

INTERNATIONAL
STANDARD

ISO
3096

Second edition
1996-12-15

**Rolling bearings — Needle rollers —
Dimensions and tolerances**

Roulements — Aiguilles — Dimensions et tolérances

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Reference number
ISO 3096:1996(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 3096 was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 5, *Needle roller bearings*.

This second edition cancels and replaces the first edition (ISO 3096:1974), which has been technically revised. In particular it updates the first edition by defining the symbols used and by establishing tolerances.

Annex A of this International Standard is for information only.

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International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

Rolling bearings — Needle rollers — Dimensions and tolerances

1 Scope

This International Standard specifies dimensions and tolerances for finished steel needle rollers used as rolling elements.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 286-2 :1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*.

ISO 4291 :1985, *Methods for the assessment of departure from roundness — Measurement of variations in radius*.

3 Terms, definitions and symbols

For the purposes of this International Standard, the following terms and definitions apply. The symbols (except those for tolerances) shown in figures 1 and 2 and the values given in tables 1 and 3 denote nominal dimensions unless specified otherwise.

3.1 nominal diameter of a needle roller, D_W : Diameter value used for the purpose of general identification of a needle roller diameter. See figures 1 and 2.

3.2 single diameter of a needle roller, D_{ws} : Distance between two tangents to the needle roller surface parallel to each other and in a plane perpendicular to the needle roller axis, i.e. a radial plane.

3.3 mean diameter of a needle roller in a single plane, D_{wmp} : Arithmetical mean of the largest and the smallest actual single diameters of the needle roller in a single radial plane.

3.4 nominal length of a needle roller, L_W : Length value used for the purpose of general identification of a needle roller length. See figures 1 and 2.

3.5 single length of a needle roller, L_w : Distance between the two radial planes which just contain the end extremities of the needle roller.

3.6 single chamfer dimension (of flat end needle roller), r_s . See figure 1.

3.7 smallest permissible single chamfer dimension (of flat end needle roller), $r_{s\ min}$.

3.8 largest permissible single chamfer dimension (of flat end needle roller), $r_{s\ max}$.

3.9 profile at the ends of rounded end needle rollers, R : Profile which may not necessarily be a true radius but shall fall within the limits of $D_w/2$ and $L_w/2$.

3.10 circularity deviation: Difference between the largest radius and the smallest radius of the measured profile of the workpiece, the values of the radii being taken from the centre of the least squares mean circle, LSC.

3.11 needle roller gauge: Diameter deviation range limited by a high and a low deviation of the mean needle roller diameter D_{wmp} from the nominal diameter, D_w , in a radial plane through the middle of the roller length.

NOTE— A gauge is designated by the high and low deviation expressed in micrometres, for example +2 –4.

3.12 gauge lot: Quantity of needle rollers, of the same grade and nominal dimensions, all having a mean diameter D_{wmp} within the same gauge.

NOTE— Needle rollers of any grade and nominal dimensions are supplied in gauge lots. If nothing to the contrary has been agreed between the customer and the supplier, the gauge lots may be of any one or more of the gauges included in table 2.

3.13 variation of gauge lot diameter, V_{DwL} : Difference between the mean diameter D_{wmp} of the needle roller having the largest mean diameter and that of the needle roller having the smallest mean diameter in the gauge lot.

3.14 needle roller grade: Specific combination of diameter and form tolerances for a needle roller, characteristic of its level of accuracy.

NOTE — A needle roller grade is designated by a number.

4 Dimensions

See figures 1 and 2 and table 1.

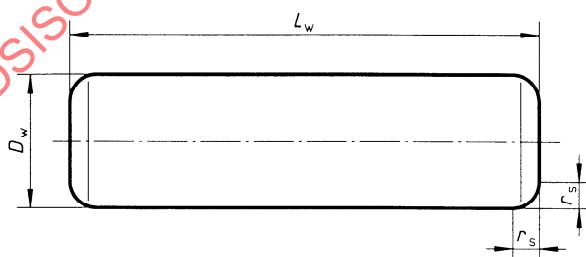


Figure 1 — Flat end needle roller

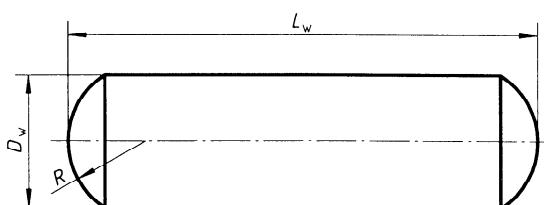


Figure 2 — Rounded end needle roller

Table 1 — Dimensions

Dimensions in millimetres

D_w	L_w																	
	5,8	6,8	7,8	9,8	11,8	13,8	15,8	17,8	19,8	21,8	23,8	25,8	27,8	29,8	34,8	39,8	49,8	59,8
1	X	X	X	X														
1,5	X	X	X	X	X	X												
2		X	X	X	X	X	X	X	X									
2,5			X	X	X	X	X	X	X	X	X							
3				X	X	X	X	X	X	X	X	X	X	X	X			
3,5					X	X	X	X	X	X	X	X	X	X	X			
4					X	X	X	X	X	X	X	X	X	X	X	X		
5						X	X	X	X	X	X	X	X	X	X	X	X	
6							X	X	X	X	X	X	X	X	X	X	X	

5 Tolerances

5.1 Diameter and circular form

Table 2 gives, for each grade specified:

- maximum variation of gauge lot diameter;
- recommended gauges of needle roller;
- maximum circularity deviation.

In addition, no single diameter within the entire length of a needle roller shall exceed the actual maximum diameter at the middle of its length by more than

- a) 0,5 μm for grade 2;
- b) 0,8 μm for grade 3;
- c) 1 μm for grade 5.

5.2 Length

The tolerance on the single length, L_{ws} , for needle rollers of all grades shall be h13, see ISO 286-2.

5.3 Chamfer dimension (see figure 1)

Chamfer dimension limits for flat end needle rollers of all grades are specified in table 3.

Table 2 — Variation of gauge lot diameter, preferred gauges and circularity deviation

Tolerance values in micrometres

Grade	$V_{D_{wL}}$ max.	Needle roller gauges (Upper and lower deviation limits of D_{wmp})											Maximum circularity deviation	
2	2	upper	0	-1	-2	-3	-4	-5	-6	-7	-8	1		
		lower	-2	-3	-4	-5	-6	-7	-8	-9	-10			
3	3	upper	0	-1,5	-3	-4,5	-6	-7	1,5					
		lower	-3	-4,5	-6	-7,5	-9	-10						
5	5	upper	0	-3	-5	-8	-10	2,5						
		lower	-5	-8	-10									
NOTES														
1 Tolerance values apply only at the middle of the needle roller length. However, each single diameter of a needle roller shall also comply with the requirement of 5.1.														
2 If nothing to the contrary is agreed between the customer and the supplier, needle rollers of any nominal dimensions and any of the quoted grades will be supplied sub-divided into the gauges listed in this table at the discretion of the supplier.														

Table 3 — Chamfer dimension limits for flat end needle roller

Dimensions in millimetres

D_w	\leq	Chamfer dimension limits		
		r_s min	r_s max	
			Directions	
			radial	axial
—	1	0,1	0,3	0,5
1	1,5	0,1	0,4	0,6
1,5	3	0,1	0,6	0,8
3	6	0,1	0,9	1

NOTE — The chamfer of a needle roller shall clear a fillet radius equal to r_s min.

6 Measurement of circularity deviation

Circularity deviation shall be measured at the middle of the needle roller length according to a), annex A, of ISO 4291:1985. In practice, it is usually measured by a numerical evaluation of the needle roller circumference, as recorded on a polar chart which shows the measured circumference.