>$C_{or}$</td>
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- $C_r$ = Dynamic Radial Load Rating
- $C_{or}$ = Static Radial Load Rating

**Note:** Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.

#### Common Options

- **Z**: One Shield
- **ZZ**: Two Shields
- **NR**: Snap Ring
- **CO†**: Normal Internal Clearance
- **C3**: Greater Than Normal

† Not shown in part number

---

**Figure:** Bearing number diagram with dimensions $D_a$ and $d$.
## Special Ball Bearings

<table>
<thead>
<tr>
<th>Bearing Number</th>
<th>Bore (Inch)</th>
<th>O.D. (Inch)</th>
<th>Width (Inch)</th>
<th>Description</th>
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<tbody>
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<td>1.7805</td>
<td>0.615 0.615</td>
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Note: Limiting speeds are lower with contact seals. For more information, contact NSK Engineering.
# Integral Shaft Bearing

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Mast Guide Bearings

Typical Applications

Type A

Type B

0.71875

13°
Mast Guide Bearings

Dimensions

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<th>Bore (d)</th>
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Specifications

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<th>Number of Balls</th>
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Interchange Table

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