**Designation: B 122/B 122M – ~~95~~01**

# Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar[1]

This standard is issued under the fixed designation B 122/B 122M; 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~~ establishes the requirements for copper-nickel-tin alloy, copper-nickel-zinc alloy (nickel silver), and copper-nickel alloy plate, sheet, strip, and rolled bar. The following alloys are covered:

| Copper Alloy UNS No.[2] | Previously Used Designation | Nominal Composition, % | | | | |
|---|---|---|---|---|---|---|
| | | Copper | Nickel | Zinc | Tin | Chro-mium |
| C70600 | ... | 90 | 10 | ... | ... | ... |
| C70620 | ... | 86 | 10 | ... | ... | ... |
| C71000 | 6 | 80 | 20 | ... | ... | ... |
| C71500 | 5 | 70 | 30 | ... | ... | ... |
| C71520 | ... | 65 | 31 | ... | ... | ... |
| C72200 | ... | 85 | 15 | ... | ... | 0.5 |
| C72500 | ... | 89 | 9 | ... | 2 | ... |
| C73500 | 1 | 72 | 18 | 10 | ... | ... |
| C74000 | 9 | 70 | 10 | 20 | ... | ... |
| C74500 | 3 | 65 | 10 | 24 | ... | ... |
| C75200 | 2 | 65 | 18 | 17 | ... | ... |
| C76200 | 8 | 59 | 12 | 29 | ... | ... |
| C77000 | 4 | 55 | 18 | 27 | ... | ... |

[1] This specification is under the jurisdiction of ASTM 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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***A Summary of Changes section appears at the end of this standard.**

NOTE 1—Plates of copper-nickel alloy Copper Alloy UNS Nos. C70600, C70620, C71500, C71520, and C72200 for use as tube plates in surface condensers and heat exchangers are covered by Specification B 171/B 171M.

1.2 The values stated in either inch-pound units of SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system shall be used ~~in~~ independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.2.1 When the product is ordered in inch-pound units, the inch-pound units are to be regarded as the standard except grain size is always specified in millimeteres.

1.2.2 When the product is ordered in SI units, the SI units are to be regarded as the standard.

## 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 171/B 171M Specification for Copper-Alloy Plate and Sheet for Pressure Vessels, Condensers, and Heat Exchangers[3]

B 248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar[3]

B ~~601 Practice~~ 248M Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar (Metric)[3]

B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast[3]

B 846 Terminology for Copper and Copper Alloys[3]

E 8 Test Methods for Tension Testing of Metallic Materials[4]

E 8M Test Methods for Tension Testing of Metallic Materials [Metric][4]

E 112 Test Methods for Determining Average Grain Size[4]

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[6]

E 527 Practice for Numbering Metals and Alloys (UNS)[7]

## 3. ~~Ordering Information~~

~~3.1 Orders for material under this specification should include the~~General Requirements

3.1 The following ~~information:~~

~~3.1.1 Alloy number (Section 1),~~

~~3.1.1.1 Whether the alloy ordered will be used in applications requiring it to be welded (see Table 1, Footnote B),~~

~~3.1.2 Temper (Section 5),~~

~~3.1.3 Dimensions: thickness~~ sections of Specification B 248 constitute a part of this specification:

3.1.1 Terminology—Definitions,

3.1.2 Materials and ~~width (see 9.2~~ Manufacturing,

3.1.3 Workmanship, Finish, and ~~9.3),~~

~~3.1.4 Type~~ Appearance,

3.1.4 Sampling—except for chemical analysis,

3.1.5 Number of ~~edge, if required: slit, sheared, sawed, square corners, rounded corners, rounded edges, or full rounded edges (see 9.6),~~

~~3.1.5 How furnished: flat or rolls,~~

~~3.1.6 Length (see 9.4), and~~

~~3.1.7 Weight: total~~ Tests and Retests,

3.1.6 Specimen Preparation,

3.1.7 Test Methods—except for ~~each size.~~

~~3.1.8 ASTM Specification B 122/B 122M, year~~ chemical analysis,

3.1.8 Significance of Numerical Limits,

3.1.9 Insupection,

3.1.10 Rejection and Rehearing,

3.1.11 Certification,

3.1.12 Test Reports (Mill),

[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] *Annual Book of ASTM Standards*, Vol 0~~1~~3.01.

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

[6] *Annual Book of ASTM Standards*, Vol 03.06.

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

**TABLE 1 4 ChemApproxicmatte Rockwequill Hardnemess of Annealed Matserial**

| Copper Alloy UNS No. | | | | | Composition, % |
|---|---|---|---|---|---|
| Temper Alloy UNS No. | | | | | Approximate Rockwell Hardness[A] |
| Copper, incl Silver | Nickel, incl Cobalt | Lead, max | Iron, max | Manganese, m30-T | |
| Standard Designation | Nominal Grain Size, mm | B Scale | F Scale | Superficial 30-T | |
| Copper Alloy UNS No. C70600 axnd C70620 | | | | | |
| Copper Alloy UNS No. C70600 and C70620 | | | | | |
| OS035 | Zinc | Tin | Chro-mium | Other Named Elements | |
| OS035 | 0.035 | 10–27 | 55–72 | 15–34 | |
| C70600 | remainder | 9.0–11.0[A] | 0.05B | 1.0–1.8 | 45 |
| OS015 | 0.015 | 16–48 | 65–83 | 25–1.8 | 45 |
| | | 1.000 | | | |
| Copper Alloy UNS No. C71000 | | | | | |
| OS035 | 1.0B max | ... | ... | B | |
| OS035 | 0.035 | 18–35 | 67–76 | 28–40 | |
| C71000 | remainder | 19.0–23.0 | 0.05[B] | 1.0 max | –55 |
| OS015 | 0.015 | 35–58 | 76–90 | 40 max | –55 |
| | | 1.00 and C71520 | | | |
| Copper Alloy UNS No. C71500 and C71520 | | | | | |
| OS035 | 1.0B max | ... | ... | B | |
| OS035 | 0.035 | 23–45 | 70–85 | 31–46 | |
| C71500 | remainder | 29.0–33.0[A] | 0.05[B] | 0.40–1.0 | 58 |
| OS015 | 0.015 | 37–63 | 74–93 | 40–1.0 | 58 |
| | | 1.00 | | | |
| Copper Alloy UNS No. C72200 | | | | | |
| OS035 | 1.0B max | ... | ... | B | |
| OS035 | 0.035 | 14–31 | ... | 24–36 | |
| C72200 | remainder | 15.0–18.0 | 0.05[B] | 0.50–1.0 | |
| OS015 | 0.015 | 18–42 | ... | 26–41.0 | |
| | | 1.00 | | | |
| Copper Alloy UNS No. C72500 | | | | | |
| OS035 | 1.0B | ... | 0.30–0.70 | B | |
| OS035 | 0.035 | 24–39 | 70–81 | 32–42 | |
| C72500 | remainder | 8.5–10.5 | 0.05 | 0.6 | 41–58 |
| OS015 | 0.015 | 37–61 | 78–92 | 0.6 | 41–58 |
| | | 0.2 C73500 | | | |
| Copper Alloy UNS No. C73500 | | | | | |
| OS035 | 0.5 max | 1.8–2.8 | ... | ... | |
| OS035 | 0.035 | 20–35 | 70–80 | 29–40 | |
| C73500 | 70.5–73.5 | 16.5–19.5 | 0.10 | 0.25 max | 3 |
| OS015 | 0.015 | 28–55 | 76–90 | 34–5 max | 3 |
| | | 0.5 C74000 | | | |
| Copper Alloy UNS No. C74000 | | | | | |
| OS070 | remainder | ... | ... | ... | |
| OS070 | 0.070 | 5–20 | ... | ... | |
| C74000 | 69.0–73.5 | 9.0–11.0 | 0.10 | 0.25 max | .. |
| OS035 | 0.035 | 20–40 | ... | .25 max | .. |
| 0.50 | remainder | ... | ... | ... | |
| OS015 | 0.015 | 35–55 | ... | ... | |
| | | C74500 | | | |
| Copper Alloy UNS No. C74500 | | | | | |
| 63.5–66.5 | 9.0–11.0 | 0.10 | 0.25 max | 26–36 | |
| OS070 | 0.070 | 15–30 | 63–73 | 26–36 | |
| OS0.50 | remainder | ... | ... | ... | |
| OS035 | 0.035 | 23–41 | 70–80 | 31–44 | |
| C75200 | 63.5–66.5 | 16.5–19.5 | 0.05 | 044–56 | |
| OS015 | 0.015 | 41–59 | 80–90 | 44–56 | |
| Copper Alloy UNS No.25 max200 | | | | | |
| Copper Alloy UNS No. C75200 | | | | | |
| OS070 | 0.50 | remainder | ... | ...32–43 | |
| OS070 | 0.070 | 25–40 | 70–80 | 32–43 | |
| OS035 | ...035 | 35–55 | 75–88 | 40–53 | |
| OS035 | 0.035 | 35–55 | 75–88 | 40–53 | |
| C76200 | 57.0–61.0 | 11.0–13.5 | 0.10 | 046–64 | |
| OS015 | 0.015 | 45–70 | 83–93 | 46–64 | |
| Copper Alloy UNS No.200 | | | | | |
| Copper Alloy UNS No. C76200 | | | | | |
| OS035 max | 0.50 | remainder | ... | ... | |
| OS035 | 0.035 | 20–35 | 70–80 | ... | |
| | 0.015 | 28–55 | 76–90 | ... | |
| OS015 | 0.015 | 28–55 | 76–90 | ... | |
| | | C77000 | | | |
| Copper Alloy UNS No. C77000 | | | | | |
| OS070 | 53.5–56.5 | 16.5–19.5 | 0.05 | 35–46 | |
| OS070 | 0.070 | 29–45 | 72–83 | 35–46 | |
| OS0.25 max | 0.50 | remainder | ... | ...41–57 | |
| OS035 | 0.035 | 37–60 | 76–91 | 41–57 | |

3.1.13 Packaging and Package Marking, and

3.1.14 Supplementary Requirements,

3.2 In addition, when ~~material is purchased for agencies of the U.S. Government, it shall conform~~ a section with a title identical to ~~the Supplementary Requirements as defined~~ that referenced in ~~Specification B 248 when specified~~ 4.1 appears in ~~the contract or purchase order.~~
this specification, it contains additional requirements, which supplement those appearing in Specification B 248.

## 4. Terminology

4.1 *Definitions*— For standard terms related to copper and copper alloys, refer to Terminology B 846.

## 5. Ordering Information

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

5.1.1 ASTM designation and year of issue (B 122/B 122M–01),

5.1.2 Copper (alloy) UNS number designation,

5.1.3 Temper (Section 8),

5.1.4 Dimensions: thickness and width (see Section 12),

5.1.5 Type of edge, if required: slit, sheared, sawed, square corners, rounded corners, rounded edges, or full rounded edges,

5.1.6 How furnished: flat or rolls,

5.1.7 Length (see Section 12), and

5.1.8 Weight: total for each size.

5.2 In addition, when material is purchased for agencies of the U.S. government, it shall conform to the Supplementary Requirements as defined in Specification B 248 when specified in the contract or purchase order.

## 6. Materials and Manufacture

6.1 *Material*

6.1.1 The material of manufacture shall be a cast bar, cake, slab, and so forth of Copper Alloy UNS No. C70600, C70620, C71000, C71500, C71520, C72200, C72500, C73500, C74000, C74500, C75200, C76200, or C77000 as specified in the ordering information.

6.1.2 In the event that heat identification or traceability is required, the purchaser shall specify the details desired.

NOTE 2—Because of the discontinuous nature of the processing of castings into wrought products, it is not always practical to identify a specific casting analysis with a specific quantity of finished material.

6.2 *Manufacture*:

6.2.1 The product shall be manufactured by such hot-working, cold-working, and annealing processes as to produce a uniform wrought structure in the finished product.

6.2.2 The product shall be hot or cold worked to the finished size and subsequently annealed, when required, to meet the temper properties specified in the ordering information.

6.2.3 *Edges*—Slit edges shall be furnished unless otherwise specified in the contract or purchase order.

## 7. Chemical Composition

~~4~~7.1 The material shall conform to the chemical composition prescribed in Table 1.

~~4~~7.2 These specification limits do not preclude the presence of other elements. Limits may be established for unnamed elements by agreement between manufacturer or supplier and purchaser.

~~4~~7.2.1 For copper alloys for which copper is specified as a remainder, copper may be taken as the difference between the sum of all the elements analyzed and 100 %. When all the elements in Table 1 are analyzed, their sum shall be as follows:

| ~~Copper Alloy UNS No.~~ Copper Alloy UNS No. | ~~Copper plus Named Elements, % min~~ Copper Plus Named Elements, % min |
|---|---|
| C70600 | 99.5 |
| C70620 | 99.5 |
| C71000 | 99.5 |
| C71500 | 99.5 |
| ~~C72200~~ | ~~99.5~~ |
| C71520 | 99.5 |
| C72200 | 99.8 |
| C72500 | 99.8 |

~~4~~7.2.2 For copper alloys for which zinc is specified as a remainder, either copper or zinc may be taken as the difference between the sum of all elements analyzed and 100 %. When all elements in Table 1 are analyzed, their sum shall be as follows:

**TABLE 1 Chemical Requirements**

| Copper Alloy UNS No. | Composition, % | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Copper, incl Silver | Nickel, incl Cobalt | Lead, max | Iron, max | Manganese, max | Zinc | Tin | Chromium | Other Named Elements |
| C70600 | remainder | 9.0–11.0[A] | 0.05[B] | 1.0–1.8 | 1.0 | 1.0[B] max | ... | ... | [B] |
| C70620 | 86.5 min | 9.0–11.0 | 0.02 | 1.0–1.8 | 1.0 | 0.50 max | ... | ... | [C] |
| C71000 | remainder | 19.0–23.0 | 0.05[B] | 1.0 max | 1.0 | 1.0[B] max | ... | ... | [B] |
| C71500 | remainder | 29.0–33.0[A] | 0.05[B] | 0.40–1.0 | 1.0 | 1.0[B] max | ... | ... | [B] |
| C71520 | 65.0 min | 28.0–33.0 | 0.02 | 0.40–1.0 | 1.0 | 0.50 max | ... | ... | [C] |
| C72200 | remainder | 15.0–18.0 | 0.05[B] | 0.50–1.0 | 1.0 | 1.0[B] | ... | 0.30–0.70 | [B] |
| C72500 | remainder | 8.5–10.5 | 0.05 | 0.6 | 0.2 | 0.5 max | 1.8–2.8 | ... | [D] |
| C73500 | 70.5–73.5 | 16.5–19.5 | 0.10 | 0.25 max | 0.50 | remainder | ... | ... | ... |
| C74000 | 69.0–73.5 | 9.0–11.0 | 0.10 | 0.25 max | 0.50 | remainder | ... | ... | ... |
| C74500 | 63.5–66.5 | 9.0–11.0 | 0.10 | 0.25 max | 0.50 | remainder | ... | ... | ... |
| C75200 | 63.5–66.5 | 16.5–19.5 | 0.05 | 0.25 max | 0.50 | remainder | ... | ... | ... |
| C76200 | 57.0–61.0 | 11.0–13.5 | 0.10 | 0.25 max | 0.50 | remainder | ... | ... | ... |
| C77000 | 53.5–56.5 | 16.5–19.5 | 0.05 | 0.25 max | 0.50 | remainder | ... | ... | ... |

[A] Copper plus elements with specific limits, 99.5 % min.
[B] When the product is for subsequent welding applications and so specified by the purchaser, zinc shall be 0.50 % max, lead 0.02 % max, phosphorus 0.02 % max, sulfur 0.02 % max, and carbon 0.05 % max.
[C] Phosphorus at 0.2 % max, sulfur at 0.02 % max, and carbon at 0.05 % max.
[D] Silicon and titanium each at 0.03 % max.

| ~~Copper Alloy UNS No.~~ Copper Alloy UNS No. | ~~Copper plus Named Elements, % min~~ Copper Plus Named Elements, % min |
|---|---|
| C73500 | 99.5 |
| C74000 | 99.5 |
| C74500 | 99.5 |
| C75200 | 99.5 |
| C76200 | 99.5 |
| C77000 | 99.5 |

## ~~5~~8. Temper

~~5~~8.1 *As Hot-Rolled (M20) ~~Material~~ Tempers*—The standard temper of sheet and plate produced by hot rolling and is as designated in Table 2.

~~5~~8.2 *Cold Rolled (H) ~~Material~~ Tempers*—The standard tempers of cold rolled ~~material~~ tempers are as designated in Table 2 with the prefix "H." Former designations and the standard designations as defined in Practice B 601 are shown. Special or nonstandard tempers are subject to negotiation between manufacturer and purchaser (See ~~3~~ 5.1.2).

~~5~~8.3 *Annealed Tempers*—The standard ~~temper is O60 (soft), as indicated in Table 2.~~

## ~~6. Mechanical Properties of Rolled Tempers~~

~~6.1 *Tensile Strength*:~~

~~6.1.1 Products ordered to this specification in inch-pound units shall conform to the tensile strength requirements prescribed in ksi units in Table 2.~~

~~6.1.2 Products ordered to this specification in SI units shall conform to the tensile strength requirements prescribed in MPa units [bracketed] in Table 2.~~

~~6.1.3 Acceptance or rejection based on mechanical properties shall depend only on the tensile strength.~~

~~6.1.4 The tension test specimens shall be taken so the longitudinal axis of the specimen is parallel to the direction of rolling.~~

**TABLE 2 Tensile Strength Requirements and Approximate Rockwell Hardness Values for Rolled Tempers**

NOTE 1—Plate is generally available in only the as hot–rolled (M20) tempers. Required properties for other tempers shall be agreed upon between manufacturer and purchaser at the time of placing the order.

| Temper Designation | | Tensile Strength, ksi[A] [MPa[B]] | | Approximate Rockwell Hardness[C,D] | | |
|---|---|---|---|---|---|---|
| Standard | Former | Min | Max | G Scale | B Scale | Superficial 30-T |
| | | Copper Alloy UNS No. C70600† and C70620 | | | | |
| M20 | as hot-rolled | 40 [275] | 62 [425] | ... | ... | ... |
| H01 | quarter hard | 51 [350] | 67 [460] | ... | 51–78 | 52–70 |
| H02 | half hard | 58 [400] | 72 [495] | ... | 66–81 | 61–72 |
| H04 | hard | 71 [490] | 83 [570] | ... | 76–86 | 67–74 |
| H06 | extra hard | 73 [505] | 85 [585] | ... | 80–88 | 71–77 |
| H08 | spring | 78 [540] | 88 [605] | ... | 83–91 | 72–78 |
| | | Copper Alloy UNS No. C71000 | | | | |
| M20 | as hot-rolled | 38 [260] | 56 [385] | ... | ... | ... |
| H01 | quarter hard | 47 [325] | 63 [435] | ... | 45–72 | 46–65 |
| H02 | half hard | 56 [385] | 70 [485] | ... | 64–78 | 59–69 |
| H04 | hard | 67 [460] | 79 [545] | ... | 76–84 | 67–73 |
| H06 | extra hard | 72 [495] | 84 [580] | ... | 79–87 | 69–75 |
| H08 | spring | 76 [525] | 87 [600] | ... | 82–88 | 71–75 |
| | | Copper Alloy UNS No. C71500 and C71520 | | | | |
| M20 | as hot-rolled | 45 [310] | 65 [450] | ... | ... | ... |
| H01 | quarter hard | 58 [400] | 72 [495] | ... | 67–81 | 61–71 |
| H02 | half hard | 66 [455] | 80 [550] | ... | 76–85 | 67–74 |
| H04 | hard | 75 [515] | 88 [605] | ... | 83–89 | 72–76 |
| H06 | extra hard | 80 [550] | 92 [635] | ... | 85–91 | 73–77 |
| H08 | spring | 84 [580] | 94 [650] | ... | 87–91 | 74–77 |
| | | Copper Alloy UNS No. C72200 | | | | |
| M20 | as hot-rolled | 42 [290] | 62 [425] | ... | ... | ... |
| H01 | quarter hard | 55 [380] | 67 [460] | ... | 63–78 | 58–70 |
| H02 | half hard | 58 [400] | 72 [495] | ... | 66–85 | 61–73 |
| H04 | hard | 71 [490] | 85 [585] | ... | 76–88 | 67–78 |
| H06 | extra hard | 73 [505] | 90 [620] | ... | 79–90 | 69–78 |
| H08 | spring | 78 [540] | 91 [625] | ... | 81–91 | 71–79 |
| | | Copper Alloy UNS No. C72500 | | | | |
| M20 | as hot-rolled | 50 [345] | 70 [485] | ... | ... | ... |
| H01 | quarter hard | 55 [380] | 75 [515] | ... | Up to 85 | Up to 72 |
| H02 | half hard | 65 [450] | 80 [550] | ... | 70–90 | 62–75 |
| H04 | hard | 75 [515] | 90 [620] | ... | 75–90 | 66–75 |
| H06 | extra hard | 80 [550] | 95 [655] | ... | 80–95 | 70–80 |
| H08 | spring | 85 [585] | 100 [690] | ... | 85–95 | 72–80 |
| H10 | extra spring | 90 [620] | 105 [725] | ... | 87–95 | 76–80 |
| H14 | super spring | 100 [690] | 125 [860] | ... | 92 and over | 78 and over |
| | | Copper Alloy UNS No. C73500 | | | | |
| M20 | as hot-rolled | 48 [330] | 63 [435] | ... | ... | ... |
| H01 | quarter hard | 56 [385] | 69 [475] | 20–47 | 66–80 | 60–70 |
| H02 | half hard | 63 [435] | 75 [515] | 38–53 | 75–84 | 67–73 |
| H04 | hard | 73 [505] | 84 [580] | 51–61 | 83–88 | 72–75 |
| H06 | extra hard | 79 [545] | 90 [620] | 57–65 | 86–90 | 74–76 |
| | | Copper Alloy UNS No. C74000 | | | | |
| M20 | as hot-rolled | 48 [330] | 63 [435] | ... | ... | ... |
| H01 | quarter hard | 55 [380] | 70 [485] | ... | 60–80 | ... |
| H02 | half hard | 63 [435] | 77 [530] | ... | 70–85 | ... |
| H04 | hard | 73 [505] | 87 [600] | ... | 79–91 | ... |
| H06 | extra hard | 79 [545] | 91 [625] | ... | 83–93 | ... |
| | | Copper Alloy UNS No. C74500 | | | | |
| M20 | as hot-rolled | 48 [330] | 65 [450] | ... | ... | ... |
| H01 | hard | 56 [385] | 73 [505] | ... | 51–80 | 50–70 |
| H02 | half hard | 67 [460] | 82 [565] | ... | 72–87 | 65–75 |
| H04 | hard | 80 [550] | 94 [650] | ... | 85–92 | 73–78 |
| H06 | extra hard | 89 [615] | 102 [700] | ... | 90–94 | 76–79 |
| H08 | spring | 95 [655] | 108 [740] | ... | 92–96 | 77–80 |
| | | Copper Alloy UNS No. C75200 | | | | |
| M20 | as hot-rolled | 52 [355] | 65 [450] | ... | ... | ... |
| H01 | quarter hard | 58 [400] | 72 [495] | ... | 50–75 | 49–67 |

**TABLE 2** *Continued*

| Temper Designation | | Tensile Strength, ksi[A] [MPa[B]] | | Approximate Rockwell Hardness[C,D] | | |
|---|---|---|---|---|---|---|
| Standard | Former | Min | Max | G Scale | B Scale | Superficial 30-T |
| H02 | half hard | 66 [455] | 80 [550] | ... | 68–82 | 62–72 |
| H04 | hard | 78 [540] | 91 [625] | ... | 80–90 | 70–76 |
| H06 | extra hard | 86 [595] | 98 [675] | ... | 87–94 | 74–79 |
| H08 | spring | 90 [620] | 101 [700] | ... | 89–96 | 75–80 |
| | | Copper Alloy UNS No. C76200 | | | | |
| M20 | as hot-rolled | 55 [380] | 75 [515] | ... | ... | ... |
| H01 | quarter hard | 65 [450] | 81 [560] | ... | 61–85 | 57–74 |
| H02 | half hard | 75 [515] | 91 [625] | ... | 78–91 | 69–77 |
| H04 | hard | 90 [620] | 105 [720] | ... | 90–95 | 76–79 |
| H06 | extra hard | 99 [685] | 114 [790] | ... | 94–98 | 79–81 |
| H08 | spring | 107 [740] | 122 [840] | ... | 97–100 | 80 and over |
| | | Copper Alloy UNS No. C77000 | | | | |
| M20 | as hot-rolled | 60 [415] | 80 [550] | ... | ... | ... |
| H01 | quarter hard | 69 [475] | 87 [600] | 23–62 | 70–88 | 63–75 |
| H02 | half hard | 78 [540] | 95 [655] | 51–69 | 81–92 | 71–78 |
| H04 | hard | 92 [635] | 109 [750] | 67–76 | 90–96 | 76–80 |
| H06 | extra hard | 102 [700] | 117 [810] | 73–80 | 95–99 | 79–82 |
| H08 | spring | 108 [740] | 123 [850] | 77–83 | 97–100 | 80 and over |

[A] ksi = 1000 psi.
[B] See Appendix X1.
[C] Rockwell hardness values apply as follows: The B and G scale hardness values apply to metal 0.020 in. (0.508 mm) and over in thickness, and the 30-T scale hardness values apply to metal 0.012 in. (0.305 mm) and over in thickness.
[D] Standard designation defined in Practice B 601.

~~**TABLE 2 Tensile Strength Requirements and Approximate Rockwell Hardness Values for Rolled Tempers**~~

~~NOTE 1—Plate is generally available in only the as hot-rolled (M20) tempers. Required properties for other~~ tempers ~~shall be agreed upon between manufacturer and purchaser at the time of placing the order.~~

| ~~Temper Designation~~ | | ~~Tensile Strength, ksi[A] (MPa[B])~~ | | ~~Approximate Rockwell Hardness[C,D]~~ | | |
|---|---|---|---|---|---|---|
| ~~Standard~~ | ~~Former~~ | ~~Min~~ | ~~Max~~ | ~~G Scale~~ | ~~B Scale~~ | ~~Superficial 30-T~~ |
| | | ~~Copper Alloy UNS No. C70600†~~ | | | | |
| ~~M20~~ | ~~as hot-rolled~~ | ~~40 [275]~~ | ~~62 [425]~~ | ~~...~~ | ~~...~~ | ~~...~~ |
| ~~H01~~ | ~~quarter hard~~ | ~~51 [350]~~ | ~~67 [460]~~ | ~~...~~ | ~~51–78~~ | ~~52–70~~ |
| ~~H02~~ | ~~half hard~~ | ~~58 [400]~~ | ~~72 [495]~~ | ~~...~~ | ~~66–81~~ | ~~61–72~~ |
| ~~H04~~ | ~~hard~~ | ~~71 [490]~~ | ~~83 [570]~~ | ~~...~~ | ~~76–86~~ | ~~67–74~~ |
| ~~H06~~ | ~~extra hard~~ | ~~73 [505]~~ | ~~85 [585]~~ | ~~...~~ | ~~80–88~~ | ~~71–77~~ |
| ~~H08~~ | ~~spring~~ | ~~78 [540]~~ | ~~88 [605]~~ | ~~...~~ | ~~83–91~~ | ~~72–78~~ |
| | | ~~Copper Alloy UNS No. C71000~~ | | | | |
| ~~M20~~ | ~~as hot-rolled~~ | ~~38 [260]~~ | ~~56 [385]~~ | ~~...~~ | ~~...~~ | ~~...~~ |
| ~~H01~~ | ~~quarter hard~~ | ~~47 [325]~~ | ~~63 [435]~~ | ~~...~~ | ~~45–72~~ | ~~46–65~~ |
| ~~H02~~ | ~~half hard~~ | ~~56 [385]~~ | ~~70 [485]~~ | ~~...~~ | ~~64–78~~ | ~~59–69~~ |
| ~~H04~~ | ~~hard~~ | ~~67 [460]~~ | ~~79 [545]~~ | ~~...~~ | ~~76–84~~ | ~~67–73~~ |
| ~~H06~~ | ~~extra hard~~ | ~~72 [495]~~ | ~~84 [580]~~ | ~~...~~ | ~~79–87~~ | ~~69–75~~ |
| ~~H08~~ | ~~spring~~ | ~~76 [525]~~ | ~~87 [600]~~ | ~~...~~ | ~~82–88~~ | ~~71–75~~ |
| | | ~~Copper Alloy UNS No. C71500~~ | | | | |
| ~~M20~~ | ~~as hot-rolled~~ | ~~45 [310]~~ | ~~65 [450]~~ | ~~...~~ | ~~...~~ | ~~...~~ |
| ~~H01~~ | ~~quarter hard~~ | ~~58 [400]~~ | ~~72 [495]~~ | ~~...~~ | ~~67–81~~ | ~~61–71~~ |
| ~~H02~~ | ~~half hard~~ | ~~66 [455]~~ | ~~80 [550]~~ | ~~...~~ | ~~76–85~~ | ~~67–74~~ |
| ~~H04~~ | ~~hard~~ | ~~75 [515]~~ | ~~88 [605]~~ | ~~...~~ | ~~83–89~~ | ~~72–76~~ |
| ~~H06~~ | ~~extra hard~~ | ~~80 [550]~~ | ~~92 [635]~~ | ~~...~~ | ~~85–91~~ | ~~73–77~~ |
| ~~H08~~ | ~~spring~~ | ~~84 [580]~~ | ~~94 [650]~~ | ~~...~~ | ~~87–91~~ | ~~74–77~~ |
| | | ~~Copper Alloy UNS No. C72200~~ | | | | |
| ~~M20~~ | ~~as hot-rolled~~ | ~~42 [290]~~ | ~~62 [425]~~ | ~~...~~ | ~~...~~ | ~~...~~ |
| ~~H01~~ | ~~quarter hard~~ | ~~55 [380]~~ | ~~67 [460]~~ | ~~...~~ | ~~63–78~~ | ~~58–70~~ |
| ~~H02~~ | ~~half hard~~ | ~~58 [400]~~ | ~~72 [495]~~ | ~~...~~ | ~~66–85~~ | ~~61–73~~ |
| ~~H04~~ | ~~hard~~ | ~~71 [490]~~ | ~~85 [585]~~ | ~~...~~ | ~~76–88~~ | ~~67–78~~ |
| ~~H06~~ | ~~extra hard~~ | ~~73 [505]~~ | ~~90 [620]~~ | ~~...~~ | ~~79–90~~ | ~~69–78~~ |
| ~~H08~~ | ~~spring~~ | ~~78 [540]~~ | ~~91 [625]~~ | ~~...~~ | ~~81–91~~ | ~~71–79~~ |
| | | ~~Copper Alloy UNS No. C72500~~ | | | | |

**TABLE 2** *Continued*

| Temper Designation | | Tensile Strength, ksi[A] (MPa[B]) | | Approximate Rockwell Hardness[C,D] | | |
|---|---|---|---|---|---|---|
| Standard | Former | Min | Max | G Scale | B Scale | Superficial 30-T |
| M20 | as hot-rolled | 50 [345] | 70 [485] | ... | ... | ... |
| H01 | quarter hard | 55 [380] | 75 [515] | ... | Up to 85 | Up to 72 |
| H02 | half hard | 65 [450] | 80 [550] | ... | 70–90 | 62–75 |
| H04 | hard | 75 [515] | 90 [620] | ... | 75–90 | 66–75 |
| H06 | extra hard | 80 [550] | 95 [655] | ... | 80–95 | 70–80 |
| H08 | spring | 85 [585] | 100 [690] | ... | 85–95 | 72–80 |
| H10 | extra spring | 90 [620] | 105 [725] | ... | 87–95 | 76–80 |
| H14 | super spring | 100 [690] | 125 [860] | ... | 92 and over | 78 and over |
| | | Copper Alloy UNS No. C73500 | | | | |
| M20 | as hot-rolled | 48 [330] | 63 [435] | ... | ... | ... |
| H01 | quarter hard | 56 [385] | 69 [475] | 20–47 | 66–80 | 60–70 |
| H02 | half hard | 63 [435] | 75 [515] | 38–53 | 75–84 | 67–73 |
| H04 | hard | 73 [505] | 84 [580] | 51–61 | 83–88 | 72–75 |
| H06 | extra hard | 79 [545] | 90 [620] | 57–65 | 86–90 | 74–76 |
| | | Copper Alloy UNS No. C74000 | | | | |
| M20 | as hot-rolled | 48 [330] | 63 [435] | ... | ... | ... |
| H01 | quarter hard | 55 [380] | 70 [485] | ... | 60–80 | ... |
| H02 | half hard | 63 [435] | 77 [530] | ... | 70–85 | ... |
| H04 | hard | 73 [505] | 87 [600] | ... | 79–91 | ... |
| H06 | extra hard | 79 [545] | 91 [625] | ... | 83–93 | ... |
| | | Copper Alloy UNS No. C74500 | | | | |
| M20 | as hot-rolled | 48 [330] | 65 [450] | ... | ... | ... |
| H01 | hard | 56 [385] | 73 [505] | ... | 51–80 | 50–70 |
| H02 | half hard | 67 [460] | 82 [565] | ... | 72–87 | 65–75 |
| H04 | hard | 80 [550] | 94 [650] | ... | 85–92 | 73–78 |
| H06 | extra hard | 89 [615] | 102 [700] | ... | 90–94 | 76–79 |
| H08 | spring | 95 [655] | 108 [740] | ... | 92–96 | 77–80 |

**TABLE 2** *Continued*

| Temper Designation | | Tensile Strength, ksi[A] (MPa[B]) | | Approximate Rockwell Hardness[C,D] | | |
|---|---|---|---|---|---|---|
| Standard | Former | Min | Max | G Scale | B Scale | Superficial 30-T |
| | | Copper Alloy UNS No. C75200 | | | | |
| M20 | as hot rolled | 52 [355] | 65 [450] | ... | ... | ... |
| H01 | quarter hard | 58 [400] | 72 [495] | ... | 50–75 | 49–67 |
| H02 | half hard | 66 [455] | 80 [550] | ... | 68–82 | 62–72 |
| H04 | hard | 78 [540] | 91 [625] | ... | 80–90 | 70–76 |
| H06 | extra hard | 86 [595] | 98 [675] | ... | 87–94 | 74–79 |
| H08 | spring | 90 [620] | 101 [700] | ... | 89–96 | 75–80 |
| | | Copper Alloy UNS No. C76200 | | | | |
| M20 | as hot rolled | 55 [380] | 75 [515] | ... | ... | ... |
| H01 | quarter hard | 65 [450] | 81 [560] | ... | 61–85 | 57–74 |
| H02 | half hard | 75 [515] | 91 [625] | ... | 78–91 | 69–77 |
| H04 | hard | 90 [620] | 105 [720] | ... | 90–95 | 76–79 |
| H06 | extra hard | 99 [685] | 114 [790] | ... | 94–98 | 79–81 |
| H08 | spring | 107 [740] | 122 [840] | ... | 97–100 | 80 and over |
| | | Copper Alloy UNS No. C77000 | | | | |
| M20 | as hot rolled | 60 [415] | 80 [550] | ... | ... | ... |
| H01 | quarter hard | 69 [475] | 87 [600] | 23–62 | 70–88 | 63–75 |
| H02 | half hard | 78 [540] | 95 [655] | 51–69 | 81–92 | 71–78 |
| H04 | hard | 92 [635] | 109 [750] | 67–76 | 90–96 | 76–80 |
| H06 | extra hard | 102 [700] | 117 [810] | 73–80 | 95–99 | 79–82 |
| H08 | spring | 108 [740] | 123 [850] | 77–83 | 97–100 | 80 and over |

[A] ksi = 1000 psi.
[B] See Appendix.
[C] Rockwell hardness values apply as follows: The B and G scale hardness values apply to metal 0.020 in. (0.508 mm) and over in thickness, and the 30-T scale hardness values apply to metal 0.012 in. (0.305 mm) and over in thickness.
[D] Standard designation defined in Practice B 601.

## 7. Grain Size Requirements of Annealed Tempers

7.1 Grain size shall be the standard test for material of all thicknesses in annealed tempers, and acceptance or rejection shall depend on the grain sizes. The average grain size of each of two samples of annealed material as determined on a plane parallel to the surface of the material shall be within the limits prescribed in Table 3.

## 8. Rockwell Hardness

8.1 Rockwell hardness tests offer a quick and convenient method of checking copper-nickel-zinc and copper-nickel alloys of any temper for general conformity to the requirements for tensile strength or grain size. The approximate Rockwell hardness values for the rolled tempers are given indicated in Table 2 and those for the annealed tempers of material 0.015 in. and over in thickness are given in Table 4 3, for general information and assistance in testing. .

## 9. ĐGrain Size for Annealed Tempers

9.1 Grain size shall be the standard requirement for all products in the annealed tempers.

9.2 Acceptance or rejection based upon grain size shall depend only on the average grain size of test specimens taken from each of two sampling portions and each specimen shall be within the limits prescribed in Table 3 when determined in accordance with Test Methods E 112.

9.3 Grain size shall be determined on a plane parallel to the flat surfaces of the product.

## 10. Mechanical Property Requirements

10.1 *Tensile Strength Requirements* :

10.1.1 Products ordered to this specification in inch-pound units shall be tested in accordance with Test Methods E 8 and shall conform to tensile strength requirements prescribed in ksi units in Table 2.

10.1.2 Products ordered to this specification in SI units shall be tested in accordance with Test Methods E 8M, and shall conform to tensile strength requirements prescribed in MPa units in Table 2.

10.1.3 Acceptance or rejection based on mechanical properties shall depend only on the tensile strength.

10.1.4 The tension test specimens shall be taken so the longitudinal axis of the specimens is parallel to direction of rolling.

10.2 *Rockwell Hardness*:

10.2.1 The approximate Rockwell hardness values given in Tables 2 and 4 are for general information and assistance in testing and shall not be used as a basis for product rejection.

NOTE 3—The Rockwell hardness test offers a quick and convenient method of checking for general conformity to the specification requirements for temper, tensile strength, and grain size.

**TABLE 4 3 AppGroximatin Size Rockwell Haquirdnementss o for Annealed Material**

| TemCopper Alloy UNS No. | AStandard Tempperox Desimgnate Riockwell Hardness[A] | Grain Size, mm | | | |
|---|---|---|---|---|---|
| | | Standard DesNomignationl | NomMinal Grain Size, mm | B ScMale | F Scale Superficial 30-T |
| | Copper Alloy UNS No. C70600 | | | | |
| | Copper Alloy UNS No. C70600x | | | | |
| OS035 | 0.035 | 10–27 | 55–72 | 15–34 | |
| C70600, C70620, C71000, | | | | | |
| OS 015 | 0.015 | 16–48 | 65–83 | 25–45 | |
| C71500, C71520, | | | | 25–45 | |
| C72200, C72500, | | | | | |
| | Copper Alloy UNS No. C71000 | | | | |
| | Copper Alloy UNS No. C71000 | | | | |
| OS0 35 | 0.035 | 18–35 | 67–76 | 28–40 | |
| C73500, and | 0.035 | 18–35 | 67–76 | 28–40 | |
| OS015 | 0.015 | 35–58 | 76–90 | 40–55 | |
| | Copper Alloy UNS No. C71500 | | | | |
| OS035 | 0.035 | 23–45 | 70–8531–46 | | |
| OS035 | 0.035 | 0.025 | 0.050 | | |
| OS015 | 0.015 | 37–63 | 74–93 | 40–58 | |
| | Copper Alloy UNS No. C72200 | | | | |
| OS035 | 0.035 | 14–31 | ... | 24–36 | |
| OS015 | 0.015 | 18–42 | ... | 26–41 | |
| | Copper Alloy UNS No. C72500 | | | | |
| OS035 | 0.035 | 24–39 | 70–81 | 32–42 | |
| OS015 | 0.015 | 37–61 | 78–92 | 41–58 | |
| | Copper Alloy UNS No. C73500 | | | | |
| OS035 | 0.035 | 20–35 | 70–80 | 29–40 | |
| OS015 | 0.015 | 28–55 | 76–90 | 34–53 | |
| | Copper Alloy UNS No. C74000 | | | | |
| OS070 | 0.070 | 5–20 | ... | ... | |
| OS035 | 0.035 | 20–40 | ... | ... | |
| OS015 | 0.015 | 35–55 | .. | ... | |
| OS015 | 0.015 | [B] | 0.. | ... | |
| | Copper Alloy UNS No. C74500 | | | | |
| | Copper Alloy UNS No. C745025 | | | | |
| OS070 | 0.070 | 15–30 | 63–73 | 26–36 | |
| OS035 | 0.035 | 23–41 | 70–80 | 31–44 | |
| C74000, C74500, | 0.035 | 23–41 | 70–80 | 31–44 | |
| OS015 | 0.015 | 41–59 | 80–90 | 44–56 | |
| | Copper Alloy UNS No. C75200 | | | | |
| OS070 | 0.070 | 25–40 | 70–8032–43 | | |
| OS070 | 0.070 | 0.050 | 0.100 | | |
| OS03 5 | 0.035 | 35–55 | 75–88 | 40–53 | |
| C75200, and | 0.035 | 35–55 | 75–88 | 40–53 | |
| OS015 | 0.015 | 45–70 | 83–93 | 46–64 | |
| | Copper Alloy UNS No. C76200 | | | | |
| OS035 | 0.035 | 20–35 | 70–80 | ... | |
| OS035 | 0.035 | 0.025 | 0–80 | .050 | |
| OS 015 | 0.015 | 28–55 | 76–90 | ... | |
| C77000 | 0.015 | 28–55 | 76–90 | ... | |
| | Copper Alloy UNS No. C77000 | | | | |
| OS070 | 0.070 | 29–45 | 72–83 | 35–46 | |
| OS035 | 0.035 | 37–60 | 76–91 | 41–57 | |
| OS015 | 0.015 | 47–73 | 84–98 | 47–65 | |
| OS015 | 0.015 | [B] | 84–98 | 47–60.025 | |

[A] Rockwell hStandardn dess-vignalues apply as ftiollows: The B an d F scale hardfiness vd in Pralucticses app B 601.

[B] Alythough no metal 0.020in. (0.508imum) grain ed ov size is requinred, thickness mandthe 30-T seriale shardness valul bes app fully to m recrystal 0.015lin. (0.381 mm) and ovzer in thicknessd.

## 11. Other Requirements

11.1 *Purchases for U.S. Government Agencies*—When identified in the contract or purchase order, product purchased for agencies of the U.S. government shall conform to the special government requirements stipulated in the supplemental requirements given in Specification B 248.

## 12. Dimensions, Mass, and Permissible Variations

912.1 The inch-pound dimensions and tolerances for products covered by this specification shall be as prescribed in the current edition of Specification B 248, and the SI dimensions and tolerances covered by this specification shall be as prescribed in the

current edition of Specification ~~B 248M, with particular reference to Section 5 and the following tables of that specification:~~

~~9.2~~ B 248M.

12.2 *Thickness*~~—See 4.2, Table 1 and Table 2. when~~—When special thickness tolerances for Copper Alloy UNS No. C72500 are required, see ~~5.2.3 and Table 3.~~

~~9.3~~ appropriate table.

12.3 *Width*:

~~9~~

12.3.1 *Slit Metal and Slit Metal with Rolled Edges*~~—See 5.3, Table 4.~~

~~9.3.2~~ .

12.3.2 *Square-Sheared Metal*~~—See 5.3, Table 5.~~

~~9.3.3~~ .

12.3.3 *Sawed Metal*~~—See 5.3, Table 6.~~

~~9.4~~ .

12.4 *Length*:

~~9~~

12.4.1 *Specific and Stock Lengths With and Without Ends*~~—See Section 5.4, Table 7.~~

~~9.4.2~~ .

12.4.2 *Schedule of Lengths (Specific and Stock) with Ends*~~—See 5.4, Table 8.~~

~~9.4.3~~ .

12.4.3 *Length Tolerances for Square-Sheared Metal*~~—See 5.4, Table 9.~~

~~9.4.4~~ .

12.4.4 *Length Tolerances for Sawed Metal*~~— See 5.4, Table 10.~~

~~9.5~~ .

12.5 *Straightness*:

~~9~~

12.5.1 *Slit Metal or Slit Metal Either Straightened or Edge-Rolled*~~—See 5.5, Table 11.~~

~~9.5.2~~ .

12.5.2 *Square-Sheared Metal*~~—See 5.5, Table 12.~~

~~9.5.3~~ .

12.5.3 *Sawed Metal*~~—See 5.5, Table 13.~~

~~9.6~~ .

12.6 *Edges*~~—See 5.6.~~

~~9.6.1~~ .

12.6.1 *Square Edges*~~—See 5.6.1, Table 14.~~

~~9.6.2~~ .

12.6.2 *Rounded Corners*~~—See 5.6.2, Table 15.~~

~~9.6.3~~ .

12.6.3 *Rounded Edges*~~—See 5.6.3, Table 16.~~

~~9.6.4~~ .

12.6.4 *Full-Rounded Edges*~~—See 5.6.4, Table 17.~~

~~**10. General Requirements**~~

~~10.1 Products furnished under this specification~~.

**13. Workmanship, Finish and Appearance**

13.1 The product shall be free of defects, but blemishes of a nature that does not interfere with the intended application are acceptable.

**14. Sampling**

14.1 *Chemical Analysis*:

14.1.1 The sample for chemical analysis shall be taken from the pieces selected and combined into one composite sample in ~~inch-pound units~~ accordance with Practice E 255 for product in its final form. The minimum weight of the composite sample shall be 150 g.

14.1.2 Instead of sampling in accordance with Practice E 255, the manufacturer shall have the option of taking samples at the time the castings are poured or by taking samples from the semifinished product.

14.1.2.1 When composition of the material has been determined during the course of manufacture, sampling of the finished product by the manufacturer is not required.

14.1.3 The number of samples to be taken for determination of chemical composition shall be as follows:

14.1.3.1 When sampled at the ~~applicable requirements~~ time the castings are poured, at least one sample shall be taken for each

group of castings poured from the ~~current edition~~ same source of ~~Specification B 248.~~

~~10.2 Products furnished under this specification in SI Units~~ molten metal.

14.1.3.2 When sampled from the semifinished product, at least one sample shall ~~conform~~ be taken to represent each 10 000 lb, or fraction thereof, except that not more than one sample shall be required per piece.

14.1.3.3 Only one sample need be taken from the ~~applicable requirements~~ semifinished product of one cast bar from a single furnace melt charge continuously processed.

14.1.3.4 When the material is cast in the horizontal continuous casting mode, at least one sample will be taken to represent the~~d~~ composition of ~~S~~ the holder per cast coil.

## 15. Test Methods

15.1 *Chemical Analysis*:

15.1.1 Chemical composition shall be determined, in case of disagreement, by the following appropriate methods:

| Element | Test Method |
|---|---|
| Copper | E 478 |
| ~~Nickel~~ | ~~E 478 (gratic)~~ |
| Nickel | E 478 (gravimetric) |
| Chromium | E 478 (AA) |
| ~~Tin B~~ | ~~248M (photometric)~~ |
| Tin | E 478 (photometric) |
| Zinc | E 478 (AA) |

15.1.2 Test methods(s) used for the determination of other element(s) required by contractual or purchase order agreement shall be as agreed upon between the manufacturer and the purchaser.

## 11~~6~~. Keywords

11~~6~~.1 copper-nickel plate; copper-nickel rolled bar; copper-nickel sheet; copper-nickel strip; copper-nickel-tin plate; copper-nickel-tin rolled bar; copper-nickel-tin sheet; copper-nickel-tin strip; copper-nickel-zinc plate; copper-nickel-zinc rolled bar; copper-nickel-zinc sheet; copper-nickel-zinc strip

## 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 which 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 122/B 122M-95) that may impact the use of this standard.

(*1*) Changed scope (covers).

(*2*) Added terminology section.

(*3*) Changed ordering information to match outline of form.

(*4*) Added section on materials and manufacturing.

(*5*) Revised sections on grain size and mechanical properties.

(*6*) Added section on other requirements.

(*7*) Added section on sampling.

(*8*) Added alloys C70620 and C71520 to this standard in Section 1 (Scope) and Tables 1-4.