Designation: B 584 – 00

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

This standard is issued under the fixed designation B 584; 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 covers requirements for copper alloy sand castings for general applications. Nominal compositions of the alloys defined by this specification are shown in Table 1.[2] This is a composite specification replacing former documents as shown in Table 1.

NOTE 1—Other copper alloy castings are included in the following ASTM specifications: B 22, B 61, B 62, B 66, B 67, B 148, B 176, B 271, B 369, B 427, B 492, B 505, B 763, B 770, and B 806.

1.2 Component part castings produced to this specification may be manufactured in advance and supplied from stock. In such cases the manufacturer shall maintain a general quality certification of all castings without specific record or date of casting for a specific casting.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are provided for information purposes only.

2. Referenced Documents

2.1 *ASTM Standards:*

B 22 Specification for Bronze Castings for Bridges and Turntables[3]
B 61 Specification for Steam or Valve Bronze Castings[3]
B 62 Specification for Composition Bronze or Ounce Metal Castings[3]
B 66 Specification for Bronze Castings for Steam Locomotive Wearing Parts[3]
B 67 Specification for Car and Tender Journal Bearings, Lined[3]
B 148 Specification for Aluminum-Bronze Sand Castings[3]
B 176 Specification for Copper-Alloy Die Castings[3]
B 208 Practice for Preparing Tension Test Specimens for Copper Alloy Sand, Permanent Mold, Centrifugal, and Continuous Castings[3]
B 271 Specification for Copper-Base Alloy Centrifugal Castings[3]
B 369 Specification for Copper-Nickel Alloy Castings[3]
B 427 Specification for Gear Bronze Alloy Castings[3]
B 492 Specification for Cast Copper-Nickel Ship Tailshaft Sleeves[4]
B 505 Specification for Copper-Base Alloy Continuous Castings[3]
B 763 Specification for Copper Alloy Sand Castings for Valve Application[3]
B 770 Specification for Copper-Beryllium Alloy Sand Castings for General Applications[3]
B 806 Specification for Copper Alloy Permanent Mold Castings for General Applications[3]
B 824 Specification for General Requirements for Copper Alloy Castings[3]
B 846 Terminology for Copper and Copper Alloys[3]
E 527 Practice for Numbering Metals and Alloys (UNS)[5]

2.2 *ASME Code:*

ASME Boiler and Pressure Vessel Code[6]

3. Terminology

3.1 Definitions of terms relating to copper alloys can be found in Terminology B 846.

4. General Requirements

4.1 The following sections of Specification B 824 form a part of this specification. In the event of a conflict between this specification and Specification B 824, the requirements of this specification shall take precedence.

4.1.1 Terminology,
4.1.2 Other Requirements,
4.1.3 Dimensions, Mass, and Permissible Variations,
4.1.4 Workmanship, Finish, and Appearance,
4.1.5 Sampling,
4.1.6 Number of Tests and Retests,
4.1.7 Specimen Preparation,

[1] This practice 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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[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] *Annual Book of ASTM Standards,* Vol 02.01.

[4] Discontinued—*Annual Book of ASTM Standards,* Vol 02.01.

[5] *Annual Book of ASTM Standards,* Vol 01.01.

[6] Available from the American Society of Mechanical Engineers, United Engineering Center, 345 E. 47th St., New York, NY 10017.

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

TABLE 1 Nominal Compositions

Classification	Copper Alloy UNS No.	Previous Designation	Commercial Designation	Copper	Tin	Lead	Zinc	Nickel	Iron	Aluminum	Manganese	Silicon	Niobium	Bismuth
Leaded red brass	C83450	. . .	. . .	88	2½	2	6½	1	. . .	. . .	. . .	. . .	. . .	. . .
	C83600	B 145-4A	85-5-5-5 or No. 1 composition	85	5	5	5	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C83800	B 145-4B	commercial red brass, 83-4-6-7	83	4	6	7	. . .	. . .	. . .		. . .	. . .	. . .
Leaded semi-red brass	C84400	B 145-5A	valve composition, 81-3-7-9	81	3	7	9	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C84800	B 145-5B	semi-red brass, 76-2½-6½-15	76	2½	6½	15	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Leaded yellow brass	C85200	B 146-6A	high-copper yellow brass	72	1	3	24	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C85400	B 146-6B	commercial No. 1 yellow brass	67	1	3	29	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C85700	B 146-6C	leaded naval brass	61	1	1	37	. . .	. . .	. . .	. . .	. . .	. . .	. . .
High-strength yellow brass	C86200	B 147-8B	high-strength manganese bronze	63	. . .	. . .	27	. . .	3	4	3	. . .	. . .	. . .
	C86300	B 147-8C	high-strength manganese bronze	61	. . .	. . .	27	. . .	3	6	3	. . .	. . .	. . .
	C86400	B 147-7A	leaded manganese bronze	58	1	1	38	. . .	1	½	½	. . .	. . .	. . .
	C86400	B 132-A												
	C86500	B 147-8A	No. 1 manganese bronze	58	. . .	. . .	39	. . .	1	1	1	. . .	. . .	. . .
	C86700	B 132-B	leaded manganese bronze	58	1	1	34	. . .	2	2	2	. . .	. . .	. . .
Silicon bronze + silicon brass	C87300	B 198-12A	silicon bronze	95	. . .	. . .	. . .	. . .	. . .	. . .	1	4	. . .	. . .
	C87400	B 198-13A	silicon brass	82	. . .	½	14	. . .	. . .	. . .	. . .	3½	. . .	. . .
	C87500	B 198-13B	silicon brass	82	. . .	. . .	14	. . .	. . .	. . .	. . .	4	. . .	. . .
	C87600	B 198-13C	silicon bronze	91	. . .	. . .	5	. . .	. . .	. . .	. . .	4	. . .	. . .
	C87610	B 198-12A	silicon bronze	92	. . .	. . .	4	. . .	. . .	. . .	. . .	4	. . .	. . .
Bismuth selenium brass	C89510[A]	. . .	sebiloy I	87	5	. . .	5	. . .	. . .	. . .	. . .	. . .	. . .	1.0
	C89520[B]	. . .	sebiloy II	86	5½	. . .	5	. . .	. . .	. . .	. . .	. . .	. . .	1.9
Bismuth semi-red brass	C89844	. . .	bismuth brass	84½	4	. . .	8	. . .	. . .	. . .	. . .	. . .	. . .	3
Tin bronze + leaded tin bronze	C90300	B 143-1B	modified “G” bronze, 88-8-0-4	88	8	. . .	4	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C90500	B 143-1A	“G” bronze, 88-10-0-2	88	10	. . .	2	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C92200	B 143-2A	steam or valve bronze-Navy “M”	88	6	1½	4½	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C92210	. . .	. . .	88	5	2	4	1	. . .	. . .	. . .	. . .	. . .	. . .
	C92300	B 143-2B	87-5-1-4, Navy PC	87	8	1	4	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C92600	. . .	87-10-1-2	87	10	1	2	. . .	. . .	. . .	. . .	. . .	. . .	. . .
High-lead tin bronze	C93200	B 144-3B	83-7-7-3	83	7	7	3	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93500	B 144-3C	85-5-9-1	85	5	9	1	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93700	B 144-3A	80-10-10	80	10	10	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93800	B 144-3D	78-7-15	78	7	15	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C94300	B 144-3E	71-5-24	71	5	24	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Nickel-tin bronze + leaded nickel-tin bronze	C94700	B 292-A	nickel-tin bronze Grade “A”	88	5	. . .	2	5	. . .	. . .	. . .	. . .	. . .	. . .
	C94800	B 292-B	leaded nickel-tin bronze Grade “B”	87	5	1	2	5	. . .	. . .	. . .	. . .	. . .	. . .
	C94900	. . .	leaded nickel-tin bronze Grade “C”	80	5	5	5	5	. . .	. . .	. . .	. . .	. . .	. . .
Spinodal alloy	C96800	. . .	. . .	82	8	. . .	. . .	10	. . .	. . .	. . .	. . .	0.2	. . .
Leaded nickel bronze	C97300	B 149-10A	12 % leaded nickel silver	57	2	9	20	12	. . .	. . .	. . .	. . .	. . .	. . .
	C97600	B 149-11A	20 % leaded nickel silver	64	4	4	8	20	. . .	. . .	. . .	. . .	. . .	. . .
	C97800	B 149-11B	25 % leaded nickel silver	66	5	2	2	25	. . .	. . .	. . .	. . .	. . .	. . .

[A] Selenium 0.5.
[B] Selenium 0.9.

4.1.8 Test Methods,
4.1.9 Significance of Numerical Limits,
4.1.10 Inspection,
4.1.11 Rejection and Rehearing,
4.1.12 Certification,
4.1.13 Test Report,
4.1.14 Product Marking,
4.1.15 Packaging and Package Marking, and
4.1.16 Supplementary Requirements.

5. Ordering Information

5.1 Orders for castings under this specification should include the following information:

5.1.1 Specification title, number, and year of issue,

5.1.2 Quantity of castings,

5.1.3 Copper alloy UNS Number (Table 1) and temper (as-cast, heat treated, and so forth),

5.1.4 Pattern or drawing number, and condition (as-cast, machined, etc.),

5.1.5 *ASME Boiler and Pressure Vessel Code*—compliance (Section 10),

5.1.6 When material is purchased for agencies of the U.S. Government, the Supplementary Requirements of Specification B 824 may be specified.

5.2 The following options are available and should be specified in the purchase order when required:

5.2.1 Chemical analysis of residual elements (7.3),

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

5.2.3 Approval of weld repair or impregnation, or both (Section 9),

5.2.4 Certification (Specification B 824),

5.2.5 Foundry test report (Specification B 824),

5.2.6 Witness inspection (Specification B 824), and

5.2.7 Product marking (Specification B 824).

6. Manufacture

6.1 Copper alloy UNS Nos. C94700 and C96800 may be supplied in the heat treated condition to obtain the higher mechanical properties shown in Table 2. Suggested heat treatments for these alloys are given in Table 3. Actual practice may vary by manufacturer.

6.2 Separately cast test bar coupons representing castings made in copper alloy UNS Nos. C94700HT and C96800HT shall be heat treated with the castings.

TABLE 2 Mechanical Requirements

Copper Alloy UNS No.	Tensile Strength, min		Yield Strength,[A] min		Elongation in 2 in. or 50 mm, min, %
	ksi[B]	MPa[C]	ksi[B]	MPa[C]	
C83450	30	207	14	97	25
C83600	30	207	14	97	20
C83800	30	207	13	90	20
C84400	29	200	13	90	18
C84800	28	193	12	83	16
C85200	35	241	12	83	25
C85400	30	207	11	76	20
C85700	40	276	14	97	15
C86200	90	621	45	310	18
C86300	110	758	60	414	12
C86400	60	414	20	138	15
C86500	65	448	25	172	20
C86700	80	552	32	221	15
C87300	45	310	18	124	20
C87400	50	345	21	145	18
C87500	60	414	24	165	16
C87600	60	414	30	207	16
C87610	45	310	18	124	20
C89510	26	184	17	120	8
C89520	25	176	17	120	6
C89844	28	193	13	90	15
C90300	40	276	18	124	20
C90500	40	276	18	124	20
C92200	34	234	16	110	22
C92210	32	225	15	103	20
C92300	36	248	16	110	18
C92600	40	276	18	124	20
C93200	30	207	14	97	15
C93500	28	193	12	83	15
C93700	30	207	12	83	15
C93800	26	179	14	97	12
C94300	24	165	. . .	. . .	10
C94700	45	310	20	138	25
C94700 (HT)	75	517	50	345	5
C94800	40	276	20	138	20
C94900	38	262	15	103	15
C96800	125	862	100[D]	689[D]	3
C96800 (HT)	135	931	120[D]	821[D]	. . .
C97300	30	207	15	103	8
C97600	40	276	17	117	10
C97800	50	345	22	152	10

[A] Yield strength shall be determined as the stress producing an elongation under load of 0.5 %, that is, 0.01 in. (0.254 mm) in a gage length of 2 in. or 50 mm.
[B] ksi = 1000 psi.
[C] See Appendix X1.
[D] Yield strength 0.2 %, offset.

TABLE 3 Suggested Heat Treatments

Copper Alloy UNS No.	Solution Treatment (not less than 1 h followed by water quench)	Annealing Treatment (not less than 2 h followed by air cool)
C96800	1500°F (815°C)	(Age to develop properties) 660°F (350°C)
	Solution treatment (not less than 2 h followed by water quench)	Precipitation hardening (5 h)
C94700	1425–1475°F (775–800°C)	580–620°F (305–325°C)

7. Chemical Composition

7.1 The castings shall conform to the compositional requirements for named elements as shown in Table 4 for the copper alloy UNS numbers specified in the purchase order.

7.2 These specification limits do not preclude the presence of other elements. Limits may be established and analysis required for unnamed elements agreed upon between manufacturer or supplier and purchaser. Copper or zinc, when zinc is 20 % or greater, 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 4 are analyzed, their sum shall be as specified in Table 5.

7.3 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.

8. Mechanical Properties

8.1 Mechanical properties shall be determined from separately cast test bar castings, and shall meet the requirements shown in Table 2.

9. Casting Repair

9.1 The castings shall not be weld repaired without approval of the purchaser (5.2.3).

9.2 The castings shall not be impregnated without approval of the purchaser (5.2.3).

10. ASME Requirements

10.1 When specified in the purchase order to meet ASME Boiler and Pressure Vessel Code requirements, castings in copper alloy UNS Nos. C92200, C93700, and C97600 shall comply with the following:

10.1.1 Certification requirements of Specification B 824.

10.1.2 Foundry test report requirements of Specification B 824.

10.1.3 Castings shall be marked with the manufacturer's name, the copper alloy UNS number, and the casting quality factor. In addition, heat numbers or serial numbers that are traceable to heat numbers shall be marked on all pressure-containing castings individually weighing 50 lbs (22.7 kg) or more. Pressure-containing castings weighing less than 50 lbs (22.7 kg) shall be marked with either the heat number or a serial number that will identify the casting as to the month in which it was poured. Marking shall be in such a position as to not impair the usefulness of the casting.

10.2 The castings shall not be repaired, plugged, welded, or "burned in" unless permission from the purchaser has been

TABLE 4 Chemical Requirements

Copper Alloy UNS No.	Composition, % Max Except as Indicated																		
	Major Elements											Residual Elements							
	Copper	Tin	Lead	Zinc	Iron	Nickel Incl. Cobalt	Alumi-num	Manga-nese	Silicon	Bismuth	Sele-nium	Iron	Anti-mony	Nickel incl. Cobalt	Sulfur	Phos-phorus	Alumi-num	Manga-nese	Silicon	Lead
C83450	87.0–89.0	2.0–3.5	1.5–3.0	5.5–7.5	...	0.75–2.0	...	...	...	...	...	0.30	0.25	...	0.08	0.05	0.005	...	0.005	...
C83600	84.0–86.0	4.0–6.0	4.0–6.0	4.0–6.0	...	1.0[A]	...	...	...	...	...	0.30	0.25	...	0.08	0.05	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	...	...	0.80	...	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	0.10–1.0	...	...	...	...	...	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	3.6–5.0	...	...	0.20	...	...	...	...	...	...	...	...
C87400	79.0 min	...	1.0	12.0–16.0	...	...	...	...	2.5–4.0	...	...	...	...	...	...	...	0.80	...	...	...
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	...	...	...	...	3.5–5.5	...	...	...	...	...	...	...	...	...	...	...
C87610	90.0 min	...	0.20	3.0–5.0	...	...	...	...	3.0–5.0	...	...	0.20	...	...	...	...	...	0.25	...	...
C89510	86.0–88.0	4.0–6.0	0.25	4.0–6.0	0.30	1.0	...	...	...	0.5–1.5	0.35–0.70	...	0.25	...	0.08	0.05	0.005	...	0.005	...
C89520	85.0–87.0	5.0–6.0	0.25	4.0–6.0	0.20	1.0	...	...	...	1.6–2.2	0.8–1.1	...	0.25	...	0.08	0.05	0.005	...	0.005	...
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	0.2
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	...
C92200	86.0–90.0	5.5–6.5	1.0–2.0	3.0–5.0	...	1.0[A]	...	...	...	...	...	0.25	0.25	...	0.05	0.05	0.005	...	0.005	...
C92210	86.0–89.0	4.5–5.5	1.7–2.5	3.0–4.5	...	0.7–1.0	...	...	...	...	...	0.25	0.20	...	0.05	0.03	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	2.0–4.0	...	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	...	1.0[A]	...	...	...	...	...	0.15	0.50	...	0.08	0.15	0.005	...	0.005	...
C93800	75.0–79.0	6.3–7.5	13.0–16.0	0.8	...	1.0[A]	...	...	...	...	...	0.15	0.80	...	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[ABC]	...	...	...	...	...	0.15	0.80	...	0.08	0.05	0.005	...	0.005	...
C94700	85.0–90.0	4.5–6.0	0.10	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	...
C96800	remainder	...	0.005	1.0	0.50	9.5–10.5	0.10	0.05–0.30	...	...	...	...	0.02	...	0.0025	0.005	...	...	...	...
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	...

[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] Niobium 0.10–0.30 %, boron 0.001 % max, bismuth 0.001 % max, magnesium 0.0005–0.15 %, and titanium 0.01 % max.

TABLE 5 Sum of All Named Elements Analyzed

Copper Alloy UNS Number	Copper Plus Major Elements, % Minimum
C83450	99.3
C83600	99.3
C83800	99.3
C84400	99.3
C84800	99.3
C85200	99.1
C85400	98.9
C85700	98.7
C86200	99.0
C86300	99.0
C86400	99.0
C86500	99.0
C86700	99.0
C87300	99.5
C87400	99.2
C87500	99.5
C87600	99.5
C87610	99.5
C89510	99.3
C89520	99.3
C89844	99.3
C90300	99.4
C90500	99.7
C92200	99.3
C92210	99.3
C92300	99.3
C92600	99.3
C93200	99.2
C93500	99.4
C93700	99.0
C93800	98.9
C94300	99.0
C94700	99.3
C94800	99.3
C94900	99.2
C96800	99.5
C97300	99.0
C97600	99.7
C97800	99.6

previously secured. This will be given only when the defects are such that after the approved repair the usefulness and strength of the castings has not been impaired.

10.3 Alloys in this specification are generally weldable. Preparation for repair welding shall include inspection to ensure complete removal of the defect. Repairs shall be made utilizing welding procedures qualified in accordance with Section IX if the ASME code and repair welding shall be done by welders or welding operators meeting the qualification requirements of ASME Section IX. The following records shall be maintained:

10.3.1 A sketch or drawing showing the dimensions, depth, and location of excavations,

10.3.2 Postweld heat treatment, when applicable,

10.3.3 Weld repair inspection results,

10.3.4 Casting identification number,

10.3.5 Weld procedure identification number,

10.3.6 Welder identification, and

10.3.7 Name of inspector.

11. Sampling

11.1 Test bar castings for copper alloy UNS Nos. C86200, C86300, C86400, C86500, and C86700 shall be cast to the form and dimensions shown in Figs. 1 or 2 of Practice B 208. Test bar castings for all other alloys listed in this specification shall be cast to the form and dimensions shown in Figs. 2, 3, or 4 of Practice B 208.

11.2 When castings are specified to meet the requirements of the ASME Boiler and Pressure Vessel Code, for small remelts the lot size shall not exceed 1000 lbs (455 kg) of castings and shall consist of all of the metal from a single master heat poured from an individual melting unit or group of melting units operating during the course of one-half shift, not to exceed 5 h.

12. Test Methods

12.1 Analytical chemical methods are given in Specification B 824.

13. Keywords

13.1 copper alloy castings; copper-base alloy castings; sand castings

APPENDIX

(Nonmandatory Information)

X1. METRIC EQUIVALENTS

X1.1 The SI unit for strength properties now shown is in accordance with the International System of Units (SI). The derived SI unit for force is the newton (N), which is defined as that force that when applied to a body having a mass of one kilogram gives it an acceleration of one metre per second squared ($N = kg \cdot m/s^2$). The derived SI unit for pressure or stress is the newton per square metre (N/m^2), which has been named the pascal (Pa) by the General Conference on Weights and Measures. Since 1 ksi = 6 894 757 Pa, the metric equivalents are expressed as megapascal (MPa), which is the same as MN/m^2 and N/mm^2.

SUMMARY OF CHANGES

Committee B05 has identified the location of selected changes to this standard since the last issue (B 584 - 98) that may impact the use of this standard.

(*1*) Table 1 revised to include Bismuth Selenium Brass C89510.
(*2*) Table 4 revised to include C89510.
(*3*) Table 5 revised to include C89510.
(*4*) Table 2 revised to include C89510.