

## 5. Boundary dimensions and bearing number codes

### 5.1 Boundary dimensions

A rolling bearing's major dimensions, known as "boundary dimensions," are shown in Fig. 5.1 through Fig. 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 to 2 500 mm.

Outside 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 (refer to page H-2 through page H-19).

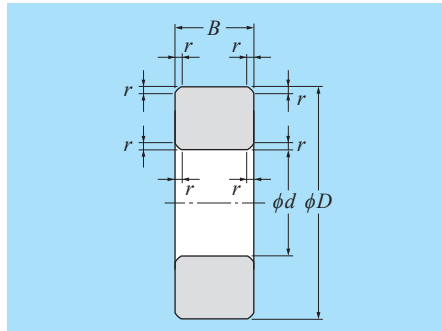


Fig. 5.1 Radial bearings (excluding tapered roller bearings)

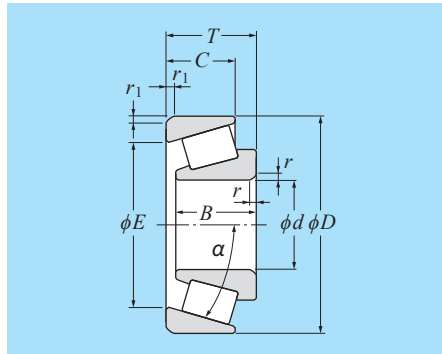


Fig. 5.2 Tapered roller bearings

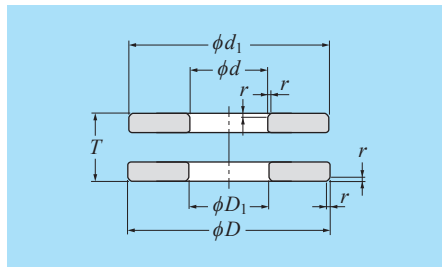


Fig. 5.3 Single direction thrust bearings

Table 5.1 Dimension series numbers

	Dimension series				Reference diagram
	Code	Diameter series (outside 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	

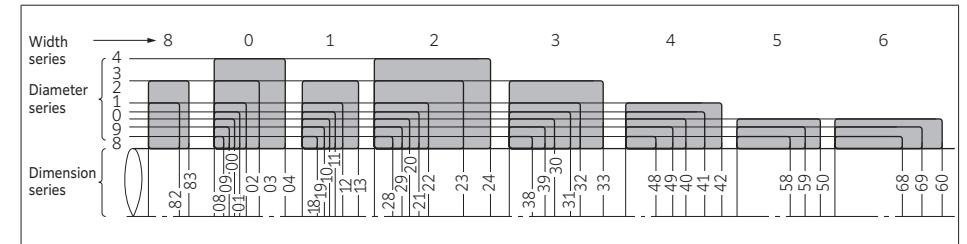


Fig. 5.4 Dimension series for radial bearings (excluding tapered roller bearings; diameter series 7 has been omitted)

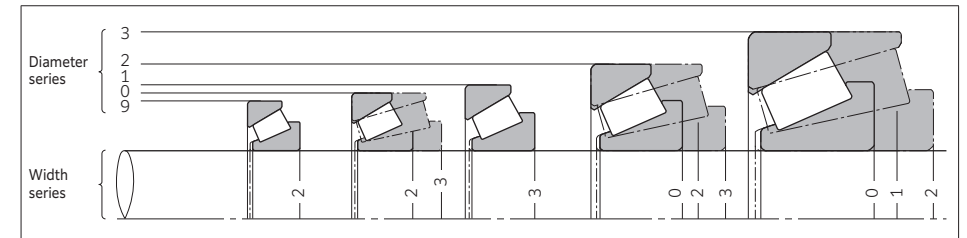


Fig. 5.5 Dimension series for tapered roller bearings (based on JIS B 1534)

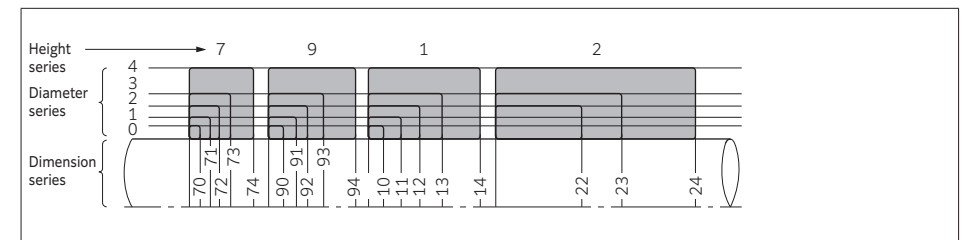


Fig. 5.6 Dimension series for thrust bearings (excluding diameter series 5)

## ● Boundary Dimensions and Bearing Number Codes **NTN**

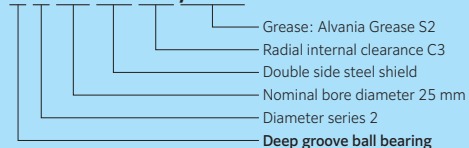
### 5.2 Bearing numbers

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**.

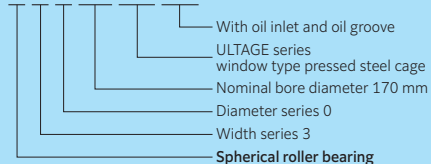
The **basic number** indicates general information about a bearing, such as its fundamental type, boundary dimensions, series number, bore diameter code and contact angle. The **supplementary codes** derive from prefixes and suffixes which indicate a bearing’s tolerances, internal clearances, and related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

(Bearing number examples)

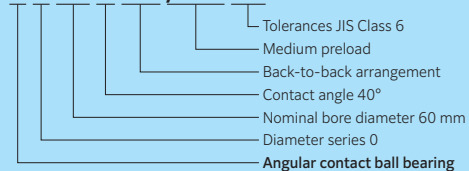
**6 2 05 ZZ C3 /2AS**



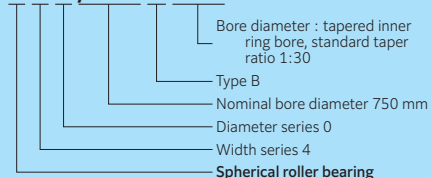
**2 3 0 34 EA D1**



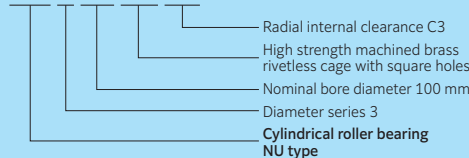
**7 0 12 B DB /GM P6**



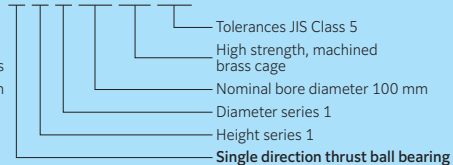
**2 4 0 /750 B K30**



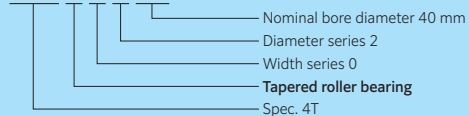
**NU 3 20 G1 C3**



**5 1 1 20 L1 P5**



**4T- 3 0 2 08**



## ● Boundary Dimensions and Bearing Number Codes **NTN**

“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	
	Bearing series code	Dimension series code		Code	Bore diameter mm	Code <sup>1)</sup>	Contact angle
Width/height series <sup>1)</sup>		Diameter series					
4T- 4T tapered roller bearings	Deep groove ball bearings (type code 6)			/0.6	0.6		Angular contact ball bearing
	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°
E- Bearings using carburizing (case hardened) steel	160	(0)	0				Tapered roller bearing
	60	(1)	0	1	1		Contact angle over 10° to/including 17°
	62	(0)	2	:	:		Contact angle over 17° to/including 24°
	63	(0)	3	9	9	(B)	Contact angle over 24° to/including 32°
F- Stainless steel bearings	Angular contact ball bearings (type code 7)						
	78	(1)	8	00	10	C	
	79	(1)	9	01	12	D	
	70	(1)	0	02	15		
	72	(0)	2	02	15		
	73	(0)	3	03	17		
TS2- Dimension stabilized bearing for high temperature use (to 160 °C)	Self aligning ball bearings (type code 1, 2)						
	12	(0)	2	/22	22		
	13	(0)	3	/28	28		
	22	(2)	2	/32	32		
	23	(2)	3				
TS3- Dimension stabilized bearing for high temperature use (to 200 °C)	Cylindrical roller bearings (type code NU, N, NF, NNU, NN, etc.)						
	NU10	1	0	04	20		
	NU2	(0)	2	05	25		
	NU22	2	2	06	30		
	NU3	(0)	3	:	:		
	NU23	2	3	88	440		
	NU4	(0)	4	92	460		
	NNU49	4	9	96	480		
	NN30	3	0				
TS4- Dimension stabilized bearing for high temperature use (to 250 °C)	Tapered roller bearings (type code 3)			/500	500		
	329X	2	9	/530	530		
	320X	2	0	/560	560		
	302	0	2	:	:		
	322	2	2	/2 360	2 360		
	303	0	3	/2 500	2 500		
	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				
	Thrust cylindrical roller bearings (type code 8)						
	811	1	1				
	812	1	2				
	893	9	3				
	Thrust spherical 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.

Internal modifications code	Cage code	Seal / Shield code	Supplementary suffix codes					Lubrication
			Raceway external configuration code	Duplex arrangement code	Internal clearance <sup>2)</sup> Preload code	Tolerance code <sup>2)</sup>		
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	N 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 EP Grease 2	
HT Angular contact ball bearings and cylindrical roller bearings for high axial loads	J Pressed steel cage	NR Snap ring (contact type)	NR Snap ring	D2 Two matched, paired bearings	P2 JIS Class 2		/5K Multemp SRL	
E High load capacity cylindrical roller bearing	A Pressed steel cage (ULTAGE series spherical roller bearings)	LLU Double-side synthetic rubber seal (contact type)	D With oil inlet	+α Spacer (α = spacer's standard width dimensions)	C4 Internal clearance greater than C3	-4 ABMA Class 4	/LX11 Barrierta JFE552	
EA ULTAGE series cylindrical roller bearings	M High strength, machined brass cage	D1 With oil inlet and oil groove	D1 With oil inlet and oil groove	C5 Internal clearance greater than C4	-3 ABMA Class 3		/LP03 Solid grease	
E ULTAGE series spherical roller bearings	T2 Resin cage	LH One-side synthetic rubber seal (low-torque type)		CM Radial internal clearance for electric motor use	-0 ABMA Class 0			
UTG ULTAGE series Large size tapered roller bearing	Z One-side steel Shield	LLH Double-side synthetic rubber seal (low-torque type)		/GL Light preload				
	ZZ Double-side steel Shield			/GN Normal preload				
				/GM Medium preload				
				/GH Heavy preload				

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

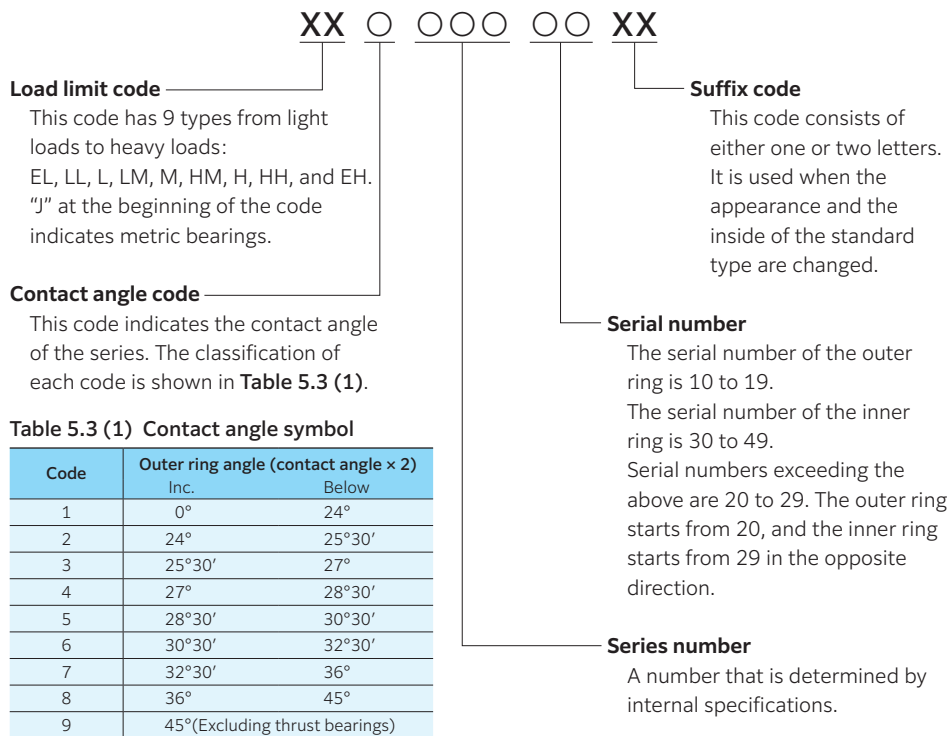
**5.2.1 Numbers of inch series tapered roller bearings**

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.



**Table 5.3 (1) Contact angle symbol**

Code	Outer ring angle (contact angle × 2)	
	Inc.	Below
1	0°	24°
2	24°	25°30'
3	25°30'	27°
4	27°	28°30'
5	28°30'	30°30'
6	30°30'	32°30'
7	32°30'	36°
8	36°	45°
9	45°(Excluding thrust bearings)	

**5.2.2 Numbers of metric tapered roller bearings based on ISO 355**

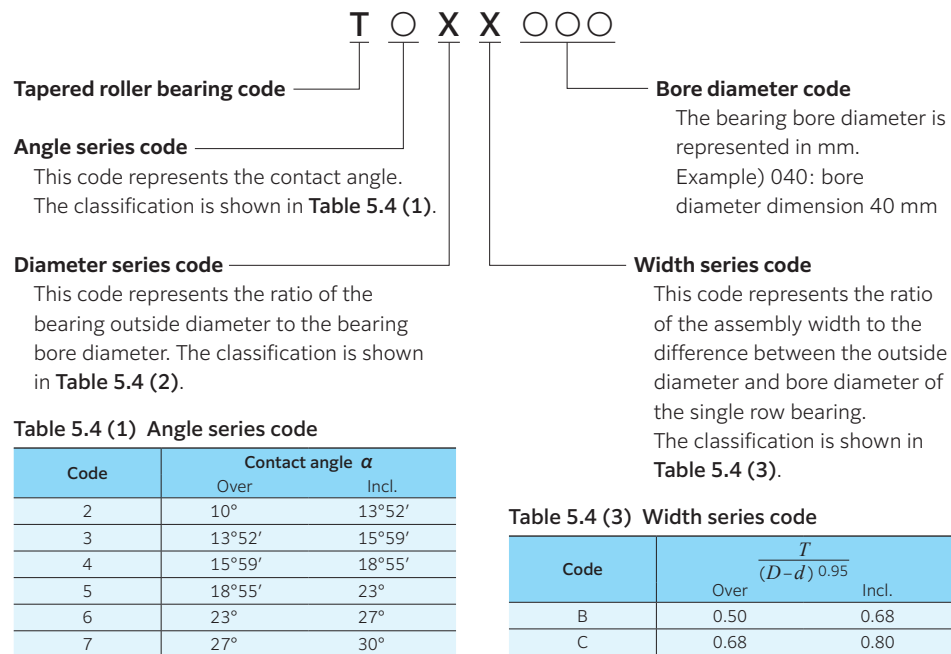
Dimension series previously not covered by 3XX are regulated under JIS B 1512-3. These dimension series are specified in ISO 355 and consist of series codes of the angle, diameter, and width. In addition, the inner ring subunit and the outer ring are internationally interchangeable. The composition of bearing

numbers are shown in **Table 5.4**. The series codes of the dimension series are shown in **Table 5.4 (1)** through **Table 5.4 (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 bore 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 bore diameter  
*D* : Nominal outside diameter  
*T* : Assembly width of single row bearing