Designation: ~~B22/B22M – 13ε1~~ B22/B22M – 14

Standard Specification for Bronze Castings for Bridges and Turntables[1]

This standard is issued under the fixed designation B22/B22M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

~~ε[1] NOTE—Designation was corrected editorially in October 2013.~~

1. Scope*

1.1 This specification establishes requirements for bronze castings for turntables, movable bridges and bridge parts, and bronze castings suitable for use in bridges and other structures for fixed and expansion bearings in which motion is slow and intermittent. The following Copper Alloys are specified: UNS No. C86300, C90500, C91100, C91300, and C93700.

NOTE 1—Historically, the alloys in this specification have been used in the applications listed in Appendix X1. Actual practice may vary.[2]

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 The following documents in the current issue of the Book of Standards form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[3]

B208 Practice for Preparing Tension Test Specimens for Copper Alloy Sand, Permanent Mold, Centrifugal, and Continuous Castings

B824 Specification for General Requirements for Copper Alloy Castings

B846 Terminology for Copper and Copper Alloys

E9 Test Methods of Compression Testing of Metallic Materials at Room Temperature

E10 Test Method for Brinell Hardness of Metallic Materials

E255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

3. Terminology

3.1 For definitions of terms related to copper alloys, refer to Terminology B846.

4. General Requirements

4.1 The following sections of Specification B824 form a part of this specification. In the event of a conflict between this specification and Specification B824, the requirements of this specification shall take precedence.

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[1] This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.05 on Castings and Ingots for Remelting.

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This specification was prepared in cooperation with representatives of the American Association of State Highway Officials and the American Railway Engineering Association.

[2] The UNS system for copper and copper alloys (see Practice E527) is a simple expansion of the former standard designation system accomplished by the addition of a prefix "C" and a suffix "00." The suffix can be used to accommodate composition variations of the base alloy.

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

4.1.1 Terminology (Section 3),
4.1.2 Other Requirements (Section 7),
4.1.3 Dimensions, Mass, and Permissible Variations (Section 8),
4.1.4 Workmanship, Finish, and Appearance (Section 9),
4.1.5 Sampling (Section 10),
4.1.6 Number of Tests and Retests (Section 11),
4.1.7 Specimen Preparation (Section 12),
4.1.8 Test Methods (Section 13),
4.1.9 Significance of Numerical Limits (Section 14),
4.1.10 Inspection (Section 15),
4.1.11 Rejection and Rehearing (Section 16),
4.1.12 Certification (Section 17),
4.1.13 Test Report (Section 18),
4.1.14 Product Marking (Section 19),
4.1.15 Packaging and Package Marking (Section 20),
4.1.16 Keywords (Section 21), and
4.1.17 Supplementary Requirements.

5. Ordering Information

5.1 Include the following information when placing order for castings products under this specification:
5.1.1 ASTM designation and year of issue (for example, B22-95),
5.1.2 Number of castings or total weight, for each size and form,
5.1.3 Copper Alloy UNS Number (see Table 1), and
5.1.4 Pattern or drawing number and condition (as-cast, machined, and so forth).
5.1.5 When material is purchased for agencies of the U.S. government, the Supplementary Requirements in Specification B824 may be specified.

5.2 The following are optional and should be specified in the purchase order when required:
5.2.1 Chemical analysis of residual elements (see 7.6),
5.2.2 Soundness requirements (Specification B824),
5.2.3 Certification (Specification B824),
5.2.4 Foundry test report (Specification B824),
5.2.5 Witness inspection (Specification B824), and
5.2.6 Product marking (Specification B824).

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Composition, % max, except as indicated														
	Major Elements								Residual Elements						
	Copper	Tin	Lead	Zinc	Iron	Nickel Including Cobalt	Aluminum	Manganese	Iron	Antimony	Nickel Incl. Cobalt	Sulfur	Phosphorus	Aluminum	Silicon
C86300	60.0–66.0[A]	0.20	0.20	22.0–28.0	2.0–4.0	...	5.0–7.5	2.5–5.0	...	...	1.0	...	...	...	...
C90500	86.0–89.0[A]	9.0–11.0	0.30	1.0–3.0	...	1.0	...	...	0.20	0.20	...	0.05	0.05[B]	0.005	0.005
C91100	82.0–85.0[A]	15.0–17.0	0.25	0.25	...	0.50	...	...	0.25	0.20	...	0.05	1.0[B]	0.005	0.005
C91300	79.0–82.0[A]	18.0–20.0	0.25	0.25	...	0.50	...	...	0.25	0.20	...	0.05	1.0[B]	0.005	0.005
C93700	78.0–82.0†	9.0–11.0	8.0–11.0	0.8	...	0.50	...	...	0.7[C]	0.50	...	0.08	0.10[B]	0.005	0.005

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Composition, % max, except as indicated											
	Copper	Tin	Lead	Zinc	Iron	Nickel Including Cobalt	Aluminum	Manganese	Antimony	Sulfur	Phosphorus	Silicon
C86300	60.0–66.0	0.20	0.20	22.0–28.0	2.0–4.0	1.0[A]	5.0–7.5	2.5–5.0	...	...	...	...
C90500	86.0–89.0	9.0–11.0	0.30	1.0–3.0	0.20	1.0[A]	0.005	...	0.20	0.05	0.05[B]	0.005
C91100	82.0–85.0	15.0–17.0	0.25	0.25	0.25	0.50[A]	0.005	...	0.20	0.05	1.0[B]	0.005
C91300	79.0–82.0	18.0–20.0	0.25	0.25	0.25	0.50[A]	0.005	...	0.20	0.05	1.0[B]	0.005
C93700	78.0–82.0	9.0–11.0	8.0–11.0	0.8	0.7[C]	0.50[A]	0.005	...	0.50	0.08	0.10[B]	0.005

[A] In determining copper minimum, copper may be calculated as copper plus nickel.
[B] For continuous castings, phosphorus shall be 1.5 % max.
[C] ~~Fe~~Iron shall be ~~.35~~0.35 % max. when used for steel-backed.
~~†Editorially corrected.~~