
**Plain bearings — Wrapped bushes —
Part 2:
Test data for outside and inside
diameters**

*Paliers lisses — Bagues roulées —
Partie 2: Données d'essai pour le diamètre extérieur et le diamètre
intérieur*

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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 3547-2 was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 3, *Dimensions, tolerances and construction details*.

This second edition cancels and replaces the first edition (ISO 3547-2:1999), which has been technically revised.

ISO 3547 consists of the following parts, under the general title *Plain bearings — Wrapped bushes*:

- *Part 1: Dimensions* <https://standards.iteh.ai/catalog/standards/sist/88cfcae0-b28e-48c2-86a7-395061de608e/iso-3547-2-2006>
- *Part 2: Test data for outside and inside diameters*
- *Part 3: Lubrication holes, grooves and indentations*
- *Part 4: Materials*

The following parts are under preparation:

- *Part 5: Checking the outside diameter*
- *Part 6: Checking the inside diameter*
- *Part 7: Measurement of wall thickness of thin-walled half-bearings and thin-walled bushes*

Plain bearings — Wrapped bushes —

Part 2: Test data for outside and inside diameters

1 Scope

This part of ISO 3547 specifies the test data for outside and inside diameters of wrapped bushes made of solid and multi-layer bearing material for plain bearing applications. It also specifies test designations.

Since the wall thickness of the bush is measured in the free condition, no special test data is required for this on the drawing (see ISO 3547-5 and ISO 3547-6).

NOTE Depending on the manufacturing method, the back of the bushes can show isolated light depressions and, similarly, bushes with lubrication holes, grooves and bore indentations can show distortion. The wall thickness must therefore be measured away from these areas.

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 3547-1:2006, *Plain bearings — Wrapped bushes — Part 1: Dimensions*

ISO 3547-4:2006, *Plain bearings — Wrapped bushes — Part 4: Materials*

ISO 4378-1, *Plain bearings — Terms, definitions and classification — Part 1: Design, bearing materials and their properties*

ISO 12301, *Plain bearings — Quality control techniques and inspection of geometrical and material quality characteristics*

ISO 13715, *Technical drawings — Edges of undefined shape — Vocabulary and indication*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4378-1 apply.

4 Symbols and units

See Table 1.

Table 1 — Symbols and units

Symbol	Description	Unit
A_{cal}	Reduced area of cross section (calculated value) of the bush	mm ²
B	Width of the bush	mm
C_i	Inside chamfer	mm
C_o	Outside chamfer	mm
D_{fl}	Flange diameter	mm
D_{H}	Housing bore diameter	mm
D_i	Inside diameter of the bush	mm
$D_{i,\text{ch}}$	Inside diameter of the bush in the ring gauge	mm
D_o	Outside diameter of the bush	mm
F_{ch}	Checking load	mm
$d_{\text{ch},1}$	Diameter of the checking block or ring gauge	mm
$d_{\text{ch},2}$	Diameter of the setting plug or plug gauge	mm
r	Flange radius	mm
s_1	Thickness of the backing layer ^a	mm
s_2	Thickness of the bearing material layer ^a	mm
s_3	Wall thickness ^a	mm
s_{fl}	Flange thickness	mm
ΔD_o	Tolerance of D_o	mm
v	Elastic reduction of the outside diameter under checking load F_{ch}	mm
z	Distance apart of the halves of the checking block	mm
Δz	Indicator reading	mm
Δz_{D}	Circumference indicator reading for test D	mm

^a For bushes which are made of a single material, $s_1 = s_3$ or $s_2 = s_3$.

5 Presentation of data on drawing

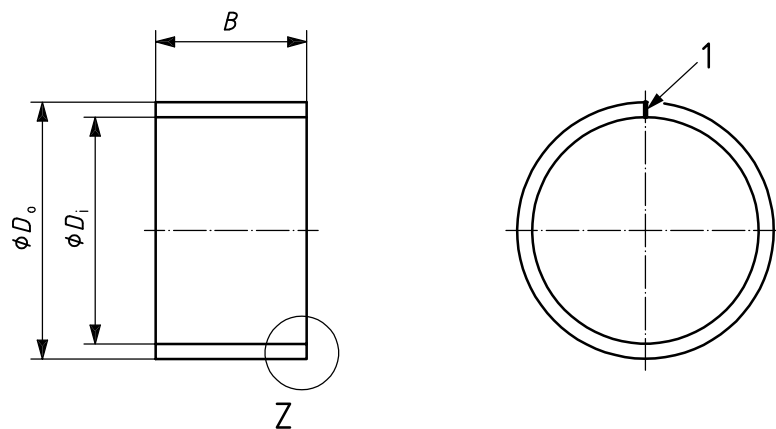
The drawing should show either

- the outside diameter, D_o , and the wall thickness, s_3 , or
- the outside diameter, D_o , and the inside diameter, D_i .

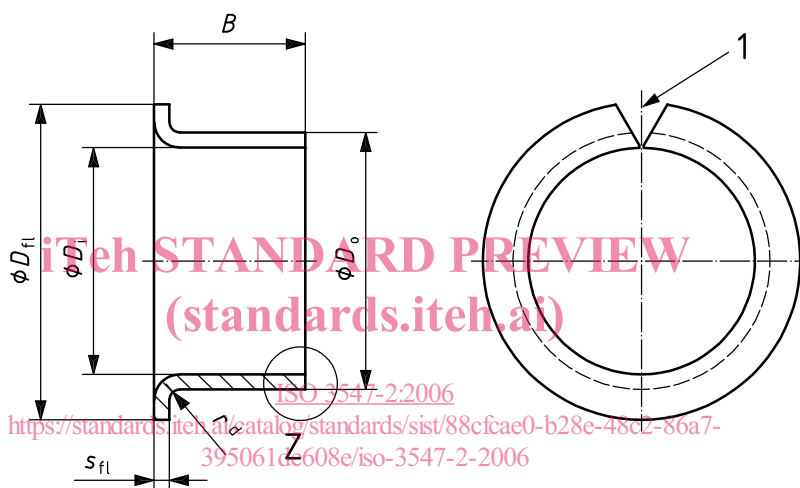
Wall thickness, s_3 , and inside diameter, D_i , shall not be specified together on the same drawing.

See Figure 1.

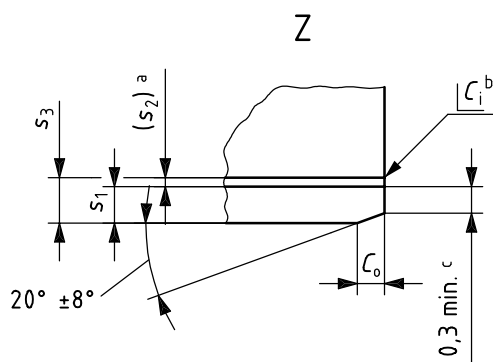
Dimensions in millimetres



Type C cylindrical bush



Type F flanged bush



Key

- 1 split
- a Thickness of the bearing material layer: only valid as a basis for calculation in accordance with 7.2.
- b C_i may be a chamfer or break edge, in accordance with ISO 13715.
- c 0,2 mm min. for nominal wall thickness 0,5 mm.
- d $r_{\max} = s_3$.

Figure 1 — Cylindrical and flanged bush

6 Tests

6.1 Test A

Check the outside diameter, D_o , using a checking block in a test rig and setting plug, in accordance with Clause 7.

6.2 Test B

Check the outside diameter, D_o , using two ring gauges, in accordance with Clause 8.

6.3 Test C

Check the inside diameter, D_i , of a bush pressed into a ring gauge, in accordance with Clause 9.

6.4 Test D

Check the outside diameter, D_o , using precision measuring tape, in accordance with Clause 10.

7 Test A

7.1 Description

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This test is applicable to $2D_o$ up to 180 mm.

The test rig consists of a base on which the two parts of the checking block are mounted (see ISO 3547-5).

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A setting plug is inserted in the checking block and the two halves of the checking block are pressed towards one another using the given checking load, F_{ch} , and the indicator reading set.

The setting plug is then removed and replaced by the bush to be checked, and the checking load reapplied.

After the bush has been inserted, the distance, z , between the two halves of the checking block changes under checking load F_{ch} and the distance indicator reading, Δz , is recorded.

From this, D_o can be calculated.

Flanged bushes may be checked either before or after flange forming at the option of the manufacturer.

7.2 Calculation basis

7.2.1 Elastic reduction, v , of outside diameter, D_o

The elastic reduction, v , of the outside diameter, D_o , is the difference between D_o under zero load and the resultant diameter when the checking load, F_{ch} , is applied. Force F_{ch} shall be sufficient to ensure that the bush conforms properly to the surface of the test housing and that the results in the elastic reduction, v , of the outside diameter are in accordance with Table 2.

Table 2 — Elastic reduction, v , of the outside diameter, D_o , under checking load, F_{ch}

Dimensions in millimetres

D_o nominal		v
	≤ 6	0,003
> 6	≤ 12	0,006
> 12	≤ 80	0,013
> 80	≤ 180	0,025

7.2.2 Calculation of diameter of checking block, $d_{ch,1}$

The diameter of the checking block can be calculated from the specified upper limit of the outside diameter, $D_{o,max}$, of the bush from the equation:

$$d_{ch,1} = D_{o,max} - v$$

7.2.3 Effective cross-sectional area, A_{cal}

In order to calculate the checking load, F_{ch} , the effective cross-sectional area, A_{cal} , of the bush shall first be determined.

A_{cal} depends on the material type, bush width B , s_1 and s_2 . See Table 3.

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Table 3 — Nominal dimensions for wall thickness, s_3 , backing material, s_1 , and bearing layer, s_2

Dimensions in millimetres

Wall thickness (see ISO 3547-1)	Nominal thicknesses	
	Backing material of bushes made from multi-layer materials	Bearing material layer of bushes made from multi-layer materials
s_3	s_1	s_2
0,5	0,3	0,2
0,75	0,53	0,22
1,0	0,68	0,32
1,5	1,1	0,4
2,0	1,55	0,45
2,5	2,05	0,45