



Designation: **B 134/B 134M – 9601**

Standard Specification for Brass Wire¹

This standard is issued under the fixed designation B 134/B 134M; 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 establishes requirements for round, hexagonal, octagonal, rectangular and square brass wire of UNS Alloys C21000, C22000, C22600, C23000, C23400, C24000, C26000, C27000, and C27400.

1.1.1 ~~Inquiry of the manufacturer or supplier concerning the product availability of a specific alloy is advisable.~~

1.2 ~~The~~

1.2 ~~Units—The values given stated in either inch-pound or SI units are to be regarded separately as standard. Values given in parentheses~~ Within the text and tables, the SI units are shown in brackets. 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 nonconformance with the standard.


2. Referenced Documents

2.1 *ASTM Standards:*

¹ This specification is under the jurisdiction of ASTM Committee B-5 B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.02 on Rods, Bars, Wire, Shapes, ~~Non-Electrical Wire~~ and Forgings.

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

 **B 134/B 134M – 9601**

B 250 Specification for General Requirements for Wrought Copper-Alloy Wire²

~~B-601 Practice E 250M Specification for General Requirements for Wrought Copper-Alloy Wire (Metric)~~²

B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast²

E 8 Test Methods for Tension Testing of Metallic Materials³

~~E-112 Test 8M Test Methods for Determining the Average Grain Size~~⁴ Tension Testing of Metallic Materials (Metric)³

~~E-478 Test 112 Test Methods for Chemical Analysis of Copper Alloys~~⁴ Determining the Average Grain Size³

² Refer to Practice E 527 for explanation

² ~~Annual Book of the Unified Numbering System (UNS); ASTM Standards, Vol 02.01.~~

³ Annual Book of ASTM Standards, Vol 023.01.

~~E-527 Practice 478 Test Methods for Numbering Metals and Chemical Analysis of Copper Alloys (UNS)⁴⁵~~

3. Ordering Information

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

~~3.1 The following information:~~

~~3.1.1 ASTM Designation and year sections of issue;~~

~~3.1.2 Copper Alloy UNS No. designation;~~

~~3.1.3 Temper Designation (Section 6);~~

~~3.1.4 Quantity; total weight, footage, Specification B 250 or number B 250M constitute a part of this specification.~~

~~3.1.1 Terminology;~~

~~3.1.2 Materials and Manufacture;~~

~~3.1.3 Workmanship, Finish and Appearance;~~

~~3.1.4 Sampling;~~

~~3.1.5 Number of each temper, form, or alloy;~~

~~3.1.5 Dimensions; diameter or distance between parallel surfaces;~~

~~3.1.6 Type of edge; square corners, rounded edge, full rounded edge;~~

~~3.1.7 How furnished; coil, spool, or reel, specific lengths with or without ends, and~~

~~3.1.8 When material is purchased for agencies Tests and Retests;~~

~~3.1.6 Specimen Preparation;~~

~~3.1.7 Test Methods;~~

~~3.1.8 Significance of the U.S. Government (Specification B 250);~~

~~3.2 The following requirements are optional under this specification Numerical limits,~~

~~3.1.9 Inspection;~~

~~3.1.10 Rejection and-s Rehearing;~~

~~3.1.11 Certification;~~

~~3.1.12 Mild-bl Test Reports;~~

~~3.1.13 Product Marking;~~

~~3.1.14 Packaging and Package Marking;~~

~~3.1.15 Supplementary Requirements.~~

~~3.2 In addition, when a section with a title identical to that referenced in 3.1 appears in this specification, it contains additional requirements that supplement those that appear in Specification B 250 or purchase order when required:~~

~~3.2.1 Certification (Specification B 250), and~~

~~3.2.2 Mill Test Report (Specification B 250)- B 250M.~~

4. Materials Ordering Information

~~4.1 Include the following information in orders for product:~~

~~4.1.1 ASTM Designation and Manufacture~~

~~4.1 The material shall be made from cast billets, logs, or rods year of issue,~~

~~4.1.2 Copper Alloy UNS Numbers C21000, C22000, C23000, C24000, C26000, C27000; No. designation;~~

~~4.1.3 Temper;~~

~~4.1.4 Cross section (round, hexagonal, octagonal, rectangular, or-C27400; square);~~

~~4.1.5 Quantity; total weight, footage, or number of pieces of each temper, cross section, or alloy;~~

~~4.1.6 Dimensions; diameter or distance between parallel surfaces, width and-shall be thickness, length;~~

~~4.1.7 Type of such soundness and structure to enable them to be processed into the desired product.~~

~~4.2 The manufacture edge; square corners, rounded edge, full-rounded edge,~~

~~4.1.8 How furnished; coil, spool, or reel, specific lengths with or without ends, and~~

~~4.1.9 When material is purchased for agencies of the material shall be by such hot working, cold working, and annealing processing as U.S. Government (Specification B 250 or B 250M).~~

~~4.2 The following options are available to produce a uniform wrought structure this specification and should be specified in the finished product-contract or purchase order when required:~~

~~4.2.1 Certification (Specification B 250 or B 250M), and~~

~~4.2.2 Mill Test Report (Specification B 250 or B 250M).~~

5. Materials and Manufacture

~~5.1 Material:~~

~~5.1.1 The material shall be made from cast billets, logs, or rods of Copper Alloy UNS Numbers C21000, C22000, C22600, C23000, C23400, C24000, C26000, C27000, or C27400, of such purity, soundness, and structure to be suitable for processing into the desired product.~~

⁵ Annual Book of ASTM Standards, Vol 03.0T6.

5.2 Manufacture:

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

6. Chemical Composition

56.1 The material shall conform to the chemical compositional requirements specified in Table 1 for the copper alloy specified in the ordering information.

56.1.1 When all elements specified for a given alloy in Table 1 are determined, their sum of results shall be as follows:

Alloy UNS Nos.	Sum of Results, Percent, Minimum
C21000, C22000, C23000, C24000	99.8
C21000, C22000, C22600, C23000, C23400, C24000	99.8
C26000, C27000, C27400	99.7

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

56.3 Zinc, listed as the “remainder,” is the difference between the sum of results for all elements determined and 100 %.

6. Temper

6.1 The product in drawn or rolled wire of UNS Alloy Nos. C21000, C22000, C23000, C24000, C26000, C27000 and C27400 shall be available in H00, H01, H02, H03, H04, H06, H08 and H10 tempers as defined in Practice B 601.

6.1.1 Product made in H04 temper is not generally available in sizes over 1/2 in. (12.7 mm) in diameter.

6.1.2 Product made in H06 temper is not generally available in sizes over 3/8 in. (9.52 mm) in diameter.

6.1.3 Product made in H08 temper is not generally available in sizes over 1/4 in. (6.35 mm) in diameter.

6.1.4 Square product is not generally available in H06 or H08 tempers.

6.1.5 The tension test shall be the standard temper test for all H temper wire.

6.1.6 The product in annealed form of UNS Alloys Nos. C21000 and C22000 shall be available in OS050, OS035, OS025 and OS015 tempers as defined in Practice B 601.

6.1.7 The product in annealed form of UNS Alloy Nos. C23000 and C24000 shall be available in OS070, OS050, OS035, OS025 and OS015 tempers as defined in Practice B 601.

6.1.8 The product in annealed form of UNS Alloy Nos. C26000, C27000 and C27400 shall be available in OS120, OS070, OS050, OS035, OS025 and OS015 tempers as defined in Practice B 601.

7. Grain Size for Annealed Wire

7.1 Product furnished Temper

7.1 The product in the annealed (OS) condition drawn or rolled wire of UNS Alloy Nos. C21000, C22000, C22600, C23000, C23400, C24000, C26000, C27000, and C27400 shall conform to the requirements specified be available in Table 2 for the temper H00, H01, H02, H03, H04, H06, H08, and Copper Alloy UNS No. designated H10 tempers as defined in the ordering information, when tested Practice B 601.

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Composition, %			
	Copper	Lead, max	Iron, max	Zinc
C21000	94.0–96.0	0.05	0.05	remainder ^A
C21000	94.0–96.0	0.05	0.05	remainder
C22000	89.0–91.0	0.05	0.05	remainder ^A
C22000	89.0–91.0	0.05	0.05	remainder
C22600	86.0–89.0	0.05	0.05	remainder
C23000	84.0–86.0	0.05	0.05	remainder ^A
C23000	84.0–86.0	0.05	0.05	remainder
C23400	81.0–84.0	0.05	0.05	remainder
C24000	78.5–81.5	0.05	0.05	remainder ^A
C24000	78.5–81.5	0.05	0.05	remainder
C26000	68.5–71.5	0.07	0.05	remainder ^A
C26000	68.5–71.5	0.07	0.05	remainder
C27000	63.0–68.5	0.10	0.07	remainder ^A
C27000	63.0–68.5	0.10	0.07	remainder
C27400	61.0–64.0	0.10	0.05	remainder ^A
C27400	61.0–64.0	0.10	0.05	remainder

^A Taken by difference.

~~7.1.1 Product made in accordance with Test Methods E 112.~~

~~7.1.1 Acceptance H04 temper is not generally available in sizes over 1/2 in. [13 mm] in diameter.~~

~~7.1.2 Product made in H06 temper is not generally available in sizes over 3/8 in. [10 mm] in diameter.~~

~~7.1.3 Product made in H08 temper is not generally available in sizes over 1/4 in. [6 mm] in diameter.~~

~~7.1.4 Square product is not generally available in H06 or rejection based upon grain size H08 tempers.~~

~~7.1.5 The tension test shall depend upon be the average grain size standard temper test for all H temper wire.~~

~~7.1.6 The product in annealed form of UNS Alloys Nos. C21000 and C22000 shall be available in OS050, OS035, OS025, and OS015 tempers as defined in Practice B 601.~~

~~7.1.7 The product in annealed form of UNS Alloy Nos. C22600, C23000, C23400, and C24000 shall be available in OS070, OS050, OS035, OS025, OS015, and OS010 tempers as defined in Practice B 601.~~

~~7.1.8 The product in annealed form of UNS Alloy Nos. C26000, C27000, and C27400 shall be available in OS120, OS070, OS050, OS035, OS025, and OS015 tempers as defined in Practice B 601.~~

8. Grain Size for Annealed Wire

8.1 Grain size shall be the standard requirement for all product in the annealed tempers.

8.2 Acceptance or rejection based on grain size shall depend only on the average grain size of test specimens taken from each of two sample portions and each specimen shall be within the limits prescribed in Table 2 when determined in accordance with Test Methods E 112.

9. Mechanical Property Requirements

89.1 *Tensile Strength Requirements* :

89.1.1 Drawn or rolled product ~~alloy~~ shall conform to the requirements specified in ~~Table 3 and Table 4~~ Tables 3-6, by alloy and temper, for wire 0.020 in. ~~(0.508 mm)~~ [0.5 mm] and over in diameter or distance between parallel surfaces.

89.1.1.1 The temper of wire under 0.020 in. ~~(0.508 mm)~~ [0.5 mm] in diameter or distance between parallel surfaces shall be subject to agreement between the manufacturer, or supplier, and the purchaser.

8.1.2 ~~Rectangular product other than square,~~

9.1.2 Rectangular product, furnished in the “H” tempers shall conform to the requirements in Table ~~4s~~ 5 and 6 for the ~~form,~~ temper, temper and Copper Alloy UNS No. designation specified in the ordering information when tested in accordance with Test Methods ~~E 8.~~

8.1.3 ~~Acceptance E 8 or E 8M.~~

9.1.3 Acceptance or rejection based upon mechanical property shall depend on the tensile strength values obtained when tested in accordance with Test Methods E 8 ~~or E 8M.~~

TABLE 3 2 TeGrains Size Strength Requirements for Round, Hex agonal, Octagonal, and Squa Appre Woxire 0.020 in. (0.508mm)andte Rovckwell Har idn-Diess Vamlueters for-Dista Ance-Between-Pearallel-Sud Wirfaces

Temper Designation		TeGrains Size-S, mm		Approximate Rockwell Hardness for Rectangth-, ksular Wire ^A (MPa ^B)					
F Standard B(601)		Former	Copper Alloy UNS No. C21000		Copper Alloy UNS No. C22000		Copper Alloy UNS No. C23000		Copper Alloy U C24000
Min	Max		Min	Max	Min	Max	Min	Max	
Standard (B 601)	Nominal	Min	Max	Min	Max	Min	Max	Min	Max
Copper Alloy UNS No. C21000									
OS050	Min	Max							
OS050	0.050	Max							
H00	Eighth-hard	35(240)		45(310)	38(260)	5 4			
OS035	0.035	40 ^B		52 ^B	...	4			
OS0(345)	43(295)	57(395)		50(345)	65(450)	50(345)			65(450)
OS035	0.035 ^C	0.025		0.050	47 ^B	54 ^B	...		65(450)
H04	Quarter-hard	41(285)		51(350)	45(310)	57(395)	53(365)		65(4517)
OS025	0.025	0.015		0.035	50 ^B	61 ^B	1		17
OS0	62(425)	75(515)		62(425)	54 ^B	65 ^B	77(530)		23
OS015	0.015 ^C	^D		0.025	54 ^B	65 ^B	77(530)		23
Copper Alloy UNS No. C22000									
H02	Half-hard	49(340)		58(400)	56(385)	67(460)	66(455)		77(5316)
OS050	0.050	0.035		0.090	50	60	1		16
OS0	78(540)	90(620)		79(545)	54	64	94(650)		24
OS035	0.035 ^C	0.025		0.050	54	64	94(650)		21
H03	Three-quarter hard	57(395)		64(440)	64(440)	74(510)	76(525)		86(31)
OS025	0.025	0.015		0.035	58	70	13		31
OS01595)	90(620)	101(700)		92(635)	62	75	49		39
OS015	0.015 ^C	^D		0.025	62	75	19		39
Copper Alloy UNS Nos. C22600(740)									
Copper Alloy UNS Nos. C22600, C23000, and C23400									
OS070	0.070	0.050		0.100	53	60	H04		16
OS050	0.050 ^C	Hard		61(420)	68(470)	70(485)	79(545)		820
OS050	0.050 ^C	0.035		0.070	56	63	10		20
OS03(570)	92(635)	100(690)		110(760)	102(700)	66	117(810)3		24
OS035	0.035 ^C	0.025		0.050	58	66	13		24
H0625	0.025 ^C	0.015		0.035	60	72	16		34
OS025	0.025 ^C	0.015		0.035	60	72	16		34
OS015	0.015 ^C	^D		0.025	62	79	19		48
OS040	0.040	^E		Extra-hard	66(455)	73(505)	78(540)		86(595)0
OS010	0.010 ^C	^D		0.015	66	83	25		50
Copper Alloy UNS No. C24000									
OS070	94(650)	102(700)		112(770)	121(830)	115(790)	129(890)		21
OS070	0.070	0.050		0.120	53	64	2		21
OS050	0.050 ^C	0.035		0.070	57	67	H08		27
OS035	0.035 ^E	0.025		0.050	64	72	16		35
OS035	0.035 ^C	0.025		0.050	61	72	16		35
OS025	0.025	0.015		0.035	63	77	20		42
OS025	0.025 ^C	0.015		0.035	63	77	20		42
OS015	0.015 ^E	Spring		72(495)	...	84(580)	...		100(
OS015	0.015 ^C	^D		0.025	66	83	25		50
690)00, C27000, and C27400									
Copper Alloy UNS Nos. C26000, C27000, and C27400									
OS120	...	116(800)		...	120(830)		24
OS120	0.120	0.070		...	50	62	...		21
OS070	0.070	0.050		0.120	52	67	3		27
OS050	0.050	0.035		0.070	61	73	20		35
OS035	0.035	0.025		0.050	65	76	25		38
OS025	0.025	0.015		0.035	67	79	27		42
OS015	0.015	^D		0.025	72	85	33		50

^A Rockwell hardness values apply as follows: The F scale applies to metal 0.020 in. [0.5 mm] in thickness and over; the 30-T scale applies to metal 0.015 in. [0.4 mm] in thickness and over.

^B Copper Alloy UNS No. C21000 in these App several OS (annealed) tempers is too soft for Rockwell F hardness tests below 0.030 in. [0.75 mm] in thickness.

^C H04 (Third) to nominal grain sizes are those in which wire other than rectangular are normally available. Rectangular wire is normally available 1/2 in. (12.7 mm) in diameter grain sizes listed.

^D H06 (ex Ultra-hard) tough no temper is net generally available in size is over 1 in. (9.52 mm) in diameter.

^E Square wire is not, though materially available in extra-hard or muspring tempers fully rs.

^F H08 (spring) temper is not generally available in sizes over 1/4 in. (6.35 mm) in diameter.



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TABLE 4 3 Tensile Strength Requirements and App for Round, Heximate Rgcockwenall H, Octardgoness Val, and Squares fo Wir Recta 0.020 ingul. arnd Over in Diamether or Disthan Squce Between Paralle-Wil Surfaces

Temper Designation			Tensile Strength, ksi (MPa ¹)						Approximate R
B-Steel	Superficial-30-T		Min	Max	0.020 (0.508) to 0.036 in.0	Copper Alloy UNS (0.914 mm) incl	C22000	Over 0.036 in. (0.914 mm)	
	Standard- (B-604)	e							
Codard- (B-604)	e	Namer	Min	Max	0.020 Copper Alloy UNS No. C21000	Copper Alloy UNS No. mm) incl	C22000	Copper Alloy UNS Nos. C22600 mm)	
									Former
and C27400									
Copper Alloy UNS No. C21000									
H04	Quarter-hard	37(255)	47(325)	20-48	24-52	34-51	37-54		
H01Min	Max	Min	Max	Min	Max	34-51	37-54		
H02	Half-hard	42(290)	52(360)	40-56	44-60	46-57	48-59		
H03	Three-quarter-hard	46(315)	56(385)	50-64	53-64	52-60	54-62		
H04	Hard	50(345)	59(405)	57-64	60-67	57-62	59-64		
H06	Extra-hard	56(385)	64(440)	64-70	66-72	62-66	63-67		
H08	Spring	60(415)	68(470)	68-73	70-75	64-68	65-69		
H10	Extra-spring	61(420)	69(475)	69-74	71-76	65-69	66-70		
Copper Alloy UNS No. C22000									
H04	Quarter-hard	40(275)	50(345)	27-52	31-56	38-53	41-56		
H01Min	Quarter-hard	40(275)	50(345)	27-52	31-56	38-53	41-56		
H02	Half-hard	47(325)	57(395)	50-63	53-66	52-61	54-63		
H03	Three-quarter-hard	52(360)	62(425)	59-68	62-71	58-64	60-66		
H04	Hard	57(395)	66(455)	65-72	68-75	62-66	64-68		
H06	Extra-hard	64(440)	72(495)	72-77	74-79	67-71	68-72		
H08	Spring	69(475)	77(530)	76-79	78-81	70-72	71-73		
H10	Extra-spring	72(495)	80(550)	78-81	80-83	71-73	72-74		
Copper Alloy UNS No. C23000									
H04	Quarter-hard	44(305)	54(370)	33-58	37-62	42-57	45-60		
H01Max	Quarter-hard	44(305)	54(370)	33-58	37-62	42-57	45-60		
H02	Half-hard	51(350)	61(420)	56-68	59-71	56-64	58-66		
H03	Three-quarter-hard	57(395)	67(460)	66-73	69-76	63-68	65-70		
H04	Hard	63(435)	72(495)	72-78	74-80	67-71	68-72		
H06	Extra-hard	72(495)	80(550)	78-83	80-85	70-74	71-75		
H08	Spring	78(540)	86(595)	82-85	84-87	74-76	75-77		
H10	Extra-spring	82(565)	90(620)	84-87	86-89	75-77	76-78		
Copper Alloy UNS No. C24000									
H04	Quarter-hard	48(330)	58(400)	38-61	42-65	42-57	45-60		
H01Min	Quarter-hard	48(330)	58(400)	38-61	42-65	42-57	45-60		
H02	Half-hard	55(380)	65(450)	59-70	62-73	56-64	58-66		
H03	Three-quarter-hard	61(420)	71(490)	69-76	72-79	63-68	65-70		
H04	Hard	68(470)	77(530)	76-82	78-84	68-72	69-73		
H06	Extra-hard	78(540)	87(600)	83-87	85-89	72-75	73-76		
H08	Spring	85(585)	93(640)	87-90	89-92	75-77	76-78		
H10	Extra-spring	89(615)	97(670)	88-91	90-93	76-78	77-79		
Copper Alloy UNS No. C26000									
Max									
H04	Quarter-hard	49(340)	59(405)	40-61	44-65	43-57	46-60		
H00	eighth-hard	35	45	38	50	43	46-60		
H02	Half-hard	57(395)	67(460)	60-74	63-77	56-66	58-68		
H0257	50	65	50	60-74	63-77	56-66	58-68		
H03	Three-quarter-hard	64(440)	74(510)	72-79	75-82	65-70	67-72		
H01	quarter-hard	41	51	45	57	53	67-72		
H04	Hard	71(490)	81(560)	79-84	81-86	70-73	71-74		
H045	62	75	62	79-84	81-86	70-73	71-74		
H06	Extrahard	83(570)	92(635)	85-89	87-91	74-76	75-77		
H02	half-hard	49	58	56	67	66	77		
H08	Spring	91(625)	100(690)	89-92	90-93	76-78	76-78		
H08	78	90	79	9-92	90-93	76-78	76-78		
H10	Extra-spring	95(655)	104(720)	91-94	92-95	77-79	77-79		
H03	three-quarter hard	57	64	64	74	76	77-79		
Copper Alloy UNS Nos. C27000 and C27400									
H04	Quarter-hard	49(340)	59(405)	40-65	43-57	46-60			
H0186	90	101	92	144-65	43-57	46-60			
H02	Half-hard	55(380)	65(450)	57-71	60-74	54-64	56-66		
H04 ^B	hard	61	68	70	79	83	56-66		
H03	Three-quarter-hard	62(425)	72(495)	70-77	73-80	65-69	67-71		
H0392	100	110	102	70-77	73-80	65-69	67-71		
H04	Hard	68(470)	78(540)	76-82	78-84	68-72	69-73		
H06 ^{C,D}	extra-hard	66	73	78	86	94	69-73		
H06	Extra hard	79(545)	89(615)	83-87	85-89	73-75	74-76		

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TABLE 2 4 GraiTen Ssize Strength Requirements and App for Round, Heximate Rgonal, Ockwetagonal H, and Square Wire 0.5 mm and Ovev Vr in Dialumes fter or A Distannce Between Paralled Wil Surfaces

Temper Designation		GraiTen Ssize, mm										Approxima Ste-Reck gular-Other th,
F-SeCode	Name	Copper Alloy UNS No. C210-T00		Copper Alloy UNSe No. C22000		Copper Alloy UNS Nos. C22600 and C23000		Copper Alloy UNS Nos. C23400 and C24000		Copper Alloy UNS Nos. C26000, C27000, and C27400		
		StaMinderd B-604	NominMax	Min	Max	Min	Max	Min	MaxCopper Alloy UNS No. C24000	Min	Max	
OS 050	0-050	0.035	0.090	40B	52 ^B	...	-4					
	H00	240	310	260	345	...	-4					
	OS035	0.035C	0.025	0.050	47 ^B	54 ^B	...	-7				
	OS035	295	395	345	47 ^B	54 ^B	...	-7				
	OS025	0.025	0.015	0.0350								
50 ^B	OS025	450	345	450								
OS045	64 ^B	1	47									
	0.015C	D	0.025	54 ^B	65 ^B	-7	23					
OS015	Quarter-hard	285	350	310	395	65 ^B	-7	23				
Copper Alloy UNS No. C22000												
54	OS050	0.050	0.035	0.090	50	60	-4	16				
	OS050	365	450	425	50	60	-4	16				
	OS035	0.035C	0.025	0.050								
	OS035	515	425	530								
OS025	64	7	24									
	0.025	0.015	0.035	58	70	13	31					
OS025	Half-hard	340	400	385	460	70	13	31				
	OS045	0.015C	D	0.025	62	75	19	39				
OS015		455	530	540	62	75	19	39				
Copper Alloy UNS No. C23000												
53	OS070	0.070	0.050	0.100								
	OS070	620	545	650-100								
OS050	60	6	16									
	0.050 ^C	0.035	0.070	56	63	10	20					
OS050	Three-quarter hard	395	440	440	56	63	10	20				
	OS035	0.035C	0.025	0.050	58	66	13	24				
	OS035	510	525	595	58	66	13	24				
	OS025	0.025 ^C	0.015	0.035	60	72	16	34				
	OS025	620	700	635	60	72	16	340				
OS 045	0.045 ^C	D	0.025	62	79	19	48					
	H045	0.045 ^B	Hard	420	62	79	19	48				
Copper Alloy UNS No. C24000												
OS070	0.070	0.050	0.120	53	64	-2	24					
	OS070	470	485	545	53	64	-2	24				
OS050	0.050C	0.035	0.070	57	67	-8	27					
	OS050	570	635	690	57	67	-8	27				
OS035	0.035 ^C	0.025	0.050	61-72	16	35						
	OS035	760	700	681-72	16	350						
OS 025	0.025 ^C	0.015	0.035	63	77	20	42					
	H025	0.025 ^C	0.015	0.035	63	77	20	42				
OS045	0.045 ^C	D	0.025	66	83	25	50					
	H045	0.045 ^B	Hard	420	62	79	19	48				
OS015		D	Extra-hard	66	83	25	50					
Copper Alloy UNS Nos. C26000, C27000, and C27400												
OS120	0.120	0.070	...	50	62	...	24					
	OS120	455	505	540	50	62	...	24				
OS070	0.070	0.050	0.120	52	67	-3	27					
	OS070	595	650	700	52	67	-3	27				
OS050	0.050	0.035	0.070	64	73	20-35						
	OS050	770	830	790	64	73	28-90					
OS 035	0.035	0.025	0.050	65	76	25	38					
	H08 ^{E,D}	Spring		495	65	76	25	38				
OS025	0.025	0.015	0.035	67	79	27	42					
	OS025	580	...	690	...	79	27	42				
OS045	0.045	D	0.025	72	85	33	50					
	OS045	800	...	830	72	85	33	50				

^A Rockwell C hardness values apply as follows: The F scale applies to metal 0.020 in. (0.508 mm) in thickness and over; the 30-T scale applies to metal 0.04 X15 in. (0.381 mm) in thickness and over.

^B Copper Alloy UNS No. C21 H000 in t4 (these several OS (annealed) tempers wire is too soft for Rockwell C general F by and available in ss sizes below 0.075 over 130 in. (0.762 mm) in thickness.

^C The H06 (e-nominal g-strain sizes-hard) temper is which wire other than rectangular are normally available. Rectangular wire size is normally available in any of the per 10 mm in diameter sizes listed.

^D Although square wire is not generally available in extra hard or spring tempers.

^E H08 (spring required) temper is not generally available in sizes over 6 mm in diameter.

TABLE 5 Tensile Strength Requirements and Approximate Rockwell Hardness Values for Rectangular Wire

Temper Designation		Tensile Strength, ksi		Approximate Rockwell Hardness ^A			
				B Scale		Superficial 30-T	
Standard (B 601)	Former	Min	Max	0.020 to	Over 0.036	0.012	Over 0.028
				0.036 in. incl	in.	to 0.028 in. incl	in.
Copper Alloy UNS No. C21000							
H01	quarter-hard	37	47	20-48	24-52	34-51	37-54
H02	half-hard	42	52	40-56	44-60	46-57	48-59
H03	three-quarter-hard	46	56	50-61	53-64	52-60	54-62
H04	hard	50	59	57-64	60-67	57-62	59-64
H06	extra hard	56	64	64-70	66-72	62-66	63-67
H08	spring	60	68	68-73	70-75	64-68	65-69
H10	extra spring	61	69	69-74	71-76	65-69	66-70
Copper Alloy UNS No. C22000							
H01	quarter-hard	40	50	27-52	31-56	38-53	41-56
H02	half-hard	47	57	50-63	53-66	52-61	54-63
H03	three-quarter-hard	52	62	59-68	62-71	58-64	60-66
H04	hard	57	66	65-72	68-75	62-66	64-68
H06	extra hard	64	72	72-77	74-79	67-71	68-72
H08	spring	69	77	76-79	78-81	70-72	71-73
H10	extra spring	72	80	78-81	80-83	71-73	72-74
Copper Alloy UNS Nos. C22600 and C23000							
H01	quarter-hard	44	54	33-58	37-62	42-57	45-60
H02	half-hard	51	61	56-68	59-71	56-64	58-66
H03	three-quarter-hard	57	67	66-73	69-76	63-68	65-70
H04	hard	63	72	72-78	74-80	67-71	68-72
H06	extra hard	72	80	78-83	80-85	70-74	71-75
H08	spring	78	86	82-85	84-87	74-76	75-77
H10	extra spring	82	90	84-87	86-89	75-77	76-78
Copper Alloy UNS Nos. C23400 and C24000							
H01	quarter-hard	48	58	38-61	42-65	42-57	45-60
H02	half-hard	55	65	59-70	62-73	56-64	58-66
H03	three-quarter-hard	61	71	69-76	72-79	63-68	65-70
H04	hard	68	77	76-82	78-84	68-72	69-73
H06	extra hard	78	87	83-87	85-89	72-75	73-76
H08	spring	85	93	87-90	89-92	75-77	76-78
H10	extra spring	89	97	88-91	90-93	76-78	77-79
Copper Alloy UNS No. C26000							
H01	quarter-hard	49	59	40-61	44-65	43-57	46-60
H02	half-hard	57	67	60-74	63-77	56-66	58-68
H03	three-quarter-hard	64	74	72-79	75-82	65-70	67-72
H04	hard	71	81	79-84	81-86	70-73	71-74
H06	extra hard	83	92	85-89	87-91	74-76	75-77
H08	spring	91	100	89-92	90-93	76-78	76-78
H10	extra spring	95	104	91-94	92-95	77-79	77-79
Copper Alloy UNS Nos. C27000 and C27400							
H01	quarter-hard	49	59	40-61	44-65	43-57	46-60
H02	half-hard	55	65	57-71	60-74	54-64	56-66
H03	three-quarter-hard	62	72	70-77	73-80	65-69	67-71
H04	hard	68	78	76-82	78-84	68-72	69-73
H06	extra hard	79	89	83-87	85-89	73-75	74-76
H08	spring	86	95	87-90	89-92	75-77	76-78
H10	extra spring	90	99	88-91	90-93	76-78	77-79

^A Rockwell hardness values apply as follows: the B scale values apply to metal 0.020 in. and over in thickness, and the 30-T scale values apply to metal 0.012 in. and over in thickness.

89.2 Rockwell Hardness:

89.2.1 The approximate Rockwell hardness values for rectangular other than square wire given in Table 4 2, Table 5, and Table 2 6 are for general information and assistance in testing and shall not be used as a basis for product rejection.

NOTE 1—The Rockwell hardness test offers a quick and convenient method of checking for general compliance with properties for temper condition.

910. Dimensions, Mass, and Permissible Variations

9.1 Refer to Specification B 250

10.1 The dimensions and tolerances for product described by this specification shall be as specified in Specifications B 250 or B 250M with particular reference to the following tables and related paragraphs in those specifications:

TABLE 6 Tensile Strength Requirements and Approximate Rockwell Hardness Values for Rectangular Wire

Temper Designation		Tensile Strength, MPa ^A		Approximate Rockwell Hardness ^B			
				B Scale		Superficial 30-T	
Standard (B 601)	Former	Min	Max	0.5 to 0.9 mm incl	Over 0.9 mm	0.3 to 0.7 mm incl	Over 0.7 mm
Copper Alloy UNS No. C21000							
H01	quarter-hard	255	325	20-48	24-52	34-51	37-54
H02	half-hard	290	360	40-56	44-60	46-57	48-59
H03	three-quarter-hard	315	385	50-61	53-64	52-60	54-62
H04	hard	345	405	57-64	60-67	57-62	59-64
H06	extra hard	385	440	64-70	66-72	62-66	63-67
H08	spring	415	470	68-73	70-75	64-68	65-69
H10	extra spring	420	475	69-74	71-76	65-69	66-70
Copper Alloy UNS No. C22000							
H01	quarter-hard	275	345	27-52	31-56	38-53	41-56
H02	half-hard	325	395	50-63	53-66	52-61	54-63
H03	three-quarter-hard	360	425	59-68	62-71	58-64	60-66
H04	hard	395	455	65-72	68-75	62-66	64-68
H06	extra hard	440	495	72-77	74-79	67-71	68-72
H08	spring	475	530	76-79	78-81	70-72	71-73
H10	extra spring	495	550	78-81	80-83	71-73	72-74
Copper Alloy UNS Nos. C22600 and C23000							
H01	quarter-hard	305	370	33-58	37-62	42-57	45-60
H02	half-hard	350	420	56-68	59-71	56-64	58-66
H03	three-quarter-hard	395	460	66-73	69-76	63-68	65-70
H04	hard	435	495	72-78	74-80	67-71	68-72
H06	extra hard	495	550	78-83	80-85	70-74	71-75
H08	spring	540	595	82-85	84-87	74-76	75-77
H10	extra spring	565	620	84-87	86-89	75-77	76-78
Copper Alloy UNS Nos. C23400 and C24000							
H01	quarter-hard	330	400	38-61	42-65	42-57	45-60
H02	half-hard	380	450	59-70	62-73	56-64	58-66
H03	three-quarter-hard	420	490	69-76	72-79	63-68	65-70
H04	hard	470	530	76-82	78-84	68-72	69-73
H06	extra hard	540	600	83-87	85-89	72-75	73-76
H08	spring	585	640	87-90	89-92	75-77	76-78
H10	extra spring	615	670	88-91	90-93	76-78	77-79
Copper Alloy UNS No. C26000							
H01	quarter-hard	340	405	40-61	44-65	43-57	46-60
H02	half-hard	395	460	60-74	63-77	56-66	58-68
H03	three-quarter-hard	440	510	72-79	75-82	65-70	67-72
H04	hard	490	560	79-84	81-86	70-73	71-74
H06	extra hard	570	635	85-89	87-91	74-76	75-77
H08	spring	625	690	89-92	90-93	76-78	76-78
H10	extra spring	655	720	91-94	92-95	77-79	77-79
Copper Alloy UNS Nos. C27000 and C27400							
H01	quarter-hard	340	405	40-61	44-65	43-57	46-60
H02	half-hard	380	450	57-71	60-74	54-64	56-66
H03	three-quarter-hard	425	495	70-77	73-80	65-69	67-71
H04	hard	470	540	76-82	78-84	68-72	69-73
H06	extra hard	545	615	83-87	85-89	73-75	74-76
H08	spring	595	655	87-90	89-92	75-77	76-78
H10	extra spring	620	685	88-91	90-93	76-78	77-79

^A See Appendix X1.

^B Rockwell hardness values apply as follows: the B scale values apply to metal 0.5 mm and over in thickness, and the 30-T scale values apply to metal 0.3 mm and over in thickness.

910.1.1 *Diameter or Distance Between Parallel Surfaces*—Table 1 in Specifications B 250 or B 250M.

910.1.2 *Thickness*—Table 3 in Specifications B 250 or B 250M.

910.1.3 *Width*—Table 5 in Specification B 250 or Table 4 in Specification B 250M.

910.1.4 *Length*—Tables 7 and 8 in Specification B 250 or Tables 8 5 and 6 in Specification B 250M.

910.1.5 *Straightness*—Table 9 in Specification B 250 or Table 7 in Specification B 250M.

910.1.5.1 This requirement is applicable to rectangular and square product only when ordered in lengths.

910.1.6 *Edge Contour*—Refer to the section on ~~Edge Contour~~.

~~10. Analytical edge contour.~~

11. Test Methods

~~101.1 Chemical Analysis~~

~~11.1.1 Composition shall be determined, in case of dispute, be determined disagreement, as follows:~~

Element	Test Method
Copper	E 478
Lead	E 478 (AA)
Iron	E 478
Zinc	E 478 (Titrametric)

~~10.1.1.2 Test methods used to be followed for the determination of elements required by resulting from contractual or purchase order agreement shall be as agreed upon between the manufacturer or supplier and the purchaser.~~

11. General Requirements

~~11.1 The following sections of Specification B-250 constitute a part of this specification:~~

- ~~11.1.1 Terminology;~~
- ~~11.1.2 Materials and manufacture;~~
- ~~11.1.3 Workmanship, finish and appearance;~~
- ~~11.1.4 Sampling;~~
- ~~11.1.5 Number of tests and retests;~~
- ~~11.1.6 Specimen preparation;~~
- ~~11.1.7 Test methods;~~
- ~~11.1.8 Significance of numerical limits;~~
- ~~11.1.9 Inspection;~~
- ~~11.1.10 Rejection and rehearing;~~
- ~~11.1.11 Certification;~~
- ~~11.1.12 Mill test reports;~~
- ~~11.1.13 Product marking;~~
- ~~11.1.14 Packaging and package marking;~~
- ~~11.1.15 Supplementary requirements.~~

~~11.2 In addition, when a section with a title identical to that referenced in 11.1 appears in this specification, it contains additional requirements which supplement those that appear in Specification B-250.~~

12. Keywords

~~12.1 brass wire; C21000; C22000; C22600; C23000; C23400; C24000; C26000; C27000; C27400; copper-alloy wire; copper-zinc alloy wire; general purpose wire; hexagonal wire; high strength wire; leaded brass nonelectrical wire; non-electrical wire; octagonal wire; ornamental wire; rectangular wire; round wire; spring wire; square wire; wire~~

■ —

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 ($N = \text{kg}\cdot\text{m}/\text{s}^2$). 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 $1 \text{ ksi} = 6\,894\,757 \text{ Pa}$, the metric equivalents are expressed as megapascal (MPa), which is the same as MN/m^2 and N/mm^2 .

SUMMARY OF CHANGES

Committee ~~B-5~~ B05 has identified the location of selected changes to this standard since the last issue (B 134-936) that may impact the use of this standard.

- ~~(1) Added sections on Ordering Information, Material alloys C22600 and Manufacture, and Grain Size of Annealed Wire. C23400 to the standard.~~
- (2) Generally revised document to conform to ASTM form and style requirements.
- (3) Revised the standard as a combined specification with both inch-pound and metric requirements.

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