

# TECHNICAL INSIGHT

A PUBLICATION OF NSK EUROPE

## Bearing dimensions and designations

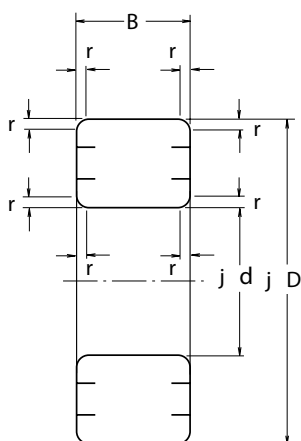
### Parameters for dimensions and structure of bearing designations

The dimensions of bearings (bore, outer diameter, width) are internationally standardised.

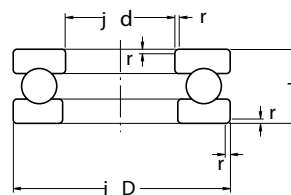
### Bearing dimensions

The size of a bearing has to be known for its installation on a shaft and in a housing. This is determined by the dimensions of the outer geometry of the bearing and includes:

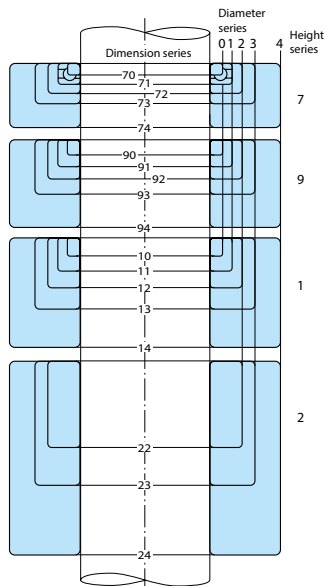
- › Diameter of the bearing bore  $d$
- › Outer diameter  $D$
- › Nominal width  $B$
- › Height of the bearing  $T$
- › Edge reduction  $r$



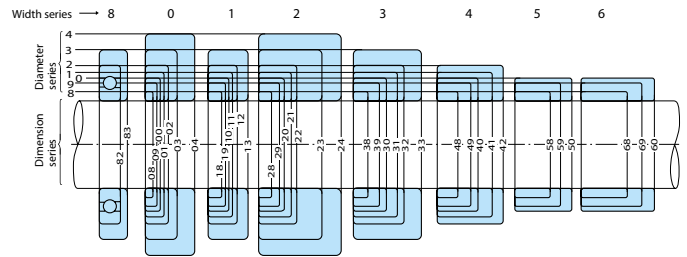
Boundary dimension of radial ball and roller bearings



Single-direction thrust ball bearings

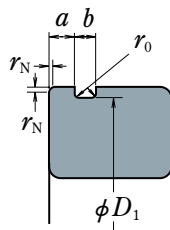


Comparison of the cross sections of thrust bearings (except diameter series 5) for various dimension series



Comparison of the cross sections of radial bearings (except tapered roller bearings) for various dimension series

The dimensions of snap ring grooves in the outer bearing rings are defined by ISO 464 and DIN 616. The snap rings are defined according to ISO 464 and DIN 5417



Dimensions for snap ring grooves and snap rings

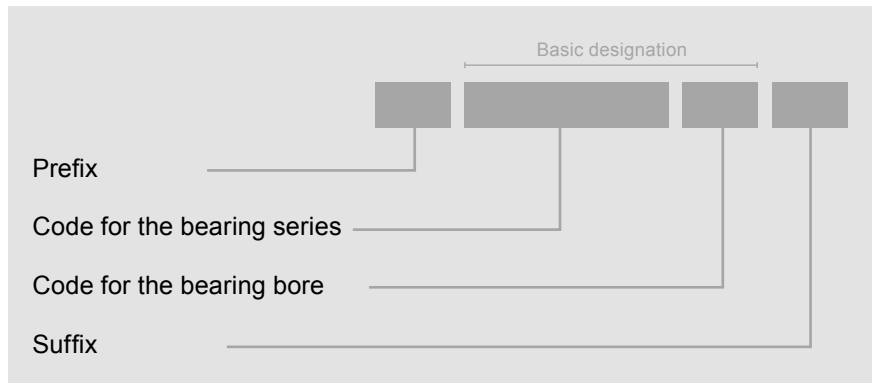
## Bearing designations

The designations of the bearings consist of a combination of numbers and letters. They identify the following parameters:

- › Bearing type
- › Dimensions
- › Dimensional and running accuracy
- › Bearing clearance
- › Further details

The bearing designations of standard bearings are defined by JIS B 1513 and DIN 623. NSK also uses supplementary designations for a further classification.

## Breakdown of a bearing designation



Examples:

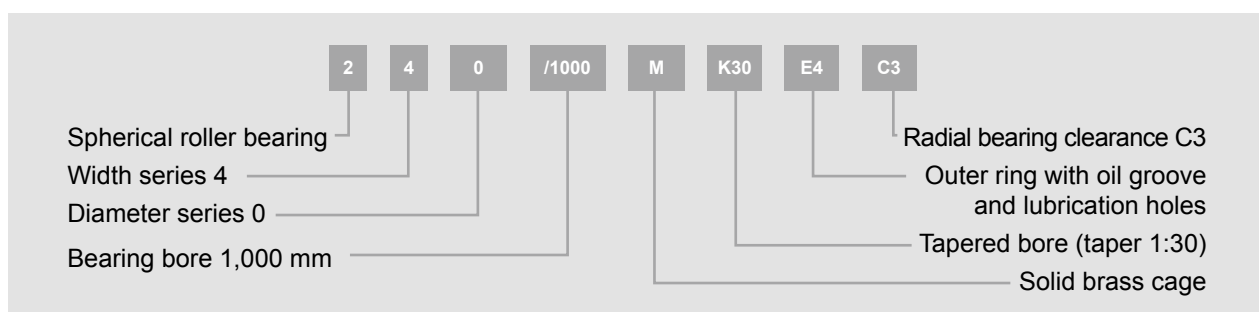
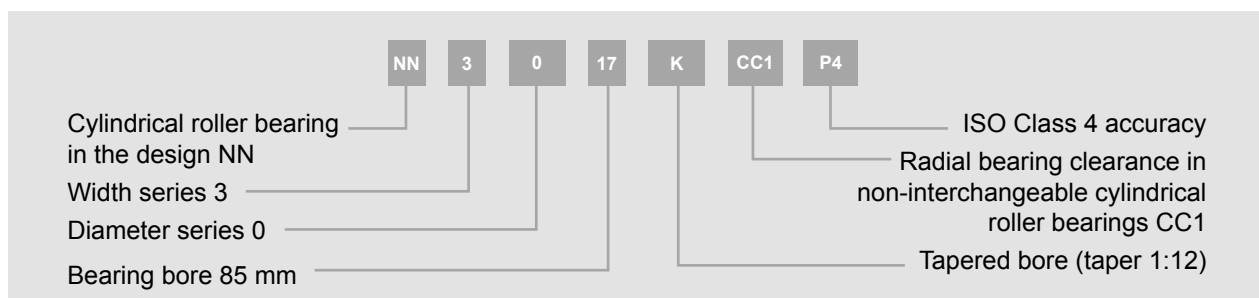
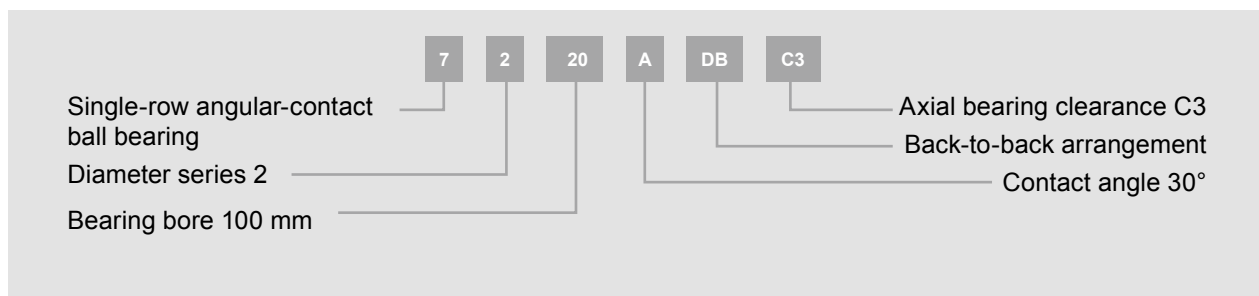
HR	313	09	J
F	60	8	MC3

## Pronunciation of the basic designation

The summary of the digits within the basic type should follow the breakdown of the bearing designation. The digit groups of the dimension series and bore code should be separated.

Example:	62 05	sixty-two zero five
	223 15	two hundred and twenty-three fifteen
	303 18	three hundred and three eighteen
	NJ2 12	en-jay-two twelve
	512 36	five hundred and twelve thirty-six

## Examples of bearing designations



## Composition of Bearing Designations

Basic numbers				Auxiliary symbols									
Bearing series symbols <sup>(1)</sup>		Bore number		Contact angle symbol		Internal design symbol		Material symbol		Cage symbol		Seals, shields symbol	
Symbol	Meaning	Zeichen	Bedeutung	Zeichen	Bedeutung	Zeichen	Bedeutung	Zeichen	Bedeutung	Zeichen	Bedeutung	Zeichen	Bedeutung
68	Single-row deep-groove ball bearings	1	1mm		(Angular-contact ball bearings)		Internal design differs from standard one	g	Case-hardened steel used in rings, rolling elements	M	Machined brass cage	Z	Shield on one side only
69		2	2			A						ZS	
60		3	3										
:		:	:	A	Contact angle of 30°								
70	Single-row angular-contact ball bearings	9	9			J	Smaller diameter of outer ring raceway, contact angle and outer ring width of tapered roller bearings conform to ISO 355	h		W	Pressed-steel cage	ZZ	Shields on both sides
72		00	10									ZS	
73		01	12	A5	Standard contact angle of 25°				Stainless steel used in rings, rolling elements	T	Synthetic-resin cage		
:		02	15										
12	Self-aligning ball bearings	03	17							V	Without cage	DU	Contact rubber seal on one side only
13		/22	22										
22		/28	28										
:		/32	32										
NU10	Cylindrical roller bearings	04 <sup>(3)</sup>	20	B	Standard contact angle of 40°		(for high-capacity bearings)					DDU	Contact rubber seals on both sides
NJ 2		05	25										
N 3		06	30										
NN 30		:	:										
:		88	440	C	Standard contact angle of 15°								
NA48	Needle roller bearings	92	460			C	Spherical roller bearings						
NA49		96	480			CA							
NA69		/500	500			CD							
:		/530	530			EA						V	Non-contact rubber seal on one side only
320	Tapered roller bearings <sup>(2)</sup>	/560	560		Tapered roller bearings								
322		:	:										
323		/2 360	2,360	(8)	Standard contact angle of 17°	E	Cylindrical roller bearings						
:		/2 500	2,500										
230	Spherical roller bearings					E	Thrust spherical roller bearings					VV	Non-contact rubber seals on both sides
222													
223													
:													
511	Thrust ball bearings with flat seats			C	Contact angle about 20°								
512													
513													
:													
292	Thrust spherical roller bearings			D	Contact angle about 28°								
293													
294													
HR <sup>(4)</sup>	High-capacity tapered roller bearings												
Designations correspond to JIS <sup>(5)</sup>						NSK code						NSK code	
Marked on bearings										Not marked on bearings		Normally marked on bearings	

- Notes:
- (1) Bearing series symbols conform to table 7.5.
  - (2) For basic numbers of tapered roller bearings in ISO's new series, refer to page B129.
  - (3) For bearing bore numbers 04 to 96, five times the bore number gives the bore size (mm) – except for double-direction thrust ball bearings.
  - (4) HR is prefix to bearing series symbols and it is NSK's original prefix.
  - (5) JIS : Japanese Industrial Standards.

Auxiliary symbols													
Symbol for design of rings		Arrangement symbol		Internal clearance symbol and preload symbol		Tolerance class symbol		Heat Treatment		Spacer or sleeve symbol		Lubrication Symbol	
Symbol	Meaning	Sym- bol	Meaning	Symbol	Meaning	Symbol	Meaning	Sym- bol	Meaning	Sym- bol	Meaning	Sym- bol	Meaning
<b>K</b>	Tapered bore of inner ring (taper 1:12)	<b>DB</b>	Back-to-back arrangement	<b>C1</b> <b>C2</b> <b>C3</b> <b>C4</b> <b>C5</b>	For all radial bearings Clearance less than C2 Clearance less than CN CN clearance Clearance greater than CN Clearance greater than C3 Clearance greater than C4	<sup>(8)</sup> <b>P6</b>	ISO Normal ISO Class 6		Bearings treated for dimensional stabilisation	<b>+K</b>	Bearings with outer ring spacers	<b>AS2</b>	Shell Alvania grease S2
<b>K30</b>	Tapered bore of inner ring (taper 1:30)	<b>DF</b>	Face-to-face arrangement	<b>CC1</b> <b>CC2</b> <b>CC</b> <b>CC3</b> <b>CC4</b> <b>CC5</b>		For non-interchangeable cylindrical roller bearings Clearance less than CC2 Clearance less than CC Normal clearance Clearance greater than CC Clearance greater than CC3 Clearance greater than CC4	<b>P6X</b>			ISO Class 6X ISO Class 5	<b>X26</b>	Working temperature lower than 150 °C	<b>+L</b>
<b>E</b>	Notch or lubricating groove in ring	<b>DT</b>	Tandem arrangement	<b>MC1</b> <b>MC2</b> <b>MC3</b> <b>MC4</b> <b>MC5</b> <b>MC6</b>	For extra small and miniature bearings Clearance less than MC2 Clearance less than MC3 Normal clearance Clearance greater than MC3 Clearance greater than MC4 Clearance greater than MC5		<b>P5</b>	ISO Class 4	<b>X28</b>	Working temperature lower than 200 °C			<b>+KL</b>
<b>E4</b>	Lubricating groove in outside surface and holes in outer ring			<b>CM</b>		Clearance in deep-groove ball bearings for electric motors	<b>P4</b>	ISO Class 2			<b>X29</b>	Working temperature lower than 250 °C	<b>H</b>
<b>N</b>	Snap ring groove in outer ring			<b>CT</b> <b>CM</b>	Clearance in cylindrical roller bearings for electric motors		<b>P2</b>	ISO Class 2	<b>S11</b>	Dimensional stabilising treatment working temperature lower than 200 °C			<b>AH</b>
<b>NR</b>	Snap ring groove with snap ring in outer ring			<b>EL</b> <b>L</b> <b>M</b> <b>H</b>		Extra light preload Light preload Medium preload Heavy preload		ABMA <sup>(7)</sup> tapered roller bearing					<b>HJ</b>
				<b>PN2</b> <b>PN3</b> <b>PN0</b> <b>PN00</b>	Class 4 Class 2 Class 3 Class 0 Class 00								
Partially the same as JIS <sup>(5)</sup>		Same as JIS <sup>(5)</sup>		NSK symbol	Partially the same as JIS <sup>(5)/</sup> BAS <sup>(6)</sup>	Same as JIS <sup>(5)</sup>		NSK symbol, partially the same as JIS <sup>(5)</sup>					
In principle, marked on bearings										Not marked on bearings			

Hinweise: <sup>(5)</sup> JIS : Japanese Industrial Standards.  
<sup>(6)</sup> BAS : The Japan Bearing Industrial Association Standard.  
<sup>(7)</sup> ABMA : The American Bearing Manufacturers Association.  
<sup>(8)</sup> Without suffix.

Further information on this topic can be found in our brochure “Bearing Designation Systems”.