Designation: ~~B888/B888M – 13~~ B888/B888M – 17

Standard Specification for Copper Alloy Strip for Use in Manufacture of Electrical Connectors or Spring Contacts[1]

This standard is issued under the fixed designation B888/B888M; 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.

1. Scope*

1.1 This specification establishes the requirements for copper alloy strip for use in the manufacture of electrical connectors or spring contacts produced from one of the following Copper Alloy UNS Nos.[2]: C14530, C15100, C15500, C17000, C17200, C17410, C17450, C17460, C17500, C17510, C19002, C19010, C19015, C19025, C19210, C19400, C19500, C19700, C23000, C26000, C40810, C40850, C40860, C42200, C42500, C42520, C42600, C50580, C50780, C51000, C51080, C51100, C51180, C51980, C52100, C52180, C52480, C63800, C64725, C65400, C68800, C70250, C70260, C70265, C70310, C70350, C75200, and C76200.

1.2 The requirements for the other copper alloys such as copper-nickel-tin spinodal, UNS C72650, C72700, and C72900, shall be as prescribed in the current edition of Specification B740.

1.3 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.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

B193 Test Method for Resistivity of Electrical Conductor Materials
B248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar
B248M Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar (Metric)
B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast
B740 Specification for Copper-Nickel-Tin Spinodal Alloy Strip
B820 Test Method for Bend Test for Determining the Formability of Copper and Copper Alloy Strip
B846 Terminology for Copper and Copper Alloys
E8/E8M Test Methods for Tension Testing of Metallic Materials
E54 Test Methods for Chemical Analysis of Special Brasses and Bronzes (Withdrawn 2002)[4]
E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[4]
E75 Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys (Withdrawn 2010)[4]
E478 Test Methods for Chemical Analysis of Copper Alloys
E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

[1] This specification is under the jurisdiction of Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.01 on Plate, Sheet, and Strip.

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[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~~standard's Document Summary page on the ASTM website.

[4] The last approved version of this historical standard is referenced on www.astm.org.

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

2.2 *ISO Standards:*[5]
ISO 4744 Copper and Copper Alloys—Determination of Chromium Content—Flame Atomic Absorption Spectrometric Method
ISO 7602 Copper and Copper Alloys—Determination of Tellurium Content

3. Terminology

3.1 *Definitions*—For definition of terms used in this specification, refer to Terminology B846.

4. General Requirements

4.1 For product furnished under this specification in English units, the following sections of Specification B248 must constitute a part of this specification. For product furnished under this specification in the SI units, the following sections of Specification B248M must constitute a part of this specification.
4.1.1 Terminology,
4.1.2 Materials and Manufacture,
4.1.3 Dimensions, Weights, 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,
4.1.8 Test Methods,
4.1.9 Significance of Numerical Limits,
4.1.10 Certification,
4.1.11 Test Reports, and
4.1.12 Packaging and Package Marking.

4.2 In the event of a conflict between this specification and Specification B248 or B248M, the requirements of this specification shall take precedence.

5. Classification

5.1 Product produced to this specification is classified as strip material to be used for spring contact or electrical and electronic connector applications only.

6. Ordering Information

6.1 Contract or purchase orders for product under this specification should include the following information:
6.1.1 ASTM designation and year of issue,
6.1.2 UNS alloy designation,
6.1.3 Dimensions, for example, thickness, width,
6.1.4 Quantity, and
6.1.5 Temper (Section 8).

6.2 The following options are available under this specification and shall be specified in the contract or purchase order when required:
6.2.1 Type of edge: slit, sheared, sawed, square corners, rounded corners, rounded edges, or full-rounded edges (Section 11),
6.2.2 Width and straightness tolerances, slit-metal tolerances, square-sheared metal tolerances, sawed metal tolerances, straightened or edge-rolled metal tolerances (Section 11),
6.2.3 Identification marking (Section 22),
6.2.4 Certification (Section 20),
6.2.5 Mill test report (Section 21), and
6.2.6 How packaged: coil wound in traverse or pancake style (Section 22).
6.2.6.1 Number of strip lengths per coil,
6.2.6.2 Size and weight of each coil, and
6.2.7 The electrical resistivity or any other physical and electrical properties (See Table X1.1).

7. Materials and Manufacture

7.1 *Material*—The material of manufacture shall be a cast bar, slab, cake, billet, or other form of the composition given in Table 1 for the specified alloy, suitable for processing into the product prescribed in this specification.

[5] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Copper	Elements Composition, %															
		Alum-inum	Beryll-ium	Cobalt	Iron	Lead	Magnes-ium or Magnes-ium-ese	Mangan-ese or Man-ganese	Nickel or Phos-phorus	Phos-phorus	Tin	Zinc	Chromium or Cobalt or Zirconium	Zirco-nium	Silicon	Silver	Tellur-ium	Other
C14530	99.90[A] min	...	...	...	...	...	...	...	...	0.001–0.010	0.003–0.023	...	...	...	...	...	0.003–0.023[B]	...
C15100[C]	99.80[D] min	...	...	...	...	...	...	...	...	...	...	...	...	0.05–0.15	...	...	...	...
C15500	99.75[D] min	...	...	...	...	...	0.08–0.13	...	...	0.040–0.080	...	...	...	...	...	0.027–0.10	...	...
~~C17000[E]~~	~~remainder[D]~~	~~0.20 max~~	~~1.60–1.79~~	~~0.20[F] min~~	~~...~~	~~...~~	~~...~~	~~...~~	~~...~~	~~...~~	~~...~~	~~...~~	~~...~~	~~...~~	~~0.20 max~~	~~...~~	~~...~~	~~...~~
C17000[E]	remainder[D]	0.20 max	1.60–1.85	0.20[F] min	...	...	...	...	...	...	...	...	...	...	0.20 max	...	...	...
C17200[E]	remainder[D]	0.20 max	1.80–2.00	0.20[F] min	...	...	...	...	...	...	...	...	...	...	0.20 max	...	...	...
C17410[E]	remainder[D]	0.20 max	0.15–0.50	0.35–0.6	0.20 max	...	...	...	...	...	...	...	...	...	0.20 max	...	...	...
~~C17450[E]~~	~~remainder[D]~~	~~0.20 max~~	~~0.15–0.50~~	~~...~~	~~0.20 max~~	~~...~~	~~...~~	~~...~~	~~0.50–1.0~~	~~...~~	~~0.25 max~~	~~...~~	~~...~~	~~0.50 % max~~	~~0.20 max~~	~~...~~	~~...~~	~~...~~
C17450[E]	remainder[D]	0.20 max	0.15–0.50	...	0.20 max	...	...	...	0.50–1.0	...	0.25 max	...	...	0.50 % max	0.20 max	...	...	...
C17460[E]	remainder[D]	0.20 max	0.15–0.50	...	0.20 max	...	...	...	1.0–1.4	...	0.25 max	...	...	0.50 % max	0.20 max	...	...	...
C17500[E]	remainder[D]	0.20 max	0.4–0.7	2.4–2.7	0.10 max	...	...	...	...	...	...	...	...	...	0.20 max	...	...	...
C17510[E]	remainder[D]	0.20 max	0.2–0.6	0.3 max	0.10 max	...	...	...	1.4–2.2	...	...	...	...	...	0.20 max	...	...	...
~~C19002[E]~~	~~remainder[D]~~	~~...~~	~~...~~	~~...~~	~~0.10~~	~~0.05~~	~~0.01~~	~~...~~	~~1.4–1.7[G]~~	~~0.05~~	~~0.02–0.30~~	~~0.04–0.35~~	~~...~~	~~0.005–0.05~~	~~0.20–0.35~~	~~0.02–0.50~~	~~...~~	~~...~~
C19002[E]	remainder[D]	...	...	...	0.10	0.05	0.01	...	1.4–1.7[G]	0.05	0.02–0.30	0.04–0.35	...	0.005–0.05	0.20–0.35	0.02–0.50	...	...
C19010[E]	remainder[D]	...	...	...	...	...	...	...	0.8–1.8	0.01–0.05	...	...	...	...	0.15–0.35	...	...	...
~~C19015[H]~~	~~remainder[D]~~	~~...~~	~~...~~	~~...~~	~~...~~	~~...~~	~~0.02–0.15~~	~~...~~	~~0.50–2.4~~	~~0.02–0.20~~	~~...~~	~~...~~	~~...~~	~~...~~	~~0.10–.40~~	~~...~~	~~...~~	~~...~~
C19015[H]	remainder[D]	...	...	...	...	...	0.02–0.15	...	0.50–2.4	0.02–0.20	...	...	...	...	0.10–0.40	...	...	...
C19025[I]	remainder[D]	...	...	...	0.10 max	...	...	...	0.8–1.2	0.03–0.07	0.7–1.1	0.20 max	...	...	...	...	...	...
C19210[H]	remainder	...	...	...	0.05–0.15	...	...	...	...	0.025–0.04	...	...	...	...	...	...	...	...
C19400[H]	97.0 min	...	...	...	2.1–2.6	0.03 max	...	...	...	0.015–0.15	...	0.05–0.20	...	...	...	...	...	...
C19500[H]	96.0 min	0.02 max	...	0.30–1.3	1.0–2.0	0.02 max	...	...	...	0.01–0.35	0.10–1.0	0.20 max	...	...	...	...	...	...
C19700[H]	remainder	...	...	0.05 max	0.30–1.2	0.05 max	0.01–0.20	0.05 max	0.05 max	0.10–0.40	0.20 max	0.20 max	...	...	...	...	...	...

TABLE 1 *Continued*

Copper Alloy UNS No.	Copper	Elements Composition, %																
		Alum-inum	Beryll-ium	Cobalt	Iron	~~Magnes~~Lead	~~Magnes~~-ium	~~Mangan~~-ese	Man-ganese	Nickel	~~Phos~~phorus	Phos-phorus	Tin	~~Chromium~~Zinc	~~Cz~~mium	~~Zirconium~~	Zirco-nium	Silicon	Silver	Tellur-ium	Other
C23000[H]	84.0-86.0	...	...	...	0.05 max	0.05 max	...	...	...	...	...	...	...	remainder	...	...	...	...	...	...	...
C26000[I]	68.5-71.5	...	...	...	0.05 max	0.07 max	...	...	...	...	...	...	...	remainder	...	...	...	...	...	...	...
C40810[I]	94.5-96.5	...	...	...	0.08–0.12	0.05 max	...	...	...	0.11–0.20	0.028–0.04		1.8–2.2	remainder	...	...	...	...	...	...	...
C40850[I]	94.5-96.5	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20	0.01–0.20		2.6–4.0	remainder	...	...	...	...	...	...	...
C40860[I]	94.0-96.0	...	...	...	0.01–0.05	0.05 max	...	...	...	0.05–0.20	0.02–0.04		1.7–2.3	remainder	...	...	...	...	...	...	...
C42200[I]	86.0-89.0	...	...	...	0.05 max	0.05 max	...	...	...	...	0.35 max		0.8–1.4	remainder	...	...	...	...	...	...	...
C42500[I]	87.0-90.0	...	...	...	0.05 max	0.05 max	...	...	...	...	0.35 max		1.5–3.0	remainder	...	...	...	...	...	...	...
C42520[I]	88.0-91.0	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20	0.01–0.20		1.5–3.0	remainder	...	...	...	...	...	...	...
C42600[I]	87.0-90.0[D]	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20[G]	0.01–0.20		2.5–4.0	remainder	...	...	...	...	...	...	...
C50580[E]	remainder	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20	0.01–0.35		1.0–1.7	0.30 max	...	...	...	...	...	...	...
~~C50780[E]~~	~~remainder~~	...	...	...	~~0.05–0.20~~	~~0.05 max~~	...	...	...	~~0.05–0.20~~	~~0.01–0.35~~		~~1.7–2.3~~	~~0.30 max~~	...	...	...	...	...	...	...
C50780[E]	remainder	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20	0.01–0.35		1.7–2.3	0.30 max	...	...	...	...	...	...	...
~~C51000[E]~~	~~remainder~~	...	...	...	~~0.10 max~~	~~0.05 max~~	...	...	...	...	~~0.03–0.35~~		~~4.2–5.8~~	~~0.30 max~~	...	...	...	...	...	...	...
C51000[E]	remainder	...	...	...	0.10 max	0.05 max	...	...	...	...	0.03–0.35		4.2–5.8	0.30 max	...	...	...	...	...	...	...
~~C51080[E]~~	~~remainder~~	...	...	...	~~0.05–0.20~~	~~0.05 max~~	...	...	...	~~0.05–0.20~~	~~0.01–0.35~~		~~4.8–5.8~~	~~0.30 max~~	...	...	...	...	...	...	...
C51080[E]	remainder	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20	0.01–0.35		4.8–5.8	0.30 max	...	...	...	...	...	...	...
~~C51100[E]~~	~~remainder~~	...	...	...	~~0.10 max~~	~~0.05 max~~	...	...	...	...	~~0.03–0.35~~		~~3.5–4.9~~	~~0.30 max~~	...	...	...	...	...	...	...
C51100[E]	remainder	...	...	...	0.10 max	0.05 max	...	...	...	...	0.03–0.35		3.5–4.9	0.30 max	...	...	...	...	...	...	...
C51180[E]	remainder	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20	0.01–0.35		3.5–4.9	0.30 max	...	...	...	...	...	...	...
C51980[E]	remainder	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20	0.01–0.35		5.5–7.0	0.30 max	...	...	...	...	...	...	...
C52100[E]	remainder	...	...	...	0.10 max	0.05 max	...	...	...	...	0.03–0.35		7.0–9.0	0.20 max	...	...	...	...	...	...	...
C52180[E]	remainder	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20	0.01–0.35		7.0–9.0	0.30 max	...	...	...	...	...	...	...
C52480[E]	remainder	...	...	...	0.05–0.20	0.05 max	...	...	...	0.05–0.20	0.01–0.35		9.0–11.0	0.30 max	...	...	...	...	...	...	...
C63800[E]	remainder[D]	2.5-3.1	...	0.25–0.55	0.20 max	0.05 max	...	0.10 max		0.20 max	...		...	0.8 max	...	...		1.5–2.1	...	...	...

TABLE 1 *Continued*

Copper Alloy UNS No.	Copper	Aluminum	Beryllium	Cobalt	Iron	Lead	Magnesium	Manganese	Nickel	Phosphorus	Tin	Zinc	Chromium	Zirconium	Silicon	Silver	Tellurium	Other
		Elements Composition, %																
~~C64725~~[E]	~~95.0 min~~[D]	...	...	...	~~0.25~~	~~0.01~~	~~0.20~~	...	~~1.3–2.7~~[G]	...	~~0.20–0.8~~	~~0.50–1.5~~	~~0.09~~	...	~~0.20–0.8~~	...	...	~~0.01 Calcium~~
C64725[E]	95.0 min[D]	...	...	...	0.25	0.01	0.20	...	1.3–2.7[G]	...	0.20–0.8	0.50–1.5	0.09	...	0.20–0.8	...	...	0.01 Calcium
~~C65400~~[E]	~~remainder~~[D]	...	...	...	...	~~0.05 max~~	...	...	...	...	~~1.2–1.9~~	~~0.50 max~~	~~0.01–0.12~~	...	~~2.7–3.4~~	...	...	...
C65400[E]	remainder[D]	...	...	...	...	0.05 max	...	...	...	...	1.2–1.9	0.50 max	0.01–0.12	...	2.7–3.4	...	...	...
~~C68800~~[E]	~~remainder~~[D]	~~3.0–3.8~~[J]	...	~~0.25–0.55~~	~~0.20 max~~	~~0.05 max~~	...	...	...	...	...	~~21.3–24.1~~[J]	...	...	...	...	...	...
C68800[E]	remainder[D]	3.0–3.8[J]	...	0.25–0.55	0.20 max	0.05 max	...	...	...	...	...	21.3–24.1[J]	...	...	...	...	...	...
C70250[E]	remainder[D]	...	...	...	0.20 max	0.05 max	0.05–0.30	0.10 max	2.2–4.2[G]	...	...	1.0 max	...	...	0.25–1.2	...	...	...
C70260[E]	remainder[D]	...	...	...	...	...	...	...	1.0–3.0[G]	0.01 max	...	...	...	...	0.20–0.7	...	...	...
~~C70265~~[E]	~~remainder~~[D]	...	...	...	...	~~0.05 max~~	...	...	~~1.0–3.0~~[G]	~~0.01 max~~	~~0.05–0.8~~	~~0.30 max~~	...	...	~~0.20–0.7~~	...	...	...
C70265[E]	remainder[D]	...	...	...	...	0.05 max	...	...	1.0–3.0[G]	0.01 max	0.05–0.8	0.30 max	...	...	0.20–0.7	...	...	...
~~C70310~~[E]	~~remainder~~[D]	...	...	...	~~0.10~~	~~0.05~~	~~0.01~~	...	~~1.0–4.0~~[G]	~~0.05~~	~~1.0~~	~~2.0~~	...	~~0.005–0.05~~	~~0.08–1.0~~	~~0.02–0.50~~	...	...
C70310[E]	remainder[D]	...	...	...	0.10	0.05	0.01	...	1.0–4.0[G]	0.05	1.0	2.0	...	0.005–0.05	0.08–1.0	0.02–0.50	...	...
C70350[E]	remainder[D]	...	...	1.0–2.0	0.20 max	0.05 max	0.04 max	0.20 max	1.0–2.5	...	...	1.0 max	...	...	0.50–1.2	...	...	...
C75200[E]	63.0-66.5[D]	...	...	...	0.25 max	0.05 max	...	0.50 max	16.5–19.5[G]	...	...	remainder	...	...	...	...	...	...
C76200[E]	57.0-61.0[D]	...	...	...	0.25 max	0.09 max	...	0.50 max	11.0–13.5[G]	...	...	remainder	...	...	...	...	...	...

[A] Includes silver + tin + tellurium + selenium.
[B] Tellurium or selenium, or both.
[C] Copper + the sum of the named elements shall be 99.9 % min.
[D] Copper value includes silver.
[E] Copper + the sum of the named elements shall be 99.5 % min.
[F] Nickel + cobalt, 0.20 % min; nickel + iron +cobalt, 0.6 % max.
[G] Includes cobalt.
[H] Copper + the sum of the named elements shall be 99.8 % min.
[I] Copper + the sum of the named elements shall be 99.7 % min.
[J] Aluminum + zinc = 25.1–27.1.

7.2 *Manufacture*—The product shall be produced by either hot- or cold-working operation. It shall be finished, unless otherwise specified, by such hot working, cold working, annealing, or heat treatment as may be necessary to meet the properties specified in Table 2.

7.3 *Edges*—The edges shall be slit or rolled edges as specified by the buyer. Slit edges shall be furnished unless otherwise specified or agreed upon between the purchaser and supplier or manufacturer.

8. Chemical Composition

8.1 The materials shall conform to the chemical compositional requirements in Table 1 for the corresponding Copper Alloy UNS Number designation specified in the ordering information.

8.2 These composition limits do not preclude the presence of other elements. Limits for unnamed elements may be established and analysis required by agreement between manufacturer or supplier and purchaser when required.

8.3 Copper, when given as the remainder, is determined as the difference between the sum of results for all elements determined and 100 %.

8.4 Zinc, when given as the remainder, is determined as the difference between the sum of results for all elements determined and 100 %.

8.4.1 For those copper alloys in which zinc is given as the remainder, copper may be determined by difference; however, when so determined, the result shall conform to the limits prescribed in Table 1.

8.5 When a chemical analysis is performed as specified in the ordering information, for the Copper Alloy UNS No. in Table 1, copper plus the sum of the named elements shall be as specified in the appropriate table footnote.

9. Temper

9.1 Tempers, as defined in Classification B601, available under this specification are as follows:

Temper Designation[A]

~~Standard~~ Standard	~~Former~~ Former
O61	annealed
H01	¼ hard
H02	½ hard
H03	¾ hard
H04	hard
H06	extra hard
H08	spring
H10	extra spring
TM00	AM
TM01	¼ HM
TM02	½ HM
TM03	¾ HM
TM04	HM
TM05	SHM
TM06	XHM
TM08	XHMS
TM10	SHMS

[A] All tempers are subject to product limitations, and the manufacturer should be consulted.

9.2 *Rolled (H) Material*—The standard tempers of rolled products are as designated in Table 2 with the prefix "H." Former designations and the standard designations as defined in Classification B601 are shown.

9.3 *Mill Hardened (TM) Material*—The standard tempers of mill hardened products are as designated in Table 2 with the prefix "TM." Former designations and the standard designations as defined in Classification B601 are shown.

NOTE 1—The properties for product in special or nonstandard tempers are subject to negotiation between the manufacturer and the purchaser.

10. Mechanical Property Requirements

10.1 Product ordered to this specification shall conform to the requirements prescribed in Table 2 for the alloy and temper specified in the contract or purchase order.

10.1.1 The ultimate tensile strength, 0.2 % offset minimum yield strength, and the minimum elongation properties shall be the basis for acceptance or rejection when tested in accordance with Test Methods E8/E8M.

10.1.1.1 Product ordered to this specification in inch-pound units shall be tested in accordance with Test Methods E8/E8M and shall conform to tensile strength, 0.2 % offset minimum yield strength, and minimum elongation requirements prescribed in ksi units in Table 2.