Designation: A 818 – 06

Standard Specification for Coppered Carbon Steel Wire[1]

This standard is issued under the fixed designation A 818; 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 covers coppered carbon steel wire supplied in coils for general use. It may be produced hard drawn, annealed in process, or annealed at finish size. The coating is very thin and is not designed for protection against corrosion.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in brackets are provided for information only.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

A 510 Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 *U.S. Federal Standard:*

Fed. Std. No. 123 Marking for Shipments (Civil Agencies)[3]

2.3 *U.S. Military Standards:*

MIL-STD-129 Marking for Shipment and Storage[3]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *annealed coppered wire*—wire that may be either

3.1.2 *annealed-in-process wire*—at some stage before application of the copper, the steel wire is thermally treated and subsequently coated with copper and redrawn. coated with copper, drawn, and annealed at finish size, or drawn, annealed at finish size and then coppered.

3.1.3 *carbon steel*—steel that has no minimum content specified or required for aluminum, chromium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, or zirconium or any other element added to obtain a desired alloying effect; steel that has the specified minimum copper content that does not exceed 0.40 %; or the maximum content for any of the following elements that does not exceed these percentages: manganese 1.65, silicon 0.60, or copper 0.60.

3.1.4 *coppered steel wire*—produced by cold drawing rod or wire that has been immersed in a copper sulfate solution.

3.1.5 *hard drawn wire*—wire that is coppered and drawn without the use of thermal treatment.

4. Ordering Information

4.1 Orders for material under this specification should include the following information:

4.1.1 Quantity (weight in pounds),

4.1.2 Coated wire diameter, in inches, to the third decimal point,

4.1.3 Name of material (coppered carbon steel wire),

4.1.4 Grade of steel,

4.1.5 Condition (hard drawn, annealed in process, or annealed at finished size),

4.1.6 Finish (lustrous or matte),

4.1.7 Packaging requirements, and

4.1.8 ASTM designation and year of issue.

NOTE 1—A typical ordering description is as follows: 40 000 lb, 0.148-in. coppered carbon steel wire, Grade 1008, hard drawn, lustrous finish in 600-lb catch-weight coils on tubular carriers to ASTM A 818 – .

5. Materials and Manufacture

5.1 The steel rod from which the wire is drawn shall be manufactured by the open-hearth, electric-furnace, or basic-oxygen process.

[1] This specification is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.12 on Wire Specifications.

Current edition approved June 15, 2006. Published July 2006. Originally approved in 1983. Last previous edition approved in 2001 as A 818 - 91(2001).

[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] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.

Copyright ASTM International
Provided by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Not for Resale

5.2 Coppered wire may be supplied in any of the following conditions: hard-drawn, annealed-in-process, or annealed.

6. Mechanical Properties

6.1 The coppered steel wire shall meet the tensile strength requirements shown in Table 1 when tested in accordance with Methods A 370.

6.2 Test specimens found to contain a weld or an obvious defect shall be discarded and another test specimen obtained to verify conformance to the tensile strength requirements.

7. Dimensions and Tolerances

7.1 The permissible variation in diameter of the coppered wire as represented by the test specimens shall be as indicated in Specification A 510.

8. *Coating Requirements* Coating Requirements

8.1 Due to the nature of the process, the thickness of the copper coating is extremely thin. Therefore, there is no requirement for thickness of coating; the requirement is that the coating be continuous.

8.2 The coppered wire as represented by the test specimens shall be capable of being wrapped in a close helix at a rate not exceeding 15 turns/min around a cylindrical steel mandrel having a diameter equal to the diameter of the coated wire without cracking or flaking the copper coating to such an extent that any copper can be removed by rubbing with the bare fingers. Loosening or detachment during the adhesion test of superficial, small particles of copper formed by mechanical polishing of the surface of the coppered wire shall not be considered cause for rejection.

TABLE 1 Tensile Strength Requirements

Wire Diameter, in. [mm][A]	Wire Condition		
	Hard Drawn, min, ksi [MPa]	Annealed-in-Process, max, ksi [MPa]	Annealed,[B] max, ksi [MPa]
Grade 1006			
Less than 0.035 [0.89]	. . .	95 [655]	60 [415]
0.035 to 0.057 [0.89 to 1.46]	105 [725]	90 [620]	60 [415]
0.058 to 0.085 [1.47 to 2.17]	90 [620]	90 [620]	60 [415]
0.086 to 0.127 [2.18 to 3.27]	80 [550]	85 [585]	60 [415]
0.128 to 0.177 [3.28 to 4.50]	70 [485]	80 [550]	60 [415]
0.178 to 0.250 [4.51 to 6.35]	60 [415]	70 [485]	60 [415]
Grades 1008 and 1010			
Less than 0.035 [0.89]	. . .	95 [655]	70 [485]
0.035 to 0.057 [0.89 to 1.46]	. . .	90 [620]	65 [450]
0.058 to 0.085 [1.47 to 2.17]	100 [690]	90 [620]	65 [450]
0.086 to 0.127 [2.18 to 3.27]	85 [585]	90 [620]	65 [450]
0.128 to 0.177 [3.28 to 4.50]	75 [517]	83 [570]	65 [450]
0.178 to 0.250 [4.51 to 6.35]	65 [450]	75 [517]	65 [450]
Grade 1015			
Less than 0.035 [0.89]	. . .	95 [655]	75 [517]
0.035 to 0.057 [0.89 to 1.46]	. . .	95 [655]	70 [485]
0.058 to 0.085 [1.47 to 2.17]	105 [725]	95 [655]	70 [485]
0.086 to 0.127 [2.18 to 3.27]	90 [620]	95 [655]	70 [485]
0.128 to 0.177 [3.28 to 4.50]	80 [550]	85 [585]	70 [485]
0.178 to 0.250 [4.51 to 6.35]	70 [485]	78 [540]	70 [485]
Grades 1018 and 1020			
Less than 0.035 [0.89]	. . .	100 [690]	75 [517]
0.035 to 0.057 [0.89 to 1.46]	. . .	100 [690]	75 [517]
0.058 to 0.085 [1.47 to 2.17]	. . .	100 [690]	75 [517]
0.086 to 0.127 [2.18 to 3.27]	105 [725]	100 [690]	75 [517]
0.128 to 0.177 [3.28 to 4.50]	85 [585]	90 [620]	75 [517]
0.178 to 0.250 [4.51 to 6.35]	75 [517]	82 [570]	75 [517]

[A]For the purpose of determining conformance with this specification, an observed value shall be rounded to the nearest 0.001 in. in accordance with the rounding method of Practice E 29.

[B]Annealed denotes annealed at finished size.

9. Workmanship

9.1 The coppered wire shall be free of slivers, scale, and other imperfections that would be detrimental to intended use. The copper coating shall be continuous and reasonably smooth. To ensure large continuous length coils, welds may be present in the finished wire.

10. Number of Tests and Retests

10.1 A lot shall consist of all of the coils of wire of the same size, type and class, and shall be offered for inspection at one time. A wire sample of sufficient length, approximately 4 ft. [1.2 m], shall be cut from either end of each coil selected for tests described in Sections 6, 8 and 9.

10.2 The number of test specimens taken from the ends of coils during production to assure compliance with Sections 6 and 7 varies with the quality control procedures and the manufacturing facilities of each manufacturer, but is generally not less than 10 % of the coils produced. For the purpose of final product testing, one specimen from every ten coils or fraction thereof in a lot shall be selected at random, or a total of seven specimens, whichever is less.

10.3 Should one or more of the wire specimens fail any requirement, the lot shall be subjected to retest. For retest purposes the original lot shall be regrouped into 50 coil lots or fractions thereof. Each lot shall be tested for the property in which the original sample failed to comply at a frequency of 10 % or more so that the total number of tests is at least double the original. Any lot that exhibits a failure shall be rejected. If during retesting an additional quality parameter is observed to be defective, the lot of 50 is subject to rejection for that cause. The manufacturer may test each coil in the failed lot for the property in which failure occurred and reject only the nonconforming coils.

11. Inspection

11.1 The manufacturer shall afford the inspector representing the purchaser all reasonable facilities to satisfy that the material is being furnished in accordance with this specification. All tests and inspections shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere with the operation of the works.

12. Rejection and Rehearing

12.1 Any rejection by the purchaser shall be reported to the manufacturer within a reasonable time from receipt of material.

12.2 The material must be adequately protected and correctly identified in order that the manufacturer may make a proper investigation.

Copyright ASTM International
Provided by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Not for Resale

13. Marking, Packaging, and Loading for Shipment

13.1 The size, name of product, grade and condition, ASTM specification number, weight, and name or mark of the manufacturer shall be indicated on a tag securely attached to each coil or package of wire.

13.2 The coil weight, dimensions, and methods of packaging shall be as specified on the purchase order. Unless otherwise specified, loading for shipment shall be in accordance with Practices A 700.

13.3 When specified in the contract or order, and for direct procurement by or direct shipment to the U.S. Government, marking for shipment, in addition to requirements specified in the contract or order, shall be in accordance with MIL-STD-129 for U.S. Military agencies and in accordance with Fed. Std. No. 123 for U.S. Government civil agencies.

14. Keywords

14.1 copper coated carbon steel wire; coppered wire; steel wire; wire

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).

Copyright ASTM International
Provided by IHS under license with ASTM
No reproduction or networking permitted without license from IHS
Not for Resale