
**Rolling bearings — Needle roller
bearings, drawn cup without inner ring —
Boundary dimensions and tolerances**

*Roulements — Douilles à aiguilles sans bague intérieure — Dimensions
d'encombrement et tolérances*

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 3245 was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 5, *Needle roller bearings*.

This third edition cancels and replaces the second edition (ISO 3245:1997), which has been technically revised.

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Rolling bearings — Needle roller bearings, drawn cup without inner ring — Boundary dimensions and tolerances

1 Scope

This International Standard specifies the boundary dimensions and preferred dimensions to be used for drawn cup needle roller bearings without inner ring as well as the minimum chamfer dimension limits. Also specified are the closed end thickness dimensions for bearings with closed end drawn cups.

In addition, dimensional tolerances and methods for checking the needle roller complement bore diameter are specified.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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 1132-1, *Rolling bearings — Tolerances — Part 1: Terms and definitions*

ISO 1132-2:2001, *Rolling bearings — Tolerances — Part 2: Measuring and gauging principles and methods*

ISO 5593, *Rolling bearings — Vocabulary*

ISO 10579, *Technical drawing — Dimensioning and tolerancing — Non-rigid parts*

ISO 15241, *Rolling bearings — Symbols for quantities*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1132-1 and ISO 5593 apply.

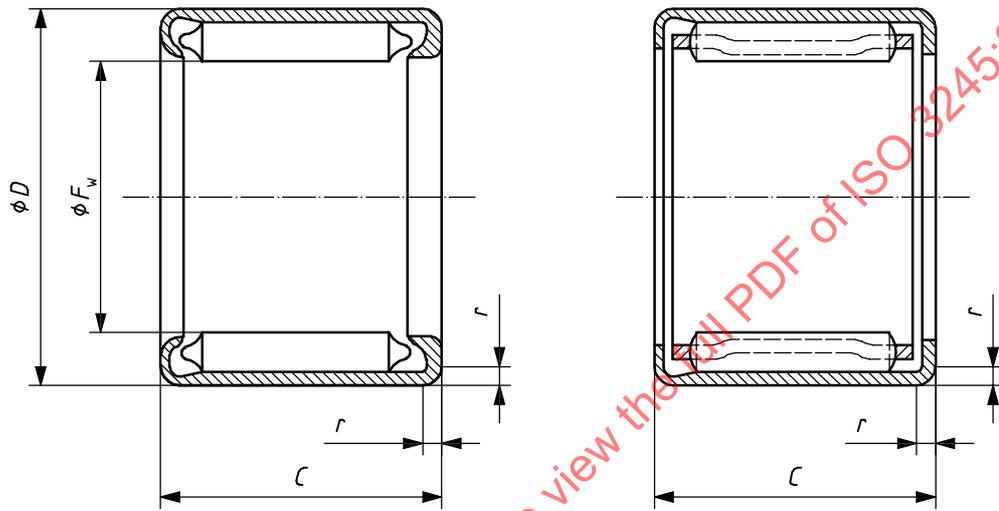
4 Symbols

For the purposes of this document, the symbols given in ISO 15241 and the following apply.

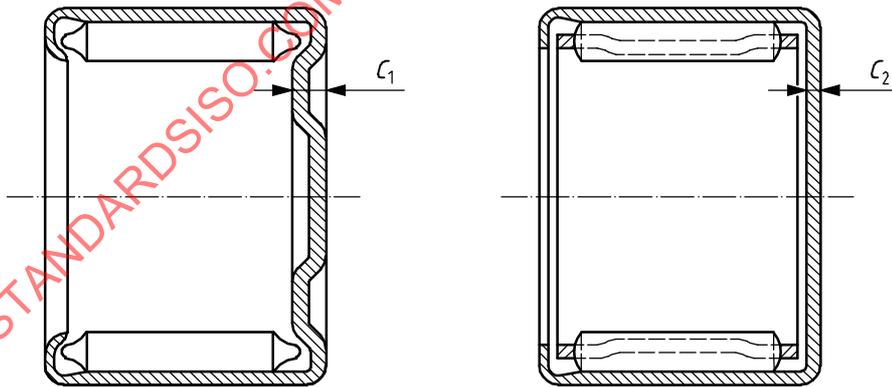
The symbols (except those for tolerances) shown in Figure 1, and the values given in Tables 1 to 4 denote nominal dimensions unless otherwise specified.

| | |
|-------|---|
| C | drawn cup width |
| C_1 | end thickness of profiled end drawn cup |
| C_2 | end thickness of flat end drawn cup |

- D drawn cup outside diameter
- F_w bore diameter of needle roller complement
- $F_{ws\ min}$ smallest single bore diameter of needle roller complement ¹⁾
- r chamfer dimension
- $r_{s\ min}$ smallest single chamfer dimension
- ΔC_s deviation of single drawn cup width



a) With open ends



b) With closed end

Figure 1 — Needle roller bearings, drawn cup without inner ring

1) The smallest single bore diameter of the needle roller complement is the diameter of the cylinder which, when placed in the needle roller complement bore, results in zero radial clearance in at least one radial direction.

5 Boundary dimensions

The boundary dimensions of drawn cup needle roller bearings, without inner ring, closed end and open ends, of diameter series 1D are given in Table 1, those of diameter series 2D are given in Table 2.

The maximum limits of C_1 and C_2 are given to enable the user to avoid contact between the end face of the shaft and the internal end face of the drawn cup. If contact between these faces is required, the user should consult the bearing manufacturer.

Table 1 — Boundary dimensions of needle roller bearings without inner ring, with open ends or closed end — Diameter series 1D

Dimensions in millimetres

| F_w | D | C | | | | | | | | C_1^a max. | C_2^a max. | $r_{s\ min}^b$ |
|-------|-----|------------------|-----------|-----------|-----------|-----------|-----|-----|-----|-----------------|-----------------|----------------|
| | | Dimension series | | | | | | | | | | |
| | | 21D | 31D | 41D | 51D | 61D | 71D | 81D | 91D | | | |
| 4 | 8 | 7 | <u>8</u> | 9 | — | — | — | — | — | 1,9 | 1 | 0,3 |
| 5 | 9 | 7 | 8 | <u>9</u> | — | — | — | — | — | 1,9 | 1 | 0,4 |
| 6 | 10 | 7 | 8 | <u>9</u> | 10 | — | — | — | — | 1,9 | 1 | 0,4 |
| 7 | 11 | 7 | 8 | <u>9</u> | 10 | 12 | — | — | — | 1,9 | 1 | 0,4 |
| 8 | 12 | 7 | 8 | 9 | 10 | 12 | — | — | — | 1,9 | 1 | 0,4 |
| 9 | 13 | 7 | 8 | 9 | <u>10</u> | 12 | 14 | — | — | 1,9 | 1 | 0,4 |
| 10 | 14 | 7 | 8 | 9 | <u>10</u> | 12 | 14 | — | — | 1,9 | 1 | 0,4 |
| 12 | 16 | 7 | 8 | 9 | <u>10</u> | 12 | 14 | — | — | 1,9 | 1 | 0,4 |
| 14 | 20 | 10 | <u>12</u> | 14 | <u>16</u> | 18 | 20 | — | — | 2,8 | 1,3 | 0,4 |
| 15 | 21 | 10 | 12 | 14 | 16 | 18 | 20 | — | — | 2,8 | 1,3 | 0,4 |
| 16 | 22 | 10 | <u>12</u> | 14 | <u>16</u> | 18 | 20 | — | — | 2,8 | 1,3 | 0,4 |
| 17 | 23 | 10 | 12 | 14 | <u>16</u> | 18 | 20 | — | — | 2,8 | 1,3 | 0,4 |
| 18 | 24 | 10 | <u>12</u> | 14 | <u>16</u> | 18 | 20 | — | — | 2,8 | 1,3 | 0,4 |
| 20 | 26 | 10 | <u>12</u> | 14 | <u>16</u> | 18 | 20 | — | — | 2,8 | 1,3 | 0,4 |
| 22 | 28 | 10 | <u>12</u> | 14 | <u>16</u> | 18 | 20 | — | — | 2,8 | 1,3 | 0,4 |
| 25 | 32 | 12 | 14 | <u>16</u> | 18 | <u>20</u> | 24 | 28 | 32 | 2,8 | 1,3 | 0,8 |
| 28 | 35 | 12 | 14 | <u>16</u> | 18 | <u>20</u> | 24 | 28 | 32 | 2,8 | 1,3 | 0,8 |
| 30 | 37 | 12 | 14 | <u>16</u> | 18 | <u>20</u> | 24 | 28 | 32 | 2,8 | 1,3 | 0,8 |
| 32 | 39 | 12 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 2,8 | 1,3 | 0,8 |
| 35 | 42 | 12 | 14 | <u>16</u> | 18 | 20 | 24 | 28 | 32 | 2,8 | 1,3 | 0,8 |
| 38 | 45 | 12 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 2,8 | 1,3 | 0,8 |
| 40 | 47 | 12 | 14 | <u>16</u> | 18 | 20 | 24 | 28 | 32 | 2,8 | 1,3 | 0,8 |
| 42 | 49 | 12 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 2,8 | 1,3 | 0,8 |
| 45 | 52 | 12 | 14 | <u>16</u> | 18 | 20 | 24 | 28 | 32 | 2,8 | 1,3 | 0,8 |
| 50 | 58 | 14 | 16 | 18 | <u>20</u> | <u>24</u> | 28 | 32 | 36 | 2,8 | 1,6 | 0,8 |
| 55 | 63 | 14 | 16 | 18 | <u>20</u> | <u>24</u> | 28 | 32 | 36 | 2,8 | 1,6 | 0,8 |
| 60 | 68 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 36 | 2,8 | 1,6 | 0,8 |
| 65 | 73 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 36 | 2,8 | 1,6 | 0,8 |
| 70 | 78 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 36 | 2,8 | 1,6 | 0,8 |

NOTE Underlined values are the preferred dimensions.

^a No minimum limit is specified for thickness of the closed end.

^b No maximum limit is specified for chamfer dimensions.

Table 2 — Boundary dimensions of needle roller bearings without inner ring, with open ends or closed end — Diameter series 2D

Dimensions in millimetres

| F_w | D | C | | | | | | | C_1^a max. | C_2^a max. | $r_{s\ min}^b$ |
|-------|-----|------------------|-----|-----|-----|-----|-----|-----|-----------------|-----------------|----------------|
| | | Dimension series | | | | | | | | | |
| | | 22D | 32D | 42D | 52D | 62D | 72D | 82D | | | |
| 8 | 14 | 10 | 12 | 14 | — | — | — | — | 2,8 | 1,3 | 0,4 |
| 9 | 15 | 10 | 12 | 14 | 16 | — | — | — | 2,8 | 1,3 | 0,4 |
| 10 | 16 | 10 | 12 | 14 | 16 | — | — | — | 2,8 | 1,3 | 0,4 |
| 12 | 18 | 10 | 12 | 14 | 16 | 18 | — | — | 2,8 | 1,3 | 0,4 |
| 14 | 22 | 12 | 14 | 16 | 18 | 20 | 24 | — | 2,8 | 1,3 | 0,4 |
| 15 | 23 | 12 | 14 | 16 | 18 | 20 | 24 | — | 2,8 | 1,3 | 0,4 |
| 16 | 24 | 12 | 14 | 16 | 18 | 20 | 24 | — | 2,8 | 1,3 | 0,8 |
| 17 | 25 | 12 | 14 | 16 | 18 | 20 | 24 | — | 2,8 | 1,3 | 0,8 |
| 18 | 26 | 12 | 14 | 16 | 18 | 20 | 24 | — | 2,8 | 1,3 | 0,8 |
| 20 | 28 | 12 | 14 | 16 | 18 | 20 | 24 | — | 2,8 | 1,3 | 0,8 |
| 22 | 30 | 12 | 14 | 16 | 18 | 20 | 24 | — | 2,8 | 1,3 | 0,8 |
| 25 | 35 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 3,4 | 1,6 | 0,8 |
| 28 | 38 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 3,4 | 1,6 | 0,8 |
| 30 | 40 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 3,4 | 1,6 | 0,8 |
| 32 | 42 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 3,4 | 1,6 | 0,8 |
| 35 | 45 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 3,4 | 1,6 | 0,8 |
| 38 | 48 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 3,4 | 1,6 | 0,8 |
| 40 | 50 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 3,4 | 1,6 | 0,8 |
| 42 | 52 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 3,4 | 1,6 | 0,8 |
| 45 | 55 | 14 | 16 | 18 | 20 | 24 | 28 | 32 | 3,4 | 1,6 | 0,8 |

^a No minimum limit is specified for thickness of the closed end.
^b No maximum limit is specified for chamfer dimensions.

6 Tolerances

6.1 Tolerances for the bore diameter of needle roller complement

Drawn cup needle roller bearings are non-rigid parts according to the definition in ISO 10579 and require the outside diameter of the drawn cup to be restrained in a ring gauge for verification of the bore diameter of the needle roller complement.

The free state condition defined in ISO 10579 is valid for the tolerances applied to dimensions C , C_1 , C_2 and $r_{s\ min}$.

The tolerances given in Tables 3 and 4 for the smallest single bore diameter of needle roller complement, $F_{ws\ min}$, are valid on the condition that the drawn cup is pressed into a ring gauge having a radial cross-section as specified in ISO 1132-2:2001, 7.4 and 7.5. The bore diameter of the ring gauge shall be in accordance with Tables 3 and 4.

The ring gauge bore diameter values specified in Tables 3 and 4 are equal to the low limit of tolerance class N6 as specified in ISO 286-2:1988, when applied to the nominal outside diameter of drawn cup, D . If the actual bore diameter of the ring gauge deviates from this dimension, the limit tolerances for the smallest single bore diameter of needle roller complement, $F_{ws\ min}$, should be corrected to compensate for the variation in the bore diameter of the ring gauge. However, the maximum limit of the bore diameter of the ring gauge should be the corresponding high limit of tolerance class N6 as specified in ISO 286-2:1988.

Table 3 — Tolerances for the bore diameter of needle roller complement — Diameter series 1D

| F_w mm | D^a mm | Bore diameter of ring gauge mm | Tolerances for $F_{ws\ min}^b$ μm | |
|-------------|-------------|--------------------------------------|---|-----|
| | | | high | low |
| 4 | 8 | 7,984 | +28 | +10 |
| 5 | 9 | 8,984 | | |
| 6 | 10 | 9,984 | +31 | +13 |
| 7 | 11 | 10,98 | | |
| 8 | 12 | 11,98 | | |
| 9 | 13 | 12,98 | | |
| 10 | 14 | 13,98 | | |
| 12 | 16 | 15,98 | +34 | +16 |
| 14 | 20 | 19,976 | | |
| 15 | 21 | 20,976 | | |
| 16 | 22 | 21,976 | | |
| 17 | 23 | 22,976 | | |
| 18 | 24 | 23,976 | | |
| 20 | 26 | 25,976 | +41 | +20 |
| 22 | 28 | 27,976 | | |
| 25 | 32 | 31,972 | | |
| 28 | 35 | 34,972 | | |
| 30 | 37 | 36,972 | | |
| 32 | 39 | 38,972 | +50 | +25 |
| 35 | 42 | 41,972 | | |
| 38 | 45 | 44,972 | | |
| 40 | 47 | 46,972 | | |
| 42 | 49 | 48,972 | | |
| 45 | 52 | 51,967 | | |
| 50 | 58 | 57,967 | | |
| 55 | 63 | 62,967 | +60 | +30 |
| 60 | 68 | 67,967 | | |
| 65 | 73 | 72,967 | | |
| 70 | 78 | 77,967 | | |

^a No deviations are specified for the outside diameter of drawn cup D . The bearing manufacturer shall ensure a fit corresponding to the function.

^b The values in this table give the limits of the difference between $F_{ws\ min}$ and F_w .