Designation: B 30 – 00$^{\epsilon 1}$

Standard Specification for Copper Alloys in Ingot Form[1]

This standard is issued under the fixed designation B 30; 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.

ϵ[1] NOTE—In Table 4, Footnote B was added editorially in February 2002.

1. Scope *

1.1 This specification establishes the requirements for copper alloys in ingot form for remelting for the manufacturing of castings having the Copper Alloy UNS No. designation, commercial designations and nominal composition shown in Table 1 and Table 2.

1.2 A cross reference of Copper Alloy UNS Nos. and copper alloy casting specifications is given in Table 3.

1.3 Inch-pound units are the standard. SI values given in parentheses are for information only.

2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*

B 22 Specification for Bronze Castings for Bridges and Turntables[2]

B 61 Specification for Steam or Valve Bronze Castings[2]

B 62 Specification for Composition Bronze or Ounce Metal Castings[2]

B 66 Specification for Bronze Castings for Steam Locomotive Wearing Parts[2]

B 67 Specification for Car and Tender Journal Bearings, Lined[2]

B 148 Specification for Aluminum-Bronze Sand Castings[2]

B 176 Specification for Copper-Alloy Die Castings[2]

B 194 Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar[2]

B 208 Practice for Preparing Tension Test Specimens for Copper Alloy Sand, Permanent Mold, Centrifugal, and Continuous Castings[2]

B 271 Specification for Copper-Base Alloy Centrifugal Castings[2]

B 369 Specification for Copper-Nickel Alloy Castings[2]

B 427 Specification for Gear Bronze Alloy Castings[2]

B 505 Specification for Copper-Base Alloy Continuous Castings[2]

B 584 Specification for Copper Alloy Sand Castings for General Applications[2]

B 763 Specification for Copper Alloy Sand Castings for Valve Application[2]

B 770 Specification for Copper-Beryllium Alloy Sand Castings for General Applications[2]

B 806 Specification for Copper Alloy Permanent Mold Castings for General Applications[2]

E 8 Test Methods for Tension Testing of Metallic Materials[3]

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[4]

E 54 Test Methods for Chemical Analysis of Special Brasses and Bronzes[5]

E 62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods)[5]

E 76 Test Methods for Chemical Analysis of Nickel-Copper Alloys[5]

E 255 Practice for Sampling Copper and Copper Alloys for Determination of Chemical Composition[5]

E 478 Test Methods for Chemical Analysis of Copper Alloys[5]

E 581 Test Methods for Chemical Analysis of Manganese-Copper Alloys[5]

3. Ordering Information

3.1 Orders for ingot should include the following information:

3.1.1 ASTM designation and year of issue (for example, B 30 – 00),

3.1.2 Copper Alloy UNS No. (for example, C83450 and Table 1, Table 2, Table 4, and Table 5),

3.1.3 Quantity; total weight, and

[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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[2] *Annual Book of ASTM Standards,* Vol 02.01.

[3] *Annual Book of ASTM Standards,* Vol 03.01.

[4] *Annual Book of ASTM Standards,* Vol 14.02.

[5] *Annual Book of ASTM Standards,* Vol 03.05.

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

3.1.4 When purchase is for agencies of U.S. Government.

3.2 The following options are available under this specification and shall be specified in the contract or purchase order when required:

3.2.1 Mechanical requirements, when specified in the purchase order (Section 7).

3.2.2 Nickel content in Copper Alloys UNS Nos. C90300, C90500, C92200, and C92300 (Table 4).

TABLE 1 Nominal Compositions

Alloy Name	Copper Alloy UNS No.	Previously Used Designation	Commercial Designation	Nominal Composition, %										
				Copper	Tin	Lead	Zinc	Nickel	Iron	Aluminum	Manganese	Silicon	Niobium	Bismuth
Leaded red brass	C83450	. . .		88	2.5	2	6.5	1	. . .	. . .	. . .	. . .	. . .	. . .
	C83600	4A	85-5-5-5 or No. 1 composition	85	5	5	5	. . .	. . .		. . .	. . .	. . .	. . .
	C83800	4B	commercial red brass, 83-4-6-7	83	4	6	7	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Leaded semi-red brass	C84200	. . .	semi-red brass, 80-5-2-13	80	5	2	13	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C84400	5A	valve composition 81-3-7-9	81	3	7	9	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C84800	5B	semi-red brass, 76-2½-6½-15	76	2.5	6.5	15	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Leaded yellow brass	C85200	6A	high-copper yellow brass	72	1	3	24	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C85400	6B	commercial No. 1 yellow brass	67	1	3	29	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C85700	6C	60–40 leaded yellow (naval) brass	61	1	1	37	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C85800	. . .	die-cast yellow brass	62	1	1	36	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C86100	. . .	high-strength manganese bronze	67	. . .	. . .	21	. . .	3	5	4	. . .	. . .	. . .
Leaded high-strength yellow brass and high-strength yellow brass	C86200	8B	high-strength manganese bronze	63	. . .	. . .	27	. . .	3	4	3	. . .	. . .	. . .
	C86300	8C	high-strength manganese bronze	61	. . .	. . .	27	. . .	3	6	3	. . .	. . .	. . .
	C86400	7A	leaded manganese bronze	58	1	1	38	. . .	1	0.5	0.5	. . .	. . .	. . .
	C86500	8A	No. 1 manganese bronze	58	. . .	. . .	39	. . .	1	1	1	. . .	. . .	. . .
	C86700	. . .	leaded manganese bronze	58	1	1	34	. . .	2	2	2	. . .	. . .	. . .
Silicon bronze	C87300	. . .	silicon bronze	95	. . .	. . .	. . .	. . .	. . .	. . .	1	4	. . .	. . .
Silicon brass	C87400	13A	silicon brass	82	. . .	0.5	14	. . .	. . .	. . .	. . .	3.5	. . .	. . .
	C87500	13B		82	. . .	. . .	14	. . .	. . .	. . .	. . .	4	. . .	. . .
Silicon bronze	C87600	. . .	silicon bronze	91	. . .	. . .	5	. . .	. . .	. . .	. . .	4	. . .	. . .
	C87610	. . .	silicon bronze	92	. . .	. . .	4	. . .	. . .	. . .	. . .	4	. . .	. . .
Silicon brass	C87800	. . .	die-cast silicon brass	82	. . .	. . .	14	. . .	. . .	. . .	. . .	4	. . .	. . .
Bismuth tin bronze	C89320[A]		lead-free bronze	89	6	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Bismuth selenium brass	C89510[B]		lead-free bronze	87	5.0	. . .	5.0	. . .	. . .	. . .	. . .	. . .	. . .	1.0
	C89520[C]	. . .	lead-free brass	86	5.5	. . .	5	. . .	. . .	. . .	. . .	. . .	. . .	1.9
Bismuth semi-red brass	C89844	. . .	cast bismuth brass	84.5	4	. . .	8	. . .	. . .	. . .	. . .	. . .	. . .	3
Tin bronze and leaded tin bronze	C90300	1B	88-8-0-4 or modified "G" bronze	88	8	. . .	4	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C90500	1A	88-10-0-2 or "G" bronze	88	10	. . .	2	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C90700	. . .	89-11 gear bronze	89	11	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C90800	. . .	88-12 gear bronze	88	12	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C91000	. . .	85-15 tin bronze	85	15	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C91100	. . .	84-16 tin bronze	84	16	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C91300	. . .	81-19 tin bronze or bell metal	81	19	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C91600	. . .	nickel gear bronze	88	10.5	. . .	. . .	1.5	. . .	. . .	. . .	. . .	. . .	. . .
	C91700	. . .	nickel gear bronze	86.5	12	. . .	. . .	1.5	. . .	. . .	. . .	. . .	. . .	. . .
	C92200	2A	steam or valve bronze-Navy "M"	88	6	1.5	4.5	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C92210	. . .	. . .	88	5	2	4	1	. . .	. . .	. . .	. . .	. . .	. . .
	C92300	2B	87-8-1-4 Navy P-C	87	8	1	4	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C92500		87-11-1-0-1 leaded gear bronze	87	11	1	. . .	1	. . .	. . .	. . .	. . .	. . .	. . .
	C92600		87-10-1-2 leaded tin bronze	87	10	1	2	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C92700		88-10-2-0 leaded tin bronze	88	10	2	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C92800		79-16-5 leaded tin bronze	79	16	5	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C92900		leaded gear bronze	84	10	2.5	. . .	3.5	. . .	. . .	. . .	. . .	. . .	. . .
High-leaded tin bronze	C93200	3B	83-7-7-3	83	7	7	3	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93400		84-8-8	84	8	8	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93500	3C	85-5-9-1	85	5	9	1	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93600		81-7-12	81	7	12	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93700	3A	80-10-10	80	10	10	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93800	3D	78-7-15	78	7	15	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C93900		77-6-16-1 high-lead-tin bronze	77	6	16	1	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C94000		72-13-15	72	13	15	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C94100		journal bronze	75	5	18	2	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C94300		71-5-24	71	5	24	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C94400		81-8-11	81	8	11	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
	C94500		73-7-20	73	7	20	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .

TABLE 1 *Continued*

Alloy Name	Copper Alloy UNS No.	Previously Used Designation	Commercial Designation	Nominal Composition, %										
				Copper	Tin	Lead	Zinc	Nickel	Iron	Alumi-num	Man-ganese	Sili-con	Nio-bium	Bis-muth
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	9A	Grade A	88	. . .	. . .	. . .	. . .	3	9	. . .	. . .	. . .	. . .
	C95300	9B	Grade B	89	. . .	. . .	. . .	. . .	1	10	. . .	. . .	. . .	. . .
	C95400	9C	Grade C	86	. . .	. . .	. . .	. . .	4	10	. . .	. . .	. . .	. . .
	C95410			84	. . .	. . .	. . .	2	4	10	. . .	. . .	. . .	. . .
	C95500	9D	Grade D	81	. . .	. . .	. . .	4	4	11	. . .	. . .	. . .	. . .
	C95520		nickel-aluminum bronze	78.5	. . .	. . .	. . .	5.5	5.0	11	. . .	. . .	. . .	. . .
Silicon aluminum bronze	C95600	9E	silicon-aluminum bronze	91	. . .	. . .	. . .	. . .	. . .	7	. . .	2	. . .	. . .
Manganese aluminum bronze	C95700	9F	manganese-aluminum bronze	75	. . .	. . .	. . .	2	3	8	12	. . .	. . .	. . .
Nickel aluminum bronze	C95800		nickel-aluminum bronze	81	. . .	. . .	. . .	4.5	4	9	1.5	. . .	. . .	. . .
Aluminum bronze	C95900		aluminum bronze	82.5	. . .	. . .	. . .	. . .	4.5	13	. . .	. . .	. . .	. . .
Cupro-nickel	C96200		90-10 cupro-nickel	87	. . .	. . .	. . .	10	1.5	. . .	1	. . .	1	. . .
	C96400		70-30 cupro-nickel	66	. . .	. . .	. . .	30.5	0.5	. . .	1	. . .	1	. . .
	C96800		spinodal alloy	82	8	. . .	. . .	10		. . .	. . .	. . .	0.2	. . .
Leaded nickel bronze	C97300	10A	12 % leaded nickel silver	57	2	9	20	12	. . .	. . .	. . .	. . .	. . .	. . .
	C97600	11A	20 % leaded nickel silver	64	4	4	8	20	. . .	. . .	. . .	. . .	. . .	. . .
	C97800	11B	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	. . .	. . .
White brass	C99700			58	. . .	1.5	22.5	5.0	. . .	1.0	12	. . .	. . .	. . .
	C99750			58	. . .	1.0	20.0	. . .	. . .	1.0	20	. . .	. . .	. . .

^{A}Bismuth 5.0.
^{B}Selenium 0.5.
^{C}Selenium 0.9.

TABLE 2 Nominal Compositions

Alloy Name	Copper Alloy UNS No.	Previous Designation	Copper	Nickel	Iron	Silicon	Beryllium	Cobalt	Chro-mium	Zircon-ium	Titan-ium	Man-ganese
Copper beryllium	C81400	70C	99.1	. . .	. . .	. . .	0.06	. . .	0.8	. . .	. . .	. . .
	C82000	10C	97	. . .	. . .	. . .	0.5	2.5	. . .	. . .	. . .	. . .
	C82200	3C, 14C	98	1.5	. . .	. . .	0.5	. . .	. . .	. . .	. . .	. . .
	C82400^{A}	165C, 165CT^{A}	97.8	. . .	. . .	. . .	1.7	0.5	. . .	. . .	. . .	. . .
	C82500^{A}	20C, 20CT^{A}	97.2	. . .	. . .	0.3	2.0	0.5	. . .	. . .	. . .	. . .
	C82510	21C	96.6	. . .	. . .	0.3	2.0	1.1	. . .	. . .	. . .	. . .
	C82600^{A}	245C, 245CT^{A}	96.8	. . .	. . .	0.3	2.4	0.5	. . .	. . .	. . .	. . .
	C82800^{A}	275C, 275CT^{A}	96.6	. . .	. . .	0.3	2.6	0.5	. . .	. . .	. . .	. . .
	C96700	72C	67.2	31.0	0.6	. . .	1.2	. . .	. . .	0.3	0.3	0.6

^{A}When fine grained castings are specified, 0.02–0.12 Ti is added.

3.2.3 Weldability test for Copper Alloys UNS Nos. C96200 and C96400 (Section 7).

3.2.4 Lot consisting of ingots from more than a single heat or melt (Section 10.1.1).

3.2.5 Place of inspection (Section 14).

3.2.6 Type of ingot surface (5.1).

4. Material and Manufacture

4.1 *Material*—Any material may be used which when melted will produce an alloy of the required chemical composition and mechanical requirements.

4.2 *Manufacture*:

4.2.1 Any manufacturing process may be used that will yield ingot of uniform composition that is free of defects of a nature that would render the ingot unsuitable for remelting.

4.2.2 Each heat or lot of ingot shall maintain heat identification numbers.

5. Workmanship, Finish and Appearance

5.1 The ingots shall have the surface specified in the purchase order (3.2.6).

6. Chemical Composition

6.1 The ingot shall conform to the requirements given in Table 4 or Table 5 for the specified alloy. Ingot is an intermediate product, therefore the limits listed in Table 4 and Table 5 may be more restrictive than those applicable for cast products produced from the ingot after remelting.

NOTE 1—Table 5 contain the requirements for copper-beryllium alloys.

6.1.1 Since no recognized test method is known to be published, the determination of bismuth shall be subject to agreement between the manufacturer or supplier and the purchaser.

6.1.2 These specification limits do not preclude the presence

of other elements. Limits may be established and analysis required for unnamed elements by agreement between the manufacturer and the purchaser.

6.2 For alloys in which copper is designated as the remainder, copper may be taken as the difference between the sum of results for specified elements and 100 %.

7. Mechanical Properties

7.1 Ingot is an intermediate product intended for remelting by the purchaser, therefore, mechanical properties are not applicable.

NOTE 2—However, when specified in the purchase order, ingot when remelted and cast into tension test coupons shall meet the mechanical requirements of a specified casting specification. The place of remelting and testing shall be as agreed upon between the purchaser and the manufacturer. Mechanical requirements for those Copper Alloy UNS Numbers for which no mechanical requirements are given in the applicable casting specification shall be by agreement between the purchaser and the manufacturer.

7.2 Table 3 provides a cross reference between the Copper Alloy UNS Nos. in this specification and the casting specifications in which they appear.

TABLE 3 Alloy/Specification Cross Reference

Copper Alloy UNS No.	ASTM Copper Alloy Casting Specification															
	B22	B30	B61	B62	B66	B67	B148	B176	B271	B369	B427	B505	B584	B763	B770	B806
C81400	...	X	...	...	...	...	...	...	...	...	...	...	...	...	X	...
C82000	...	X	...	...	...	...	...	...	...	...	...	...	...	...	X	...
C82200	...	X	...	...	...	...	...	...	...	...	...	...	...	...	X	...
C82400	...	X	...	...	...	...	...	...	...	...	...	...	...	...	X	...
C82500	...	X	...	...	...	...	...	...	...	...	...	...	...	...	X	...
C82510	...	X	...	...	...	...	...	...	...	...	...	...	...	...	X	...
C82600	...	X	...	...	...	...	...	...	...	...	...	...	...	...	X	...
C82800	...	X	...	...	...	...	...	...	...	...	...	...	...	...	X	...
C83450	...	X	...	...	...	...	...	...	...	...	...	...	X	X	...	...
C83600	...	X	...	X	...	...	...	...	X	...	...	X	X	...	...	...
C83800	...	X	...	...	...	...	...	...	X	...	...	X	X	X	...	...
C84200	...	X	...	...	...	...	...	...	...	...	...	X	...	...	...	...
C84400	...	X	...	...	...	...	...	...	X	...	...	X	X	X	...	...
C84800	...	X	...	...	...	...	...	...	X	...	...	X	X	X	...	...
C85200	...	X	...	...	...	...	...	...	X	...	...	...	X	X	...	...
C85400	...	X	...	...	...	...	...	...	X	...	...	...	X	X	...	...
C85700	...	X	...	...	...	...	...	X	X	...	...	X	X	X	...	...
C85800	...	X	...	...	...	...	...	X	...	...	...	...	...	...	...	...
C86100	...	X	...	...	...	...	...	...	...	...	...	...	...	...	...	...
C86200	...	X	...	...	...	...	...	...	X	...	...	X	X	X	...	...
C86300	X	X	...	...	...	...	...	...	X	...	...	X	X	X	...	...
C86400	...	X	...	...	...	...	...	...	X	...	...	...	X	X	...	...
C86500	...	X	...	...	...	...	...	X	X	...	...	X	X	X	...	...
C86700	...	X	...	...	...	...	...	...	X	...	...	...	X	X	...	...
C87300	...	X	...	...	...	...	...	...	X	...	...	...	X	X	...	...
C87400	...	X	...	...	...	...	...	...	X	...	...	...	X	X	...	...
C87500	...	X	...	...	...	...	...	...	X	...	...	...	X	X	...	X
C87600	...	X	...	...	...	...	...	...	X	...	...	...	X	X	...	...
C87610	...	X	...	...	...	...	...	...	...	...	...	...	X	X	...	...
C87800	...	X	...	...	...	...	...	X	...	...	...	...	...	...	...	X
C89320	...	X	...	...	...	...	...	...	...	...	...	X	...	...	...	...
C89510	...	X	...	...	...	...	...	...	...	...	...	...	X	...	...	...
C89520	...	X	...	...	...	...	...	...	...	...	...	...	X	...	...	...
C89844	...	X	...	...	...	...	...	...	...	...	...	...	X	X	...	...
C90300	...	X	...	...	...	...	...	...	X	...	...	X	X	X	...	...
C90500	X	X	...	...	...	...	...	...	X	...	...	X	X	X	...	...
C90700	...	X	...	...	...	...	...	...	...	...	X	X	...	...	...	...
C90800	...	X	...	...	...	...	...	...	...	...	X	...	...	...	...	...
C91000	...	X	...	...	...	...	...	...	...	...	...	X	...	...	...	...
C91100	X	X	...	...	...	...	...	...	...	...	...	...	...	...	...	...
C91300	X	X	...	...	...	...	...	...	...	...	...	X	...	...	...	...
C91600	...	X	...	...	...	...	...	...	...	...	X	...	...	...	...	...
C91700	...	X	...	...	...	...	...	...	...	...	X	...	...	...	...	...
C92200	...	X	X	...	...	...	...	...	X	...	...	X	X	...	...	...
C92210	...	X	...	...	...	...	...	...	...	...	...	...	X	...	...	...
C92300	...	X	...	...	...	...	...	...	X	...	...	X	X	X	...	...
C92500	...	X	...	...	...	...	...	...	...	...	...	X	...	...	...	...
C92600	...	X	...	...	...	...	...	...	...	...	...	...	X	X	...	...
C92700	...	X	...	...	...	...	...	...	...	...	...	X	...	...	...	...
C92800	...	X	...	...	...	...	...	...	...	...	...	X	...	...	...	...
C92900	...	X	...	...	...	...	...	...	...	...	X	X	...	...	...	...
C93200	...	X	...	...	X	...	...	...	X	...	...	X	X	X	...	...
C93400	...	X	...	...	X	...	...	...	...	...	...	X	...	...	...	...
C93500	...	X	...	...	...	...	...	...	X	...	...	X	X	X	...	...
C93600	...	X	...	...	X	...	...	...	X	...	...	X	...	...	...	...
C93700	X	X	...	...	X	...	...	...	X	...	...	X	X	X	...	...

TABLE 3 *Continued*

Copper Alloy UNS No.	ASTM Copper Alloy Casting Specification															
	B22	B30	B61	B62	B66	B67	B148	B176	B271	B369	B427	B505	B584	B763	B770	B806
C93800	...	X	...	...	X	...	...	...	X	...	...	X	X	X	...	...
C93900	...	X	...	...	...	...	...	...	...	...	...	X	...	...	...	...
C94000	...	X	...	...	...	...	...	...	...	...	...	X	...	...	...	...
C94100	...	X	...	...	...	X	...	...	...	...	...	X	...	...	...	...
C94300	...	X	...	...	X	...	...	...	X	...	...	X	X	X	...	...
C94400	...	X	...	...	X	...	...	...	...	...	...	...	...	...	...	...
C94500	...	X	...	...	X	...	...	...	...	...	...	...	...	...	...	...
C94700	...	X	...	...	...	...	...	...	...	...	...	X	X	X	...	...
C94800	...	X	...	...	...	...	...	...	...	...	...	X	X	X	...	...
C94900	...	X	...	...	...	...	...	...	...	...	...	...	X	X	...	...
C95200	...	X	...	...	...	...	X	...	X	...	...	X	...	X	...	...
C95300	...	X	...	...	...	...	X	...	X	...	...	X	...	X	...	X
C95400	...	X	...	...	X	...	X	...	X	...	...	X	...	X	...	X
C95410	...	X	...	...	...	...	X	...	X	...	...	X	...	X	...	X
C95500	...	X	...	...	...	...	X	...	X	...	...	X	...	X	...	X
C95520	...	X	...	...	...	...	X	...	X	...	...	X	...	...	...	...
C95600	...	X	...	...	...	...	X	...	...	...	...	...	...	X	...	...
C95700	...	X	...	...	...	...	X	...	...	...	...	X	...	...	...	...
C95800	...	X	...	...	...	...	X	...	X	...	...	X	...	X	...	X
C95900	...	X	...	...	...	...	X	...	X	...	...	X	...	...	...	...
C96200	...	X	...	...	...	...	...	...	...	X	...	...	...	...	...	...
C96400	...	X	...	...	...	...	...	...	...	X	...	X	...	...	...	...
C96700	...	X	...	...	...	...	...	...	...	...	...	...	...	...	X	...
C96800	...	X	...	...	...	...	...	...	...	...	...	...	X	...	...	...
C97300	...	X	...	...	...	...	...	X	...	...	...	X	X	X	...	...
C97600	...	X	...	...	...	...	...	X	...	...	...	X	X	X	...	...
C97800	...	X	...	...	...	...	...	X	...	...	...	X	X	X	...	...
C99400	...	X	...	...	...	...	...	...	...	...	...	...	...	X	...	...
C99500	...	X	...	...	...	...	...	...	...	...	...	...	...	X	...	...
C99700	...	X	...	...	...	...	...	X	...	...	...	...	...	...	...	...
C99750	...	X	...	...	...	...	...	X	...	...	...	...	...	...	...	...

8. Performance Requirements

8.1 *Weldability*—When specified in the contract or purchase order, ingots produced from Copper Alloys No. C96200 and C96400 shall pass the weldability test requirements when subjected to test in accordance with the Weldability Test Section of Specification B 369.

9. Purchases for Agencies of the U.S. Government

9.1 When a purchase is specified in the contract or purchase order to be for an agency of the U.S. Government, the material shall conform to the Special Government Requirements as stipulated in the Supplementary Requirements section.

10. Sampling

10.1 The lot size, portion size, and selection of portion pieces shall be as follows:

10.1.1 *Lot Size*—An inspection lot shall be all ingots subject to inspection which are produced from a single furnace charge during one casting period.

10.1.2 *Portion Size*—The portion size shall be not less than 100 lbs (45.5 kg).

10.1.3 *Selection of Portion Pieces*—The sample ingot(s) shall be randomly selected.

10.2 *Chemical Analysis*:

10.2.1 The sample for chemical analysis shall be taken in accordance with Practice E 255 from the piece(s) selected in 10.1.2. The minimum weight of the composite sample shall be 150 g.

10.2.2 Instead of sampling in accordance with Practice E 255, the manufacturer shall have the option of sampling at the time the ingots are poured and at least two samples shall be taken during the pouring period.

10.2.2.1 When chemical composition is determined during the course of manufacture, sampling and analysis of the finished product is not required.

10.3 *Tension Testing*:

10.3.1 Tension test coupons, when required by the purchase order, shall be cast to the form and dimensions of the applicable figure in Practice B 208 as prescribed in the applicable casting specification.

10.3.2 Tension test coupons for those Copper Alloy UNS Nos. for which no applicable figure in Practice B 208 is prescribed in the applicable casting specification shall be as agreed upon between the manufacturer or supplier and the purchaser.

11. Number of Tests and Retests

11.1 *Tests*:

11.1.1 *Chemical Analysis*—Chemical composition shall be determined as the average of results from at least two determinations for each element with a limiting value listed in Table 4 or Table 5 for the specified copper alloy.

11.1.2 *Weldability Test*—When required, Copper Alloy UNS Nos. C96200 and C96400 shall meet the requirements of the weldability test.

11.2 *Retests*:

11.2.1 When requested by the manufacturer or supplier, a retest may be permitted should test results obtained by the purchaser fail to conform with the requirements of Table 4 or Table 5 for the specified alloy.

11.2.1.1 The retest shall be as directed in 11.1.2 except the number of replicate determinations shall be twice that of the first test. All determinations shall conform to specification requirements and failure to comply shall be cause for lot rejection.

12. Specimen Preparation

12.1 *Chemical Analysis*—Preparation of the analytical specimen shall be the responsibility of the reporting laboratory.

13. Test Methods

13.1 Test methods used for quality control or production control, or both, for determining conformance to product property requirements are discretionary.

13.1.1 Test methods used to obtain data for the preparation of certification or test report shall be made available to the purchaser on request.

13.2 *Chemical Analysis*—In case of disagreement, the test method to be followed for a specific element and range or maximum concentration shall be as indicated in Table 6 for alloys listed in Table 4.

13.2.1 Refer to the Annex of Specification B 194 for test methods to be followed in the analysis of Copper-Beryllium alloys listed in Table 5.

13.2.2 The determination of magnesium, niobium, zirconium, and titanium, for which no recognized test method is known to be published, shall be subject to agreement between the manufacturer or supplier and the purchaser.

TABLE 4 Ingot Chemical Requirements

Classification	Copper Alloy UNS No.	Composition, % max except as indicated														Corresponding ASTM Casting Specifications[A]
		Copper	Tin	Lead	Zinc	Iron	Antimony	Nickel (incl Cobalt)	Sulfur	Phosphorus	Aluminum	Manganese	Silicon	Bismuth	Other	
Leaded red brass	C83450	87.0–89.0	2.2–3.0	1.5–2.5	5.8–7.5	0.25	0.25	0.8–1.5	0.08	0.03	0.005	. . .	0.005		. . .	B 584 (C83450) B 763 (C83450)
	C83600	84.0–86.0[B]	4.3–6.0	4.0–5.7	4.3–6.0	0.25	0.25	0.8	0.08	0.03	0.005		0.005			B 62 (C83600) B 271 (C83600) B 505 (C83600) B 584 (C83600)
	C83800	82.0–83.5[B]	3.5–4.2	5.8–6.8	5.5–8.0	0.25	0.25	0.8	0.08	0.02	0.005		0.005			B 584 (C83800) B 271 (C83800) B 505 (C83800) B 763 (C83800)
Leaded semi-red brass	C84200	78.0–82.0	4.3–6.0	2.0–2.8	10.0–16.0	0.35	0.25	0.8	0.08	0.02	0.005		0.005			B 505 (C84200)
	C84400	79.0–82.0[B]	2.5–3.5	6.3–7.7	7.0–10.0	0.35	0.25	0.8	0.08	0.02	0.005		0.005			B 584 (C84400) B 271 (C84400) B 505 (C84400) B 763 (C84400)
	C84800	75.0–76.7[B]	2.3–3.0	5.5–6.7	13.0–16.0	0.35	0.25	0.8	0.08	0.02	0.005		0.005			B 584 (C84800) B 271 (C84800) B 505 (C84800) B 763 (C84800)
Leaded yellow brass	C85200	70.0–73.0	0.8–1.7	1.5–3.5	21.0–27.0	0.50	0.20	0.8	0.05	0.01	0.005		0.05			B 271 (C85200) B 584 (C85200) B 763 (C85200)
	C85400	66.0–69.0	0.50–1.5	1.5–3.5	25.0–31.0	0.50		0.8			0.005		0.05			B 271 (C85400) B 584 (C85400) B 763 (C85400)
	C85700	58.0–63.0	0.50–1.5	0.8–1.5	33.0–40.0	0.50		0.8			0.80		0.05			B 271 (C85700) B 176 (C85700) B 584 (C85700) B 763 (C85700) B 763 (C85710)
	C85710	58.0–63.0	1.0	1.0–2.5	32.0–39.0	0.8		1.0			0.20–0.8	0.50	0.05			B 584 (C85710)
	C85800	57.0 min[C]	1.5	1.5	31.0–41.0	0.50	0.05	0.50	0.05	0.01	0.50	0.25	0.25		0.05As	B 176
	C86100	66.0–68.0	0.10	0.10	remainder	2.0–4.0	. . .	. . .	. . .	. . .	4.5–5.5	2.5–5.0	. . .		. . .	
High-strength yellow brass	C86200	60.0–66.0	0.10	0.10	22.0–28.0	2.0–4.0		0.8			3.0–4.9	2.5–5.0				B 271 (C86200) B 505 (C86200) B 584 (C86200) B 763 (C86200)
	C86300	60.0–66.0	0.10	0.10	22.0–28.0	2.0–4.0		0.8			5.0–7.5	2.5–5.0				B 22 (C86300) B 271 (C86300) B 505 (C86300) B 584 (C86300) B 763 (C86300)