Designation: B272 – 12

Standard Specification for Copper Flat Products with Finished (Rolled or Drawn) Edges (Flat Wire and Strip)[1]

This standard is issued under the fixed designation B272; 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 establishes the requirements for copper products, flat wire and strip, with rolled or drawn finished edges produced for general application.

1.1.1 The product is produced in UNS Copper Nos. C10100, C10200, C10300, C10500, C10700, C10800, C11000, C11040, C12200, and C14200 unless otherwise established by agreement between manufacturer and purchaser.

1.2 *Units*—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.

NOTE 1—When a copper other than that listed in 1.1.1 is designated by the purchaser, the resulting product shall conform to the physical, mechanical, performance, dimensional, and tolerance requirements per agreement between the manufacturer and purchaser.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B49 Specification for Copper Rod Drawing Stock for Electrical Purposes

B170 Specification for Oxygen-Free Electrolytic Copper—Refinery Shapes

B193 Test Method for Resistivity of Electrical Conductor Materials

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

B250/B250M Specification for General Requirements for Wrought Copper Alloy Wire

B577 Test Methods for Detection of Cuprous Oxide (Hydrogen Embrittlement Susceptibility) in Copper

B846 Terminology for Copper and Copper Alloys

B950 Guide for Editorial Procedures and Form of Product Specifications for Copper and Copper Alloys

E8/E8M Test Methods for Tension Testing of Metallic Materials

E18 Test Methods for Rockwell Hardness of Metallic Materials

E53 Test Method for Determination of Copper in Unalloyed Copper by Gravimetry

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[3]

E290 Test Methods for Bend Testing of Material for Ductility

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 for strip products and of Specification B250/B250M for flat wire products:

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 Tests and Retests,
3.1.6 Specimen Preparation,
3.1.7 Test Methods,
3.1.8 Significance of Numerical Limits,
3.1.9 Inspection,
3.1.10 Rejection and Rehearing,
3.1.11 Certification,
3.1.12 Test Reports,
3.1.13 Packaging and Package Marking, and
3.1.14 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 appearing in Specifications B248 or B250/B250M, or both.

[1] This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.02 on Rod, Bar, Wire, Shapes and Forgings.

Current edition approved Oct. 1, 2012. Published November 2012. Originally approved in 1952. Last previous edition approved in 2007 as B272 – 07. DOI: 10.1520/B0272-12.

[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**

4. Terminology

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

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,

5.1.2 Copper UNS No. designation (Section 1),

5.1.3 *Temper*—O61 (annealed), H00 (eight hard), H01 (quarter hard), H02 (half hard), H03 (three-quarter hard), H04 (hard), H06 (extra hard), H08 (spring) (Section 8),

5.1.4 *Dimensions*—Width and thickness (Section 13),

5.1.5 *Quantity*—Total weight, footage, or number of pieces,

5.1.6 *How Furnished*—Lengths, coils, spools, and so forth, (see sections 13.4.1 and 13.4.3 for clarification),

5.1.7 Intended application, and

5.1.8 Edge contours required, (see 13.6).

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 Electrical resistivity (Section 9),

5.2.2 Hydrogen embrittlement susceptibility test (Section 11),

5.2.3 Bend test (Section 11),

5.2.4 Certification (Specification B248 or Specification B250/B250M, or both),

5.2.5 Mill test reports (Specification B248 or Specification B250/B250M, or both).

5.2.6 If product is purchased for agencies of the U.S. government (Section 12).

5.2.7 Heat identification or traceability details.

6. Material and Manufacture

6.1 *Materials:*

6.1.1 The material of manufacture shall be a copper billet, cake, wire bar or rod of such purity and soundness as to be suitable for processing into the products to the product specification listed in Section 1.

6.1.2 Copper other than that listed in 1.1.1 is permitted only upon agreement between the manufacturer and the purchaser (see Note 1).

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

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.

6.3 *Edges*—The edges shall be finished by rolling or drawing per 13.6.

7. Chemical Composition

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

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

8. Temper

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

8.1.1 Annealed temper O61.

8.1.2 Cold-worked tempers H00, H01, H02, H03, H04, H06, and H08.

9. Physical Property Requirement

9.1 *Electrical Resistivity Requirement:*

9.1.1 When specified in contract or purchase order (see section 5) Copper UNS No. C10100, C10200, C10300, C11000, C11040, C10500, and C10700 shall conform to the electrical mass resisitivity requirements in Table 2, when tested in accordance with Test Method B193. When Electrical Resistivity testing is specified for other copper alloys the acceptance requirements shall be established by agreement between the manufacturer and the purchaser.

NOTE 2—The International Annealed Copper Standard electrical conductivity equivalents are as follows:

TABLE 1 Chemical Requirements

	Composition, % Copper UNS No.									
Element	C10100[A]	C10200[B]	C10300	C10500	C10700	C10800	C11000	C11040[C]	C12200	C14200
Copper (incl silver), min	99.99[D]	99.95	99.95[E]	99.95	99.95	99.95[E]	99.90	99.90	99.9	99.4
Phosphorus	...	...	0.001–0.005	...	...	0.005–0.012	...	...	0.015–0.040	0.015–0.040
Arsenic	...	...	...	...	...	...	...	[C]	...	0.15–0.50
Silver, min	...	...	...	0.034	0.085	...	...	[C]	...	...
Oxygen, max	0.0005	0.0010	...	0.0010	0.0010	...	...	[C]	...	...

[A] Refer to Table 1, Chemical Requirements, Grade 1 of Specification B170 for impurity limits for Copper UNS No. C10100.
[B] Refer to Table 1, Chemical Requirements, Grade 2 of Specification B170 for impurity limits for Copper UNS No. C10200.
[C] The following additional maximum limits shall apply: Se, 2 ppm (0.0002 %); Bi, 1.0 ppm (0.00010 %); Te, 2 ppm (0.0002 %); Group Total, Te + Se + Bi, 3 ppm (0.0003 %). Sn, 5 ppm (0.0005 %); Pb, 5 ppm (0.0005 %); Fe, 10 ppm (0.0010 %); Ni, 10 ppm (0.0010 %); S, 15 ppm (0.0015 %); Ag, 25 ppm (0.0025 %); Sb, 4 ppm (0.0004 %); As, 5 ppm (0.0005 %); Oxygen 100-650 ppm (0.010-0.065 %). The total maximum allowable of 65 ppm (0.065 %) does not include oxygen.
[D] The copper value is determined by the difference between the impurity total and 100 %. The copper value is exclusive of Ag.
[E] Includes P.

TABLE 2 Mechanical (All Alloys) and Electrical Requirements (Conductor Alloys Only)

Temper		Thickness, in. (mm)	Rockwell	Tensile		Elongation	Bend	Electrical Resistivity, max, Ω·g/m² at 20°C (68°F)		
			F Scale	ksi (MPa)		Min in 2 in %	Angle, degree			
Standard	Name			Min	Max			C10100	C10300	C10200, C11000, C11040, C10500, C10700
O61	annealed	up to 0.010 (0.254), incl	. . .	. . .	. . .	20	180	0.151 76	0.156 14	0.153 28
		over 0.010 (0.0254) to 0.035 (0.900), incl	. . .	. . .	40 (275)	25	180	0.151 76	0.156 14	0.153 28
		over 0.035 (0.900) to 0.050 (1.25), incl	65 max	. . .	38 (260)	25	180	0.151 76	0.156 14	0.153 28
		over 0.050 (1.25) to 0.188 (4.80), incl	65 max	. . .	37 (255)	25	180	0.151 76	0.156 14	0.153 28
H00	⅛-hard	up to 0.035 (0.900), incl	. . .	32 (220)	40 (275)	18	120	0.156 14	0.159 40	0.157 75
		over 0.035 (0.900) to 0.188 (4.80), incl	54–82	32 (220)	40 (275)	20	120	0.156 14	0.159 40	0.157 75
H01	¼-hard	up to 0.035 (0.900), incl	. . .	34 (235)	42 (290)	15	120	0.156 14	0.159 40	0.157 75
		over 0.035 (0.900) to 0.188 (4.80), incl	60–86	34 (235)	42 (290)	15	120	0.156 14	0.159 40	0.157 75
H02	½-hard	up to 0.035 (0.900), incl	. . .	37 (255)	46 (315)	10	120	0.156 14	0.159 40	0.157 75
		over 0.035 (3.20) to 0.188 (4.80), incl	77–91	37 (255)	46 (315)	10	120	0.156 14	0.159 40	0.157 75
H03	¾-hard	up to 0.035 (0.900), incl	. . .	41 (280)	50 (345)	6	120	0.156 14	0.159 40	0.157 75
		over 0.035 (3.20) to 0.188 (4.80), incl	82–94	41 (280)	50 (345)	6	120	0.156 14	0.159 40	0.157 75
H04	hard	up to 0.035 (0.900), incl	. . .	43 (295)	58 (400)	4	120	0.156 14	0.159 40	0.157 75
		over 0.035 (0.900) to 0.125 (3.20), incl	85–97	43 (295)	. . .	4	120	0.156 14	0.159 40	0.157 75
		over 0.125 (3.20) to 0.188 (4.80), incl	80–95	43 (295)	. . .	4	120	0.156 14	0.159 40	0.157 75
H06	extra hard	up to 0.035 (0.900), incl	. . .	47 (325)	56 (385)	. . .	. . .	0.156 14	0.159 40	0.157 75
		over 0.035 (3.20) to 0.188 (4.80), incl	88–97	47 (325)	56 (385)	. . .	. . .	0.156 14	0.159 40	0.157 75
H08	spring	up to 0.035 (0.900), incl	. . .	50 (345)	58 (400)	. . .	. . .	0.156 14	0.159 40	0.157 75
		over 0.035 (3.20) to 0.188 (4.80), incl	91–98	50 (345)	58 (400)	. . .	. . .	0.156 14	0.159 40	0.157 75

Electrical Resistivity, Ω·g/m ²	Conductivity, %
0.151 76	101.00
0.153 28	100.00
0.156 14	98.16
0.157 75	97.16
0.159 40	96.16

10. Mechanical Property Requirements

10.1 *Tensile Requirements:*

10.1.1 Product 0.035 in. (0.90 mm) and under in thickness shall conform to the tensile strength and elongation requirements prescribed in Table 2, when tested in accordance with Test Methods E8/E8M.

10.1.1.1 Tensile strength test results shall be the basis for acceptance or rejection for mechanical properties for product 0.035 in. (0.90 mm) and under in thickness.

10.1.2 Product over 0.035 in. (0.90 mm) in thickness shall conform to the requirements prescribed in Table 2 when tested in accordance with Test Methods E8/E8M.

10.2 *Rockwell Hardness:*

10.2.1 Product over 0.035 in. (0.90 mm) in thickness shall conform to the hardness requirements prescribed in Table 2 when tested in accordance with Test Methods E18.

10.2.1.1 Rockwell hardness test results shall be the basis for acceptance or rejection for mechanical properties for product over 0.035 in. (0.90 mm) in thickness.

11. Performance Requirements

11.1 *Hydrogen Embrittlement Susceptibility:*

11.1.1 Samples of finished flat wire and strip of Copper UNS Nos. C10100, C10200, C10300, C10500, C10700, C10800, C12200, and C14200 shall be capable of passing the embrittlement test of Procedure B of Test Methods B577. The actual performance of this test is not mandatory under the terms of this specification unless definitely specified in the ordering information (see 5).

11.1.2 In case of dispute, Test Method C of Test Methods B577 shall be used.

11.2 *Bend Test Requirement:*

11.2.1 When specified in contract or purchase order and tested in accordance with Test Method E290, the specimen shall withstand being bent cold (room temperature) on a radius equal to the minimum cross sectional dimension to the angle prescribed in Table 2. The bend shall be radial to this minimum dimension and after bending, no fracture shall be visible to the unaided eye on the outside bent surface.

12. Purchases for U.S. Government

12.1 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 Supplementary Requirements section of Specification B248 or B250/B250M, as appropriate.

13. Dimensions and Permissible Variations

13.1 *General*—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.

NOTE 3—Blank spaces in the tolerance tables indicate either that the material is not generally available or that no tolerances have been established.

13.2 *Thickness*—The standard method of specifying thickness shall be in decimal fractions of an inch. The tolerances shall be as shown in Table 3.

13.3 *Width*—The standard method of specifying width shall be in decimal fractions of an inch. The tolerances shall be as shown in Table 4.

13.4 *Lengths*—Hard temper flat wire and strip, unless otherwise specified, (see 5.1.6) shall be furnished in straight lengths.

13.4.1 Straight lengths shall be furnished in stock lengths with ends included, in accordance with the schedule shown in Table 5, unless the order specifies stock lengths only, specific lengths, or specific lengths with ends.

13.4.2 The length tolerance for full length pieces shall be as shown in Table 6.

13.4.3 Soft temper flat wire and strip, unless otherwise specified (see 5.1.6), shall be furnished, at the manufacturer's option, in rolls, bucks, or reels.

13.5 *Straightness*—The deviation from straightness shall not exceed the limits shown in Table 7.

13.5.1 To determine compliance with this tolerance the length shall, in case of disagreement, be checked by the following method:

13.5.1.1 Place the lengths on a level table so that the arc of departure from straightness is horizontal. Measure the depth of arc to the nearest 1⁄32 in. (0.79 mm) using a metal scale and a straightedge.

13.6 *Edge Contours:*

13.6.1 *Square Corners*—Unless otherwise specified, the material shall be finished with commercially square corners with the maximum permissible radius as shown in Table 8.

TABLE 4 Width Tolerances
(For squares, use thickness tolerances in Table 2)

Width, in. (mm)	Tolerances, Plus and Minus,[A] in. (mm)
Up to 0.050 (1.27), incl	0.0013 (0.033)
Over 0.050 (1.27) to 0.090 (2.29), incl	0.0015 (0.038)
Over 0.090 (2.29) to 0.130 (3.30), incl	0.002 (0.051)
Over 0.130 (3.30) to 0.188 (4.78), incl	0.003 (0.076)
Over 0.188 (4.78) to 0.500 (12.7), incl	0.0035 (0.089)
Over 0.500 (12.7) to 1.25 (31.8), incl	0.005 (0.13)
Over 1.25 (31.8) to 2.00 (50.8), incl	0.008 (0.20)
Over 2.00 (50.8) to 4.00 (102), incl	0.012 (0.30)
Over 4.00 (102) to 12.00 (305), incl	0.30[B]

[A] If tolerances all plus or minus are desired, double the values given.
[B] Percent of the width expressed to the nearest 0.001 in. (0.025 mm).

13.6.2 *Rounded Corners*—When specified, the material may be furnished with corners rounded as shown in Fig. 1 to a quarter circle of a radius as shown in Table 9. The tolerance on the radius shall be ±25 %.

13.6.3 *Rounded Edge*—When specified, the material may be finished with edges rounded as shown in Fig. 2, with a radius of curvature as shown in Table 10.

13.6.4 *Full Rounded Edge*—When specified, the material shall be finished with substantially uniform round edges, the radius of curvature being approximately 1½ the thickness of the product as shown in Fig. 3, but in no case to exceed ½ the thickness of the product by more than 25 %.

14. Test Methods

14.1 *Chemical Analysis:*

14.1.1 Chemical composition shall be determined as directed in the annex of the following product specifications:

UNS No.	Specification
C10100	B170
C10200	B170

14.1.2 For UNS Nos. C11000, C11040, C10300, C10500, C10700, C10800, C12200, or C14200 the following test methods shall be used:

Element	Test Method
Copper	E53
Phosphorous	E62
Arsenic	E62
Silver	E478

14.1.3 The test method(s) to be followed for the determination of element(s) resulting from contractual or purchase order agreement shall be as agreed upon between the manufacturer or supplier and the purchaser.

TABLE 3 Thickness Tolerances

Thickness, in. (mm)	Thickness Tolerances, Plus and Minus, in. (mm), for Widths Given in Inches (Millimetres)[A]				
	Up to 1¼ (31.8), incl	Over 1¼ (31.8) to 2.00 (50.8), incl	Over 2.00 (50.8) to 4.00 (102), incl	Over 4.00 (102) to 8.00 (203), incl	Over 8.00 (203) to 12.00 (305), incl
0.013 (0.330), incl	0.001 (0.025)	...	...	...	...
Over 0.013 (0.330) to 0.050 (1.27), incl	0.0013 (0.033)	0.0015 (0.038)	...	...	...
Over 0.050 (1.27) to 0.090 (2.29), incl	0.0015 (0.038)	0.002 (0.051)	0.0025 (0.064)	...	...
Over 0.090 (2.29) to 0.130 (3.30), incl	0.002 (0.051)	0.0025 (0.064)	0.003 (0.076)	0.0035 (0.089)	...
Over 0.130 (3.30) to 0.188 (4.78), incl	0.003 (0.076)	0.003 (0.076)	0.0035 (0.089)	0.004 (0.10)	0.005 (0.13)

[A] If tolerances all plus or all minus are desired, double the values given.

TABLE 5 Schedule of Lengths (Specific and Stocks) with Ends

Squares, Side in in. (mm)	Rectangles, Area,[A] in.^{2} (cm^2)	Nominal Length, ft (m)	Shortest Permissible Length,[B] Percent of Nominal Length	Maximum Permissible Weight of Ends, Percent of Lot Weight
3/16 (4.76) and under	0.250 (1.61) and under	6 (1.83) to 14 (4.27), incl	75	20
	Over 0.250 (1.61) to 1 (6.45), incl	6 (1.83) to 14 (4.27), incl	70	30
	Over 1 (6.45) to 2.25 (14.5), incl	6 (1.83) to 12 (3.66), incl	60	40
	Over 2.25 (14.5) to 4 (25.8), incl	6 (1.83) to 12 (3.66), incl	50	45

[A] Width times thickness, disregarding any rounded corners or edges.
[B] Expressed to the nearest ½ ft (150 mm).

TABLE 6 Length Tolerances for Material Furnished Straight

Length Classification	Length Tolerances, All Plus,[A] in. (mm) (Applicable Only to Full-Length Pieces)
Specific lengths	3/8 (9.5)
Specific lengths with ends	1 (25)
Stock lengths with or without ends	1 (25)[B]

[A] If all minus tolerances are desired, use the same values; if tolerances plus and minus are desired, halve the values given.
[B] As stock lengths are cut and placed in stock in advance of orders, departure from this tolerance is not practicable.

TABLE 7 Straightness Tolerances Applicable to Any Longitudinal Edge of Material Supplied in Nominally Flat Straight Lengths and in Rolls or in Bucks

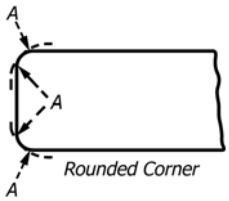
For material having a cross-sectional area of 0.010 in.^{2} (0.0645 cm^2) and over and a thickness of 0.010 in. (0.254 mm) and over, furnished in straight lengths, in rolls, or in bucks	½-in. (13-mm) maximum edgewise curvature (depth of arc) in any 6-ft (1.83-m) portion of the total length.
For materials having a cross-sectional area of less than 0.010 in.^{2} (0.0645 cm^2), or a thickness of less than 0.010 in. (0.254 mm), and all material furnished on reels or on stagger wound rolls	No straightness tolerances established

TABLE 8 Requirements for Square Corners

Specified Thickness, in. (mm)	Maximum Radius of Corners Allowable for Square Corner, in. (mm)
1/32 (0.794) to 1/16 (1.59), incl	1/100 (0.254)
Over 1/16 (1.59) to 3/16 (4.76), incl	1/64 (0.397)

15. Keywords

15.1 copper flat products; copper flat wire; copper strip; copper wire; flat wire; general purpose strip; general purpose wire; strip; UNS Copper No. C10100; UNS Copper No. C10200; UNS Copper No. C10300; UNS Copper No. C10500; UNS Copper No. C10700; UNS Copper No. C10800; UNS Copper No. C11000; UNS Copper No. C11040; UNS Copper No. C12200; UNS Copper No. C14200; wire

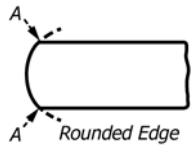


NOTE 1—The arc shall not necessarily be tangent at Points *A*, but the product shall be commercially free from sharp, rough, or projecting edges.

FIG. 1 Rounded Corners

TABLE 9 Requirements for Rounded Corners

Specified Thickness, in. (mm)	Nominal Radius of Corner, in. (mm)	
	For Widths Up to and Including 2× Thickness	For Widths More Than 2× Thickness
Up to 0.072 (1.83)	0.012 (0.305)	full rounded edges as given in 13.6.4
Over 0.072 (1.83) to 1/8 (3.18), incl	1/64 (0.397)	full rounded edges as given in 13.6.4
Over 1/8 (3.18) to 3/16 (4.76), incl	1/32 (0.794)	1/32 (0.794)

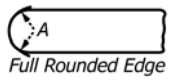


NOTE 1—The arc shall be substantially symmetrical with the axis of the product. The Corners *A* will usually be sharp but shall not have rough or projecting edges.

FIG. 2 Rounded Edge

TABLE 10 Requirements for Rounded Edges

Specified Thickness, in. (mm)	Nominal Radius of Rounded Edge, in. (mm)	Tolerances on Radius, Plus and Minus, in. (mm)
Up to 3⁄16 (4.76), incl	1¼ × thickness	½ × thickness



Full Rounded Edge

NOTE 1—The arc shall not necessarily be tangent at Points *A* but shall be substantially symmetrical with the axis of the product, and the product shall be commercially free from sharp, rough, or projecting edges.

FIG. 3 Full Rounded Edge

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, B272-07, that may impact the use of this standard. (Approved October 1, 2012)

(1) Minor editing to conform to the B05 Standard Guide B950.
(2) Elimination of restriction in 6.1.1 to only allow wire bar, cakes and rod. Other forms are commercially available such as cast rod to Specification B49.
(3) Eliminated references in Reference Documents to B5 and B379.
(4) Added 6.1.3 to acknowledge the option of heat identification or traceability.