

JIS

JAPANESE INDUSTRIAL STANDARD

Phosphor Bronze Castings

JIS H 5113—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has been withdrawn.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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Phosphor Bronze Castings

H 5113-1988
(Reaffirmed: 1994)1. Scope

This Japanese Industrial Standard specifies the phosphor 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 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

2. Class and Symbol

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

Class	Casting method	Symbol	Informative reference
			Features and examples of use
Class 2	Sand mould casting, etc. ⁽¹⁾	PBC 2	Excellent in corrosion and abrasion resistance. Used for gears, worm gears, bearings, bushes, sleeves, impellers, general machinery parts, etc.
Class 2 B	Metal mould casting	PBC 2 B	
Class 2 C	Continuous casting	PBC 2 C	
Class 3 B	Metal mould casting	PBC 3 B	Excellent in hardness and abrasion resistance. Used for sliding parts, hydraulic cylinders, sleeves, gears, various rollers in papermaking machinery, etc.
Class 3 C	Continuous casting	PBC 3 C	

Note ⁽¹⁾ "Sand mould casting, etc." means the sand mould 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	P	Ni	Zn	Pb	Fe	Sb	Al	Si
Class 2	87.0 to 91.0	9.0 to 12.0	0.05 to 0.20	(1.0 max.)	(0.3 max.)	(0.3 max.)	(0.2 max.)	(0.05 max.)	(0.01 max.)	(0.01 max.)
Class 2 B			0.15 to 0.50							
Class 2 C			0.05 to 0.50							
Class 3 B	84.0 to 88.0	12.0 to 15.0	0.15 to 0.50	(1.0 max.)	(0.3 max.)	(0.3 max.)	(0.2 max.)	(0.05 max.)	(0.01 max.)	(0.01 max.)
Class 3 C			0.05 to 0.50							

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

3.3 Mechanical Properties The mechanical properties (tensile strength, elongation and hardness) of the castings shall conform to Table 3.

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

Class	Tensile test			Hardness test
	Tensile strength kgf/mm ² {N/mm ² }	Elongation %	Proof stress (²) kgf/mm ² {N/mm ² }	Brinell hardness HB(10/1000)
Class 2	20 min. {196 min.}	5 min.	12 min. {118 min.}	60 min.
Class 2 B	30 min. {294 min.}	5 min.	15 min. {147 min.}	80 min.
Class 2 C	30 min. {294 min.}	10 min.	17 min. {167 min.}	80 min.
Class 3 B	27 min. {265 min.}	3 min.	15 min. {147 min.}	90 min.
Class 3 C	30 min. {294 min.}	5 min.	17 min. {167 min.}	90 min.

Note (²) The proof stress values are shown for informative reference.

Remark: For the continuous castings, the mechanical properties listed above shall be applied to the tubes and rods 100 mm or under in outside diameter. The mechanical properties of those exceeding 100 mm in outside diameter shall be subject to agreement between 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

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).

5.3 Hardness Test The hardness test shall be as specified in JIS Z 2243.

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 the tensile test pieces shall be as follows.
 - (2.1) Sand Mould Castings, etc. and Metal Mould Castings
 - (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 piece shall be as shown in Fig. 1 for sand mould castings, etc., and in Fig. 2 for metal mould castings. The specimen of sand mould castings shall be called Type A specimen, and that of metal mould castings Type E 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 casting 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.
- (3) The method of sampling the specimens for the preparation for the hardness test pieces shall be subject to agreement between the parties concerned.
- (4) The method of sampling the specimens for and general matters of chemical analysis shall be as specified in JIS H 0321.

Fig. 1. Shape, Dimensions of Type A Specimen and Positions for Taking Test Pieces

Unit: mm

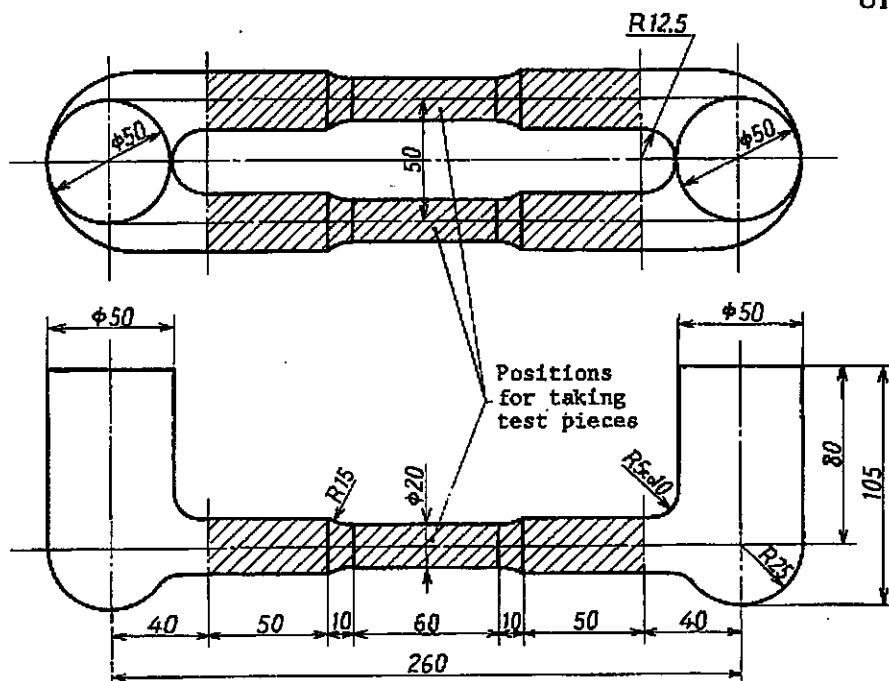
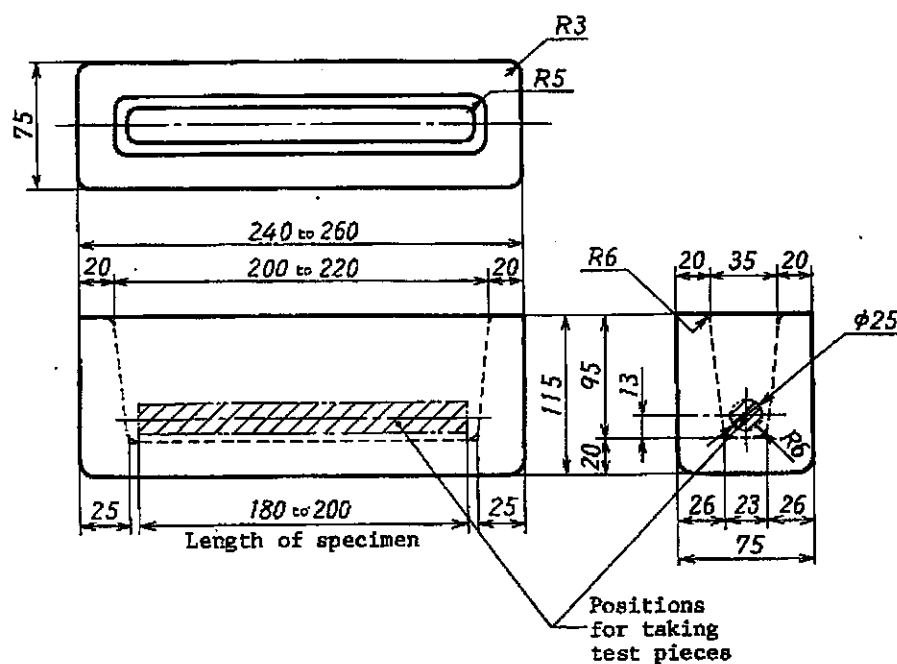


Fig. 2. Shape, Dimensions of Metal Mould Type E Specimen and Positions for Taking Test Pieces

Unit: mm



7. Marking

When required by agreement between the parties concerned, 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
- (3) Manufacturer's name or its abbreviation

Appendix

The tensile strength, elongation and hardness 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			Hardness test
	Tensile strength N/mm ²	Elongation %	Proof stress (²) N/mm ²	Brinell hardness HB(10/1000)
Class 2	195 min.	5 min.	120 min.	60 min.
Class 2 B	295 min.	5 min.	145 min.	80 min.
Class 2 C	295 min.	10 min.	165 min.	80 min.
Class 3 B	265 min.	3 min.	145 min.	90 min.
Class 3 C	295 min.	5 min.	165 min.	90 min.

Note (²) The proof stress values are shown for informative reference.

Remark: For the continuous castings, the mechanical properties listed above shall be applied to the tubes and rods 100 mm or under in outside diameter. The mechanical properties of those exceeding 100 mm in outside diameter shall be subject to agreement between the parties concerned.

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Edition 2

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