International Standard 4382/2

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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

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4382/2 was developed by Technical Committee ISO/TC 123, *Plain bearings*, and was circulated to the member bodies in September 1978.

It has been approved by the member bodies of the following countries :

Chile	Korea, Rep. of	Spain
Czechoslovakia	Libyan Arab Jamahiriya	Sweden
France	Mexico	USA
Germany, F.R.	Netherlands	USSR
India	New Zealand	Yugoslavia
Ireland	Poland	
Italy	South Africa, Rep. of	

The member body of the following country expressed disapproval of the document on technical grounds :

United Kingdom

This International Standard has been drawn up in close cooperation with ISO/TC 26, *Copper and copper alloys*.

Plain bearings — Copper alloys — Part 2 : Wrought copper alloys for solid plain bearings

1 Scope and field of application

This part of ISO 4382 specifies requirements for wrought copper alloys for use in solid plain bearings, particularly for bushes. It gives a limited selection of alloys currently available for general purposes.

2 References

ISO/R 400, *Tensile testing of copper and copper alloys.*

ISO/R 401, *Tensile testing of copper and copper alloy tubes of circular section.*

ISO 4379, *Plain bearings — Solid copper alloy bushes — Dimensions and tolerances.*

ISO 4384/2, *Plain bearings — Hardness testing on bearing metals — Part 2 : Solid materials.* [1]

3 Requirements

3.1 Chemical composition

The chemical composition shall be within the limits specified in table 1, where single figures denote maximum values.

The chemical analysis is decisive for the acceptance of the bearing metals.

3.2 Material properties

Material properties shall be according to 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.

4 Designation

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

Bearing metal ISO 4382 — CuSn8P — HB 120

1) At present at the stage of draft.

Table 1 — Wrought copper alloys

Chemical elements and properties	Chemical composition, % (*m*/*m*)			
	CuSn8P	CuZn31Si1	CuZn37Mn2Al2Si	CuAl9Fe4Ni4
Cu	90,0 to 92,5	66,0 to 70,0	57,0 to 60,0	78,0 to 87,0
Sn	7,5 to 9,0	—	0,5	0,2
Zn	0,3	28,5 to 33,3	32,0 to 40,0	0,5
Al	—	—	1,0 to 2,5	8,0 to 11,0
Ni	0,3	0,5	0,25[1]	2,5 to 5,0
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	3,0
Pb	0,05	0,8	0,8	0,1
P	0,1 to 0,4	—	—	—
Total others	0,2	0,5	0,5	0,5
Material properties of specimen				
Brinell hardness[2] HB2,5/62,5/10, min.	80 120 140 160	100 135 160	150	160
Tensile strength R_m N/mm^2 ≈	400 470 520 580	440 510 560	600	700
Elongation A % ≈	55 40 25 10	30 15 10	15	15
0,2 % Proof stress $R_{p0,2}$ N/mm^2 ≈	200 300 400 480	250 350 450	300	400
Elastic modulus E kN/mm^2 ≈	115	105	100	118
Thermal expansion 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/dm^3 ≈	8,8	8,4	8,1	7,6

1) The maximum of nickel may be raised to 2 % by agreement between supplier and purchaser.

2) For hardness testing see ISO 4384/2.

Table 2 — Guide for uses of bearing metals

Bearing alloys	Characteristics and principle uses
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.
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.