NOTICE: This standard has either been superseded and replaced by a new version or withdrawn.
Contact ASTM International (www.astm.org) for the latest information

Designation: B 763 – 08

Standard Specification for Copper Alloy Sand Castings for Valve Applications[1]

This standard is issued under the fixed designation B 763; 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 Department of Defense.

1. Scope*

1.1 This specification establishes requirements for copper alloy sand castings for valve applications. Nominal compositions of the alloys defined by this specification are shown in Table 1.[2]

NOTE 1—This specification does not cover Copper Alloy UNS Nos. C83600, C92200, C96200, and C96400. These alloys are also used in valve applications. They are covered by the following specifications:

C83600: B 62
C92200: B 61
C96200: B 369
C96400: B 369

1.2 The castings produced under this specification are used in products which may be manufactured in advance and supplied for sale from stock by the manufacturer.

1.3 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

2.1 *ASTM Standards:*[3]

B 61 Specification for Steam or Valve Bronze Castings
B 62 Specification for Composition Bronze or Ounce Metal Castings
B 208 Practice for Preparing Tension Test Specimens for Copper Alloy Sand, Permanent Mold, Centrifugal, and Continuous Castings
B 369 Specification for Copper-Nickel Alloy Castings
B 824 Specification for General Requirements for Copper Alloy Castings
E 10 Test Method for Brinell Hardness of Metallic Materials
E 527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

3. General Requirements

3.1 The following sections of Specification B 824 form a part of this specification.

3.1.1 Terminology,
3.1.2 Other Requirements,
3.1.3 Dimensions, Mass, and Permissible Variations,
3.1.4 Workmanship, Finish, and Appearance,
3.1.5 Sampling,
3.1.6 Number of Tests and Retests,
3.1.7 Specimen Preparation,
3.1.8 Test Methods,
3.1.9 Significance of Numerical Limits,
3.1.10 Inspection,
3.1.11 Rejection and Rehearing,
3.1.12 Certification,
3.1.13 Test Report,
3.1.14 Product Marking,
3.1.15 Packaging and Package Marking, and
3.1.16 Supplementary Requirements.

4. Ordering Information

4.1 Include the following information when placing orders for product under this specification, as applicable:

4.1.1 Specification title, number, and year of approval,
4.1.2 Quantity of castings,
4.1.3 Copper Alloy UNS Number and temper (as-cast, heat-treated, etc.),
4.1.4 Pattern or drawing number and condition (as-cast, machined, etc.),
4.1.5 When castings are purchased for agencies of the U.S. Government, the Supplementary Requirements of Specification B 824 may be specified.

4.2 The following requirements are optional and should be specified in the purchase order when required.

[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.

Current edition approved April 1, 2008. Published May 2008. Originally approved in 1986. Last previous edition approved in 2004 as B 763 – 04.

[2] The UNS system for copper and copper alloys (see Practice E 527) 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.**

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.

TABLE 1 Nominal Compositions

Classification	Copper Alloy UNS No.	Commercial Designation	Copper	Tin	Lead	Zinc	Nickel	Iron	Aluminum	Manganese	Silicon	Bismuth
Leaded red brass	C83450		88	2½	2	6½	1	. . .	. . .	. . .	. . .	. . .
	C83800	83-4-6-7 or commercial red brass	83	4	6	7	. . .	. . .	. . .	. . .	. . .	. . .
Leaded semi-red brass	C84400	81-3-7-9 or valve composition	81	3	7	9	. . .	. . .	. . .	. . .	. . .	. . .
	C84800	76-2½-6½-15, or semi-red brass	76	2½	6½	15	. . .	. . .	. . .	. . .	. . .	. . .
Leaded yellow brass	C85200	high-copper yellow brass	72	1	3	24	. . .	. . .	. . .	. . .	. . .	. . .
	C85400	commercial No. 1 yellow brass	67	1	3	29	. . .	. . .	. . .	. . .	. . .	. . .
	C85700	leaded naval brass	61	1	1	37	. . .	. . .	. . .	. . .	. . .	. . .
High-strength yellow brass	C86200	high-strength manganese bronze	63	. . .	. . .	27	. . .	3	4	3	. . .	. . .
	C86300	high-strength manganese bronze	61	. . .	. . .	27	. . .	3	6	3	. . .	. . .
	C86400	leaded manganese bronze	58	1	1	38	. . .	1	½	½	. . .	. . .
	C86500	No. 1 manganese bronze	58	. . .	. . .	39	. . .	1	1	1	. . .	. . .
	C86700	leaded manganese bronze	58	1	1	34	. . .	2	2	2	. . .	. . .
Silicon bronze and silicon brass	C87300	silicon bronze	95	. . .	. . .	. . .	. . .	. . .	. . .	1	4	. . .
	C87400	silicon brass	82	. . .	½	14	. . .	. . .	. . .	. . .	3½	. . .
	C87500	silicon brass	82	. . .	. . .	14	. . .	. . .	. . .	. . .	4	. . .
	C87600	silicon bronze	89	. . .	. . .	6	. . .	. . .	. . .	. . .	5	. . .
	C87610	silicon bronze	92	. . .	. . .	4	. . .	. . .	. . .	. . .	4	. . .
Bismuth semi-red brass	C89844	bismuth brass	84½	4	. . .	8	. . .	. . .	. . .	. . .	. . .	3
Tin bronze and leaded tin bronze	C90300	88-8-0-4, or modified "G" bronze	88	8	. . .	4	. . .	. . .	. . .	. . .	. . .	. . .
	C90500	88-10-0-2, on "G" bronze	88	10	. . .	2	. . .	. . .	. . .	. . .	. . .	. . .
	C92300	87-8-1-4, or Navy PC	87	8	1	4	. . .	. . .	. . .	. . .	. . .	. . .
	C92600	87-10-1-2	87	10	1	2	. . .	. . .	. . .	. . .	. . .	. . .
High-lead tin bronze	C93200	83-7-7-3	83	7	7	3	. . .	. . .	. . .	. . .	. . .	. . .
	C93500	85-5-9-1	85	5	9	1	. . .	. . .	. . .	. . .	. . .	. . .
	C93700	80-10-10	80	10	10	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93800	78-7-15	78	7	15	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C94300	71-5-24	71	5	24	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Nickel-tin bronze and leaded nickel-tin bronze	C94700	nickel-tin bronze grade "A"	88	5	. . .	2	5	. . .	. . .	. . .	. . .	. . .
	C94800	leaded nickel-tin bronze grade "B"	87	5	1	2	5	. . .	. . .	. . .	. . .	. . .
	C94900	leaded nickel-tin bronze grade "C"	80	5	5	5	5	. . .	. . .	. . .	. . .	. . .
Aluminum bronze	C95200	Grade A	88	. . .	. . .	. . .	. . .	3	9	. . .	. . .	. . .
	C95300	Grade B	89	. . .	. . .	. . .	. . .	1	10	. . .	. . .	. . .
	C95400	Grade C	85	. . .	. . .	. . .	. . .	4	11	. . .	. . .	. . .
	C95410		84	. . .	. . .	. . .	2	4	10	. . .	. . .	. . .
Silicon aluminum bronze	C95600	Grade E	91	. . .	. . .	. . .	. . .	. . .	7	. . .	2	. . .
Nickel aluminum bronze	C95500	Grade D	81	. . .	. . .	. . .	4	4	11	. . .	. . .	. . .
	C95800		81.3	. . .	. . .	. . .	4.5	4	9	1.2	. . .	. . .
Leaded nickel bronze	C97300	12 % leaded nickel silver	57	2	9	20	12	. . .	. . .	. . .	. . .	. . .
	C97600	20 % leaded nickel silver	64	4	4	8	20	. . .	. . .	. . .	. . .	. . .
	C97800	25 % leaded nickel silver	66	5	2	2	25	. . .	. . .	. . .	. . .	. . .
Special alloys	C99400		87	. . .	. . .	4.4	3.0	3.0	1.6	. . .	1.0	. . .
	C99500		87	. . .	. . .	1.5	4.5	4.0	1.7	. . .	1.3	. . .

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ASTM B763-08
https://standards.iteh.ai/catalog/standards/sist/00869f03-8103-4093-b4cd-66a3...f42ec5/astm-b763-08

4.2.1 Chemical analysis of residual elements (6.3),

4.2.2 Pressure test or soundness requirements (Specification B 824),

4.2.3 Approval of weld repair and records of repair (Section 10),

4.2.4 Certification (Specification B 824),

4.2.5 Foundry test report (Specification B 824),

4.2.6 Witness inspection (Specification B 824),

4.2.7 Product marking (Specification B 824),

4.2.8 Castings for seawater service (5.1).

5. Materials and Manufacture

5.1 For better corrosion resistance in sea water applications, castings in Copper Alloy UNS No. C95800 shall be given a temper anneal heat treatment at 1250 ± 50°F (675 ± 10°C) for 6-h minimum. Cooling shall be by the fastest means possible that will not cause excessive distortion or cracking.

5.2 Copper Alloy UNS Nos. C94700, C95300, C95400, C95410, and C95500 may be supplied in the heat-treated condition to obtain the higher mechanical properties shown in Table 4. Suggested heat treatments for these alloys and copper alloy UNS No. C95520 are given in Table 5. Actual practice may vary by manufacturer.

5.3 Separately cast test bar coupons representing castings made in Copper Alloy UNS Nos. C94700HT, C95300HT, C95400HT, C95410HT, and C95500HT shall be heat treated with the castings.

6. Chemical Composition

6.1 The castings shall conform to the requirements for major elements shown in Table 2.

6.2 These specification limits do not preclude the presence of other elements. Limits may be established and analysis required for unnamed elements agreed upon between the manufacturer or supplier and the purchaser. Copper or zinc may be given as remainder and may be taken as the difference between the sum of all elements analyzed and 100 %. When all named elements in Table 2 are analyzed, their sum shall be as specified in Table 3.

6.3 It is recognized that residual elements may be present in cast copper alloys. Analysis shall be made for residual elements only when specified in the purchase order.

TABLE 2 Chemical Requirements

Copper Alloy UNS No.	Composition, % max, except as indicated																		
	Major Elements										Residual Elements								
	Copper	Tin	Lead	Zinc	Iron	Nickel incl Cobalt	Aluminum	Manganese	Silicon	Bismuth	Iron	Antimony	Nickel incl Cobalt	Sulfur	Phosphorus	Aluminum	Manganese	Silicon	Lead
C83450	87.0–89.0	2.0–3.5	1.5–3.0	5.5–7.5	...	0.8–2.0	...	...	...	...	0.30	0.25	...	0.08	0.03	0.005	...	0.005	...
C83800	82.0–83.8	3.3–4.2	5.0–7.0	5.0–8.0	...	1.0[A]	...	...	...	...	0.30	0.25	...	0.08	0.03	0.005	...	0.005	...
C84400	78.0–82.0	2.3–3.5	6.0–8.0	7.0–10.0	...	1.0[A]	...	...	...	...	0.40	0.25	...	0.08	0.02	0.005	...	0.005	...
C84800	75.0–77.0	2.0–3.0	5.5–7.0	13.0–17.0	...	1.0[A]	...	...	...	...	0.40	0.25	...	0.08	0.02	0.005	...	0.005	...
C85200	70.0–74.0	0.7–2.0	1.5–3.8	20.0–27.0	...	...	...	...	...	...	0.6	0.20	1.0	0.05	0.02	0.005	...	0.05	...
C85400	65.0–70.0	0.50–1.5	1.5–3.8	24.0–32.0	...	...	...	...	...	...	0.7	...	1.0	...	...	0.35	...	0.05	...
C85700	58.0–64.0	0.50–1.5	0.8–1.5	32.0–40.0	...	...	...	...	...	...	0.7	...	1.0	...	...	0.8	...	0.05	...
C86200	60.0–66.0	0.20	0.20	22.0–28.0	2.0–4.0	...	3.0–4.9	2.5–5.0	...	...	...	...	1.0	...	...	...	...	...	...
C86300	60.0–66.0	0.20	0.20	22.0–28.0	2.0–4.0	...	5.0–7.5	2.5–5.0	...	...	...	...	1.0	...	...	...	...	...	...
C86400	56.0–62.0	0.50–1.5	0.50–1.5	34.0–42.0	0.40–2.0	...	0.50–1.5	0.10–1.5	...	...	...	...	1.0	...	...	...	...	...	...
C86500	55.0–60.0	1.0	0.40	36.0–42.0	0.40–2.0	...	0.50–1.5	0.10–1.5	...	...	...	...	1.0	...	...	...	...	...	...
C86700	55.0–60.0	1.5	0.50–1.5	30.0–38.0	1.0–3.0	...	1.0–3.0	1.0–3.5	...	...	...	...	1.0	...	...	...	...	...	...
C87300	94.0 min	...	0.20	0.25	...	...	...	0.8–1.5	3.5–5.0	...	0.20	...	...	...	...	...	...	...	...
C87400	79.0 min	...	1.0	12.0–16.0	...	...	...	...	2.5–4.0	...	...	...	...	...	...	0.8	...	...	...
C87500	79.0 min	...	0.50	12.0–16.0	...	...	...	...	3.0–5.0	...	...	...	...	...	...	0.50	...	...	...
C87600	88.0 min	...	0.50	4.0–7.0	0.20	...	...	...	3.5–5.5	...	...	...	...	...	...	...	0.25	...	...
C87610	90.0 min	...	0.09	3.0–5.0	0.20	...	...	...	3.0–5.0	...	...	...	...	...	...	...	0.25	...	...
C89844	83.0–86.0	3.0–5.0	...	7.0–10.0	...	1.0[A]	...	...	...	2.0–4.0	0.30	0.25	...	0.08	0.05	0.005	...	0.005	0.20
C90300	86.0–89.0	7.5–9.0	0.30	3.0–5.0	...	1.0[A]	...	...	...	...	0.20	0.20	...	0.05	0.05	0.005	...	0.005	...
C90500	86.0–89.0	9.0–11.0	0.30	1.0–3.0	...	1.0[A]	...	...	...	...	0.20	0.20	...	0.05	0.05	0.005	...	0.005	...
C92300	85.0–89.0	7.5–9.0	0.30–1.0	2.5–5.0	...	1.0[A]	...	...	...	...	0.25	0.25	...	0.05	0.05	0.005	...	0.005	...
C92600	86.0–88.5	9.3–10.5	0.8–1.5	1.3–2.5	...	0.7[A]	...	...	...	...	0.20	0.25	...	0.05	0.03	0.005	...	0.005	...
C93200	81.0–85.0	6.3–7.5	6.0–8.0	1.0–4.0	...	1.0[A]	...	...	...	...	0.20	0.35	...	0.08	0.15	0.005	...	0.005	...
C93500	83.0–86.0	4.3–6.0	8.0–10.0	2.0	...	1.0[A]	...	...	...	...	0.20	0.30	...	0.08	0.05	0.005	...	0.005	...
C93700	78.0–82.0	9.0–11.0	8.0–11.0	0.8	...	0.50[A]	...	...	...	...	0.7	0.50	...	0.08	0.10	0.005	...	0.005	...
C93800	75.0–79.0	6.3–7.5	13.0–16.0	0.8	...	1.0[A]	...	...	...	...	0.15	0.8	...	0.08	0.05	0.005	...	0.005	...
C94300	67.0–72.0	4.5–6.0	23.0–27.0	0.8	...	1.0[A]	...	...	...	...	0.15	0.8	...	0.08	0.08	0.005	...	0.005	...
C94700	85.0–90.0	4.5–6.0	0.09[B]	1.0–2.5	...	4.5–6.0	...	...	...	...	0.25	0.15	...	0.05	0.05	0.005	0.20	0.005	...
C94800	84.0–89.0	4.5–6.0	0.30–1.0	1.0–2.5	...	4.5–6.0	...	...	...	...	0.25	0.15	...	0.05	0.05	0.005	0.20	0.005	...
C94900	79.0–81.0	4.0–6.0	4.0–6.0	4.0–6.0	...	4.0–6.0	...	...	...	...	0.30	0.25	...	0.08	0.05	0.005	0.10	0.005	...
C95200	86.0 min	...	...	...	2.5–4.0	...	8.5–9.5	...	...	...	...	...	...	...	...	...	...	...	...
C95300	86.0 min	...	...	...	0.8–1.5	...	9.0–11.0	...	...	...	...	...	...	...	...	...	...	...	...
C95400	83.0 min	...	...	...	3.0–5.0	1.5	10.0–11.5	0.50	...	...	...	...	...	...	...	...	...	...	...
C95410	83.0 min	...	...	...	3.0–5.0	1.5–2.5	10.0–11.5	0.50	...	...	...	...	...	...	...	...	...	...	...
C95500	78.0 min	...	...	...	3.0–5.0	3.0–5.5	10.0–11.5	3.5	...	...	...	...	...	...	...	...	...	...	...
C95600	88.0 min	...	...	...	...	0.25	6.0–8.0	...	1.8–3.2	...	...	...	...	...	...	...	...	...	...
C95800	79.0 min	...	0.03	...	3.5–4.5[C]	4.0–5.0[C]	8.5–9.5	0.8–1.5	...	...	...	...	...	...	...	...	...	0.10	...
C97300	53.0–58.0	1.5–3.0	8.0–11.0	17.0–25.0	1.5	11.0–14.0	...	...	...	...	...	0.35	...	0.08	0.05	0.005	0.50	0.15	...
C97600	63.0–67.0	3.5–4.5	3.0–5.0	3.0–9.0	1.5	19.0–21.5	...	...	...	...	...	0.25	...	0.08	0.05	0.005	1.0	0.15	...
C97800	64.0–67.0	4.0–5.5	1.0–2.5	1.0–4.0	1.5	24.0–27.0	...	...	...	...	...	0.20	...	0.08	0.05	0.005	1.0	0.15	...
C99400	remainder	...	0.25	0.5–5.0	1.0–3.0	1.0–3.5	0.5–2.0	0.50	0.5–2.0	...	...	...	...	...	...	...	...	...	...
C99500	remainder	...	0.25	0.5–2.0	3.0–5.0	3.5–5.5	0.5–2.0	0.50	0.5–2.0	...	...	...	...	...	...	...	...	...	...

[A] In determining copper minimum copper may be calculated as copper plus nickel.
[B] It is possible that the mechanical requirements of Copper Alloy UNS No. C94700 (heat treated) will not be obtained if the lead content exceeds 0.01 %.
[C] Iron content shall not exceed the nickel content.

iTeh Standards
https://standards.iteh.ai
Document Preview
ASTM B763-08
https://standards.iteh.ai/catalog/standards/sist/...-b6a35ef12ec5/astm-b763-08