



Designation: B 122/B122M – 95

Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar¹

This standard is issued under the fixed designation B 122/B122M; 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 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:²

Copper Alloy UNS No. ²	Previously Used Designation	Nominal Composition, %				
		Copper	Nickel	Zinc	Tin	Chro- mium
C70600	...	90	10	...	...	...
C71000	6	80	20	...	...	...
C71500	5	70	30	...	...	...
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	...	...

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

1.2 The values stated in either inch-pound units or 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 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 millimeters.

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

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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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.

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 Specification for Copper-Alloy Plate and Sheet for Pressure Vessels, Condensers, and Heat Exchangers³
- B 248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar³
- B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast³
- E 527 Practice for Numbering Metals and Alloys (UNS)⁴

3. Ordering Information

3.1 Orders for material under this specification should include 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 and width (see 9.2 and 9.3),

3.1.4 Type 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 for each size.

3.1.8 ASTM Specification B 122/B 122M, year of issue.

3.2 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.

4. Chemical Composition

4.1 The material shall conform to the chemical composition prescribed in Table 1.

4.2 These specification limits do not preclude the presence of other elements. Limits may be established for unnamed

³ Annual Book of ASTM Standards, Vol 02.01.

⁴ Annual Book of ASTM Standards, Vol 01.01.

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	...	...	<i>B</i>
C71000	remainder	19.0–23.0	0.05 ^B	1.0 max	1.0	1.0 ^B max	...	...	<i>B</i>
C71500	remainder	29.0–33.0 ^A	0.05 ^B	0.40–1.0	1.0	1.0 ^B max	...	...	<i>B</i>
C72200	remainder	15.0–18.0	0.05 ^B	0.50–1.0	1.0	1.0 ^B	...	0.30–0.70	<i>B</i>
C72500	remainder	8.5–10.5	0.05	0.6	0.2	0.5 max	1.8–2.8	...	...
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	...	...	...

^ACopper plus elements with specific limits, 99.5 % min.

^BWhen 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.

elements by agreement between manufacturer or supplier and purchaser.

4.2.1 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 plus Named Elements, % min
C70600	99.5
C71000	99.5
C71500	99.5
C72200	99.5
C72500	99.8

4.2.2 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:

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

5. Temper

5.1 *As Hot-Rolled (M20) Material*—The standard temper of

sheet and plate produced by hot rolling and is as designated in Table 2.

5.2 *Rolled (H) Material*—The standard tempers of rolled material 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 3.1.2).

5.3 *Annealed*—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†						
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						
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