INTERNATIONAL STANDARD

ISO 3547-4

Second edition
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Plain bearings — Wrapped bushes —

Part 4: Materials

Paliers lisses — Bagues roulées —

Partie 4: Matériaux

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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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 3547-4 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 3547-4:1999), 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*

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 4: Materials

1 Scope

This part of ISO 3547 gives specifications for solid and multi-layer bearing materials, such as are used for wrapped bushes in accordance with the other parts of ISO 3547.

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 3547-2, *Plain bearings — Wrapped bushes — Part 2: Test data for outside and inside diameters*

ISO 3547-3, *Plain bearings — Wrapped bushes — Part 3: Lubrication holes, grooves and indentations*

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

ISO 4382-2, *Plain bearings — Copper alloys — Part 2: Wrought copper alloys for solid plain bearings*

ISO 4383, *Plain bearings — Multilayer materials for thin-walled plain bearings*

ISO 4384-1, *Plain bearings — Hardness testing of bearing metals — Part 1: Compound materials*

ISO 4384-2, *Plain bearings — Hardness testing of bearing metals — Part 2: Solid materials*

3 Terms and definitions

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

4 Requirements

4.1 Chemical analysis

Chemical analysis shall be definitive for the acceptance of the bearing metals. Arbitrary analyses or random sampling operations shall be performed in accordance with recognized methods and agreed between the supplier and user.

4.2 Hardness values

The hardness values indicated in Tables 1 and 2 are typical for each of the materials concerned. In practice, composition and processing variables can result in significant variations in hardness. Hardness specifications shall be agreed between the supplier and user.

Table 1 — Solid materials

Key	Designation[a]	Hardness[b] (guide values) HB 2,5/62,5/10	Notes relating to use	Wall thickness limit deviation series[c]
Z1	Steel (hardened)	—	Suitable for secondary applications with lightly loaded sliding characteristics.	A
Y1	CuSn8P	120	Very high load capacity, good antifrictional property, e.g. for vehicles, transmissions, conveyor systems and agricultural machinery.	A, C, W
Y2		150		
W1	CuZn31Si	110	High load capacity, good antifrictional properties, e.g. for textile machinery, motor vehicles and agricultural machinery and lifts.	
W2		140		

[a] Steel composition shall be agreed between supplier and user. It will normally have a carbon content of less than 0,25 %; composition of bearing material in accordance with ISO 4382-2.

[b] Hardness testing in accordance with ISO 4384-2.

[c] In accordance with ISO 3547-1:2006, Tables 5 and 6.

Table 2 — Multi-layer materials

Key	Designation[a]		Hardness[b] (guide values)		Notes relating to use	d
	Backing material	Bearing material	Backing material[c]	Bearing material		
T2	Steel	SnSb8Cu4	130	17 HV to 24 HV	Very good emergency running characteristics, fair load capacity, e.g. for pumps, compressors, automatic transmissions, starters and camshafts.	A, C, W
S1	Steel	CuPb24Sn (cast)	125	55 HB to 80 HB	High load capacity, with hardened shafts being necessary as a rule, e.g. for automatic transmissions, steering assemblies, camshafts and pumps.	
S2	Steel	CuPb24Sn (sinter)	125	40 HB to 60 HB		
S3	Steel	CuPb24Sn4 (cast)	125	60 HB to 90 HB	As for the material with keys S1 and S2; more suitable for the embossing of grooves. Very high load capacity, with hardened shafts being necessary as a rule, e.g. for gudgeon pins and rocker arm bearings, transmission shafts, steering assemblies and pumps. Available with greater Brinell hardness for special applications.	
S4	Steel	CuPb24Sn4 (sinter)	125	45 HB to 90 HB		
S5	Steel	CuPb10Sn10 (cast)	125	70 HB to 130 HB		
S6	Steel	CuPb10Sn10 (sinter)	125	60 HB to 90 HB		
R1	Steel	AlSn6Cu	170	35 HB to 45 HB	High load capacity, with hardened shafts being necessary as a rule, e.g. for transmissions and hydraulic pumps.	
R2	Steel	AlSn20Cu	170	30 HB to 40 HB	Good emergency running characteristics, fair load capacity, e.g. for refrigeration plant, compressors and pumps.	A, C, W
R3	Steel	AlSn12SiCu	170	40 HB to 60 HB	High load capacity, good seizure resistance, e.g. for transmissions camshafts and hydraulic pumps.	
R4	Steel	AlZn5	185 HB	60 HB to 100 HB	Higher load capacity.	
P1	Steel	With porous sintered bronze, filler and surface coating (running-in coating) of PTFE with additives.	140	—	Low friction; for vehicle suspension struts, gear levers, pivot bearings, pumps and lifting magnets; operating range from – 200 °C to + 280 °C, but not suitable for machining in the bearing bore; suitable for use as a dry bearing material.	B
B1	Bronze		100			
P2	Steel	With porous sintered bronze coated with thermoplastic.	140	—	High load capacity, greased on assembly, e.g. for cranes, hoists, lifts, packaging machinery and agricultural machinery, some temperature limitation.[e]	D, E
B2	Bronze		100			

Table 2 (*continued*)

Key	Designation[a]		Hardness[b] (guide values)		Notes relating to use	[d]
	Backing material	Bearing material	Backing material[c]	Bearing material		
D1	Steel	With directly bonded polymer bearing lining, e.g. PTFE.	140	—	For specific applications where special properties are required, e.g. limited space, corrosion resistance.	B
D2	Stainless steel		140			
D3	Bronze		100			
D4	Aluminium alloy		60			
The materials S1 to S6 and R1 may be supplied with an additional running-in coating, for series A and W only, by agreement with the supplier.						

[a] Steel composition shall be agreed between the supplier and user. It will normally have a carbon content of less than 0,25 %; composition of bearing material in accordance with ISO 4383.

[b] Hardness testing in accordance with ISO 4384-1.

[c] Hardness for steel and stainless steel HB1/30/10.
Hardness for bronze and aluminium alloy HB1/5/30.

[d] Wall thickness limit deviation series (in accordance with ISO 3547-1:2006, Tables 5 and 6).

[e] Temperature limitation for continuous duty depends on type of thermoplastic, e.g. POM: 90 °C; PVDF: 110 °C; PEEK: 250 °C.