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**Plain bearings — Wrapped bushes —**  
**Part 7:**  
**Measurement of wall thickness of**  
**thin-walled bushes**

*Paliers lisses — Bagues roulées —*

*Partie 7: Mesurage de l'épaisseur de paroi des bagues minces*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 5, *Quality analysis and assurance*.

This second edition cancels and replaces the first edition (ISO 3547-7:2007), which has been technically revised.

The main changes compared to the previous edition are as follows:

- [Clauses 2, 3, 4, 5, 6, 7](#) and [8](#) have been updated;
- [Figure 3](#) has been updated;
- [Figure 5](#) has been implemented.

A list of all parts in the ISO 3547 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Plain bearings — Wrapped bushes —

## Part 7:

# Measurement of wall thickness of thin-walled bushes

### 1 Scope

This document describes, following ISO 12301, the checking methods and measuring equipment used for measuring the total wall thickness of thin-walled bushes in the finished state.

NOTE All dimensions in this document are given in millimetres.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 12301, *Plain bearings — Quality control techniques and inspection of geometrical and material quality characteristics*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

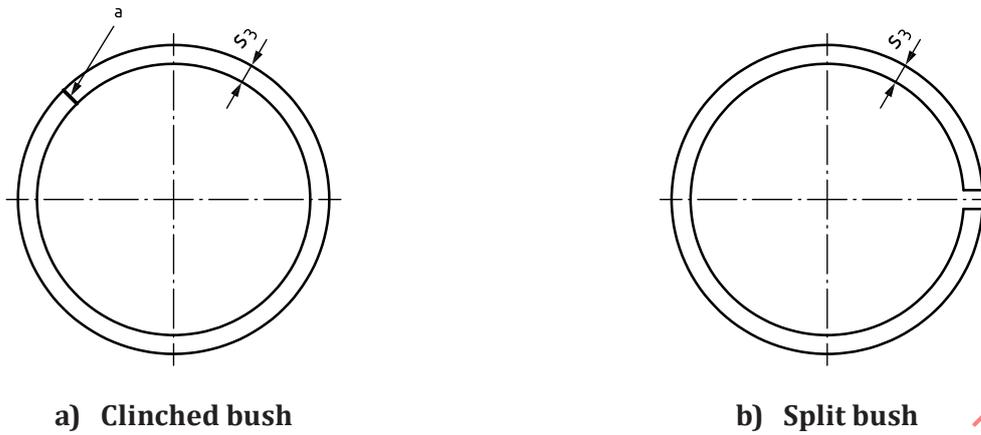
- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

#### 3.1 wall thickness

$s_3$

radial distance between the opposing measuring points at the inner and outer cylindrical surface

Note 1 to entry: See [Figure 1](#).



a Clinch.

Figure 1 — Wall thickness,  $s_3$

#### 4 Symbols and units

For the purposes of this document, the symbols and units given in [Table 1](#) apply.

Table 1 — Symbols and units

Symbol	Parameter	SI unit
$a_{ch}$	axial distance to measuring position from the edge of the bush	millimetre
$B$	width of the bush	millimetre
$D_o$	outside diameter of the bush	millimetre
$F_{pin}$	measuring pin load	newton
$M$	number of measuring lines	—
$s_3$	wall thickness	millimetre

#### 5 Purpose of checking

The purpose of checking is to ensure that the wall thickness and wall thickness tolerances are in accordance with ISO 3547-1. If this measurement is required, it is designated by  $s_3$ ; see ISO 3547-1.

#### 6 Checking methods

##### 6.1 Measuring principle

The gauging axis of the measuring device shall be in the radial direction and perpendicular to the outside surface of the test piece in order to find the minimum value of the wall thickness. The measured values may be recorded by a single measurement or by a sum measurement, as represented symbolically in [Figure 2](#).

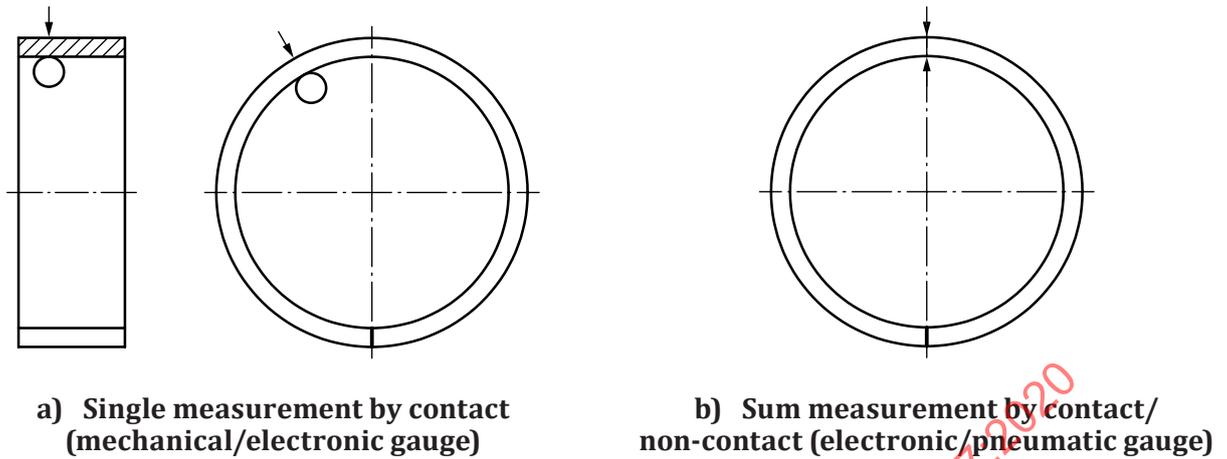


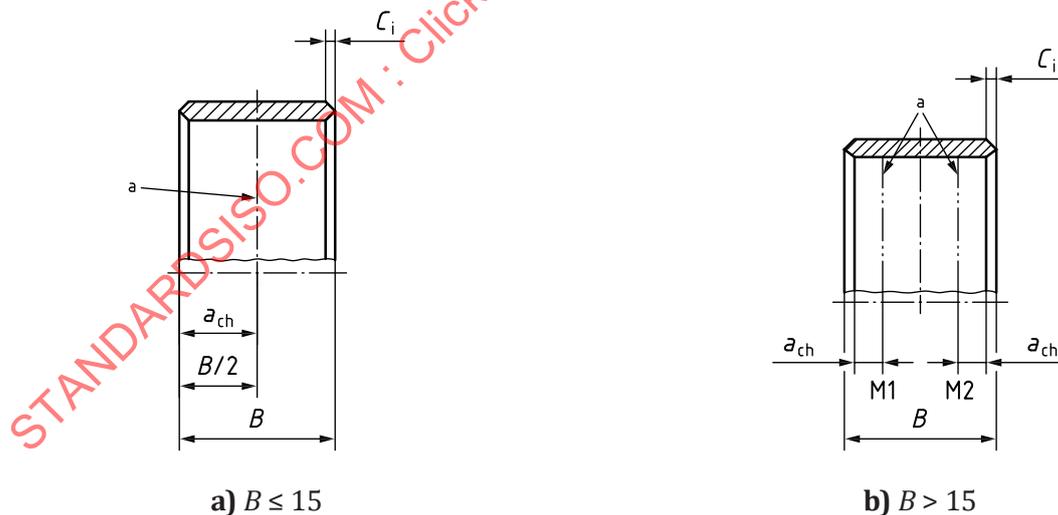
Figure 2 — Measuring principle of wall thickness measurement

The presence of lubricating holes, oil pockets, oil grooves, markings or special chamfers can require deviation from the measuring lines and measuring points specified in 6.2 and 6.3. Any such deviation shall be agreed between customer and supplier.

Any wall thickness not conforming to the specified values due to the manufacturing process, because of deformation of the bearing backing in the area of marking or at non-load-bearing places of wrapped bushes, shall be agreed between customer and supplier.

## 6.2 Line measurement around the circumference

Continuous measurement of the wall thickness around the circumference shall be carried out at the measuring lines specified in Figure 3 and Table 2.



### Key

$B$  bearing width

$a_{ch}$  distance of measuring position

$C_i$  lateral limitation of sliding surface

$a$  Measuring lines,  $M$ .

Figure 3 — Position of measuring lines

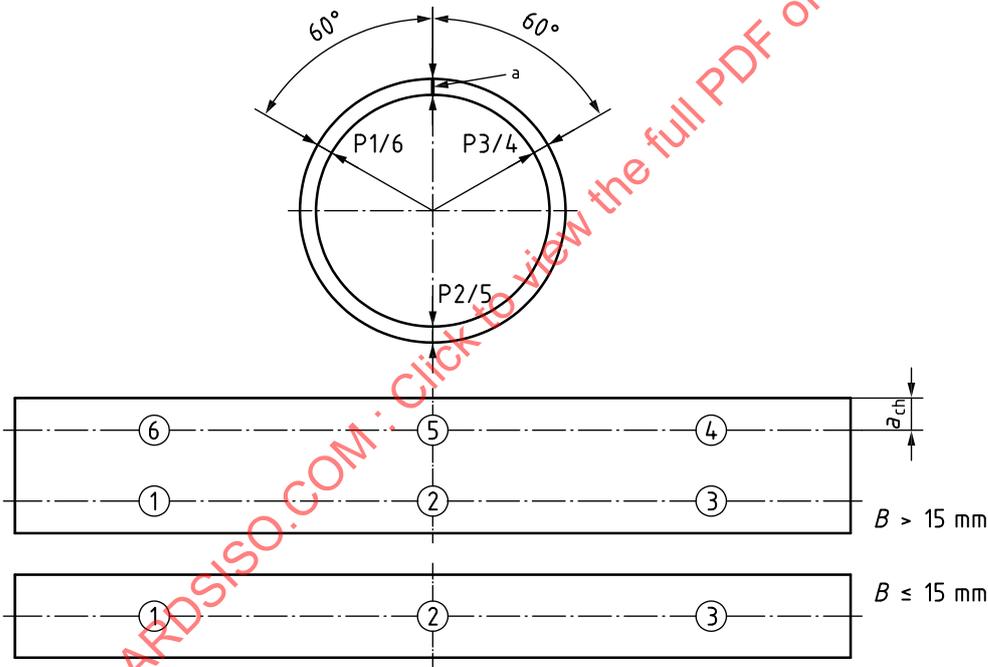
Table 2 — Distance of measuring position  $a_{ch}$

Width $B$ mm	Distance to measuring position $a_{ch}$ mm	Number of measuring lines $M$
$B < 15$	$B/2$	1
$15 < B < 50$	$C_i + 4$	2 <sup>a</sup>
$50 < B < 90$	$C_i + 4$	2 <sup>a</sup>
$B > 90$	$C_i + 8$	2 <sup>b</sup>

<sup>a</sup> Only valid for:  $C_i + 4 \text{ mm} \leq B/2 - 2 \text{ mm}$ , otherwise only one measuring line should be used.  
<sup>b</sup> Only valid for:  $C_i + 8 \text{ mm} \leq B/2 - 2 \text{ mm}$ , otherwise only one measuring line should be used.

6.3 Point measurement

Point-by-point measurement of wall thickness shall be carried out at the measuring points specified in Figure 4 for widths of  $B \leq 90 \text{ mm}$  and outside diameter  $D_o \leq 150 \text{ mm}$ . In the case where  $B > 90 \text{ mm}$  and  $D_o > 150 \text{ mm}$ , the measurement method shall be subject to agreement between the supplier and user. The measuring position distance,  $a_{ch}$ , shall be taken from Table 2.



**Key**  
 P measuring point  
 a Split position.

NOTE Figure 4 shows the three- or six-point measuring scheme on the bearing and in a developed view, depending on part width.

Figure 4 — Three- or six-point measuring scheme

7 Requirements for measuring equipment for the contact method

7.1 Radius of the measuring pin on the outside surface

The radius of the measuring pin positioned on the outside as shown in Figure 5 shall be  $1,5 \text{ mm} \pm 0,2 \text{ mm}$ .

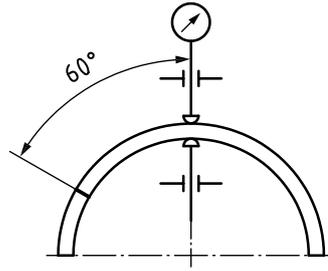


Figure 5 — Measuring equipment for the contact method

## 7.2 Radius of the measuring pin on the inside surface

The radius of the measuring pin positioned on the inside surface is given in [Table 3](#) as a function of the bush outside diameter  $D_o$  and the bearing material.

Table 3 — Radius of the measuring pin on the inside surface

Dimensions in millimetres

$D_o$ nominal		Radius of the measuring pin	
		Metallic bushes	Polymer bushes
—	$\leq 10$	$1,5 \pm 0,2$	$1,5 \pm 0,2$
$> 10$	$\leq 25$	$3 \pm 0,2$	$3 \pm 0,2$
$> 25$	$\leq 150$	$3 \pm 0,2$	$5 \pm 0,2$
$> 150$	—	$5 \pm 0,2$	$5 \pm 0,2$

## 7.3 Measuring pin load

The measuring pin load,  $F_{pin}$ , applied onto the sliding layer, shall be 0,8 N to 2,5 N in accordance with ISO 12301.

## 8 Checking of measuring equipment

The measuring equipment shall be checked for measurement uncertainty at a frequency specified by the user, based on the type of equipment and on experience from previous checks. The limits shall comply with the current industry requirements.