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Copper and copper alloy castings

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Foundry Society (JFS) /Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently JIS H 5120: 2006 is replaced with this Standard.

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Being in conformance with this Standard may come under the use of the patent rights held by the following:

- Name of invention : Lead free/free cutting bronze alloy
- Date of registration of establishment : 1999-02-19
- Patent number : 2889829
- Patent holder : Chuetsu Metal Works Co., LTD
1-1 Nisi-asihara-sin, Tateyama-mati, Nakanii-kawa-gun, Toyama-ken
- Patent holder : Tabuchi Co., LTD
2-1-56 Uriwariminami, Hirano-ku, Osaka-si, Osaka-hu
- Name of invention : Lead-free bronze alloy
- Date of registration of establishment : 2003-08-08
- Patent number : 3459623
- Patent holder : Kyowa Bronze Co., Ltd
314 Sayamasinkaiti, Kumiya-ma-tyô, Kuse-gun, Kyôto-hu
- Name of invention : Copper-base alloy, and ingot and liquid contact parts using the alloy
- Date of registration of establishment : 2005-06-24
- Patent number : 3690746
- Patent holder : Kitz Corporation
1-10-1 Nakase, Mihama-ku, Tiba-si, Tiba-ken
- Name of invention : Bronze alloy
- Date of registration of establishment : 2006-03-03
- Patent number : 3776441
- Patent holder : Kitz Corporation
1-10-1 Nakase, Mihama-ku, Tiba-si, Tiba-ken
- Name of invention : Bronze alloy, and cast ingot and liquid contacting part each using the alloy
- Date of registration of establishment : 2006-07-21
- Patent number : 3830946
- Patent holder : Kitz Corporation
1-10-1 Nakase, Mihama-ku, Tiba-si, Tiba-ken

- Name of invention : Copper alloy valve for drinking water
- Date of registration of establishment : 2006-09-08
- Patent number : 3850861
- Patent holder : Kitz Corporation
1-10-1 Nakase, Mihama-ku, Tiba-si, Tiba-ken
- Name of invention : Lead-free copper alloy for casting having excellent pressure resistance
- Date of registration of establishment : 2007-05-18
- Patent number : 3957308
- Patent holder : Shiga Valve Cooperative Association
52 Oka-mati, Hikone-si, Siga-ken
: Shiga prefectural government
4-1-1 Kyô-mati Ôtu-si Siga-ken
- Name of invention : Copper alloy series member for water supply
- Date of registration of establishment : 2007-04-20
- Patent number : 3946244
- Patent holder : Kurimoto, Ltd.
1-12-19 Kitahorie, Nisi-ku, Ôsaka-si, Ôsaka-hu
- Name of invention : Lead-free free-cutting copper alloy
- Date of registration of establishment : 2005-10-28
- Patent number : 3734372
- Patent holder : Mitsubishi Shindoh Co., LTD.
4-7-35 Kitasinagawa, Sinagawa-ku, Tokyô-to
- Name of invention : Free-cutting copper alloy
- Date of registration of establishment : 2007-02-16
- Patent number : 3917304
- Patent holder : Mitsubishi Shindoh Co., LTD.
4-7-35, Kitasinagawa, Sinagawa-ku Tokyô-to

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The “patent rights” as mentioned here include patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public.

Copper and copper alloy castings

Introduction

In Japan, lead-free copper alloy casting of lead content 0.25 % or under was standardized in 2006 and JIS H 5120 was revised. However, in Europe, low-lead copper bronze castings (not specified in JIS) are applied. In Japan, since then, on the one hand, lead-free copper alloy castings have been developed, and on the other, bronze castings with low-lead contents (less than 4 %) have been developed to respond to the globalization. This time, JIS H 5120 is revised to add newly developed 3 classes of lead-free copper alloy castings and 1 class of bronze casting with low-lead contents.

1 Scope

This Japanese Industrial Standard specifies the copper and copper alloy castings (hereafter referred to as “castings”) manufactured by sand mould casting, metal mould casting, centrifugal casting, precision casting, etc. (excluding continuous casting).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) given below shall be applied.

- JIS B 0403 *Castings—System **of** dimensional tolerances and machining allowances*
- JIS H 0321 *General rules **for** inspection **of** non-ferrous metal materials*
- JIS H 0505 *Measuring methods **for** electrical resistivity and conductivity of non-ferrous materials*
- JIS H 1051 *Methods **for** determination of copper in copper and copper alloys*
- JIS H 1052 *Methods **for** determination **of** tin in copper and copper alloys*
- JIS H 1053 *Methods **for** determination of lead in copper and copper alloys*
- JIS H 1054 *Methods **for** determination of iron in copper and copper alloys*
- JIS H 1055 *Methods **for** determination of manganese in copper and copper alloys*
- JIS H 1056 *Methods **for** determination of nickel in copper and copper alloys*
- JIS H 1057 *Methods **for** determination of aluminium in copper and copper alloys*
- JIS H 1058 *Methods **for** determination of phosphorus in copper and copper alloys*
- JIS H 1061 *Methods **for** determination of silicon in copper and copper alloys*

- JIS H 1062 *Methods for determination of zinc in copper and copper alloys*
 JIS H 1065 *Methods for determination of selenium in copper and copper alloys*
 JIS H 1068 *Methods for determination of bismuth in copper and copper alloys*
 JIS H 1070 *Methods for determination of sulfur in copper and copper alloys*
 JIS H 1072 *Methods for determination of antimony in copper and copper alloys*
 JIS H 1292 *Methods for X-ray fluorescence spectrometric analysis of copper alloys*
 JIS Z 2201 *Testpieces for tensile test for metallic materials*
 JIS Z 2241 *Method of tensile test for metallic materials*
 JIS Z 2243 *Brinell hardness test — Test method*

3 Classification and symbols

The classes of castings and the symbols for them shall be as shown in table 1 according to the alloy series and casting methods.

The classification, symbol, chemical composition and mechanical properties of bismuth bronze castings, Class 3A are shown in Annex A for reference.

Table 1 Classification and symbols

Classification	Symbol	Alloy series	Division of casting methods ^{a)}	Informative	
				Characteristics of alloys	Examples of uses
Copper casting, Class 1	CAC101	Cu series	Sand mould casting, metal mould casting, centrifugal casting and precision casting	Good in castability and good in conductivity, thermal conductivity and mechanical properties.	Tuyere, large tuyere, cold plate, hot air valve, electrode holder, general machine parts, etc.
Copper casting, Class 2	CAC102	Cu series		Better in conductivity and thermal conductivity than CAC101.	Tuyere, electrical terminal, diverging sleeve, contact, conductor, general electric parts, etc.
Copper casting, Class 3	CAC103	Cu series		Of the copper castings, the best in conductivity and thermal conductivity.	Lance nozzle for converter, electric terminal, diverging sleeve, current-carrying support, conductor, general electric parts, etc.

Table 1 (continued)

Classification	Symbol	Alloy series	Division of casting methods ^{a)}	Informative	
				Characteristics of alloys	Examples of uses
Brass casting, Class 1	CAC201	Cu-Zn series	Sand mould casting, metal mould casting, centrifugal casting and precision casting	Easy to braze.	Flanges, electric parts, decorative articles, etc.
Brass casting, Class 2	CAC202	Cu-Zn series		Of the brass castings, relatively easy in casting.	Electric parts, meter parts, general machine parts, etc.
Brass casting, Class 3	CAC203	Cu-Zn series		Better in mechanical properties than CAC202.	Water-supply and drain metal fittings, electric parts, building metal fittings, general machine parts, domestic wares and miscellaneous goods, etc.
High strength brass castings, Class 1	CAC301	Cu-Zn-Mn-Fe-Al series	Sand mould casting, metal mould casting, centrifugal casting and precision casting	Better in strength and hardness, and good in corrosion resistance and toughness than brass castings.	Propeller for ship, propeller bon-net, bearing, valve seat, valve rod, cage of bearing, lever, arm, gear, equipments for ship, etc.
High strength brass castings, Class 2	CAC302	Cu-Zn-Mn-Fe-Al series		Better in mechanical properties than CAC301 and good in abrasion resistance.	Propeller for ship, bearing, cage of bearing, slipper, end plate, valve seat, valve rod, special cylinder, general machine parts, etc.
High strength brass castings, Class 3	CAC303	Cu-Zn-Al-Mn-Fe series		Better in strength, hardness and abrasion resistance than CAC302.	Low speed and high load moving parts, large-size valve, stem, bushing, worm gear, slipper, cam, hydraulic cylinder parts, etc.
High strength brass castings, Class 4	CAC304	Cu-Zn-Al-Mn-Fe series		Of the high strength brass castings, the highest in strength and hardness, and good in abrasion resistance even in the case of high load.	Low speed and high load moving parts, base plate for bridge, bearing, bushing, nut, worm gear, abrasion resistant plate, etc.