

Plain bearings — Wrapped bushes —

Part 6: Checking the inside diameter

National foreword

This British Standard is the UK implementation of ISO 3547-6:2007. It supersedes BS ISO 12307-2:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/12, Plain bearings.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2007

© BSI 2007

ISBN 978 0 580 56493 2

Amendments issued since publication

Amd. No.	Date	Comments

INTERNATIONAL
STANDARD

ISO
3547-6

First edition
2007-10-01

Plain bearings — Wrapped bushes —
Part 6:
Checking the inside diameter

Paliers lisses — Bagues roulées —

Partie 6: Contrôle du diamètre intérieur



Reference number
ISO 3547-6:2007(E)

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Symbols and units	2
4 Method of checking	2
5 Test equipment	2
6 Procedure	6
Bibliography	7

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 according to 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 3547-6 was prepared by Technical Committee ISO/TC 123, *Plain bearings*, Subcommittee SC 5, *Quality analysis and assurance*.

This part of ISO 3547 cancels and replaces ISO 12307-2:2000, which has been technically revised.

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

- *Part 1: Dimensions*
- *Part 2: Test data for outside and inside diameters*
- *Part 3: Lubrication holes, grooves and indentations*
- *Part 4: Materials*
- *Part 5: Checking the outside diameter*
- *Part 6: Checking the inside diameter*
- *Part 7: Measurement of wall thickness of thin-walled bushes*

Plain bearings — Wrapped bushes —

Part 6: Checking the inside diameter

1 Scope

The part of ISO 3547 specifies, following ISO 12301, the checking of the inside diameter of wrapped bushes (see ISO 3547-2:2006, method C) and describes the necessary checking methods and measuring equipment.

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.

NOTE 1 All dimensions in this part of ISO 3547 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

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*

3 Symbols and units

See Table 1.

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
R_a	Surface roughness	micrometres
t_1	Tolerance of form and position	millimetres
$d_{ch, 1}$	Inside diameter of the ring gauge	millimetres
$d_{ch, 2}$	Outside diameter of the plug gauge	millimetres

4 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 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.

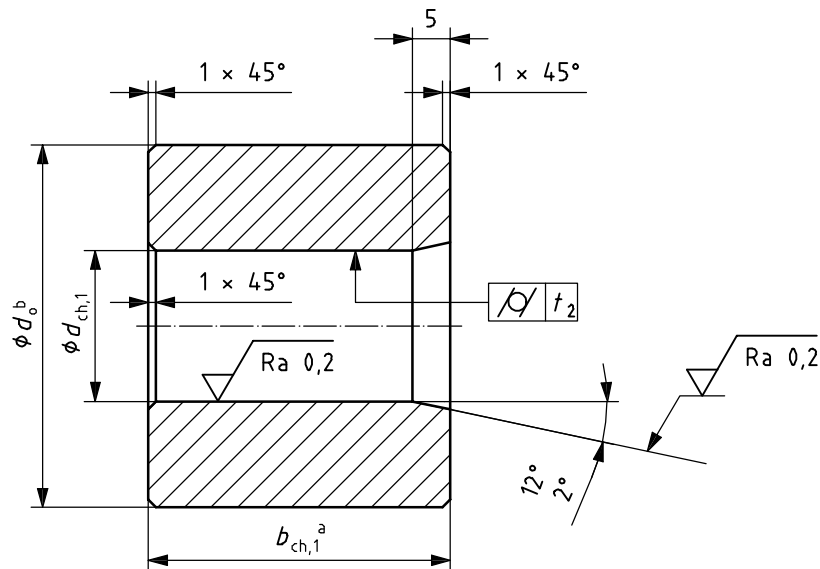
In order to enable the supplier and the user to compare results of this test it shall be agreed whether results shall be obtained by measuring or by gauging.

5 Test equipment

5.1 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		Target Size ^b	$d_{ch,1}$		$d_{ch,2}$		t_1	
			Manufacturing tolerance	Wear limit	Manufacturing tolerance	Wear limit	Manufacturing tolerance	Wear limit
	≤ 10	$D_o + 0,008$						
> 10	≤ 18	$D_o + 0,009$						
> 18	≤ 30	$D_o + 0,011$	+0,003 0	+0,005 0	0 -0,003	-0,005	0,002	0,004
> 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

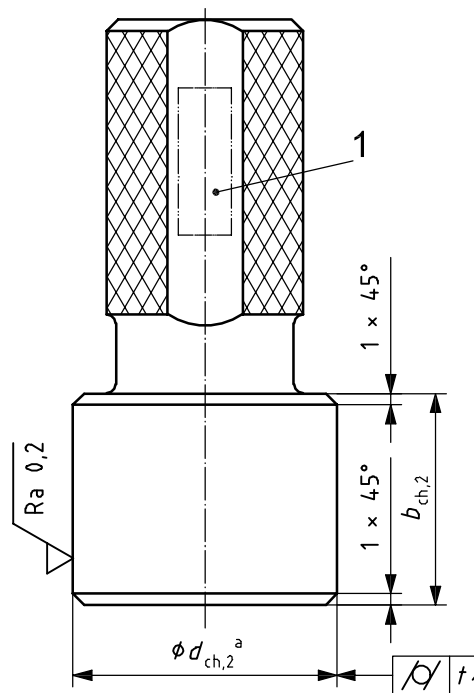
^a For bushes with $D_o > 180$ mm, agreement shall be reached between the supplier and user.

^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.

5.2 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 Table 4 in ISO 3547-1:2006.



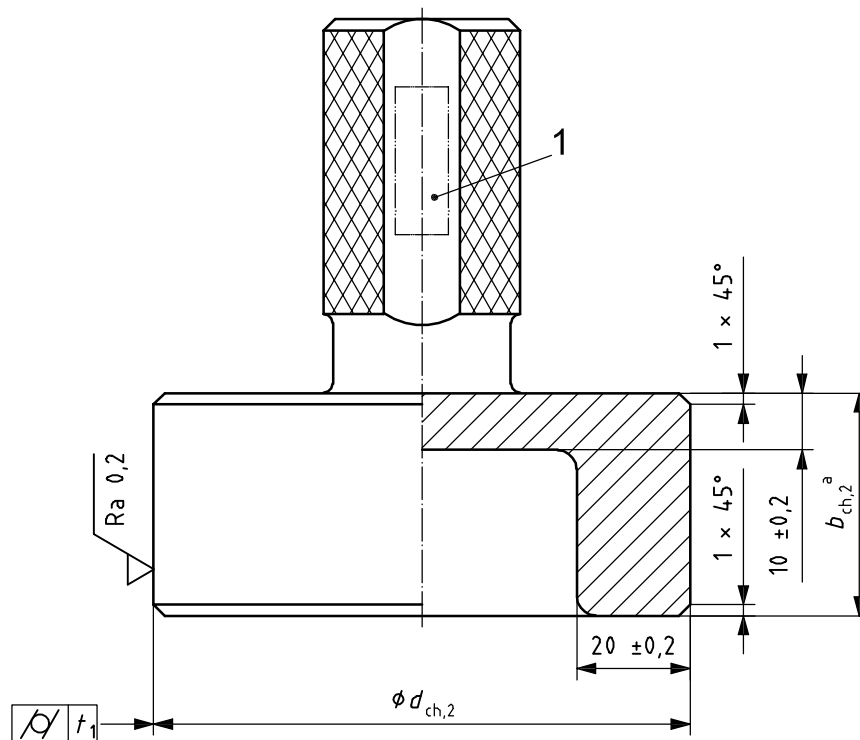
Key

1 field for marking

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

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

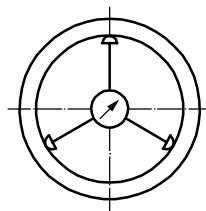
Dimensions in millimetres, unless otherwise designated

**Key**

1 field for marking

a $b_{ch,2} \geq B + 5$ **Figure 3 — Plug gauge, example with blind hole, for $d_{ch,2} > 80$ mm****5.3 Three-point measuring instrument**

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

**Figure 4 — Three-point measuring instrument**

5.4 Requirements for measuring equipment

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

5.5 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.

6 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 manually with a maximum force of 250 N. Where it is necessary to limit the maximum force, it shall be agreed between supplier and user.

Bibliography

- [1] ISO 3547-2:2006, *Plain bearings — Wrapped bushes — Part 2: Test data for outside and inside diameters*
- [2] ISO 3547-5, *Plain bearings — Wrapped bushes — Part 5: Checking the outside diameter*
- [3] ISO 3547-7, *Plain bearings — Wrapped bushes — Part 7: Measurement of wall thickness of thin-walled bushes*
- [4] ISO 12301, *Plain bearings — Quality control techniques and inspection of geometrical and material quality characteristics*

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.
Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001.
Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at <http://www.bsi-global.com>.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre.
Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.
Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001.
Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at <http://www.bsi-global.com/bsonline>.

Further information about BSI is available on the BSI website at <http://www.bsi-global.com>.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

Details and advice can be obtained from the Copyright & Licensing Manager.
Tel: +44 (0)20 8996 7070. Fax: +44 (0)20 8996 7553.
Email: copyright@bsi-global.com.