

# ASTM B122 / ASME SB122

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

This specification covers copper-nickel-tin alloy, copper-nickel-zinc alloy (nickel silver), and copper-nickel alloy plate, sheet, strip, and rolled bar.

### A. Chemical Composition :-

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

Table 1

Copper Alloy UNS No.	Copper, incl Silver	Nickel, incl Cobalt	Lead, max	Iron, max	Manganese, max	Zinc	Tin	Chromium	Other Named Elements
C70600	remainder	9.0–11.0 <sup>A</sup>	0.05 <sup>B</sup>	1.0–1.8	1.0	1.0 <sup>B</sup> max	...	...	<sup>B</sup>
C71000	remainder	19.0–23.0	0.05 <sup>B</sup>	1.0 max	1.0	1.0 <sup>B</sup> max	...	...	<sup>B</sup>
C71500	remainder	29.0–33.0 <sup>A</sup>	0.05 <sup>B</sup>	0.40–1.0	1.0	1.0 <sup>B</sup> max	...	...	<sup>B</sup>
C72200	remainder	15.0–18.0	0.05 <sup>B</sup>	0.50–1.0	1.0	1.0 <sup>B</sup>	...	0.30–0.70	<sup>B</sup>
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	0.1	0.25 max	0.5	remainder	...	...	...
C74000	69.0–73.5	9.0–11.0	0.1	0.25 max	0.5	remainder	...	...	...
C74500	63.5–66.5	9.0–11.0	0.1	0.25 max	0.5	remainder	...	...	...
C75200	63.5–66.5	16.5–19.5	0.05	0.25 max	0.5	remainder	...	...	...
C76200	57.0–61.0	11.0–13.5	0.1	0.25 max	0.5	remainder	...	...	...
C77000	53.5–56.5	16.5–19.5	0.05	0.25 max	0.5	remainder	...	...	...

<sup>A</sup> Copper plus elements with specific limits, 99.5 % min.

<sup>B</sup> 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.

### B. Temper :-

- Hot-Rolled (M20) Material— The standard temper of sheet and plate produced by hot rolling.
- Rolled (H) Material— The standard tempers of rolled material.
- Annealed— The standard temper is O60 (soft).

### C. Tensile Strength :-

Products ordered to this specification shall conform to the tensile strength requirements prescribed in Table 2.

Table 2

Temper Designation		Tensile Strength, ksi <sup>A</sup> (MPa)		Approximate Rockwell Hardness <sup>B,C</sup>		
Standard	Former	Min	Max	G Scale	B Scale	Superficial 30-T
Copper Alloy UNS No. C 70600						
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. C 71000						
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. C 71500						
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. C 72200						
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. C 72500						
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. C 73500						
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. C 74000						
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. C 74500						
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. C 75200						
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. C 76200						
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. C 77000						
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

<sup>A</sup> ksi = 1000 psi.

<sup>B</sup> 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) in thickness and over.

<sup>C</sup> Standard designation defined in Practice B 601.

#### **D. Grain Size Requirements of Annealed Tempers :-**

1. 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.

**Table 3**

Copper Alloy UNS No.	Standard Temper Designation <sup>A</sup>	Grain Size, mm		
		Nominal	Min	Max
C 70600, C 71000, C 71500, C 72200, C 72500, C 73500, and C 76200	OS035	0.035	0.025	0.050
	OS015	0.015	<sup>B</sup>	0.025
C 74000, C 74500, C 75200, and C 77000	OS070	0.070	0.050	0.100
	OS035	0.035	0.025	0.050
	OS015	0.015	<sup>B</sup>	0.025

<sup>A</sup> Standard designation defined in Practice B 601.

<sup>B</sup> Although no minimum grain size is required, this material shall be fully recrystallized.

#### E. Rockwell Hardness :-

- The approximate Rockwell hardness values for the rolled tempers are given in Table 2 and those for the annealed tempers of material 0.015 in. and over in thickness are given in Table 4.

**Table 4**

Temper		Approximate Rockwell Hardness <sup>A</sup>		
Standard Designation	Nominal Grain Size, mm	B Scale	F Scale	Superficial 30-T
Copper Alloy UNS No. C 70600				
OS035	0.035	10–27	55–72	15–34
OS015	0.015	16–48	65–83	25–45
Copper Alloy UNS No. C 71000				
OS035	0.035	18–35	67–76	28–40
OS015	0.015	35–58	76–90	40–55
Copper Alloy UNS No. C 71500				
OS035	0.035	23–45	70–85	31–46
OS015	0.015	37–63	74–93	40–58
Copper Alloy UNS No. C 72200				
OS035	0.035	14–31	...	24–36
OS015	0.015	18–42	...	26–41
Copper Alloy UNS No. C 72500				
OS035	0.035	24–39	70–81	32–42
OS015	0.015	37–61	78–92	41–58
Copper Alloy UNS No. C 73500				
OS035	0.035	20–35	70–80	29–40
OS015	0.015	28–55	76–90	34–53
Copper Alloy UNS No. C 74000				
OS070	0.07	5–20	...	...
OS035	0.035	20–40	...	...
OS015	0.015	35–55	...	...
Copper Alloy UNS No. C 74500				
OS070	0.07	15–30	63–73	26–36
OS035	0.035	23–41	70–80	31–44
OS015	0.015	41–59	80–90	44–56
Copper Alloy UNS No. C 75200				
OS070	0.07	25–40	70–80	32–43
OS035	0.035	35–55	75–88	40–53

OS015	0.015	45-70	83-93	46-64
Copper Alloy UNS No. 76200				
OS035	0.035	20-35	70-80	...
OS015	0.015	28-55	76-90	...
Copper Alloy UNS No. C 77000				
OS070	0.07	29-45	72-83	35-46
OS035	0.035	37-60	76-91	41-57
OS015	0.015	47-73	84-98	47-65

<sup>A</sup> Rockwell hardness values apply as follows: The B and F 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 0.015 in. (0.381 mm) in thickness and over.

#### **F. General Requirements :-**

1. Products furnished under this specification shall conform to the applicable requirements of the current edition of Specification B 248 / B 248M.

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