



Standard Specification for HIGH-LEADED TIN BRONZE SAND CASTINGS

This Standard is issued under the fixed designation B 144; 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.

1. Scope

1.1 This specification² covers castings of five alloys having the ASTM classifications,¹ alloy numbers¹ and commercial designations, and nominal compositions shown in Table 1.

NOTE 1—This specification covers the technical requirements for copper-base alloy castings and is not intended for use for the corresponding alloys in ingot form which are specified in ASTM Specification B 30, for Copper-Base Alloys in Ingot Form for Sand Castings.

1.2 The castings are intended for use for conventional bearings and bushings in the cast state. Alloys 937 and 938 are frequently used also for castings which are called upon to resist some of the mild acids such as are found in mine waters.

NOTE 2 The values stated in U.S. customary units are to be regarded as the standard. The metric equivalents of U.S. customary units may be approximate.

2. Ordering Information

2.1 Orders for material under this specification shall include the following information:

- 2.1.1 Alloy number (Section 1),
- 2.1.2 Tests or certification required (Sections 5, 8, 10, 16), and
- 2.1.3 Marking, if required (Section 14).

3. Manufacture

3.1 The alloy may be made by any approved method. If alloys in ingot form are used, the alloy ingot selected shall have the same ASTM classification and alloy number as prescribed in this specification and shall conform to the requirements for that alloy as prescribed in Specification B 30.

3.2 The castings shall be made in accordance with such practice as to obtain the physical properties prescribed in this specification.

3.3 The castings shall be of uniform quality.

4. Chemical Composition

4.1 The castings shall conform to the requirements as to chemical composition prescribed in Table 2.

5. Chemical Analysis

5.1 An analysis of each melt may be required at the option of the purchaser. If the castings are made from ingot metal in accordance with Specification B 30 or returns (back-stock) of known composition, and if the foundry practice of the manufacturer is satisfactory to the inspector, and if melting and casting are witnessed by the inspector, he may waive further chemical analysis.

5.2 The sample for chemical analysis shall be taken by drilling or cutting the test coupon or sprue in such a manner as to be representative of the entire cross section.

6. Methods of Chemical Analysis

6.1 Analyses, when made, shall be performed in accordance with ASTM Methods E 54, Chemical Analysis of Special Brasses and Bronzes.³

This specification is under the jurisdiction of ASTM Committee B-5 on Copper and Copper Alloys. A list of members may be found in the ASTM Yearbook.

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¹For ASME Boiler and Pressure Vessel Code applications see related Specification SB-144 in Section II of that Code.

²ASTM Classification B 119, Cast Copper-Base Alloys, which appears in the *Annual Book of ASTM Standards*, Part 5.

³The alloy numbers are arbitrarily chosen and have no other significance.

⁴*Annual Book of ASTM Standards*, Part 5.
⁵*Annual Book of ASTM Standards*, Part 32.

7. Tensile Properties

7.1 The material shall conform to the requirements as to tensile properties prescribed in Table 3.

8. Pressure and Fracture Tests

8.1 The castings made from these alloys shall conform to such requirements as to pressure and fracture tests as may be agreed upon by the manufacturer and the purchaser and as specified in the order.

9. Test Specimens

9.1 It is recommended that the test coupons and specimens for tension tests be prepared in accordance with ASTM Recommended Practice B 208, for Tension Test Specimens for Copper-Base Alloys for Sand Castings,⁷ except that Fig. 1 of Recommended Practice B 208 is not applicable to these alloys.

10. Number of Tests

10.1 Three test coupons shall be poured from each melt of metal, or such groups of melts as the purchaser may specify, but in no case shall a lot consist of more than 1000 lb (450 kg) of castings, except if individual castings weigh more than 1000 lb. The inspector shall witness the pouring of the test molds.

10.2 If any test specimen shows defective machining or reveals casting defects, it may be discarded and replaced by another specimen selected by the inspector.

10.3 The specimens shall be made and tested at the expense of the manufacturer. The inspector shall witness the testing.

10.4 One test specimen shall be tested. If the physical requirements are met by this one test, the lot shall be accepted. If the first test specimen fails to conform to the requirements specified, the two remaining specimens shall be tested. If the average properties of the two remaining specimens conform to the requirements specified, the lot shall be accepted.

11. Methods of Test

11.1 The tension tests shall be made in accordance with ASTM Methods E 8, Tension Testing of Metallic Materials.⁷

12. Significance of Numerical Limits

12.1 For purposes of determining compli-

ance with the specified limits for requirements of the properties listed in the following table, an observed value or a calculated value, shall be rounded off as indicated in accordance with the rounding-off method of ASTM Recommended Practice E 29, for Indicating Which Places of Figures Are to Be Considered Significant in Specified Limiting Values.⁷

| Property | Rounded-Off Unit for Observed or Calculated Value |
|----------------------------|--|
| Chemical composition | nearest unit in the last right-hand place of figures |
| Tensile strength | nearest 1000 psi (nearest 0.1 kgf/mm ²) |
| Yield strength | nearest multiple of 0.5 percent |
| Elongation Below 5 percent | nearest 1 percent |
| 5 percent and over | |

13. Workmanship and Finish

13.1 The castings shall be free from blow-holes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects and shall be smooth and well cleaned, before inspection, by sand blasting, tumbling, chipping, or other process approved by the inspector.

13.2 The castings shall not be repaired, plugged, welded, or "burned in," unless permission from the inspector has been previously secured. This permission will be given only when the defects are such that after the approved repair the usefulness and strength of the casting has not been impaired. Each such repair shall be encircled by a ring of white paint at the time of shipment.

13.3 All castings shall be true to pattern, free from swells, etc. Wall thicknesses shall be uniform throughout the lot of castings and all cores shall be accurately set.

13.4 Where thick and thin sections join, the manufacturer shall be permitted to add (where not previously provided) fillets of proper size to avoid cracking upon cooling, subject to the approval of the inspector.

13.5 The manufacturer shall not be responsible for the the dimensional accuracy of patterns furnished by the purchaser.

14. Marking

14.1 Upon request of the purchaser, castings shall be marked with the pattern or mark number at a position on the casting where it will