Designation: B591 – 15

Standard Specification for Copper-Zinc-Tin and Copper-Zinc-Tin-Iron-Nickel Alloys Plate, Sheet, Strip, and Rolled Bar[1]

This standard is issued under the fixed designation B591; 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 U.S. Department of Defense.

1. Scope*

1.1 This specification covers the requirements for specified copper-zinc-tin alloys and copper-zinc-tin-iron-nickel alloys plate, sheet, strip, and rolled bar. The alloys and nominal compositions are as follows:

Copper Alloy UNS No.	Copper, %	Tin, %	Zinc, %	Phos., %%	Iron, %	Nickel, %
C40500	95	1	4			
C40810	95.5	2.0	2.2	0.03	0.1	0.15
C40850	95.5	3.0	1.3	0.1	0.1	0.1
C40860	94.8	2.0	3	0.03	0.03	0.1
C41100	91	0.5	8.5			
C41300	91	1	8			
C41500	91	2	7			
C42200	87	1	12			
C42500	88	2	10			
C42520	89.8	2.0	8	0.1	0.1	0.1
C43000	85	2	13			
C43400	85	0.7	14.3			

1.2 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units which are provided for information only and are not considered standard.

2. Referenced Documents

2.1 The following documents in the current issue of the *Annual Book of ASTM Standards* form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[2]

B248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar

B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast

B846 Terminology for Copper and Copper Alloys

E8/E8M Test Methods for Tension Testing of Metallic Materials

E18 Test Methods for Rockwell Hardness of Metallic Materials

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[3]

E112 Test Methods for Determining Average Grain Size

E478 Test Methods for Chemical Analysis of Copper Alloys

3. General Requirements

3.1 The following sections of Specification B248 constitute a part of this specification:

3.1.1 Terminology—Definitions,
3.1.2 Workmanship, Finish, and Appearance,
3.1.3 Sampling,
3.1.4 Number of Tests and Retests,
3.1.5 Specimen Preparation,
3.1.6 Test Methods—except for chemical analysis,
3.1.7 Significance of Numerical Limits,
3.1.8 Inspection,
3.1.9 Rejection and Rehearing,
3.1.10 Certification,
3.1.11 Test Reports (Mill),
3.1.12 Packaging and Package Marking,
3.1.13 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, which supplement those appearing in Specification B248.

4. Terminology

4.1 For definitions of terms related to copper and copper alloys, refer to Terminology B846.

[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.

Current edition approved Feb. 15, 2015. Published March 2015. Originally approved in 1973. Last previous edition approved in 2009 as B591 – 09. DOI: 10.1520/B0591-15.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

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

5. Ordering Information

5.1 Include the following specified choices when placing orders for product under this specification, as applicable:

5.1.1 ASTM designation and year of issue (for example, B591 – XX),

5.1.2 Copper [Alloy] UNS No. Designation (for example, C42500),

5.1.3 Temper (see Section 8),

5.1.4 Dimensions, that is, thickness, width, length, and so forth (see Section 12),

5.1.5 Form: plate, sheet, strip, or rolled bar,

5.1.6 How furnished: coils, specific or stock lengths, with or without ends,

5.1.7 Quantity: total weight each form, temper, and size, and

5.1.8 Intended application.

5.2 The following options are available but may not be included unless specified at the time of placing of the order when required:

5.2.1 Type of edge: slit, sheared, sawed, square corners, round corners, rounded edges, or full rounded edges,

5.2.2 Width and straightness tolerances (see Section 12),

5.2.3 Heat Identification or traceability details (see 6.1.2),

5.2.4 Certification,

5.2.5 Mill Test Report.

5.2.6 If product is purchased for agencies of the U.S. Government, see Section 11 of this specification and the Supplementary Requirements section of Specification B248 for additional requirements, if specified.

6. Materials and Manufacture

6.1 *Material:*

6.1.1 The material of manufacture shall be a form (cast bar, cake, or slab) of Copper Alloy UNS No. C40500, C40810, C40850, C40860, C41100, C41300, C41500, C42200, C42500, C42520, C43000, or C43400 of such purity and soundness as to be suitable for processing into products prescribed herein.

6.1.2 When specified in the contract or purchase order, that heat identification or traceability is required, the purchaser shall specify the details desired.

NOTE 1—Due to 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.

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

7. Chemical Composition

7.1 The material shall conform to the chemical compositional requirements specified in Table 1 for the copper alloy UNS No. designation specified in the ordering information.

7.1.1 These composition limits do not preclude the presence of other elements. By agreement between manufacturer and purchaser, limits may be established and analysis required for unnamed elements.

7.2 For alloys in which zinc is listed as "remainder," either copper or zinc may be taken as the difference between the sum of the results for all elements determined and 100 %. When all elements in Table 1 are determined, the sum of the results shall be 99.7 % min.

8. Temper

8.1 The standard tempers for products described in this specification are given in Table 2 and Table 3.

8.1.1 *Hot Rolled Temper (M20).*

8.1.2 *Cold Rolled Tempers H01 to H10*—Special tempers not listed in this specification are subject to agreement between the manufacturer and the purchaser.

8.1.3 *Annealed Tempers OS015 to OS035*—Special tempers not listed in this specification are subject to agreement between the manufacturer and the purchaser.

8.1.4 Temper designations are defined in Classification B601.

9. Grain 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 specimen taken from each of two sampling portions and each specimen shall be

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Composition, % max (Unless Shown as a Range)						
	Copper	Tin	Lead	Iron	Phosphorus	Nickel	Zinc
C40500	94.0-96.0	0.7-1.3	0.05	0.05	. . .	. . .	remainder
C40810	94.5-96.5	1.8-2.2	0.05	0.08-0.12	0.028-0.04	0.11-0.20	remainder
C40850	94.5-96.5	2.6-4.0	0.05	0.05-0.20	0.01-0.20	0.05-0.20	remainder
C40860	94.0-96.0	1.7-2.3	0.05	0.01-0.05	0.02-0.04	0.05-0.20	remainder
C41100	89.0-92.0	0.30-0.7	0.09	0.05	. . .	. . .	remainder
C41300	89.0-93.0	0.7-1.3	0.09	0.05	. . .	. . .	remainder
C41500	89.0-93.0	1.5-2.2	0.09	0.05	. . .	. . .	remainder
C42200	86.0-89.0	0.8-1.4	0.05	0.05	0.35	. . .	remainder
C42500	87.0-90.0	1.5-3.0	0.05	0.05	0.35	. . .	remainder
C42520	88.0-91.0	1.5-3.0	0.05	0.05-0.20	0.01-0.20	0.05-0.20	remainder
C43000	84.0-87.0	1.7-2.7	0.09	0.05	. . .	. . .	remainder
C43400	84.0-87.0	0.40-1.0	0.05	0.05	. . .	. . .	remainder

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) temper. Required properties for other tempers shall be agreed upon between the manufacturer and the purchaser at the time of placing the order.

Temper Designation		Tensile Strength, ksi[A] (MPa)[B]		Approximate Rockwell Hardness			
				B-Scale		Superficial 30T	
Code[C]	Name	Min	Max	0.020 to 0.036 in. (0.51 to 0.91 mm), incl	Over 0.036 in. (0.91 mm)	0.012 to 0.028 in. (0.30 to 0.71 mm), incl	Over 0.028 in. (0.711 mm)
				Copper Alloy UNS No. C40500			
M20	As hot-rolled	35 (240)	50 (345)	. . .	. . .	. . .	. . .
H01	Quarter hard	41 (280)	53 (365)	30-54	34-62	36-56	38-58
H02	Half hard	46 (315)	58 (400)	50-66	52-69	49-60	51-62
H03	Three-quarter hard	52 (360)	64 (440)	60-72	62-74	56-66	58-68
H04	Hard	58 (400)	70 (485)	66-76	68-78	60-68	62-70
H06	Extra hard	63 (435)	75 (515)	71-78	72-80	65-71	66-73
H08	Spring	68 (470)	80 (550)	75-81	76-83	67-72	68-74
H10	Extra spring	73 (505)	84 (580)	78-83	79-85	69-73	70-75
				Copper Alloy UNS No. C40810			
H02	Half hard	57 (395)	73 (505)	65-80	66-81	60-70	62-72
H04	Hard	76 (525)	88 (605)	78-89	80-90	67-74	69-75
H06	Extra hard	90 (620)	100 (690)	82-90	83-92	69-75	70-76
H08	Spring	94 (650)	102 (705)	85-92	86-94	71-77	72-78
				Copper Alloy UNS No. C40850			
H02	Half hard	57 (395)	73 (505)	65-80	67-81	60-69	62-72
H04	Hard	76 (525)	89 (615)	78-88	80-90	67-74	69-75
H06	Extra hard	90 (620)	100 (690)	82-91	83-93	69-75	70-76
H08	Spring	94 (650)	106 (730)	85-92	87-94	72-77	73-78
				Copper Alloy UNS No. C40860			
H02	Half hard	56 (385)	72 (495)	64-80	65-80	60-70	61-72
H04	Hard	74 (510)	87 (600)	77-89	79-90	66-74	68-75
H06	Extra hard	88 (605)	98 (675)	81-90	82-91	68-75	69-76
H08	Spring	92 (635)	105 (725)	84-92	85-94	70-77	71-78
				Copper Alloy UNS No. C41100			
M20	As hot-rolled	34 (235)	50 (345)	. . .	. . .	. . .	. . .
H01	Quarter hard	42 (290)	54 (370)	32-60	34-63	37-57	38-64
H02	Half hard	49 (340)	60 (415)	51-68	52-70	50-62	51-67
H03	Three-quarter hard	55 (380)	66 (455)	62-75	63-77	58-66	59-70
H04	Hard	61 (420)	72 (495)	68-79	69-81	62-70	64-71
H06	Extra hard	67 (460)	78 (540)	74-82	76-84	66-73	67-72
H08	Spring	73 (505)	83 (570)	78-84	77-86	69-74	70-73
H10	Extra spring	78 (540)	. . .	80 and over	80 and over	70 and over	71 and over
				Copper Alloy UNS No. C41300			
M20	As hot-rolled	37 (255)	50 (345)	. . .	. . .	. . .	. . .
H01	Quarter hard	45 (310)	55 (380)	34-62	35-64	40-58	39-60
H02	Half hard	50 (345)	62 (430)	52-70	53-72	51-63	51-64
H03	Three-quarter hard	58 (400)	68 (470)	64-77	66-78	59-68	60-69
H04	Hard	65 (450)	75 (515)	71-80	72-81	63-70	64-70
H06	Extra hard	70 (485)	82 (565)	77-83	78-84	67-71	68-72
H08	Spring	76 (525)	86 (595)	81-86	82-87	70-73	70-74
H10	Extra spring	81 (560)	. . .	85 and over	86 and over	72 and over	73 and over
				Copper Alloy UNS No. C41500			
M20	As hot rolled	38 (260)	50 (345)	. . .	. . .	. . .	. . .
H01	Quarter hard	46 (315)	56 (385)	48-73	49-75	48-65	49-67
H02	Half hard	53 (365)	63 (435)	68-78	70-80	62-68	63-70
H03	Three-quarter hard	57 (395)	68 (470)	73-80	75-82	65-70	66-71
H04	Hard	64 (440)	75 (515)	78-85	79-87	69-72	69-74
H06	Extra hard	70 (485)	82 (565)	81-87	82-90	70-73	70-75
H08	Spring	78 (540)	89 (615)	86-92	87-93	73-76	73-77
H10	Extra spring	85 (585)	. . .	89 and over	90 and over	74 and over	75 and over
				Copper Alloy UNS No. C42200			
M20	As hot-rolled	40 (275)	53 (365)	. . .	. . .	. . .	. . .
H01	Quarter hard	47 (325)	57 (395)	42-68	44-70	43-62	46-65
H02	Half hard	54 (370)	65 (450)	64-74	66-76	58-68	61-70
H03	Three-quarter hard	60 (415)	72 (495)	71-80	73-82	64-69	66-71
H04	Hard	67 (460)	79 (545)	76-83	78-85	67-71	69-73
H06	Extra hard	75 (515)	85 (585)	80-85	82-87	69-73	70-74
H08	Spring	82 (565)	92 (635)	83-88	85-90	70-74	71-75
H10	Extra spring	88 (605)	. . .	86 and over	86 and over	74 and over	74 and over
				Copper Alloy UNS No. C42500			
M20	As hot-rolled	40 (275)	54 (370)	. . .	. . .	. . .	. . .
H01	Quarter hard	49 (340)	59 (405)	46-71	48-73	45-65	47-67
H02	Half hard	57 (395)	69 (485)	67-81	69-83	63-69	65-72
H03	Three-quarter hard	62 (430)	74 (510)	74-84	76-86	66-71	68-73
H04	Hard	70 (485)	82 (565)	81-88	83-90	70-74	72-76
H06	Extra hard	76 (525)	88 (605)	86-92	88-94	71-75	73-77
H08	Spring	84 (580)	94 (650)	89-93	91-95	73-77	74-78

TABLE 2 *Continued*

Temper Designation		Tensile Strength, ksi[A] (MPa)[B]		Approximate Rockwell Hardness			
				B-Scale		Superficial 30T	
Code[C]	Name	Min	Max	0.020 to 0.036 in. (0.51 to 0.91 mm), incl	Over 0.036 in. (0.91 mm)	0.012 to 0.028 in. (0.30 to 0.71 mm), incl	Over 0.028 in. (0.711 mm)
H10	Extra spring	92 (635)	. . .	92 and over	92 and over	76 and over	77 and over
				Copper Alloy UNS No. C42520			
H02	Half hard	67 (460)	82 (565)	68-83	70-85	64-71	67-73
H04	Hard	81 (560)	96 (660)	82-90	83-92	71-76	72-78
H06	Extra hard	92 (635)	107 (740)	85-94	87-96	72-77	73-79
H08	Spring	97 (670)	112 (770)	88-96	90-98	74-79	75-81
H10	Extra spring	103 (710)	118 (815)	91-101	92-102	76-82	77-83
				Copper Alloy UNS No. C43000			
M20	As hot-rolled	40 (275)	55 (380)	. . .	. . .	. . .	. . .
H01	Quarter hard	47 (325)	60 (415)	41-68	45-72	47-64	50-67
H02	Half hard	55 (380)	69 (475)	64-79	67-82	58-70	60-72
H03	Three-quarter hard	65 (450)	78 (540)	72-83	75-86	64-72	66-74
H04	Hard	72 (495)	84 (580)	78-87	80-89	68-75	70-77
H06	Extra hard	83 (570)	93 (640)	83-89	85-91	70-77	72-79
H08	Spring	89 (615)	98 (675)	87-92	89-94	74-79	75-80
H10	Extra spring	90 (620)	. . .	89 and over	91 and over	75 and over	76 and over
				Copper Alloy UNS No. C43400			
M20	As hot-rolled	37 (255)	50 (345)	. . .	. . .	. . .	. . .
H01	Quarter hard	45 (310)	58 (400)	39-64	43-68	45-61	48-64
H02	Half hard	52 (360)	66 (455)	55-74	58-77	56-68	58-70
H03	Three-quarter hard	61 (420)	74 (510)	65-77	68-80	64-70	64-72
H04	Hard	68 (470)	80 (550)	73-84	75-86	65-74	67-76
H06	Extra hard	78 (540)	89 (615)	76-87	78-89	69-76	71-78
H08	Spring	85 (585)	94 (650)	81-89	83-91	73 and over	74-79
H10	Extra spring	88 (605)	. . .	83 and over	85 and over	74 and over	75 and over

[A] ksi = 1000 psi.
[B] See Appendix X1.
[C] Temper Designation Code defined in Classification B601.

TABLE 3 Grain Size Requirements for Annealed Material

Copper Alloy UNS No.	Temper Designation (B601)	Average Grain Size, mm		
		Nominal	Min	Max
C40500, C40810	OS035	0.035	0.025	0.050
C40850, C40860	OS025	0.025	0.015	0.035
C41100, C41300, C41500, C42200, C42500, C42520, C43000, and C43400	OS015	0.015	[A]	0.025

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

within the limits prescribed in Table 3 when determined in accordance with Test Methods E112.

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 of Rolled Tempers:*

10.1.1 Product furnished under this specification shall conform to the tensile requirements prescribed in Table 2 for the temper and UNS Alloy Number specified in the ordering information when tested in accordance with Test Methods E8/E8M.

10.1.2 Test specimens shall be taken so that the longitudinal axis is parallel to the direction of rolling.

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

10.2 *Rockwell Hardness*—The approximate Rockwell values given in Table 2 and Table 4 are for general information and assistance in testing and shall not be used as a basis for rejection.

10.2.1 When performed, the hardness values shall be determined using Test Methods E18.

NOTE 2—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.

11. Other Requirements

11.1 *Purchases for U.S. Government Agencies*—When specified in the contract or purchase order, product purchased for an agency of the U.S. Government shall conform to the special government requirements specified in the supplemental requirements given in Specification B248.

12. Dimensions, Mass, and Permissible Variations

12.1 The dimensions and tolerances for product described by this specification shall be as specified in Specification B248, with particular reference to the following tables and related paragraphs in that specification:

12.1.1 *Thickness*—Tolerances as in Table 1.

12.1.2 *Width:*

12.1.2.1 Width Tolerances for Slit Metal and Slit Metal with Rolled Edges as in Table 4.

12.1.2.2 Width Tolerances for Square-Sheared Metal as in Table 5.

12.1.2.3 Width Tolerances for Sawed Metal as in Table 6.

TABLE 4 Approximate Rockwell Hardness of Annealed Material

Standard Temper Designation (B601)	Annealed Temper Nominal Grain Size	Approximate Rockwell Hardness[A] F Scale	Superficial 30T
	Copper Alloy UNS No. C40500		
OS035	0.035	51-60	2-16
OS025	0.025	55-61	8-18
OS015	0.015	60-75	16-37
	Copper Alloy UNS No. C41100		
OS035	0.035	57-63	15-26
OS025	0.025	62-69	21-32
OS015	0.015	63-75	26-37
	Copper Alloy UNS No. C41300		
OS035	0.035	58-66	17-27
OS025	0.025	63-72	22-33
OS015	0.015	66-79	27-42
	Copper Alloy UNS No. C41500		
OS035	0.035	61-67	20-28
OS025	0.025	63-73	22-35
OS015	0.015	67-81	28-44
	Copper Alloy UNS No. C42200		
OS035	0.035	62-68	24-29
OS025	0.025	65-74	26-36
OS015	0.015	68-86	29-61
	Copper Alloy UNS No. C42500		
OS035	0.035	67-73	28-35
OS025	0.025	69-75	30-42
OS015	0.015	73-90	35-55
	Copper Alloy UNS No. C43000		
OS035	0.035	63-74	20-39
OS025	0.025	65-79	25-42
OS015	0.015	68-85	28-50
	Copper Alloy UNS No. C43400		
OS035	0.035	59-69	19-24
OS025	0.025	60-70	20-32
OS015	0.015	63-76	20-39

[A] Rockwell hardness values apply as follows: The F scale applies to metal 0.020 in. (0.5 mm) in thickness and over; the 30T scale applies to metal 0.015 in. (0.38 mm) in thickness and over.

12.1.3 *Length:*

12.1.3.1 Length Tolerances for Straight Lengths as in Table 7.

12.1.3.2 Schedule of Minimum Lengths and Maximum Weight of Ends for Mill Lengths, Specific Lengths with Ends, Stock Lengths with Ends as in Table 8.

12.1.3.3 Length Tolerances for Squared-Sheared Metal in All Widths 120 in. and Under as in Table 9.

12.1.3.4 Length Tolerances for Sawed Metal as in Table 10.

12.1.4 *Straightness:*

12.1.4.1 Straightness Tolerances for Slit Metal or Slit Metal Either Straightened or Edge Rolled as in Table 11.

12.1.4.2 Straightness Tolerances for Squared-Sheared Metal as in Table 12.

12.1.4.3 Straightness Tolerance for Sawed Metal as in Table 13.

12.1.5 *Edges:*

12.1.5.1 Tolerances for Radius of Commercially Square Corners of Rolled or Drawn Edges with Square Corners as in Table 14.

12.1.5.2 Tolerances for Radius on Corners of Rolled or Drawn Edges with Rounded Corners as in Table 15.

12.1.5.3 Tolerances for Radius of Rolled or Drawn Rounded Edges as in Table 16.

12.1.5.4 Tolerances for Radius of Rolled or Drawn Full Rounded Edges as in Table 17.

13. Test Methods

13.1 *Chemical Analysis:*

13.1.1 In case of disagreement, test methods for chemical analysis shall be subject to agreement between the manufacturer or supplier and the purchaser. The following table is a list of published test methods, some of which may no longer be viable, that may be considered for use:

Element	Test Method
Copper	E478
Iron	E478 (Photometric)
Lead	E478 (AA)
Nickel	E478 (Photometric)
Phosphorus	E62
Tin	E478 (Photometric)
Zinc	E478 (AA)

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

14. Keywords

14.1 copper-zinc-tin alloy plate; copper-zinc-tin alloy rolled bar; copper-zinc-tin alloy sheet; copper-zinc-tin alloy strip; copper-zinc-tin-iron-nickel alloy plate; copper-zinc-tin-iron-nickel alloy rolled bar; copper-zinc-tin-iron-nickel alloy sheet; copper-zinc-tin-iron-nickel alloy strip; UNS C40500; UNS C40810; UNS C40850; UNS C40860; UNS C41100; UNS C41300; UNS C41500; UNS C42200; UNS C42500; UNS C42520; UNS C43000; UNS C43400

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 (B591 – 09) that may impact the use of this standard. (Approved Feb. 15, 2015.)

(1) The specification was revised in many sections to comply with the selected wording in B950.
(2) Metric conversions for tensile strength values were added to Table 2. Table 4, Tensile Strength Conversion Values for Table 2, was deleted.
(3) Section 13 was deleted because of redundant wording from Specification B248 (General Requirements specification).
(4) New Section 13, Test Methods, Chemical Analysis for Iron changed from E76 (AA) to E478 (photometric).
(5) Added Appendix X1, Metric Equivalents.