5. Boundary Dimensions and Bearing Number Codes

5.1 Boundary dimensions

A rolling bearing’s major dimensions, known as "boundary dimensions," are shown in Figs. 5.1 - 5.3. To facilitate international bearing interchangeability and economical bearing production, bearing boundary dimensions have been standardized by the International Standards Organization (ISO). In Japan, rolling bearing boundary dimensions are regulated by Japanese Industrial Standards (JIS B 1512).

Those boundary dimensions which have been standardized include: bearing bore diameter, outside diameter, width/height, and chamfer dimensions - all important dimensions when considering the compatibility of shafts, bearings, and housings. However, as a general rule, bearing internal construction dimensions are not covered by these dimensions.

For metric series rolling bearings there are 90 standardized bore diameters (d) ranging in size from 0.6mm - 2,500mm. Outer diameter dimensions (D) for radial bearings with standardized bore diameter dimensions are covered in the "diameter series;" their corresponding width dimensions (B) are covered in the "width series." For thrust bearings there is no width series; instead, these dimensions are covered in the "height series." The combination of all these series is known as the "dimension series." All series numbers are shown in Table 5.1.

Although many rolling bearing dimensions are standardized, and have been listed here for purposes of

<table>
<thead>
<tr>
<th>Dimension series</th>
<th>Diameter series (outer diameter dimensions)</th>
<th>Width series (width dimensions)</th>
<th>Height series (height dimensions)</th>
<th>Reference diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radial bearings (excluding tapered roller bearings)</td>
<td>7, 8, 9, 0, 1, 2, 3, 4, 5, 6</td>
<td>8, 0, 1, 2, 3, 4, 5, 6</td>
<td>small large</td>
<td>Diagram 5.4</td>
</tr>
<tr>
<td>Tapered roller bearings</td>
<td>9, 0, 1, 2, 3</td>
<td>0, 1, 2, 3</td>
<td>small large</td>
<td>Diagram 5.5</td>
</tr>
<tr>
<td>Thrust bearings</td>
<td>0, 1, 2, 3, 4</td>
<td></td>
<td>small large</td>
<td>Diagram 5.6</td>
</tr>
</tbody>
</table>

Fig. 5.1 Radial bearings (excluding tapered roller bearings)  
Fig. 5.2 Tapered roller bearings  
Fig. 5.3 Single direction thrust bearings  
Fig. 5.4 Dimension series for radial bearings (excluding tapered roller bearings; diameter series 7 has been omitted)  
Fig. 5.5 Dimension series for tapered roller bearings  
Fig. 5.6 Dimension series for thrust bearings (excluding diameter series 5)
future standardization, there are many standard bearing dimensions which are not presently manufactured.

Boundary dimensions for radial bearings (excluding tapered roller bearings) are shown in the attached tables.

5.2 Bearing numbers

Rolling bearing part numbers indicate bearing type, dimensions, tolerances, internal construction, and other related specifications. Bearing numbers are comprised of a “basic number” followed by “supplementary codes.” The makeup and order of bearing numbers is shown in Table 5.2.

The basic number indicates general information about a bearing, such as its fundamental type, boundary dimensions, series number, bore diameter code and contact angle. The supplementary codes derive from prefixes and suffixes which indicate a bearing’s tolerances, internal clearances, and related specifications.

(Bearing number examples)

6205ZZC3/2AS
- Shell Alvania S2 grease
- Radial internal clearance C3
- Shielded (both)
- Nominal bore diameter 25mm
- Diameter series 2
- Deep groove ball bearing

23034BD1
- Lubrication hole/lubrication groove (when outer diameter is less than 320mm)
- Type B
- Nominal bore diameter 170mm
- Dimension series 0
- Width series 3
- Spherical roller bearing

7012BDB/GMP6
- Tolerances JIS Class 6
- Medium preload
- Back-to-back duplex arrangement
- Contact angle 40°
- Nominal bore diameter 60mm
- Dimension series 0
- Angular contact ball bearing

240/750BK30
- Bore diameter: tapered inner ring bore, standard taper ratio 1:30
- Type B
- Bore diameter 750mm
- Dimension series 0
- Width series 4
- Spherical roller bearing

NU320G1C3
- Radial internal clearance C3
- High strength machined brass
- Rivetless cage with square holes
- Nominal bore diameter 100mm
- Dimension series 3
- Cylindrical roller bearing NU type

51120L1P5
- Tolerances JIS Class 5
- High strength, machined brass cage
- Nominal bore diameter 100mm
- Diameter series 1
- Height series 1
- Thrust ball bearing

4T-30208
- Nominal bore diameter 40mm
- Diameter series 2
- Width series 0
- Tapered roller bearing
- Spec. 4T
### Table 5.2 Bearing number composition and arrangement

<table>
<thead>
<tr>
<th>Supplementary prefix code</th>
<th>Bearing series</th>
<th>Dimension series code</th>
<th>Bore diameter code</th>
<th>Contact angle code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bearing series code</td>
<td>Width/height series</td>
<td>Diameter series</td>
<td>Code</td>
</tr>
<tr>
<td>E: Bearing using case hardened steel</td>
<td>Deep groove ball bearings (type code 6)</td>
<td>/0.6</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>ET: ET tapered roller bearings</td>
<td>Angular contact ball bearings (type code 7)</td>
<td>/1.5</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>ETA: ET+special heat treatment</td>
<td>Cylindrical roller bearings (type code NU, N, NF, NNU, NN, etc.)</td>
<td>/2.5</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>TA: Bearing made of nitride-treated case hardened steel</td>
<td>Tapered roller bearings (type code 3)</td>
<td>/3.5</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>TM: Bearing made of special heat-treated bearing steel (SUJ3)</td>
<td>Spherical roller bearings (type code 2)</td>
<td>/4.0</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>F: Stainless steel bearings</td>
<td>Spherical roller thrust bearings (type code 5)</td>
<td>/5.0</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>N: High speed steel bearings</td>
<td>Tapered roller thrust bearings (type code 6)</td>
<td>/6.0</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>M: Plated bearings</td>
<td>Cylindrical roller thrust bearings (type code 2)</td>
<td>/7.0</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>5S: Ceramic rolling element bearings</td>
<td>Single direction thrust ball bearings (type code 5)</td>
<td>/8.0</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>HL: HL roller bearings</td>
<td>Spherical thrust roller bearings (type code 2)</td>
<td>/9.0</td>
<td>9.0</td>
<td></td>
</tr>
<tr>
<td>ECO: ECO-Top tapered roller bearing</td>
<td></td>
<td>/10.0</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>LH: Bearing made of bearing steel that provides long life at high temperatures (STJ2), which is treated to stabilize dimensions at temperatures up to 250°C</td>
<td></td>
<td>/11.0</td>
<td>11.0</td>
<td></td>
</tr>
<tr>
<td>TS3: Dimension stabilized bearing for high temperature use (to 200°C)</td>
<td></td>
<td>/12.0</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>TS4: Dimension stabilized bearing for high temperature use (to 250°C)</td>
<td></td>
<td>/13.0</td>
<td>13.0</td>
<td></td>
</tr>
</tbody>
</table>

1. Codes in ( ) are not shown in nominal numbers.

Note: Please consult NTN Engineering concerning bearing series codes, and supplementary prefix/suffix codes not listed in the above table.
### Boundary Dimensions and Bearing Number Codes

<table>
<thead>
<tr>
<th>Internal modifications code</th>
<th>Cage code</th>
<th>Seal / Shield code</th>
<th>External configuration code</th>
<th>Duplex arrangement code</th>
<th>Internal clearance /preload code</th>
<th>Tolerance code</th>
<th>Lubrication code</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT: High axial load use cylindrical roller bearings</td>
<td>ZZ: Steel shield</td>
<td></td>
<td>D2: Two matched, paired bearings</td>
<td>C4: Internal clearance greater than C3</td>
<td>C5: Internal clearance greater than C4</td>
<td>P2: JIS Class 2</td>
<td>/5K: MULTEMP SRL</td>
</tr>
<tr>
<td></td>
<td>T1: Plastic mold cage</td>
<td></td>
<td>G: Flush ground + α: Spacer (α = spacer’s standard width dimensions)</td>
<td></td>
<td></td>
<td>2: ABMA Class 2</td>
<td>/LX11: Barierta JFE552</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3: ABMA Class 3</td>
<td>/LP03: Thermosetting grease (grease for poly-lube bearings)</td>
</tr>
</tbody>
</table>