

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 Organization for Standardization (ISO). In Japan, rolling bearing boundary dimensions are regulated by Japanese Industrial Standards (JIS B 1512 series).

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 standards.

For metric series rolling bearings there are 90 standardized bore diameters (d) ranging in size from 0.6 mm - 2,500 mm.

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 future standardization, there are many standard bearing dimensions which are not presently manufactured.

Boundary dimensions for radial bearings and thrust bearings are shown in the attached tables (I-2 to I-19).

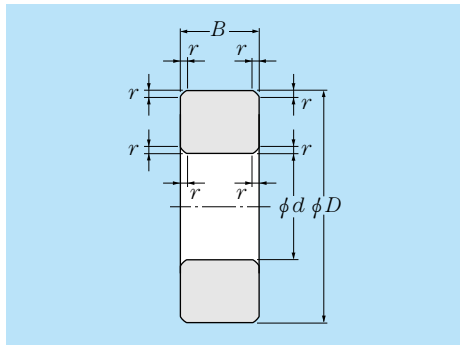


Fig. 5.1 Radial bearings (excluding tapered roller bearings)

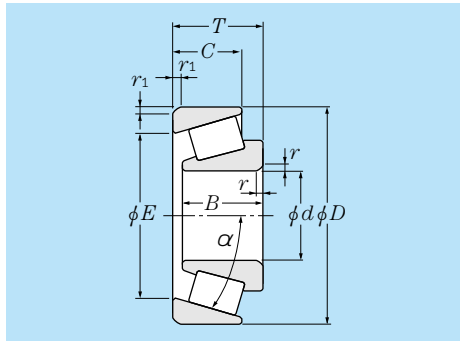


Fig. 5.2 Tapered roller bearings

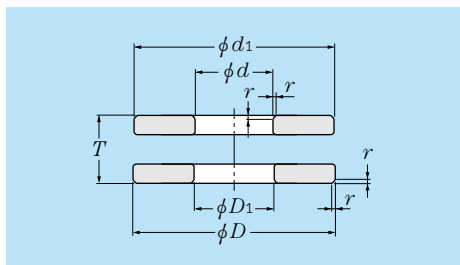


Fig. 5.3 Single direction thrust bearings

Table 5.1 Dimension series numbers

	Dimension series				Reference diagram
		Diameter series (outer diameter dimensions)	Width series (width dimensions)	Height series (height dimensions)	
Radial bearings (excluding tapered roller bearings)	Code	7.8.9.0.1.2.3.4	8.0.1.2.3.4.5.6	—	Fig. 5.4
	Dimension	Small ← → Large	Small ← → Large		
Tapered roller bearings	Code	9. 0. 1. 2. 3	0. 1. 2. 3	—	Fig. 5.5
	Dimension	Small ← → Large	Small ← → Large		
Thrust bearings	Code	0. 1. 2. 3. 4	—	7.9.1.2	Fig. 5.6
	Dimension	Small ← → Large		Small ← → Large	

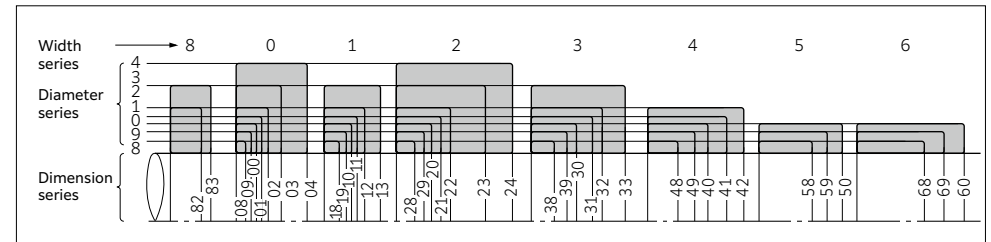


Fig. 5.4 Dimension series for radial bearings (excluding tapered roller bearings; diameter series 7 has been omitted)

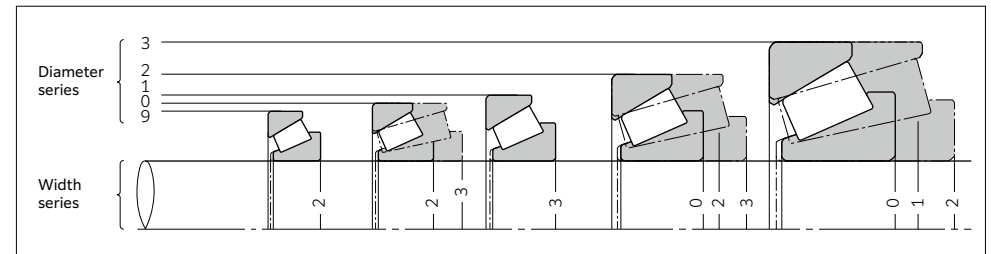


Fig. 5.5 Dimension series for tapered roller bearings (based on JIS B 1534)

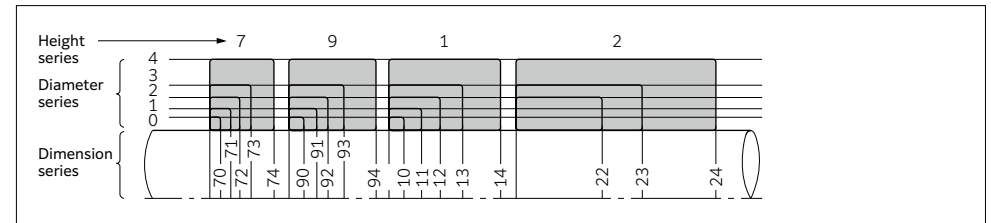


Fig. 5.6 Dimension series for thrust bearings (excluding diameter series 5)

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)

<p>6205ZZC3/2AS</p> <ul style="list-style-type: none"> Grease: Alvania Grease S2 Radial internal clearance C3 Double side steel shield Nominal bore diameter 25 mm Diameter series 2 Deep groove ball bearing 	<p>23034EAD1</p> <ul style="list-style-type: none"> Lubrication hole/lubrication groove ULTAGE basket-shaped pressed steel cage Nominal bore diameter 170 mm Diameter series 0 Width series 3 Self-aligning roller bearing
<p>7012BDB/GMP6</p> <ul style="list-style-type: none"> Tolerances JIS Class 6 Medium preload Back-to-back arrangement Contact angle 40° Nominal bore diameter 60 mm Diameter series 0 Angular contact ball bearing 	<p>240/750BK30</p> <ul style="list-style-type: none"> Bore diameter : tapered inner ring bore, standard taper ratio 1:30 Machined cage Nominal bore diameter 750 mm Diameter series 0 Width series 4 Self-aligning roller bearing
<p>NU320G1C3</p> <ul style="list-style-type: none"> Radial internal clearance C3 High strength machined brass rivetless cage with square holes Nominal bore diameter 100 mm Diameter series 3 Cylindrical roller bearing NU type 	<p>51120L1P5</p> <ul style="list-style-type: none"> Tolerances JIS Class 5 High strength, machined brass cage Nominal bore diameter 100 mm Diameter series 1 Height series 1 Thrust ball bearing
<p>4T-30208</p> <ul style="list-style-type: none"> Nominal bore diameter 40mm Diameter series 2 Width series 0 Tapered roller bearing Spec. 4T 	

“ULTAGE” (a name created from the combination of “ultimate,” signifying refinement, and “stage,” signifying NTN’s intention that this series of products be employed in diverse applications) is the general name for NTN’s new generation of bearings that are noted for their industry-leading performance.

Table 5.2 Bearing number composition and arrangement

Supplementary prefix code	Basic number						
	Bearing series			Bore diameter code		Contact angle code	
	Special application/ material/ heat treatment code	Bearing series code	Dimension series code				
Width/height series ¹⁾			Diameter series	Code	Bore diameter mm	Code ¹⁾	Contact angle
4T- 4T tapered roller bearings	Deep groove ball bearings (type code 6)			/0.6	0.6	Angular contact ball bearing	
E- Bearings using case hardened steel	67	(1)	7	/1.5	1.5	(A)	Standard contact angle 30°
	68	(1)	8	/2.5	2.5	B	Standard contact angle 40°
	69	(1)	9			C	Standard contact angle 15°
F- Stainless steel bearings	160	(0)	0	1	1	Tapered roller bearing	
	62	(0)	2	·	·	(B)	Contact angle over 10° to/including 17°
	63	(0)	3	9	9	(C)	Contact angle over 17° to/including 24°
TS2- Dimension stabilized bearing for high temperature use (to 160°C)	Angular contact ball bearings (type code 7)			00	10	D	Contact angle over 24° to/including 32°
	78	(1)	8	01	12		
	79	(1)	9	02	15		
	70	(1)	0	03	17		
	72	(0)	2				
	73	(0)	3				
TS3- Dimension stabilized bearing for high temperature use (to 200°C)	Self aligning ball bearings (type code 1, 2)			/22	22		
	12	(0)	2	/28	28		
	13	(0)	3	/32	32		
TS4- Dimension stabilized bearing for high temperature use (to 250°C)	Cylindrical roller bearings (type code NU, N, NF, NNU, NN, etc.)			04	20		
	NU10	1	0	05	25		
	NU22	(0)	2	06	30		
	NU22	(0)	2	·	·		
	NU3	(0)	3	88	440		
	NU23	(0)	3	92	460		
	NU4	(0)	4	96	480		
	NNU49	4	9	/500	500		
	NN30	3	0	/530	530		
	Tapered roller bearings (type code 3)			/560	560		
	329X	2	9	·	·		
	320X	2	0	/2 360	2 360		
	302	0	2	/2 500	2 500		
	322	2	2				
	303	0	3				
	303D	0	3				
	313X	1	3				
	323	2	3				
	Spherical roller bearings (type code 2)						
	239	3	9				
	230	3	0				
	240	4	0				
	231	3	1				
	241	4	1				
	222	2	2				
	232	3	2				
	213	1	3				
	223	2	3				
	Single direction thrust ball bearings (type code 5)						
	511	1	1				
	512	1	2				
	513	1	3				
	514	1	4				
	Cylindrical roller thrust bearings (type code 8)						
	811	1	1				
	812	1	2				
	893	9	3				
	Spherical thrust roller bearings (type code 2)						
	292	9	2				
	293	9	3				
	294	9	4				

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.

Supplementary suffix codes							
Internal modifications code	Cage code	Seal / Shield code	Raceway external configuration code	Duplex arrangement code	Internal clearance ¹⁾ Preload code	Tolerance code ¹⁾	Lubrication
U Internationally interchangeable tapered roller bearings	L1 High strength, machined brass cage	LB One-side synthetic rubber seal (non-contact type)	K Tapered inner ring bore, standard taper ratio 1:12	DB Back-to-back arrangement	C2 Internal clearance less than normal	(P0) JIS Class 0	/2AS Alvania Grease S2
R Non-internationally interchangeable tapered roller bearings	F1 Machined carbon steel cage	LLB Double-side synthetic rubber seal (non-contact type)	K30 Tapered inner ring bore, standard taper ratio 1:30	DF Face-to-face arrangement	(CN) Normal clearance	P6 JIS Class 6	/3AS Alvania Grease S3
ST Low torque tapered roller bearings	G1 High strength machined brass rivetless cage with square holes	LU One-side synthetic rubber seal (contact type)	N With snap ring groove	DT Tandem arrangement	C3 Internal clearance greater than normal	P5 JIS Class 5	/8A Alvania Grease EP2
HT Angular ball bearings and cylindrical roller bearings for high axial loads	G2 Pin type cage	LLU Double-side synthetic rubber seal (contact type)	NR Snap ring	D2 Two matched, paired bearings	C4 Internal clearance greater than C3	P4 JIS Class 4	/5K Multemp SRL
E High load capacity cylindrical roller bearing	T2 Molded resin cage	LH One-side synthetic rubber seal (low-torque type)	D With oil hole	+α Spacer (α = spacer's standard width dimensions)	C5 Internal clearance greater than C4	P2 JIS Class 2	/LX11 Barrierta JFE552
EA ULTAGE series cylindrical roller bearings	A Pressed steel cage (ULTAGE series self aligning roller bearings)	LLH Double-side synthetic rubber seal (low-torque type)	D1 Lubrication hole/lubrication groove	CM Radial internal clearance for electric motor use	-4 ABMA Class 4	-2 ABMA Class 2	-3 ABMA Class 3
E ULTAGE series self aligning roller bearings	M High strength, machined brass cage (ULTAGE series self aligning roller bearings)	Z One-side steel Shield		/GN Normal preload	-0 ABMA Class 0	/GM Medium preload	/GH Heavy preload
UTG ULTAGE series Large tapered roller bearing	ZZ Double-side steel Shield						

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.

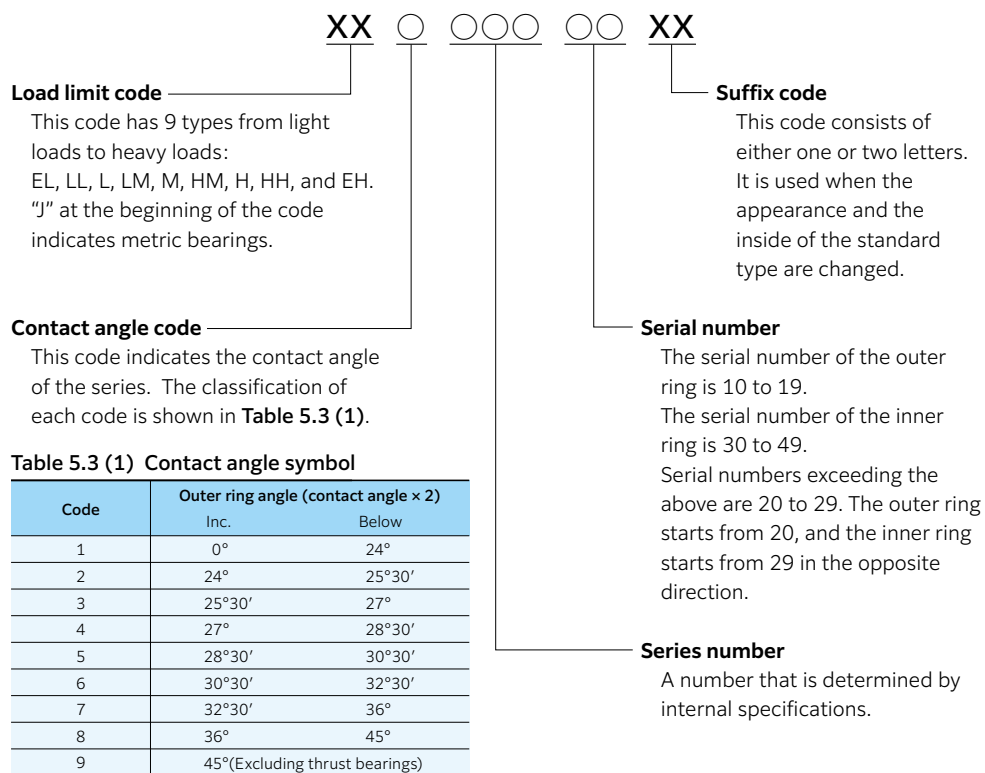
5.2.1 Numbers of inch series tapered roller bearings

The composition of numbers of inch series tapered roller bearings is specified by the American Bearing Manufacturers Association (ABMA). The inner ring component (CONE) and the outer ring (CUP) each have a corresponding number. **Table 5.3** shows the composition of these numbers. Each corresponding code is also described in more detail below.

Table 5.3 Bearing number composition

Prefix code	Contact angle code	Series number	Serial number	Suffix code
XX	○	○○○	○○	XX

Note: X in the table is represented by letters, and ○ is represented by numbers.



5.2.2 Numbers of metric tapered roller bearings based on ISO355

Dimension series previously not covered by 3XX are regulated under JIS B 1512. These dimension series are specified in ISO355 and consist of series codes of the angle, diameter, and width. In addition, the inner ring subunit and the outer ring are internationally interchangeable. The composition of bearing

numbers are shown in **Table 5.4**. The series codes of the dimension series are shown in **Table 5.4 (1) to (3)**.

Table 5.4 Bearing number composition

Tapered roller bearing code	Dimension series			Bore diameter code
	Angle series	Diameter series	Width series	
T	○	X	X	○○○

Note: X in the table is represented by letters, and ○ is represented by numbers.

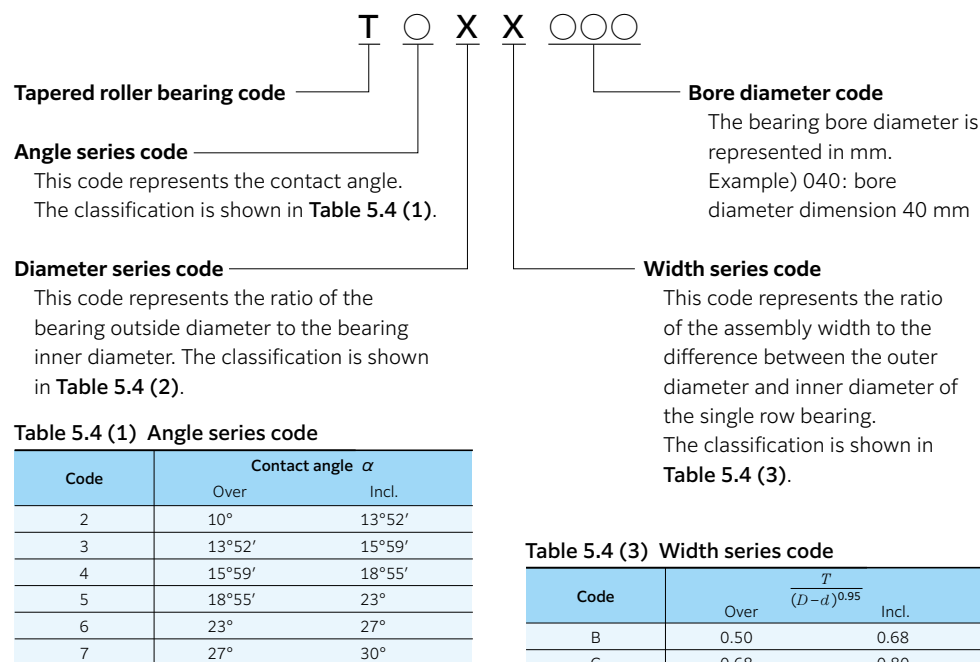


Table 5.4 (1) Angle series code

Code	Contact angle α	
	Over	Incl.
2	10°	13°52'
3	13°52'	15°59'
4	15°59'	18°55'
5	18°55'	23°
6	23°	27°
7	27°	30°

Table 5.4 (2) Diameter series code

Code	$\frac{D}{d^{0.77}}$	
	Over	Incl.
B	3.4	3.8
C	3.8	4.4
D	4.4	4.7
E	4.7	5
F	5	5.6
G	5.6	7

Note: Quantifiers
d: Nominal inner diameter
D: Nominal outside diameter

Table 5.4 (3) Width series code

Code	$\frac{T}{(D-d)^{0.95}}$	
	Over	Incl.
B	0.50	0.68
C	0.68	0.80
D	0.80	0.88
E	0.88	1

Note: Quantifiers
d: Nominal inner diameter
D: Nominal outside diameter
T: Assembly width of single row bearing