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Rolling bearings – Internal clearance – Part 1: Radial internal clearance for radial bearings (ISO 5753-1:2009, IDT)

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The International Standard ISO 5753-1:2009 has the status of a Swedish Standard. This document contains the official version of ISO 5753-1:2009.

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Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Rullningslager, SIS/TK 105.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

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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.

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 5753-1 was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 4, *Tolerances*.

This first edition of ISO 5753-1 cancels and replaces ISO 5753:1991, which has been technically revised and extended. Internal clearance values for larger bore sizes have been added for each bearing type, together with values for cylindrical roller bearings with tapered bore and toroidal roller bearings with both cylindrical and tapered bores.

ISO 5753 consists of the following parts, under the general title *Rolling bearings — Internal clearance*:

— *Part 1: Radial internal clearance for radial bearings*

Axial internal clearance will form the subject of a future part 2.

Introduction

The radial internal clearance values apply to bearings, designed in such a way that they can take purely radial load, which are not mounted or preloaded and are not subjected to any external load (i.e. with no measuring load being applied). Since measurements of radial clearance can only be made with a measuring load applied, the radial displacement resulting from the elastic deformation of the rings and rolling elements has to be added to the clearance values specified in this part of ISO 5753. The magnitude of these clearance values depends on the number and diameter of the rolling elements and the extent of contact between the rolling elements and the raceways. Methods for the measurement of radial internal clearance are given in ISO 1132-2.

Depending on the design of the bearing and measuring method, some scatter of the results of repeated measurements can be experienced. Manufacturers are expected to take such scatter into consideration by applying correspondingly reduced manufacturing tolerances.

Rolling bearings — Internal clearance —

Part 1: Radial internal clearance for radial bearings

1 Scope

This part of ISO 5753 specifies values of radial internal clearance for the following types of radial rolling bearings:

- radial contact groove ball bearings, except those for insert bearings,
- double-row self-aligning ball bearings,
- cylindrical roller bearings,
- needle roller bearings, except drawn cup needle roller bearings,
- toroidal roller bearings,
- double-row self-aligning roller bearings.

It gives radial internal clearance values for all six types of bearing with cylindrical bore and also for double-row self-aligning ball bearings, cylindrical roller bearings, toroidal roller bearings and double-row self-aligning roller bearings with tapered bore.

Values of radial internal clearance for insert bearings are specified in ISO 9628.

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 1132-1:2000, *Rolling bearings — Tolerances — Part 1: Terms and definitions*

ISO 5593, *Rolling bearings — Vocabulary*

ISO 9628, *Rolling bearings — Insert bearings and eccentric locking collars — Boundary dimensions and tolerances*

ISO 15241, *Rolling bearings — Symbols for quantities*

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3 Terms and definitions

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

3.1 radial internal clearance
(bearing capable of taking purely radial load, non-preloaded) arithmetical mean of the radial distances through which one of the rings may be displaced relative to the other, from one eccentric extreme position to the diametrically opposite extreme position, in different angular directions and without being subjected to any external load

NOTE 1 The mean value includes displacements with the rings in different angular positions relative to each other and with the set of rolling elements in different angular positions in relation to the rings.

NOTE 2 For a measurement to be valid, at each limiting eccentric position of the rings in relation to each other, their relative axial position, and the position of the rolling elements relative to the raceways, shall be such that one ring has actually assumed the extreme eccentric position in relation to the other ring.

[ISO 1132-1:2000, definition 8.1.1]

3.2 toroidal roller bearing
single-row self-aligning radial roller bearing with convex rollers as rolling elements with raceway radii of axial plane of both outer and inner rings larger than half the outer ring raceway diameter

4 Symbols

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

The symbols (except those for clearance values) and the values given in Tables 1 to 9 denote nominal dimensions unless specified otherwise.

d bore diameter

G_r radial internal clearance

5 Radial internal clearance

5.1 Radial contact groove ball bearings

Radial internal clearance values for radial contact groove ball bearings with cylindrical bore are given in Table 1.

The values in Table 1 are not valid for insert bearings; see ISO 9628 for insert bearings.

Table 1 — Radial contact groove ball bearings with cylindrical bore

Clearance values in micrometres

| <i>d</i> mm | | <i>G_r</i> | | | | | | | | | |
|----------------|-------|----------------------|------|---------|------|---------|------|---------|-------|---------|-------|
| | | Group 2 | | Group N | | Group 3 | | Group 4 | | Group 5 | |
| > | ≤ | min. | max. | min. | max. | min. | max. | min. | max. | min. | max. |
| 2,5 | 6 | 0 | 7 | 2 | 13 | 8 | 23 | — | — | — | — |
| 6 | 10 | 0 | 7 | 2 | 13 | 8 | 23 | 14 | 29 | 20 | 37 |
| 10 | 18 | 0 | 9 | 3 | 18 | 11 | 25 | 18 | 33 | 25 | 45 |
| 18 | 24 | 0 | 10 | 5 | 20 | 13 | 28 | 20 | 36 | 28 | 48 |
| 24 | 30 | 1 | 11 | 5 | 20 | 13 | 28 | 23 | 41 | 30 | 53 |
| 30 | 40 | 1 | 11 | 6 | 20 | 15 | 33 | 28 | 46 | 40 | 64 |
| 40 | 50 | 1 | 11 | 6 | 23 | 18 | 36 | 30 | 51 | 45 | 73 |
| 50 | 65 | 1 | 15 | 8 | 28 | 23 | 43 | 38 | 61 | 55 | 90 |
| 65 | 80 | 1 | 15 | 10 | 30 | 25 | 51 | 46 | 71 | 65 | 105 |
| 80 | 100 | 1 | 18 | 12 | 36 | 30 | 58 | 53 | 84 | 75 | 120 |
| 100 | 120 | 2 | 20 | 15 | 41 | 36 | 66 | 61 | 97 | 90 | 140 |
| 120 | 140 | 2 | 23 | 18 | 48 | 41 | 81 | 71 | 114 | 105 | 160 |
| 140 | 160 | 2 | 23 | 18 | 53 | 46 | 91 | 81 | 130 | 120 | 180 |
| 160 | 180 | 2 | 25 | 20 | 61 | 53 | 102 | 91 | 147 | 135 | 200 |
| 180 | 200 | 2 | 30 | 25 | 71 | 63 | 117 | 107 | 163 | 150 | 230 |
| 200 | 225 | 2 | 35 | 25 | 85 | 75 | 140 | 125 | 195 | 175 | 265 |
| 225 | 250 | 2 | 40 | 30 | 95 | 85 | 160 | 145 | 225 | 205 | 300 |
| 250 | 280 | 2 | 45 | 35 | 105 | 90 | 170 | 155 | 245 | 225 | 340 |
| 280 | 315 | 2 | 55 | 40 | 115 | 100 | 190 | 175 | 270 | 245 | 370 |
| 315 | 355 | 3 | 60 | 45 | 125 | 110 | 210 | 195 | 300 | 275 | 410 |
| 355 | 400 | 3 | 70 | 55 | 145 | 130 | 240 | 225 | 340 | 315 | 460 |
| 400 | 450 | 3 | 80 | 60 | 170 | 150 | 270 | 250 | 380 | 350 | 520 |
| 450 | 500 | 3 | 90 | 70 | 190 | 170 | 300 | 280 | 420 | 390 | 570 |
| 500 | 560 | 10 | 100 | 80 | 210 | 190 | 330 | 310 | 470 | 440 | 630 |
| 560 | 630 | 10 | 110 | 90 | 230 | 210 | 360 | 340 | 520 | 490 | 700 |
| 630 | 710 | 20 | 130 | 110 | 260 | 240 | 400 | 380 | 570 | 540 | 780 |
| 710 | 800 | 20 | 140 | 120 | 290 | 270 | 450 | 430 | 630 | 600 | 860 |
| 800 | 900 | 20 | 160 | 140 | 320 | 300 | 500 | 480 | 700 | 670 | 960 |
| 900 | 1 000 | 20 | 170 | 150 | 350 | 330 | 550 | 530 | 770 | 740 | 1 040 |
| 1 000 | 1 120 | 20 | 180 | 160 | 380 | 360 | 600 | 580 | 850 | 820 | 1 150 |
| 1 120 | 1 250 | 20 | 190 | 170 | 410 | 390 | 650 | 630 | 920 | 890 | 1 260 |
| 1 250 | 1 400 | 30 | 200 | 190 | 440 | 420 | 700 | 680 | 1 000 | — | — |
| 1 400 | 1 600 | 30 | 210 | 210 | 470 | 450 | 750 | 730 | 1 060 | — | — |