

JIS

JAPANESE INDUSTRIAL STANDARD

Leaded Tin Bronze Castings

JIS H 5115—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has been withdrawn.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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Leaded Tin Bronze Castings

H 5115-1988
(Reaffirmed: 1994)1. Scope

This Japanese Industrial Standard specifies the leaded tin 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.

2. Classes and Symbols

The classes and symbols of the castings shall be classified as given in Table 1, according to the chemical composition and casting methods.

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

JIS Z 2243-Method of Brinell Hardness Test

Table 1. Classes and Symbols

Class	Classification of casting method	Symbol	Reference
			Characteristics and examples of uses
Class 2	Sand mold castings and others ⁽¹⁾	LBC 2	High in pressure resistance and abrasion resistance. Applications to bearings for intermediate high speed and heavy load, cylinders, valves, etc.
Class 3	Sand mold castings and others ⁽¹⁾	LBC 3	Suitable for bearings of high facial pressure, and having good running-in performance. Applications to bearings for intermediate high speed and heavy load, bearings for large size engine, etc.
Class 3 C	Continuous castings	LBC 3 C	
Class 4	Sand mold castings and others ⁽¹⁾	LBC 4	Better running-in performance than class 3. Applications to bearings for intermediate high speed and medium load, bearings for vehicle, lining metal of white metal, etc.
Class 4 C	Continuous castings	LBC 4 C	
Class 5	Sand mold castings and others ⁽¹⁾	LBC 5	Particularly fine running-in performance and sticking resistance. Applications to bearings for intermediate high speed and low load, bearings for engine, etc.
Class 5 C	Continuous castings	LBC 5 C	

Note ⁽¹⁾ The sand mold castings and others mean the sand mold castings, metal mold castings, centrifugal castings and precision castings other than the continuous castings.

3. Qualities

3.1 Appearance The castings of which cast surface shall be excellent, and be free from such defects as flaws, cracks and blow holes which are harmful in use.

3.2 Chemical Composition The chemical composition of the castings shall be in accordance with Table 2.

Table 2. Chemical Composition

Unit: %										
Class	Cu	Sn	Pb	Ni	Zn	Fe	Sb	P	Al	Si
Class 2	82.0 to 86.0	9.0 to 11.0	4.0 to 6.0	(1.0 max.)	(1.0 max.)	(0.3 max.)	(0.3 max.)	(0.1 max.)	(0.01 max.)	(0.01 max.)
Class 3	77.0 to 81.0	9.0 to 11.0	9.0 to 11.0	(1.0 max.)	(1.0 max.)	(0.3 max.)	(0.5 max.)	(0.1 max.)	(0.01 max.)	(0.01 max.)
Class 3 C								(0.5 max.)		
Class 4	74.0 to 78.0	7.0 to 9.0	14.0 to 16.0	(1.0 max.)	(1.0 max.)	(0.3 max.)	(0.5 max.)	(0.1 max.)	(0.01 max.)	(0.01 max.)
Class 4 C								(0.5 max.)		
Class 5	70.0 to 76.0	6.0 to 8.0	16.0 to 22.0	(1.0 max.)	(1.0 max.)	(0.3 max.)	(0.5 max.)	(0.1 max.)	(0.01 max.)	(0.01 max.)
Class 5 C								(0.5 max.)		

Remark: Regarding the components of which numerical values have been given in (), analyses shall be carried out only on those required by the purchaser.

3.3 Mechanical Properties The mechanical properties of the castings (tensile strength, elongation and hardness) shall be in accordance with Table 3.

Table 3. Mechanical Properties

(Applicable until December 31, 1990)

Class	Tension test			Hardness test
	Tensile strength kgf/mm ² {N/mm ² }	Elongation %	Proof stress ⁽²⁾ kgf/mm ² {N/mm ² }	Brinell hardness HB (10/500)
Class 2	20 min. {196 min.}	10 min.	10 min. { 98 min.}	65 min.
Class 3	18 min. {177 min.}	7 min.	8 min. { 78 min.}	60 min.
Class 3 C	23 min. {225 min.}	10 min.	14 min. {137 min.}	65 min.
Class 4	17 min. {167 min.}	5 min.	8 min. { 78 min.}	55 min.
Class 4 C	22 min. {218 min.}	8 min.	10 min. { 98 min.}	60 min.
Class 5	15 min. {147 min.}	5 min.	6 min. { 59 min.}	45 min.
Class 5 C	18 min. {177 min.}	7 min.	8 min. { 78 min.}	50 min.

Note ⁽²⁾ The proof stress is of the value for reference.

Remark: Regarding the continuous castings, this prescription applies to the mechanical properties of the pipes and bars of 100 mm and under in outside diameter, and for the pipes and bars exceeding 100 mm in outside diameter shall be as agreed between the parties concerned.

4. Shapes, Dimensions and Masses

The shapes, dimensions and masses of the castings shall be in accordance with models and drawings. The tolerances for shapes, dimensions and masses shall be as agreed between the parties concerned.

5. Tests

5.1 Chemical Analyses The chemical analyses of the chemical composition shall be in accordance with one of the following methods.

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		

Furthermore, regarding the emission spectrochemical analysis, atomic absorptiometry or fluorescent X-rays analysis, it shall be as agreed between the parties concerned.

5.2 Tension Test The tension test shall be in accordance with JIS Z 2241. The test piece, in this case, shall be the No. 4 test piece of JIS Z 2201, using the specimen of 6. (2).

5.3 Hardness Test The hardness test shall be in accordance with JIS Z 2243.

6. Inspection

The inspection shall be carried out as given in the following:

(1) The castings shall be subjected to inspection on the appearance, shape, dimensions and mass, and then be tested in accordance with 5.; those which have conformed to the requirements of 3. and 4. shall be deemed as acceptable.

(2) The method of taking the specimens necessary for manufacturing tension test pieces shall be as follows:

(2.1) For Sand Mold Casting and Others

- (a) The samples shall be cast at the same time when castings are cast.
- (b) The samples, unless otherwise specified, shall be taken one piece and more per each melt.
- (c) The shape and dimensions of the specimen and the sampling position of the test piece shall be in accordance with Figure.

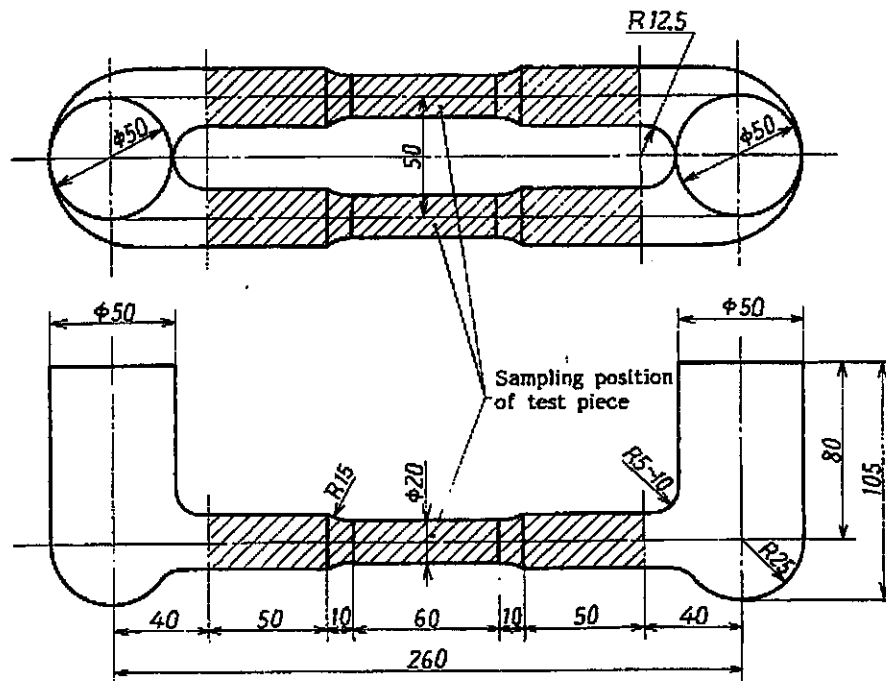
The sample of this shape is called as No. A specimen.

(2.2) For Continuous Castings

- (a) The specimens, unless otherwise specified, shall be taken one and more pieces per one continuous casting process of the same intended composition and the same shape.
 - (b) The specimens shall be the continuous castings themselves, and if these are not capable of being prepared into the No. 4 test piece, it shall be as agreed between the parties concerned.
- (3) The method of taking the specimens necessary for hardness test pieces shall be as agreed between the parties concerned.
- (4) The method of taking analysis samples and general items shall be in accordance with JIS H 0321.

Figure. Shape and Dimensions of No. A Specimen
and Sampling Position of Test Piece

Unit: mm



7. Marking

When required upon the agreement between the parties concerned, the castings or package shall be marked with the following information by an appropriate means.

- (1) Class or its symbol
- (2) Manufacturing number or year and month of manufacture
- (3) Manufacturer's name or its abbreviation

Appendix

To the standardized values for the tensile strength, elongation and hardness in accordance with the traditional units specified in 3.3 of the test of this standard, the standardized values in accordance with the SI units stated in Appendix Table apply after January 1, 1991.

Appendix Table. Mechanical Properties

(Applicable from January 1, 1991)

Class	Tension test			Hardness test
	Tensile strength N/mm ²	Elongation %	Proof stress ⁽²⁾ N/mm ²	Brinell hardness HB (10/500)
Class 2	195 min.	10 min.	100 min.	65 min.
Class 3	175 min.	7 min.	80 min.	60 min.
Class 3 C	225 min.	10 min.	135 min.	65 min.
Class 4	165 min.	5 min.	80 min.	55 min.
Class 4 C	220 min.	8 min.	100 min.	60 min.
Class 5	145 min.	5 min.	60 min.	45 min.
Class 5 C	175 min.	7 min.	80 min.	50 min.

Note ⁽²⁾ The proof stress is of the value for reference.

Remark: Regarding the continuous castings, this prescription applies to the mechanical properties of the pipes and bars of 100 mm and under in outside diameter, and for the pipes and bars exceeding 100 mm in outside diameter, it shall be as agreed between the parties concerned.

H 5115-1988
Edition 2

Japanese Text

Established by Minister of International Trade and Industry

Date of Establishment: 1958-04-26

Date of Revision: 1988-11-01

Date of Reaffirmation: 1994-04-01

Date of Public Notice in Official Gazette: 1994-04-14

Investigated by: Japanese Industrial Standards Committee

Divisional Council on Non-ferrous Metals

**This English translation is published by:
Japanese Standards Association
1-24, Akasaka 4, Minato-ku,
Tokyo 107 Japan
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**Printed in Tokyo by
Hohbunsha Co., Ltd.**