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Second edition
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Plain bearings — Wrapped bushes —

Part 6: Checking the inside diameter

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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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).

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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.

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 3547-6:2007), which has been technically revised.

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

— Clause 2 has been updated;

— Figures 1, 2 and 3 have been updated;

— Clause 3 (Terms and definitions) has been added;

— Figure 4 has been implemented;

— Clauses 5 and 6 have been updated.

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.

Introduction

Wrapped bushes in the free condition are flexible, but after insertion they adapt largely to the shape of the housing bore due to the interference between the outside diameter of the bush and the housing bore.

Plain bearings — Wrapped bushes —

Part 6: Checking the inside diameter

1 Scope

The document specifies, following ISO 12301, the checking of the inside diameter of wrapped bushes (see ISO 3547-2:2017, method C) and describes the necessary checking methods and measuring equipment.

NOTE 1 All dimensions in this document are given in millimetres except where otherwise noted/designated.

NOTE 2 The dimensions and tolerances of wrapped bushes are given in ISO 3547-1.

NOTE 3 Checking of the wall thickness is the subject of ISO 3547-7.

NOTE 4 Checking of the outside diameter of wrapped bushes is the subject of ISO 3547-5.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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/

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	Unit
B	Nominal width of the bush	millimetres
$b_{ch,1}$	Width of the ring gauge	millimetres
$b_{ch,2}$	Width of the plug gauge	millimetres
d_0	Outside diameter of the ring gauge	millimetres
D_i	Nominal inside diameter of the bush	millimetres
$D_{i,ch}$	Inside diameter of the bush in the ring gauge	millimetres
D_o	Nominal outside diameter of the bush	millimetres
Ra	Surface roughness	micrometres
t_1	Tolerance of form and position	millimetres
$d_{ch,1}$	Inside diameter of the ring gauge	millimetres

Table 1 *(continued)*

Symbol	Parameter	Unit
$d_{ch,2}$	Outside diameter of the plug gauge	millimetres

5 Method of checking

The free diameter of a wrapped bush is not measured directly because of the flexible nature of the components.

To check the inside diameter, $D_{i,ch}$, the bush is pressed into a ring gauge whose nominal diameter D_i corresponds to the dimension of the housing. For bushes specified in ISO 3547-1, the tolerance class of housing bore is normally H7.

When the bush is pressed into the ring gauge, it is possible that there is a permanent reduction in the outside diameter.

The inside diameter, $D_{i,ch}$, is measured with a three-point measuring instrument or with a GO or a NO GO gauge.

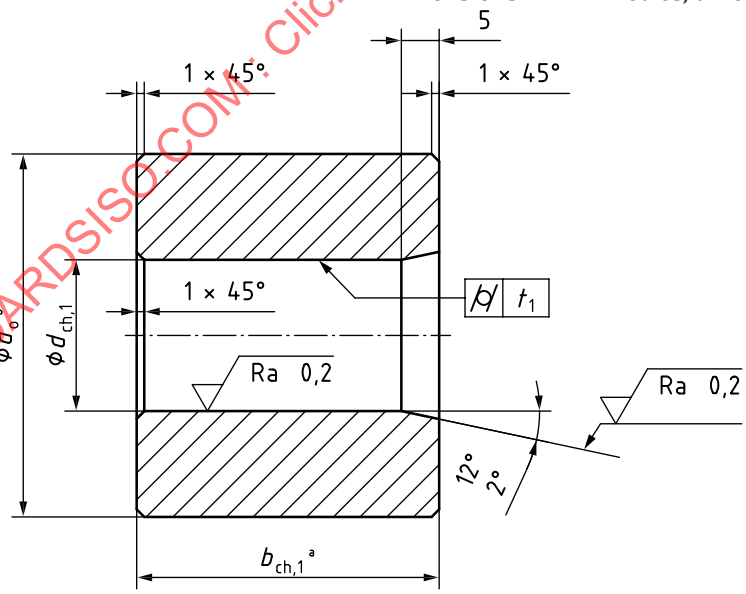
In order to enable the supplier and the user to compare results of this test, it shall be agreed whether results shall be obtained by measuring or by gauging.

6 Test equipment

6.1 Ring gauge

Unless otherwise agreed between supplier and user, the dimensions shown in Figure 1 and given in Table 2 are valid for the ring gauge.

Dimensions in millimetres, unless otherwise designated



[a] $b_{ch,1} \geq B + 9$.

[b] $d_o \geq d_{ch,1} + 50$.

Figure 1 — Ring gauge

Table 2 — Dimensions, manufacturing tolerances and wear limits for ring gauges and plug gauges

Dimensions in millimetres

D_o[a] nominal		$d_{ch,1}$			$d_{ch,2}$		t_1	
		Target size[b]	**Manufacturing tolerance**	**Wear limit**	**Manufacturing tolerance**	**Wear limit**	**Manufacturing tolerance**	**Wear limit**
	≤10	D_o + 0,008	+0,003 0	+0,005	0 −0,003	−0,005	0,002	0,004
>10	≤18	D_o + 0,009						
>18	≤30	D_o + 0,011						
>30	≤50	D_o + 0,013						
>50	≤80	D_o + 0,015						
>80	≤120	D_o + 0,018						
>120	≤180	D_o + 0,020	+0,005 0	+0,007	0 −0,005	−0,007	0,003	0,005

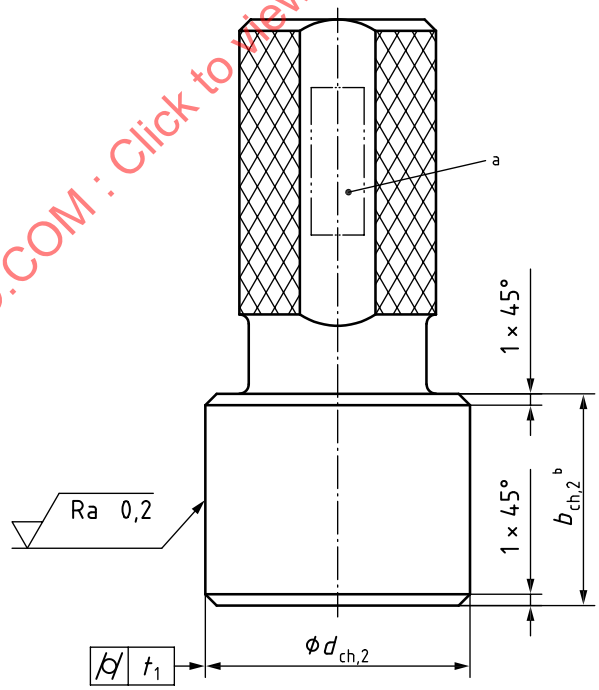
[a] For bushes with D_o > 180 mm, an agreement shall be reached between the supplier and user.

[b] The target size of the ring gauge inside diameter is made up of D_o and the rounded average value of the tolerance class H7. In ISO 3547-1, H7 is recommended as the tolerance class for the housing bore.

6.2 Plug gauge

Unless otherwise agreed between supplier and user, the following dimensions are valid for the plug gauge (see Figures 2 and 3 and Table 2).

The nominal plug gauge diameter can be obtained from ISO 3547-1:2018, Table 4.

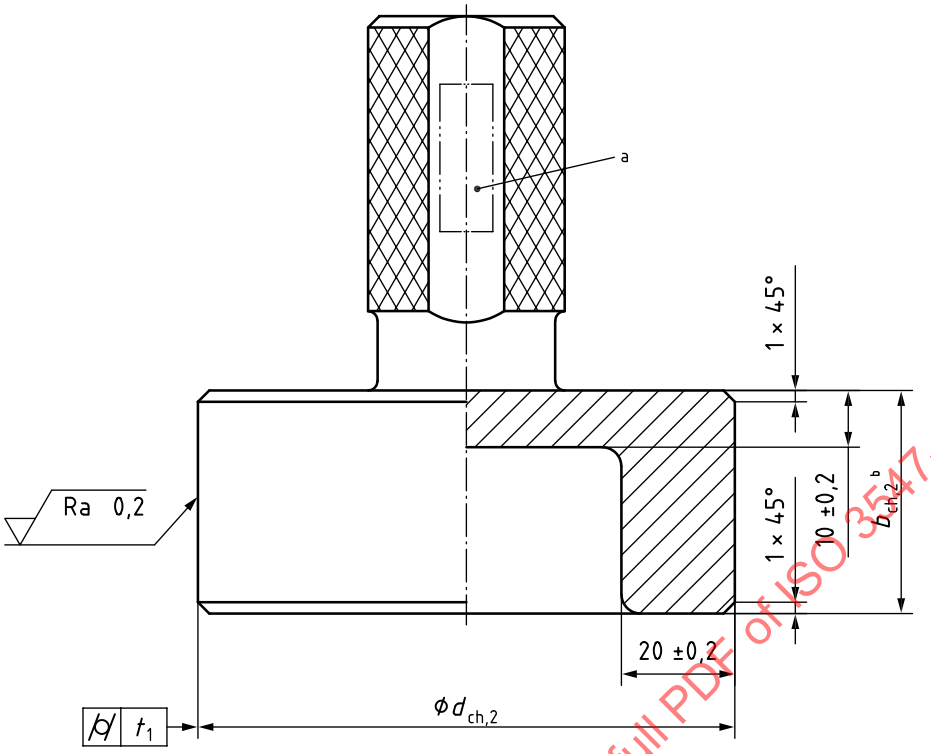


[a] Field for marking.

[b] $b_{ch,2} \geq B + 5$.

Figure 2 — Plug gauge, solid, for $d_{ch,2}$ ≤ 80 mm

Dimensions in millimetres, unless otherwise designated



a Field for marking.

b $b_{ch,2} \geq B + 5$.

Figure 3 — Plug gauge, example with blind hole, for $d_{ch,2}$ > 80 mm

6.3 Three-point measuring instrument

Measurements are made in the radial direction using the spherical faces of the measuring pins shown in Figure 4.

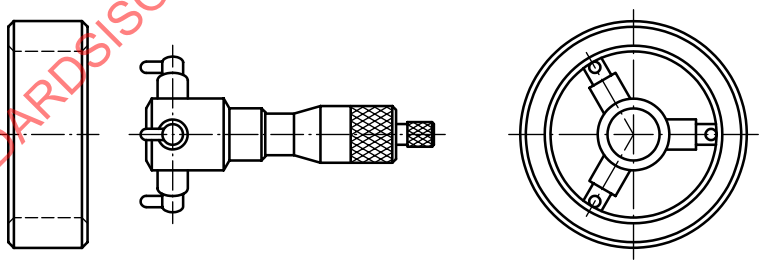


Figure 4 — Three-point measuring instrument

Other inside diameter measurement methods can be used, such as:

a) cylindrical gauge;

b) dial gauge;

c) optical measurement devices as long as correlation with mechanical devices is given.

6.4 Requirements for measuring equipment

The ring gauge and plug gauge shall be from hardened (60 HRC to 64 HRC) and non-ageing steel.

6.5 Measuring errors

Frequent measuring errors are as follows.

a) Ring gauge and plug gauge are damaged or worn.

b) Ring gauge and plug gauge have no lead-in chamfer.

c) Bush is misaligned when introduced into the ring gauge.

d) Plug gauge is misaligned when introduced into the bush.

e) Width of the ring gauge is less than the width of the bush.

f) Grease, dirt, damages, burrs and swelling are present around features on the bush and test equipment.

7 Procedure

The bush shall be introduced into the ring gauge from that side having the lead-in chamfer.

Subsequently, the inside diameter shall be determined by means of

a) the three-point measuring instrument;

b) the GO plug gauge (see Figures 2 and 3), which shall be inserted with minimum effort; the NO-GO plug gauge, which shall not be able to be inserted with a maximum force of 250 N. Where it is necessary to limit the maximum force, it shall be agreed between supplier and user.