Designation: B 130 – ~~95~~02

Standard Specification for Commercial Bronze Strip for Bullet Jackets[1]

This standard is issued under the fixed designation B 130; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

[1] This specification is under the jurisdiction of ASTM Committee ~~B-5~~ B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.01 on Plate, Sheet, and Strip.

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1. Scope *

1.1 This specification establishes general requirements for (commercial bronze) strip for manufacture of bullet jacket cups and ammunition components from Copper Alloy UNS No. C22000.[2] ~~(commercial bronze) strip for manufacture of bullet jacket cups and ammunition components.~~

~~1.2 The values~~

1.2 Values stated in inch-pound units are to be regarded as the standard except for grain size which is stated in metric units. SI values given in parentheses are for information only.

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

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

B 846 Terminology for Copper and Copper Alloys[3]

E ~~3 Methods of~~ 3 Guide for Preparation of Metallographic Specimens[4]

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

E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials[4]

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specification[5]

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

E 255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition[6]

E 478 Test Methods for Chemical Analysis of Copper Alloys[6]

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

3. Terminology

~~3.1 Refer to Specification B 248 for~~

3.1 For definition of terms related to copper and copper alloys, refer to Terminology B 846.

4. Ordering Information

4.1 Order for product under this specification should include the following information:

4.1.1 Specification ~~number~~ designation and year of issue,

4.1.2 Quantity or weight for each size,

4.1.3 Temper (Section 7),

4.1.4 Grain size of annealed temper (optional) (Section 9),

[2] Refer to Practice E 527 for an explanation of the unified numbering system (UNS).

[3] *Annual Book of ASTM Standards*, Vol 02.01.

[4] *Annual Book of ASTM Standards*, Vol 03.01.

[5] *Annual Book of ASTM Standards*, Vol 14.02.

[6] *Annual Book of ASTM Standards*, Vol 03.0~~5~~6.

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

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

4.1.5 Dimensions: thickness, width, length, (Section 10),
4.1.6 How furnished: straight lengths or coils,
4.1.7 Heat identification or traceability, if when required,
4.1.8 Certification, if when required, and
4.1.9 Mill test report, if when required.
4.1.10 When material is purchased for agencies of the U.S. Government, this shall be specified in the contract or purchase order, and the material shall conform to the Supplementary Requirements as defined in the current issue of the Specification B 248. government, see Section 11.

5. Materials and Manufacture

5.1 *Materials*:
5.1.1 The material of manufacture shall be of such quality a cast bar, cake, slab, and purity so forth of copper alloy UNS No. C22000 as specified in the ordering information.
5.1.2 In the event that heat identification or traceability is required, the purchaser shall specify the details desired.

NOTE 1—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.

5.2 *Manufacturer*:
5.2.1 The product shall have the properties be manufactured by such hot working, cold working, and characteristics prescribed annealing processes as to produce a uniform wrought structure in this specification.
5.2 The the finished product.
5.2.2 The product shall be finished by hot or cold worked to the cold-rolling finished size and subsequently annealed, when required, to meet the annealing process, and may temper properties specified in the ordering information.
5.2.3 *Edges*—Slit edges shall be furnished unless otherwise specified in either cold-rolled the contract or annealed tempers, as specified. purchase order.

6. Chemical Composition

6.1 The material product shall conform to the composition prescribed in Table 1.
6.2 These specification composition limits do not preclude the presence of other elements. Limits for unnamed elements may be established and determination required by agreement between manufacturer or supplier and purchaser.
6.3 Either copper or zinc may be taken as the difference between the sum of all elements analyzed and 100 %. Copper, when determined by difference, must conform to the requirements of Table 1. When all elements in Table 1 are analyzed, their sum shall be 99.8 % min.

7. Temper

7.1 Tempers available under this specification, as defined in Practice Classification B 601, are as follows:
7.1.1 *Cold-Rolled Tempers*—For cold rolled strip, a temper designation from Table 2 shall be specified.
7.1.2 *Annealed Tempers*—For annealed tempered strip, a temper designation from Table 3 shall be specified.

8. Mechanical Property Requirements

8.1 *Tensile Strength of Rolled Tempers*—The tension test shall be the standard test for all tempers of cold-rolled strip, and the acceptance or rejection. based upon mechanical properties, shall depend only on the tensile strength which shall conform to the requirements prescribed in Table 2. Tension test specimens shall be taken so the longitudinal axis is parallel to the direction of rolling.
8.1.1 *Rockwell Hardness of Rolled Tempers*—Since a Rockwell hardness test offers a quick and convenient method of checking commercial bronze for general conformity to the requirements for tensile strength, the approximate Rockwell hardness values for each of the cold-rolled tempers are given in Table 2 for general information and assistance in testing.
8.2 *Tension Tests Tensile Strength of Annealed Tempers*—Annealed strip shall conform to the tensile property requirements prescribed in Table 4. Tension test specimens shall be taken so the longitudinal axis is parallel to the direction of rolling.

TABLE 1 Chemical Requirements

Copper Alloy UNS No. C22000	
Element	Composition
Copper	89.0–91.0
Copper	89.0–91.0
Lead, max	0.05
Iron, max	0.05
Zinc	remainder

TABLE 2 Tensile Strength Requirements and Approximate Rockwell Hardness Values for Cold-Rolled Strip

Rolled Temper Designation		Tensile Strength, ksi[A] (MPa[B])		Approximate Rockwell Hardness[C]	
Standard	Former	Min	Max	B Scale	Superficial 30-T
H01	Quarter-hard	40 (275)	50 (345)	27–56	34–54
H02	Half-hard	47 (325)	57 (395)	50–66	50–61
H03	Three-quarter hard	52 (355)	62 (425)	59–71	55–64
H04	Hard	57 (395)	66 (455)	65–75	60–67
H06	Extra-hard	64 (440)	72 (495)	72–79	64–69
H08	Spring	69 (475)	77 (530)	76–81	67–70
H10	Extra-spring	72 (495)	80 (550)	78–83	68–71

[A] ksi = 1000 psi.
[B] See Appendix X1.
[C] Rockwell hardness values apply as follows: The B scale applies to metal 0.020 in. (0.058 mm) in thickness and over; the 30-T scale applies to metal 0.012 in. (0.305 mm) in thickness and over.

TABLE 3 Grain Size Requirements of Annealed Tempe Strip

Annealed Temper Designation	Grain Size, mm		
Standard	FNorminal Average	NomMin	Mal Grain Sizex
OS015	Light anneal	[A]	0.015 mm diameter of average grain
OS015	0.015	[A]	0.025
OS025	Intermediate anneal	0.025 mm diameter of average grain	
OS025	0.025	0.015	0.040
OS035	Drawing anneal	0.035 mm diameter of average grain	
OS035	0.035	0.025	0.050

[A] Although no minimum grain size is required, this material must be fully recrystallized.

9. Grain Size of Annealed Tempers

9.1 In addition to the tensile properties prescribed in Table 3 4 for strip over 0.020 in. (0.508 mm) in thickness, strip, grain size may also be specified by the purchaser. When grain size is specified, the average grain size of the annealed strip shall be within the limits prescribed in Table 5. 3. At a magnification of 75×, the average grain size of selected areas 79.8 mm in diameter of each of two samples of annealed strip shall be determined on a plane parallel to the surface of the strip.

10. Dimensions, Mass, and Permissible Variations

10.1 *Thickness*—The standard method of specifying thickness shall be in decimal fractions of an inch. The tolerances shall be as shown in Table 6 5. Note 1—For material 0.021 in. (0.533 mm) and under in thickness, it is recommended that the nominal thickness be stated in the nearest half-thousandth of an inch. (For example, specify 0.006 or 0.0065) (0.152 or 0.165 mm), but not 0.0063 (0.158 mm)). For material over 0.021 in. in thickness, it is recommended that the nominal thickness be stated in the nearest thousandth of an inch. (For example, specify 0.128 or 0.129 (3.25 or 3.28 mm), but not 0.1285 (3.26 mm).)

10.2 *Width*—The width tolerances of strip metal shall be as prescribed in Table 7 6.

10.3 *Length*—The strip shall be furnished in straight lengths or in coils (Rrolls), as specified. Rolls shall consist of not more than three lengths, no one of which shall be less than 10 ft (3.05 m) in length. The tolerances for straight lengths shall be as prescribed in Table 8 7.

10.3.1 *Stock Lengths*—When furnished in stock lengths with short lengths included, the schedule of short lengths shall be as prescribed in Table 9 8.

10.3.2 *Special Length*—When special lengths are required, they shall be specified in the order.

NOTE 2—For the purpose of determining conformance with the dimensional requirements prescribed in this specification, any measured value outside the specified limiting values for any dimension may be cause for rejection.

10.4 *Straightness Tolerances*—The straightness tolerances shall be as prescribed in Table 10 9.

11. Workmanship, Finish, and Appearance

11.1 The material shall be free of defects, but blemishes of a nature that do not interfere with normal commercial operations are acceptable. It shall be well-cleaned and free of dirt. A superficial film or residual light lubricant is normally present and is acceptable unless otherwise specified.

11.2 The surface finish and appearance shall be the normal commercial qualityPurchases for the alloy, thickness, and temper ordered. When application information is provided with U.S. Government

11.1 When specified in the contract or purchase order, product purchased for agencies of the surface U.S. Government shall be that commercially producible for conform to the application. Superficial films special government regulations specified in the Supplemental Requirements section as defined in the current issue of discoloration, or lubricants, or tarnish inhibitors are permissible unless otherwise specified. Specification B 248.

TABLE 4 Tension Test Requirements of Annealed Strip

Annealed Temper Designation	Thickness of Annealed Tempers, in. (mm)	Tensile Strength min. ksi[A] (MPa[B])	Elongation in 2 in. (50.8 mm), min, %
Standard Former			
OS015	Light anneal		
OS015			
	0.005 to 0.010 (0.127 to 0.254), incl	38 (260)	15
	Over 0.010 to 0.050 (0.254 to 1.27), incl	38 (260)	25
	Over 0.050 to 0.100 (1.27 to 2.54), incl	38 (260)	27
	Over 0.100 (2.54)	38 (260)	30
OS025	Intermediate anneal		
OS025			
	0.005 to 0.010 (0.127 to 0.254), incl	36 (250)	20
	Over 0.010 to 0.050 (0.254 to 1.27), incl	36 (250)	30
	Over 0.050 to 0.100 (1.27 to 2.54), incl	36 (250)	32
	Over 0.100 (2.54)	36 (250)	35
OS035	Drawing anneal		
OS035			
	0.005 to 0.010 (0.127 to 0.254), incl	34 (240)	25
	Over 0.010 to 0.050 (0.254 to 1.27), incl	34 (240)	35
	Over 0.050 to 0.100 (1.27 to 2.54), incl	34 (240)	38
	Over 0.100 (2.54)	34 (240)	40

[A] ksi = 1000 psi.
[B] See Appendix X1

TABLE 5 GraThickn Size Requirementss Tof Annealed Stripances

Annealed Temper Designation	Grain Size, mm		
	Thickness Tolerances, plus and minus,[A] in.		
Sta ndard	Former	Nom inal Average	M in., incl, in Width
Thickness, in.	8 in. and under in Width	Over 8 to 14 in., incl, in Width	Over 14 to 20 in., incl, in Width
0.004 and under	Max0.0003 (0.008)	0.0006 (0.015)	... ...
0.004 and under	0.0003 (0.008)	0.0006 (0.015)	... ...
OS 015	Light anneal	0.015	A0.0013 (0.033)
Over 0.004 to 0.006, incl	0.0004 (0.010)	0.0008 (0.020)	0.0013 (0.033)
Over 0.006 to 0.009, incl	0.0006 (0.015)	0.0010 (0.025)	0.0015 (0.038)
OS 025	Intermediate anneal	0.025	0.0158 (0.046)
Over 0.009 to 0.013, incl	0.0008 (0.020)	0.0013 (0.033)	0.0018 (0.046)
Over 0.013 to 0.017, incl	0.04010 (0.025)	0.0015 (0.038)	0.002 (0.051)
Over 0.013 to 0.017, incl	0.0010 (0.025)	0.0015 (0.038)	0.002 (0.051)
OS 035	Drawing anneal	0.035	0.02 51)
Over 0.017 to 0.021, incl	0.0013 (0.033)	0.0018 (0.046)	0.002 (0.051)
Over 0.021 to 0.026, incl	0.050.038)	0.002 (0.051)	0.0025 (0.064)
Over 0.021 to 0.026, incl	0.0015 (0.038)	0.002 (0.051)	0.0025 (0.064)
Over 0.026 to 0.037, incl	0.002 (0.015)	0.002 (0.051)	0.0025 (0.064)
Over 0.037 to 0.050, incl	0.002 (0.015)	0.0025 (0.064)	0.003 (0.076)
Over 0.050 to 0.073, incl	0.0025 (0.064)	0.003 (0.076)	0.0035 (0.089)
Over 0.073 to 0.130, incl	0.003 (0.076)	0.0035 (0.089)	0.004 (0.102)
Over 0.130 to 0.188, incl	0.0035 (0.089)	0.004 (0.102)	0.0045 (0.114)

[A] Although no minimum grain size is required this material must be fully recrystallized.

12. Workmanship, Finish, and Appearance

12.1 The material shall be free of defects, but blemishes of a nature that do not interfere with normal commercial operations are acceptable. It shall be well-cleaned and free of dirt. A superficial film or residual light lubricant is normally present and is acceptable unless otherwise specified.

TABLE 6 ThWicknessdth Tolerances

Slit Metal and Slit Metal with Rolled Edges			
	Thickness Tolerances, plus and minus,[A] in.		
	Width Tolerances[A] Plus and Minus, in. (mm)		
Thickness, in.	8 in. and under in Wid th	Over 8 to 14 in., incl, in Wid th	Over 14 to 2 0 in., incl, in Wid th
Thickness, in.	0.004 th	Over 8 to 0.032 in. (0.102 to 0.813 mm), incl, in Thickness	Over 0.032 to 0.188 in. (0.813 to 4.78 mm), incl, in Thickness
0.004 and under	0.0003 (0.008)	0.0006 (0.015)... ...	
2 (50.8) and under	0.005 (0.13)	0.010 (0.25)	
Over0.004 to0.006, incl	0.0004 (0.010)	0.0008 (0.020)	0.0013 (0.033)
Over 2 to 8 (50.8 to 203), incl	0.008 (0.20)	0.0008 (0.020)	0.0013 (0.33)
Over 0.006 to0.009, incl	0.0006 (0.015)	0.0010 (0.025)	0.0015 (0.038)
Over 8 to 14 (203 to 356), incl	0.010 (0.25)	0.015)	0.0015 (0.38)
Over 0.009 to0.013, incl	0.0008 (0.020)	0.0013 (0.033)	
Over 14 to 20 (356 to 508), incl	0.013 (0.33)	0.018 (0.46)	
	0.0018 (0.046), incl)		
Square Sheared Metal (All Lengths up to 120 in. (3.05 m), incl)			
Over 0.013	to 0.017, incl0.0010 (0.025)		0.0015 (0.038) 0.002 (0.051)
	Width Tolerances,[A] Plus and Minus, in. (0.025)		0.0015 (0.038)0.002 (0.051mm)
Over 0.017to 0.021, incl	0.0013 (0.033)	0.0018 (0.046)	0.002 (0.051)
Width, in. (mm)	1/16 in.	Over 1/16 to	Over 1/8 in.
Over 0.021 to 0.026, incl	0.0015(0.038)	0.002 (0.051)	0.0025(0.064)
	(1.59 mm)	1/8 in. (1.59	(3.18 mm) in
Over 0.026 to 0.037, incl	0.002 (0.015)	0.002 (0.051)	0.0025 (0.064)
	and Under in	to 3.18	Thickness
Over 0.037 to 0.050, incl	0.002 (0.015)	0.0025 (0.064)	0.003 (0.076)
	Thickness	mm) incl, in	
Over 0.050 to 0.073, incl	0.0025 (0.064)	0.003 (0.076)	0.0035 (0.089)
	Thicknesses		
Over0.073 to 0.130, incl	0.003 1/32 (0.076)	0.0035 3/64 (0.089)	0.004 1/16 (0.102)
20 (508) and under	1/32 (0.79)	3/64 (1.2)	1/16 (102)
Over 0.130 to 0.188, incl	0.0035 (0.089)	0.004 (0.102)	0.0045 (0.114)
Over 0.130 to 0.188, incl	0.0035 (0.089)	0.004 (0.102)	0.0045 (0.1146)

[A] When tolerances are specified as all plus or all minus, double the values given.

12.2 The surface finish and appearance shall be the normal commercial quality for the alloy, thickness, and temper ordered. When application information is provided with purchase order, the surface shall be that commercially producible for the application. Superficial films of discoloration, or lubricants, or tarnish inhibitors are permissible unless otherwise specified.

13. Sampling

123.1 *Sampling*—The lot size, portion size, and selection of sample pieces shall be as follows:

123.1.1 *Lot Size*—40 000 lb (18 144 kg) or less material of the same mill form, temper, and thickness, subject to inspection at one time.

123.1.2 *Portion Size*—Sample pieces shall be selected from eight individual pieces, and shall be taken so as to be representative of those pieces. If the lot consists of less than eight pieces, a sample shall be taken from each individual piece.

12.1.2.1

13.2 *Chemical a Analysis*:

12.1.3 When samples are taken at the time the castings are poured, at least one

13.2.1 The sample shall be taken for each group of castings poured simultaneously from the same source of molten metal.

12.1.4 When samples are taken from the semifinished product, a sample shall be taken to represent each 40 000 lb (18 144 kg) or fraction thereof, except that no more than one sample shall be required per piece.

12.2 *Chemical Analysis*—A sample for chemical analysis shall be taken and prepared in accordance with Practice E 255. Drillings, millings, etc. shall be taken E 255 for product in approximately equal weight its final form taken from each of the sample pieces selected in accordance with 12.1.2 13.1.2 and combined into one composite sample. The minimum weight of the composite sample that is to be divided into three equal parts shall be 150 g.

12.2.1 In lieu

13.2.2 Instead of sampling as directed in accordance with Practice E 255, 13.2.1, the manufacturer shall have the option of determining conformance to chemical composition as follows: Conformance shall be determined by the manufacturer by analyzing samples taken sampling at the time the castings are poured or samples taken from the semifinished product. If the manufacturer

TABLE 7 WLength Tolerances for Straidght Lengths

NOTE 1—The following length tolerances are all plus; if all minus tolerances are desired, use the same values; if tolerances are desired plus and minus, halve the values given.

Slit Metal and Slit Metal with Rolled Edges	Width TolerancesA Plus and Minus, in. (mm)	
	Length Tolerances	
Width, in. (mm)	0.004 to 0.032 in. (0.102 to 0.813 mm), incl, in Thickness	Over 0.032 to 0.188 in. (0.813 to 4.78mm), incl, in Thickness
Length, ft (m)	in.	mm
2 (50.8) and under	0.005 (0.13)	0.010 (0.25)
Specific lengths, mill lengths, Over 2to 8 (50.8to 203), incl	0.008 (0.20)	0.013 (0.33)
multiple lengths, and specific lengths with ends	¼	64
10 (3.05) and under Over 8 to 14 (203 to 35 6), incl	0.010 (0.25)	0.015 (0.38)
Over 10 to 20 (3.05 to 6.10), incl	½	13
Over 14to 20 (356to 508), inc l	0.0 13 (0.33)	0.018 (0.46)
Stock lengths and stock lengths with ends	13 (0.33)	0.018 (0.46)

Square Sheared Metal (All Lengths up to 120 in. (3.05 m), incl)

Width, in. (mm)	Width Tolerances,A Plus and Minus, in. (mm)		
	1/16 in. (1.59 mm) and Under in Thickness	Over 1/16 to ⅛ in. (1.59 to 3.18 mm) incl, in Thicknesses	Over ⅛ in. (3.18 mm) in Thickness
20 (508) and under	1/32 (0.79)	3/64 (1.2)	1/16 (1.6)
2508) and under	1/32 A (0.79)	3/64 (1.2)	1/16 (1.6)

A When tolerances are specified as all plus or all minus, double the values given.

determines the chemical composition of the material during the course of manufacture, he shall not be required to sample and analyze the finished product.

12.2.1.1 Due to

13.2.2.1 When samples are taken at the discontinuous nature of time the castings are poured, at least oene sample shall be taken from each group of castings into wrought products, it is not practical poured from the same source of molten metal.

13.2.2.2 When samples are taken from semifinished product, a sample shall be taken to keep specific casting analysis identified with represent each 10 000 lbs (5000 kg) or fraction thereof, except that no more than one sample shall be required per piece.

13.2.2.3 Only one sample need be taken from the semifinished product of one cast bar from a specific quantity single melt charge continuously processed.

13.3 *Samples for All Other Tests*—Samples for all other tests shall be taken from the sample portions selected in 13.1.2 and be of finished material.

12.2.2 In an convenient size to accomodate the event that heat identification or traceability is required, test and comply with the purchaser shall specify requirements of the details desired.

13. appropriate product specification and test method.

14. Number of Tests and Retests

134.1 *Test*:

134.1.1 *Chemical Requirements*:

134.1.2 When samples are taken at the time the castings are poured, at least one sample shall be analyzed for each group of castings poured simultaneously from the same source of molten metal.

134.1.3 When samples are taken from the semifinished or finished product, at least one sample representative of the product of each cast bar from a single melt charge continuously processed with heat identity maintained shall be analyzed.

134.2 *Mechanical Properties and Grain Size*—Unless otherwise provided in the product specification, test specimens shall be taken from two of the sample pieces selected in accordance with 123.1.2. The required tests shall be made on each of the specimens so selected.

TABLE 8 Schedule of Minimum Length Toler ances for Strd Maximum Weight Le of EngthdsNote 1—The follow r Mingll Length tolerances are all, Splus;ecif all minus toleranc Les are desired, usengthesame values; wiftolerah Ences aredesired plus and minus, halv
Stock Lengthe values g wiveth En.ds

Nominal Length, ft (m)	0.050 in. (1.27 mm) and Under in Thickness			Over 0.050 to 0.125 in. (1.27 to 3.18 mm) incl, in Thickness			Over 0.125 to 0.250 in. (3.18 to 6.35 mm) incl, in Thickness		
	Minimum Length of Shortest Piece		Maximum Permissible Weight of Ends, % of Lot Weight	Minimum Length of Shortest Piece		Maximum Permissible Weight of Ends, % of Lot Weight	Minimum Length of Shortest Piece		Maximum Permissible Weight of Ends, % of Lot Weight
	Length,ft (m)	in.m		ft	m		ft	m	
Specific leng ths, m ill lengths,		1.22	multiple lengths, and specific lengths with ends 10 (3.05) and under	¼	64				
6 to 8 (1.83 to 2.44), incl	4	1.22	20	4	64				
1.22	Over 10 to20 (3.05 to 6.10), incl	½	14	3					
1.22	25	3	0.914	30					
S tock leng ths and stock lengths w ith ends	1[A]	1.83	25A	5	1.52	30	4	1.22	35
8 to 10 (2.44 to 3.05), incl	6	1.83	25	5	1.52	30	4	1.22	35
10 to 14 (3.05 to 4.27), incl	7	2.13	30	6	1.83	35	5	1.52	40

[A] As stock lengths are cut and placed in stock in advance of orders, departure from this tolerance is not practicable.

134.3 *Other Tests*—For other tests, test specimens shall be taken from four of the sample pieces selected in accordance with 123.1.2. The required tests shall be made on each of the specimens so selected.

134.4 *Retests*:

134.4.1 If the chemical analysis of the specimens prepared from samples selected in accordance with 123.1.2 fails to conform to the specified limits, analysis shall be made on a new composite sample prepared from the pieces selected in accordance with 123.1.2.

134.4.2 If one of the two tests made to determine any of the mechanical or grain size requirementss fails to meet a specified limit, this test shall be repeated on the remaining pieces, maximum of two, selected in accordance with 123.1.2, and the results of both of these tests shall comply with the specified requirements.

134.4.3 If any test specimen shows defective machining or develops flaws, it may be discarded and another specimen substituted.

134.5 *Chemical Analysis*—Chemical analysis—shall shall be determined as the average of at least two replicate determinations for each element specified.

14. Specimen Preparation

14.1 In the grain size test, all specimens shall be prepared as specified in Method E 3.

14.2 In the tension test, all strip less than ¾″ wide shall be pulled in full size when practicable. Machined test specimens shall be as specified in Test Method E 8, Fig. 1 for sheet type specimens.

14.3 *Chemical composition*—the composite sample for laboratory analysis shall, in case of disagreement, be prepared in accordance with Practice E 255.

15. Specimen Preparation

15.1 In the grain size test, all specimens shall be prepared as specified in Guide E 3.

15.2 In the tension test, all strip less than ¾ in.-wide shall be pulled in full size when practicable. Machined test specimens shall be as specified in Test Method E 8, Fig. 1, for sheet type specimens.

15.3 *Chemical Composition*—The composite sample for laboratory analysis shall, in case of disagreement, be prepared in accordance with Practice E 255.

16. Test Methods

156.1 The properties and chemical compositions enumerated in this specification shall, in case of disagreement, be determined in accordance with the following ASTM methods:

TABLE 9 Schedule of Minimum Lengthrand Maximum Weight of Endes fs Tor Mill Lerangths, Specific Lengths with Ends and S Maximum Edgewise Curvature (depth of arck Le) ing any 72-in. (1.83-m) Porths wion of th Ee Total Lendsgth

Nominal Length, ft (m)al with Rolled Edges					
Slit Metal and Slit Metal with Rolled Edges					
	0.050 in. (1.27 mm) and Underin ThicknessOver 0.050 to 0.125 in. (1.27 to 3.18 mm) incl, in Thickness			Over 0.125 to 0.250 in. (3.18 to 6.35mm) incl, in Thickness	
	Straightness Tolerance, in Thickness			Over 0. (mm) incl, in Thickness	
M inimum Length of Shortest P iece	Maximum Permissible Weight of Ends, % of Lot Weight	Minimum Length of Shortest Piece		Maximum Permissible Weight of Ends, % of Lot Weight	d
Width, iece		As Sliece		t Only	As Slit and Either Straightenedd or Edge Rolleight
		Maxin. (mm)		t Only	
	Min imum Lengthofills	Shipped Shortest Piece			Maximum Permissible Weightof Ends, %
	Shipped in Rolls	Shipped Flatest Piece		Shipped Flat, in Rolls, or on Bucks	
of 3⁄8 Lot We ight Over 1⁄4 to 3⁄8 (6.35 to 9.53), ight					
ft ftncl	m m	ft ft	m m	ft ft	m m
6 to 8 (1.83 to 2.44), incl 2 (51)	4 1½ (38)	½ 1.22 ½ (1.22	3) 3)		
20 Over 3⁄8 to ½ (9.53 to 12.7), incl	4 1½ (38)	1. 22 1 (25)	½ (13) ½ (13)		
Over ½ to 1 (125 Over ½ to 1 (12.7 to 25.4), incl	3 1 (25)	0.9 ¾ 14 ¾ (19)	½ 30 ½ (13)		
8 to 10 (2.44 to 3.0 5), incl Over 1 to 2 (25.4 to 50.8), incl	⅝ 6 ⅝ (16)	⅝ 1.83 ⅝ (16)	⅜ (9.5) ⅜ (9.5)		
Over 25 Over 2 to 4 (50.8 to 102), incl	5 ½ ½ (13)	½ 1.52 ½ (13)	3⅜ (9.5) ⅜ (9.5)		
Over 4 (10 Over 4 (102)	4 ⅜ ⅜ (9.5)	1.22 ⅜ ⅜ (9.5)	⅜ (9.5) ⅜ (9.5)		

Square Sheared Metal Not applicable to metal over 120 in. (35			
Square Sheared Metal Not applicable to metal over 120 in. (3.05 m) in length			
10	to 14 (3.05to 4.27)		
	Straightness Tolerances, in. (mm)		
, incl	7		
Thickness, in. (mm)	Up to 10 in. (254 mm), incl, in Width	Over 10 in. (254 mm) in Width	
2⅛.13	30 1⁄16	6	1⁄32 (0.79)
⅛ (3.18) and under	1⁄16 (1.6)	6	1⁄32 (0.79)
1.83	⅛ 35	5 3⁄64 (1.2)	
Over ⅛ to 3⁄16 (3.18 to 4.78), incl	⅛ (3.2)	3⁄64 (1.2)	
Over 3⁄16 (4.78)	1⅛ .52	40 1⁄16	
Over 3⁄16 (4.78)	⅛ (3.2)	1⁄16 (1.6)	

Test	ASTM Designation
Chemical Analysis	E 478
Tension	E 8[A]
Grain Size	E 3, E 112
Rockwell hardness	E 18

[A] The tension test specimen shall conform to the dimensions shown in Fig. 1 of Test Methods E 8.

156.2 *Measurement of Dimensions*—At least ten strips shall be selected to be representative of the lot of material. The dimensions of each strip shall be measured. Measurements for thickness shall be made over the entire width of the strip, in at least three different places not less than 1 ft from each end, and at such other points as may be selected.

167. Significance of Numerical Limits

167.1 For purposes of determining compliance with the specified property limits for the properties listed in the following table, an observed value of a calculated value shall be rounded as indicated in accordance with the rounding method of Practice E 29:

Property	Rounded Unit for Observed or Calculated Value
Chemical composition	nearest unit in the last right-hand place
Hardness	of figures of the specified limits.
Tensile strength	nearest ksi (nearest 5 MPa)
Grain size:	
Up to 0.055 mm, incl	nearest multiple of 0.005 mm
Over 0.055 to 0.160 mm, incl	nearest 0.01 mm
Elongation:	
5 % and over	nearest 1 %

~~17. Inspection~~

~~17.1 The manufacture shall inspect and make the test necessary to verify that the product furnished conforms to the requirements of this specification.~~

~~17.2 If, in addition, source inspection of the material by the purchaser is agreed upon by the manufacturer and the purchaser as part of the purchase contract, the nature of the facilities needed to satisfy the inspector representing the purchaser that the product is being furnished in accordance with this specification shall be included in the agreement. All tests and the inspection shall be conducted so as not to interfere unnecessarily with the operation of the works.~~

~~17.3 The manufacturer and the purchaser, by mutual agreement, may accomplish the final inspection simultaneously.~~

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18.1 The manufacture shall inspect and make the test necessary to verify that the product furnished conforms to the requirements of this specification.

18.2 If, in addition, source inspection of the material by the purchaser is agreed upon by the manufacturer and the purchaser as part of the purchase contract, the nature of the facilities needed to satisfy the inspector representing the purchaser that the product is being furnished in accordance with this specification shall be included in the agreement. All tests and the inspection shall be conducted so as not to interfere unnecessarily with the operation of the works.

18.3 The manufacturer and the purchaser, by mutual agreement, may accomplish the final inspection simultaneously.

19. Rejection and Rehearing

189.1 *Rejection*:

189.1.1 Product that fails to conform to the specified requirements when inspected or tested by the purchaser or his agent may be rejected.

189.1.2 Rejection should be reported to the manufacturer or supplier promptly and in writing.

189.1.3 In case of dissatisfaction with the results of the test, the manufacturer or supplier may make claim for a rehearing.

~~19. Packing, Marking, Shipping, and Preservation~~

~~19.1 The~~

19.2 *Rehearing*—As a result of product ~~shall be separated by size, composition, and temper, and prepared~~ rejection, the manufacturer or supplier may make a claim for ~~shipment in such~~ a ~~manner as~~ retest to ~~ensure acceptance~~ be conducted by ~~common carrier for transportation~~ the manufacturer or supplier and ~~to afford protection from~~ the ~~normal hazards~~ purchaser. Samples of ~~transportation.~~

~~19.2 Each shipping unit~~ the rejected product shall be ~~legibly marked~~ taken in accordance with ~~the purchase order number, metal alloy designation, temper, size, shape, gross~~ this specification and ~~n~~ subject ~~wed~~ to test by both parties using the test method(s) specified in this specification, or alternatively, upon agreement of ~~supplier. The specification number shall~~ both parties, an independent laboratory may be ~~sh~~selected fo~~wn, wr~~ the test(s) using the test method(s) specified in this specification.

20. Certification

20.1 When specified in the purchase order or contract, the purchaser shall be furnished certifications that samples representing

each lot have been tested or inspected as directed in this specification and that the requirements have been met.

21. Test Report

21.1 When specified in the purchase order or contract, a report of the test results shall be furnished.

22. Packing, Marking, Shipping, and Preservation

22.1 *Packaging*—The product shall be separated by size, composition, and temper, and prepared for shipment in such a manner as to ensure acceptance by common carrier for transportation and to afford protection from the normal hazards of transportation.

22.2 *Package Markings*—Each shipping unit shall be legibly marked with the purchase order number, metal alloy designation, temper, size, shape, gross and net weight, and name of supplier. The specification number shall be shown, when specified.

23. Keywords

203.1 ammunition components; bronze; bullet jackets; strip; UNS No. C22000

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 130 – 95) that may impact the use of this standard.

(*1*) Specification B 248 was added to Section 2.2, Referenced Documents.
(*2*) Former Table 3, Annealed Temper, was deleted and the remaining tables were renumbered.
(*3*) Several sections (11, 19.2, 20, and 21) were added to meet the Committee B05 *Outline of Form for Specifications* (OFS).
(*4*) A note in Section 10 was deleted.
(*5*) Bismuth was added to Table 1.
(*6*) Reference to strip thickness for grain size was deleted from 9.1.
(*7*) Section 13 on Sampling was revised.