



Designation: A1125/A1125M – 24

Standard Specification for Wire Rod for Bridge Cable Wire¹

This standard is issued under the fixed designation A1125/A1125M; 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. Scope

1.1 This specification covers a group of common requirements that, unless otherwise specified in the applicable product specification, apply to wire rod for bridge cable wire.

1.2 This specification is applied to wire rod with a nominal diameter of 11.0 mm [$\frac{7}{16}$ in.] to 16.0 mm [$\frac{5}{8}$ in.] intended for use in bridge cable wire.

1.3 The values stated in either inch-pound units or SI units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with this specification.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment

A751 Test Methods and Practices for Chemical Analysis of Steel Products

A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E45 Test Methods for Determining the Inclusion Content of Steel

E1077 Test Methods for Estimating the Depth of Decarburization of Steel Specimens

2.2 ISO Standards:³

ISO 16120-1 Non-alloy Steel Wire Rod for Conversion to Wire—Part 1: General Requirements

ISO 16574 Determination of Percentage of Resolvable Pearlite in High Carbon Steel Wire Rod

3. Terminology

3.1 Definitions:

3.1.1 Refer to Terminology A941 for definitions of additional terms used in this standard.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *out-of-roundness, n*—the difference between the maximum diameter and the minimum diameter on the same cross section.

4. Ordering Information

4.1 Orders for wire rods under this specification shall include the following information:

- 4.1.1 Quantity (mass or weight),
- 4.1.2 Name of material (wire rods),
- 4.1.3 Chemical composition grade (Section 6),
- 4.1.4 Diameter (Section 9),
- 4.1.5 Packaging (Section 14), and
- 4.1.6 ASTM designation and year of issue.

4.2 The purchaser shall have the option to specify additional requirements, including but not limited to:

- 4.2.1 Requirements for certifications, heat analysis, or test reports (Sections 6 and 13),
- 4.2.2 Requirements for delivery condition (Section 5),
- 4.2.3 Requirements for coil weight, and
- 4.2.4 Other special requirements, if any.

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.03 on Steel Rod and Wire.

Current edition approved May 15, 2024. Published May 2024. DOI: 10.1520/A1025_A1025M-24.

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 International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.



NOTE 1—A typical ordering description is as follows: 50 000 kg steel wire rods, 13.0 mm, Grade BC82Mn in approximately 2000 kg coils to ASTM A1125/A1125M dated _____, or 100 000 lb steel wire rods, 33/64 in., Grade BC82Mn in approximately 4000 lb coils to ASTM A1125/A1125M dated _____.

5. Materials and Manufacture

5.1 The steel shall be made by any commercially accepted steel making process. The steel may be either ingot cast or strand cast.

5.2 The wire rod shall be free of detrimental pipe.

5.3 The wire rod shall be supplied in either the hot worked and controlled cooled condition, or a subsequently heat treated condition.

NOTE 2—The method of either controlled cooling or subsequent heat treating may be agreed upon by the purchaser and the manufacturer.

6. Chemical Composition

6.1 Unless otherwise specified by mutual agreement, the steel grade and chemical composition shall be in accordance with Table 1.

6.2 *Heat Analysis*—An analysis of each heat shall be made to determine the percentage of elements specified. The analysis shall be made from a test sample taken during the pouring of the heat. The chemical composition thus determined shall be reported, if required, to the purchaser or their representative. Reporting of significant figures and rounding shall be in accordance with Test Methods and Practices A751.

6.3 Product Analysis:

6.3.1 A product analysis may be made by the purchaser. The purpose of the product analysis is to verify that the chemical composition is within the specified limits for each element, including applicable permissible variations in product analysis. The results of analyses taken from different pieces of a heat may differ within permissible limits from each other and from the heat analysis. The permissible variations in product analysis shall be in accordance with Table 2. The results of the product analysis obtained shall not vary both above and below the permissible limits.

6.3.2 Location at which chips for product analysis are obtained from sample is important because of segregation. Chips are taken by milling or machining from full cross section of the sample.

6.3.3 Steel subjected to certain thermal treatment operation by purchaser may not give chemical analysis results that properly present its original composition. Therefore, purchaser

should analyze chips taken from the steel in the condition in which it is received from the producer.

6.3.4 For referee purposes, Test Methods and Practices A751 shall be used.

7. Mechanical Properties

7.1 Mechanical properties of the wire rod shall conform to Table 3. The variation range of tensile strength for the same lot of wire rod shall not be greater than 80 MPa [12 ksi].

7.2 *Number of Tests*—Specimens shall be taken from a minimum of two coils in a lot.

7.3 *Location of Tests*—It shall be permissible to take test specimens from either end of the coil.

7.4 *Test Method*—The mechanical properties shall be tested in accordance with Test Methods and Definitions A370.

8. Metallurgical Requirements

8.1 Surface Quality:

8.1.1 The wire rod shall be free of surface defects such as cracks, folds, scabs, notches, or rolling burrs that may be detrimental to the manufacture of wire and to its use for bridge cable.

8.1.2 *Number of Tests*—Each coil.

8.1.3 *Location of Tests*—Surface of each coil.

8.1.4 *Test Method*—Visual inspection and under magnification if warranted.

8.2 Decarburization:

8.2.1 The total depth of decarburization on wire rods shall not be greater than 0.20 mm [0.008 in.].

8.2.2 *Number of Tests*—Specimens shall be taken from a minimum of two coils in a lot.

8.2.3 *Location of Tests*—It shall be permissible to take test specimens from either end of the coil.

8.2.4 *Test Method*—The decarburization test shall be made in accordance with Test Methods E1077.

8.3 Microstructure:

8.3.1 Quenched microstructures (such as martensite and bainite), if present in the wire rod, shall only be present in quantities that are not detrimental to its use. The content of resolvable pearlite for BC77Mn-BC82Mn and for BC87Mn-BC97Mn shall be less than or equal to 15 % and 10 % respectively.

8.3.1.1 *Number of Tests*—Specimens shall be taken from a minimum of two coils in a lot.

TABLE 1 Steel Grade and Chemical Composition (Heat Analysis)^A

Grade ^B	Chemical Composition, %							
	Carbon	Manganese ^C	Phosphorus	Sulfur ^C	Silicon	Chromium	Copper	Nitrogen
BC77Mn	0.75–0.80	0.30–0.90	≤0.020	≤0.020	0.15–1.30	≤0.35	≤0.20	≤0.009
BC82Mn	0.80–0.85	0.30–0.90	≤0.020	≤0.020	0.15–1.30	≤0.35	≤0.20	≤0.009
BC87Mn	0.85–0.90	0.30–0.90	≤0.020	≤0.020	0.15–1.30	≤0.35	≤0.20	≤0.009
BC92Mn	0.90–0.95	0.30–0.90	≤0.020	≤0.020	0.15–1.30	≤0.35	≤0.20	≤0.009
BC97Mn	0.95–1.00	0.30–0.90	≤0.020	≤0.020	0.15–1.30	≤0.35	≤0.20	≤0.009

^A Microalloy additions may be required to achieve the desired mechanical properties. If reporting of the heat analysis is required by the purchaser, any intentional additions shall be included.

^B BC is a special grade identification of wire rod for bridge cable wire. BC is an abbreviation for “bridge cable.”

^C Manganese to sulfur ratio shall be greater than or equal to 20.