INTERNATIONAL STANDARD

ISO 4382-2

Third edition
2021-12

Plain bearings — Copper alloys —

Part 2: Wrought copper alloys for solid plain bearings

Paliers lisses — Alliages de cuivre —

Partie 2: Alliages de cuivre corroyés pour paliers lisses massifs

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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).

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).

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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 2, *Materials and lubricants, their properties, characteristics, test methods and testing conditions*.

This third edition cancels and replaces the second edition (ISO 4382-2:1991), which has been technically revised.

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

— Clause 2 “Normative references” has been updated;

— Clause 3 “Terms and definitions” has been added;

— Table 1 has been updated.

A list of all parts in the ISO 4382 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.

Plain bearings — Copper alloys —

Part 2: Wrought copper alloys for solid plain bearings

1 Scope

This document specifies requirements for wrought copper alloys for use in solid plain bearings, particularly for bushes. This document provides a limited selection of alloys currently available for general purposes.

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 terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Requirements

4.1 General

WARNING — Lead's (Pb) toxicity is recognized, and its use has since been phased out of many applications. However, many countries still allow the sale of products that expose humans to lead. Lead is a neurotoxin (see Figure 1).

a) GHS 07 **b) GHS 08** **c) GHS 09**

Figure 1 — Reach compliance symbols

4.2 Material properties

Material properties shall be in accordance with Table 1.

The Brinell hardness is regarded as the test and acceptance value. All other indicated values are mean values and are regarded as typical values for the designer. In view of the range of possible alloy

compositions, relatively large deviations from the indicated values must be expected in individual cases.

5 Designation

EXAMPLE Designation of a bearing metal having the symbol CuSn8P and a minimum Brinell hardness of 120:

Bearing metal ISO 4382 – CuSn8P – HBW 120

Table 1 — Wrought copper alloys

Chemical elements and properties	Chemical composition mass fraction %								
	CuSn8P				CuZn31Si1			CuZn37Mn2Al2Si	CuAl9Fe4Ni4
Cu	Remainder				Remainder			Remainder	Remainder
Sn	7,5 to 9				—			0,5	0,2
Zn	0,3				28,5 to 33,3			32 to 40	0,5
Al	—				—			1 to 2,5	8 to 11
Ni	0,3				0,5			0,25[a]	2,5 to 5
Fe	0,1				0,4			0,6	2,5 to 4,5
Si	—				0,7 to 1,3			0,3 to 1,3	0,1
Mn	—				—			1,5 to 3,5	3
Pb	0,05				0,8			0,8	0,1
P	0,1 to 0,4[b]				—			—	—
Total other	0,2				0,5			0,5	0,5
Material properties of specimen									
Brinell hardness[c] HBW 2,5/62,5/10, min.	80	120	140	160	100	135	160	150	160
Tensile strength R_m N/mm², min.	400	470	520	580	440	510	560	600	700
Elongation percent after fracture A %, ≈	55	40	25	10	30	15	10	15	15
0,2 % proof stress $R_{p0,2}$ N/mm² ≈	200	300	400	480	250	350	450	300	400
Elastic modulus E kN/mm² ≈	115				105			100	118
Linear thermal expansion coefficient α_l 10^{-6}/K ≈	17				18			19	16
Thermal conductivity λ, at 15 °C W/(m·K) ≈	59				67			65	27
Density ρ kg/dm³ ≈	8,8				8,4			8,1	7,6

[a] The maximum nickel content may be raised to 2 % by agreement between supplier and purchaser.

[b] For as-rolled alloy, <0,1 % is permissible.

[c] For hardness testing, see ISO 4384-2.

NOTE Table A.1 gives some general guidance on the characteristics and principal uses of the different bearing alloys.

Annex A
(informative)

Guidance for uses of bearing metals and for the hardness of the mating bearing part (shaft)

Table A.1 — Guidance for uses of bearing metals and for the hardness of the mating bearing part (shaft)

Bearing alloys	Characteristics and principal uses	Minimum hardness of the shaft[a]
CuSn8P	For hardened shafts with any combination of high load, high sliding velocity, impact loading or pounding: when there is adequate lubrication and good alignment. Hardness should be chosen to suit working conditions.	55 HRC
CuZn31Si1	For hardened shafts with any combination of high load, moderate to high sliding velocity, impact loading or pounding; when there is adequate lubrication and good alignment. Hardness should be chosen to suit working conditions.	
CuZn37Mn2Al2Si	High wear resistance; tolerant of poor lubrication; hardened shafts essential.	
CuAl9Fe4Ni4	Very hard alloy for structural components under sliding conditions. Suitable for marine environments. Hardened shafts essential. Relatively poor embeddability.	

[a] The shaft hardness should be four times higher than the bearing alloy hardness. The hardness value indicated for the shaft material is a minimum value and is valid for most applications. It can, however, be necessary to have a higher hardness of material due to the working conditions, in particular lubrication conditions.