

JIS

JAPANESE INDUSTRIAL STANDARD

Bronze Castings

JIS H 5111—1988

The text in Japanese of this English version
has been withdrawn. ~~_____~~

Translated and Published

by

Japanese Standards Association

**In the event of any doubt arising,
the original Standard in Japanese is to be final authority.**

JAPANESE INDUSTRIAL STANDARD

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Bronze Castings

H 5111-1988
(Reaffirmed: 1994)1. Scope

This Japanese Industrial Standard specifies the bronze castings for general use, hereinafter referred to as the "castings".

Remark: The units and numerical values given in { } in this Standard are based on the International System of Units (SI) and are appended for informative reference.

Further, the traditional units and numerical values accompanied by the SI units and converted values in { } shall be replaced by the units and the numerical values given in the Appendix on January 1, 1991.

Applicable Standards:

JIS H 0321-General Rules for Inspection of Non-ferrous Metal 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 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 1222-Methods for Chemical Analysis of Special Brass

JIS H 1241-Methods for Chemical Analysis of Phosphor Bronze

JIS H 1251-Methods for Chemical Analysis of Bronze

JIS Z 2201-Test Pieces for Tensile Test for Metallic Materials

JIS Z 2241-Method of Tensile Test for Metallic Materials

2. Classes and Symbols

The classes and symbols of the castings classified depending upon the chemical composition and the casting method shall be as given in Table 1.

Table 1. Classes and Symbols

Class	Casting method	Symbol	Informative reference
			Features and examples of use
Class 1	Sand mould casting, etc. (¹)	BC 1	Good fluidity and machinability. Used for valves, injectors, bearings, nameplates, general machinery parts, etc.
Class 1 C	Continuous casting	BC 1 C	
Class 2	Sand mould casting, etc. (¹)	BC 2	High resistance to pressure, abrasion and corrosion, and high mechanical strength. Used for bearings, sleeves, bushes, pump bodies, impellers, valves, gears, port-holes, electrical appliance parts, etc.
Class 2 C	Continuous casting	BC 2 C	
Class 3	Sand mould casting, etc. (¹)	BC 3	Somewhat superior to Class 2 in corrosion resistance. Used for bearings, sleeves, bushes, pump bodies, impellers, valves, gears, port-holes, electrical appliance parts, general machinery parts, etc.
Class 3 C	Continuous casting	BC 3 C	
Class 6	Sand mould casting, etc. (¹)	BC 6	High resistance to pressure and abrasion and good machinability and castability. Used for valves, pump bodies, impellers, water taps, bearings, sleeves, bushes, general machinery parts, etc.
Class 6 C	Continuous casting	BC 6 C	
Class 7	Sand mould casting, etc. (¹)	BC 7	Somewhat superior to BC 6 in mechanical properties. Used for bearings, parts of small pumps, valves, fuel pumps, general machinery parts, etc.
Class 7 C	Continuous casting	BC 7 C	

Note (¹) "Sand mould casting, etc." means the sand mould casting other than the continuous casting, the die casting, the centrifugal casting and the precision casting.

3. Quality

3.1 Appearance The castings shall be of uniform quality and free from such abnormalities as flaws, cracks or casting defects injurious to use.

3.2 Chemical Composition The chemical composition of the castings shall be as specified in Table 2.

Table 2. Chemical Composition

Unit: %

Class	Cu	Sn	Zn	Pb	Ni	Fe	P	Sb	Al	Si
Class 1	79.0 to	2.0 to	8.0 to	3.0 to	(1.0 max.)	(0.35 max.)	(0.05 max.)	(0.2 max.)	(0.01 max.)	(0.01 max.)
Class 1 C	83.0	4.0	12.0	7.0			(0.5 max.)			
Class 2	86.0 to	7.0 to	3.0 to	1.0 max.	(1.0 max.)	(0.2 max.)	(0.05 max.)	(0.2 max.)	(0.01 max.)	(0.01 max.)
Class 2 C	90.0	9.0	5.0				(0.5 max.)			
Class 3	86.5 to	9.0 to	1.0 to	1.0 max.	(1.0 max.)	(0.2 max.)	(0.05 max.)	(0.2 max.)	(0.01 max.)	(0.01 max.)
Class 3 C	89.5	11.0	3.0				(0.5 max.)			
Class 6	83.0 to	4.0 to	4.0 to	4.0 to	(1.0 max.)	(0.3 max.)	(0.05 max.)	(0.2 max.)	(0.01 max.)	(0.01 max.)
Class 6 C	87.0	6.0	6.0	6.0			(0.5 max.)			
Class 7	86.0 to	5.0 to	3.0 to	1.0 to	(1.0 max.)	(0.2 max.)	(0.05 max.)	(0.2 max.)	(0.01 max.)	(0.01 max.)
Class 7 C	90.0	7.0	5.0	3.0			(0.5 max.)			

Remark: The chemical components with their numerical values shown in () shall be subjected to analysis only at the request of the purchaser.

3.3 Mechanical Properties

Table 3. Mechanical Properties
(Applicable till the end of 1990)

Class	Tensile test	
	Tensile strength kgf/mm ² {N/mm ² }	Elongation %
Class 1	17 min. {167 min.}	15 min.
Class 1 C	20 min. {196 min.}	15 min.
Class 2	25 min. {245 min.}	20 min.
Class 2 C	28 min. {274 min.}	15 min.
Class 3	25 min. {245 min.}	15 min.
Class 3 C	28 min. {274 min.}	13 min.
Class 6	20 min. {196 min.}	15 min.
Class 6 C	25 min. {245 min.}	15 min.
Class 7	22 min. {216 min.}	18 min.
Class 7 C	26 min. {255 min.}	15 min.

Remark: For continuous castings, the above table applies to the mechanical properties of tubes and rods having an outside diameter of 100 mm or under. The mechanical properties of those exceeding 100 mm in outside diameter shall be as agreed upon by the parties concerned.

4. Shapes, Dimensions and Mass

The shapes, dimensions and mass of the castings shall be specified either by model or in drawing. The tolerances shall be subject to agreement between the parties concerned.

5. Tests

5.1 Chemical Analysis The chemical analysis shall be in accordance with one of the following Standards.

JIS H 1051
JIS H 1052
JIS H 1053
JIS H 1054
JIS H 1056
JIS H 1057
JIS H 1058
JIS H 1222
JIS H 1241
JIS H 1251

Further, the methods for emission spectrochemical analysis, atomic absorption spectrometry and fluorescent X-ray analysis shall be subject to agreement between the parties concerned.

5.2 Tensile Test The tensile test shall be as specified in JIS Z 2241. The test piece to serve shall be No. 4 test piece specified in JIS Z 2201 to be taken from the specimen sampled in accordance with 6. (2).

6. Inspection

- (1) The castings shall be examined for appearance, shapes, dimensions and mass and further tested in accordance with 5. and then those complying with the requirements of 3. and 4. shall be deemed acceptable.
- (2) The method of sampling the specimens for the preparation of tensile test pieces shall be as follows:

(2.1) Sand Mould Castings, etc.

- (a) The specimen shall be cast concurrently and integrally with the product.
- (b) Unless otherwise specified, at least one specimen shall be taken from each heat.
- (c) The dimensions of the specimen and the positions for taking the test pieces shall be as shown in Fig.

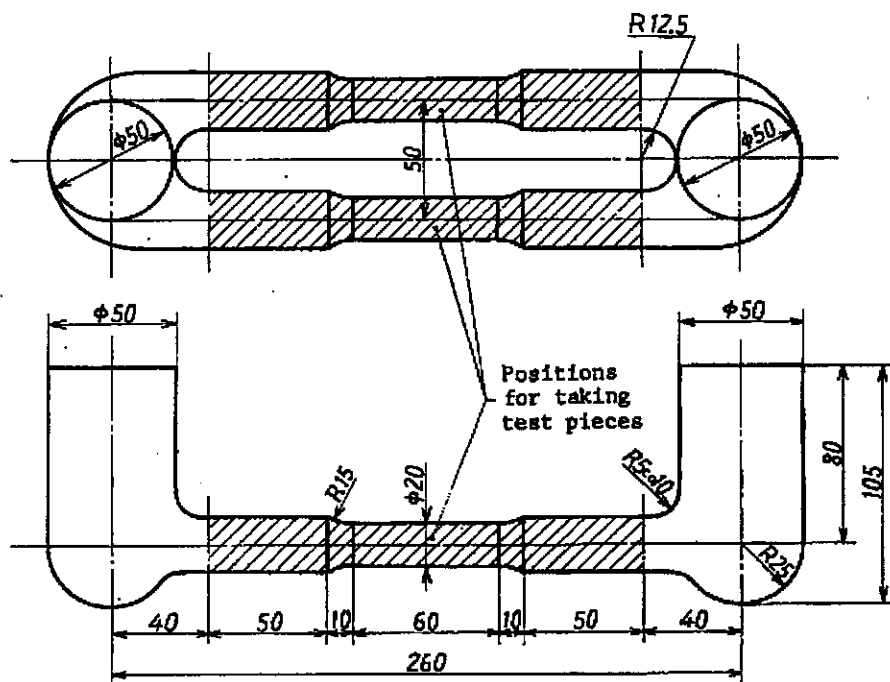
The specimen of this shape shall be called Type A specimen.

(2.2) Continuous Castings

- (a) Unless otherwise specified, at least one specimen shall be taken from each run of continuous castings of the same target composition and shape.
 - (b) The specimen shall be one of the product castings manufactured by continuous casting and, where it is impossible to prepare No. 4 test piece from the specimen, the matter shall be committed to agreement between the parties concerned.
- The methods and general matters of sampling the specimens for chemical analysis shall be as specified in JIS H 0321.

Figure **Shape, Dimensions of Type A Specimen**
and Positions for Taking Test Pieces

Unit: mm



7. Marking

When required by agreement between the purchaser and the manufacturer, the following particulars shall be marked on the castings or the packages by a suitable means:

- (1) Class or class symbol
- (2) Manufacture number or date of manufacture
- (3) Manufacturer's name or its abbreviation

Appendix

The tensile strength and elongation values specified in 3.3 of the main text of this Standard on the basis of the traditional units shall be replaced by the specified values based on the SI units on January 1, 1991.

Appendix Table Mechanical Properties
(Applicable on and after Jan. 1, 1991)

Class	Tensile test	
	Tensile strength N/mm ²	Elongation %
Class 1	165 min.	15 min.
Class 1 C	195 min.	15 min.
Class 2	245 min.	20 min.
Class 2 C	275 min.	15 min.
Class 3	245 min.	15 min.
Class 3 C	275 min.	13 min.
Class 6	195 min.	15 min.
Class 6 C	245 min.	15 min.
Class 7	215 min.	18 min.
Class 7 C	255 min.	15 min.

Remark: For continuous castings, the above table applies to the mechanical properties of tubes and rods having an outside diameter of 100 mm or under. The mechanical properties of those exceeding 100 mm in outside diameter shall be as agreed upon by the parties concerned.

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Japanese Text

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