



Designation: A752 – 04 (Reapproved 2010)

Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Alloy Steel¹

This standard is issued under the fixed designation A752; 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 general requirements for alloy steel rods and uncoated coarse round alloy wire in coils that are not required to meet hardenability band limits.

1.2 In case of conflict, the requirements in the purchase order, on the drawing, in the individual specification, and in this general specification shall prevail in the sequence named.

1.3 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards*:²

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

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

A919 Terminology Relating to Heat Treatment of Metals³

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

E30 Test Methods for Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron, and Wrought Iron³

E112 Test Methods for Determining Average Grain Size

2.2 *AIAG Standard*:

AIAGB-5 02.00 Primary Metals Identification Tag Application Standard⁴

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.

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³ Withdrawn.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

⁴ Available from Automotive Industry Action Group (AIAG), 26200 Lahser Rd., Suite 200, Southfield, MI 48033, <http://www.aiag.org>.

3. Terminology

3.1 *Description of Terms Specific to This Standard*:

3.1.1 *alloy steel*— steel is considered to be alloy steel when the maximum of the range given for the content of alloying elements exceeds one or more of the following limits: manganese 1.65 %, silicon 0.60 %, copper 0.60 %; or in which a definite range or a definite minimum quantity of any of the following elements is specified or required within the limits of the recognized field of constructional alloy steels: aluminum, chromium up to 3.99 %, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium, or any other alloying elements added to obtain a desired alloying effect. Note that aluminum, columbium, and vanadium may also be used for grain refinement purposes.

3.1.1.1 Boron treatment of alloy steels, which are fine grain, may be specified to improve hardenability.

3.1.1.2 Other elements, such as lead, selenium, tellurium, or bismuth, may be specified to improve machinability.

3.1.2 *coarse round wire*—from 0.035 to 0.999 in. (0.89 to 25.4 mm) in diameter, inclusive, wire produced from hot-rolled wire rods or hot-rolled coiled bars by one or more cold reductions primarily for the purpose of obtaining a desired size with dimensional accuracy, surface finish, and mechanical properties. By varying the amount of cold reduction and other wire mill practices, including thermal treatment, a wide diversity of mechanical properties and finishes are made available.

3.1.2.1 Coarse round wire is designated by common fractions or decimal parts of an inch, or millimetres.

3.1.3 *wire rods*—rods that are hot rolled from billets into an approximate round cross section and into coils of one continuous length. Rods are not comparable to hot-rolled bars in accuracy of cross section or surface finish and as a semi-finished product are primarily for the manufacture of wire.

3.1.3.1 Rod sizes from $\frac{7}{32}$ to $\frac{47}{64}$ in. (5.6 to 18.7 mm) in diameter, inclusive, are designated by fractions or decimal parts of an inch as shown in Table 1.



TABLE 1 Sizes of Alloy Steel Wire Rods

Inch Fraction	Decimal Equivalent, in.	Metric Equivalent, mm	Inch Fraction	Decimal Equivalent, in.	Metric Equivalent, mm
7/32	0.219	5.6	31/64	0.484	12.3
15/64	0.234	6.0	1/2	0.500	12.7
1/4	0.250	6.4	39/64	0.516	13.1
17/64	0.266	6.7	17/32	0.531	13.5
9/32	0.281	7.1	35/64	0.547	13.9
19/64	0.297	7.5	9/16	0.562	14.3
5/16	0.312	7.9	37/64	0.578	14.7
21/64	0.328	8.3	19/32	0.594	15.1
11/32	0.344	8.7	39/64	0.609	15.5
23/64	0.359	9.1	5/8	0.625	15.9
3/8	0.375	9.5	41/64	0.641	16.3
25/64	0.391	9.9	21/32	0.656	16.7
13/32	0.406	10.3	43/64	0.672	17.1
27/64	0.422	10.7	11/16	0.688	17.5
7/16	0.438	11.1	45/64	0.703	17.9
29/64	0.453	11.5	23/32	0.719	18.3
15/32	0.469	11.9	47/64	0.734	18.7

4. Ordering Information

4.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for hot-rolled wire rods under this specification. Such requirements include, but are not limited to, the following:

- 4.1.1 Quantity (pounds),
- 4.1.2 Name of material (wire rods),
- 4.1.3 Diameter (Table 1),
- 4.1.4 Chemical composition grade number (Table 2),
- 4.1.5 Thermal treatment, if required,
- 4.1.6 Packaging, and
- 4.1.7 ASTM designation and date of issue.

NOTE 1—A typical ordering description is as follows: 80 000 lb Hot-Rolled Alloy Steel Wire Rods, 1/4 in., Grade 4135 in 2 000-lb maximum coils to ASTM A 752-XX.

4.2 It shall be the responsibility of the purchaser to specify all requirements that are necessary for coarse round wire under this specification. Such requirements include, but are not limited to, the following:

- 4.2.1 Quantity (pounds),
- 4.2.2 Name of material (alloy steel wire),
- 4.2.3 Diameter (see 3.1.3.1),
- 4.2.4 Chemical composition (Table 2 or Table 3),
- 4.2.5 Thermal treatment, if required,
- 4.2.6 Packaging,
- 4.2.7 ASTM designation A752 and date of issue, and
- 4.2.8 Special requirements, if any.

NOTE 2—A typical ordering description is as follows: 40 000 lb, Alloy Steel Wire, 0.312 in. diameter, Grade 8620, annealed at finish size, in 500-lb Catch Weight Coils on Tubular Carriers to ASTM A 752-XX.

TABLE 2 Chemical Composition Ranges and Limits for Cast or Heat Analysis

NOTE 1—Grades shown in this table with prefix letter E are normally only made by the basic electric furnace process. All others are normally manufactured by the basic open hearth or basic oxygen processes but may be manufactured by a basic electric furnace process. If the electric furnace process is specified or required for grades other than those designated above, the limits for phosphorus and sulfur are respectively 0.025 % max.

NOTE 2—Small quantities of certain elements, which are not specified or required, are present in alloy steels. These elements are considered as incidental and may be present to the following maximum amounts: copper, 0.35 %, nickel, 0.25 %, chromium, 0.20 %, molybdenum, 0.06 %.

NOTE 3—Where minimum and maximum sulfur content is shown it is indicative of resulfurized steel.

NOTE 4—The chemical ranges and limits shown in Table 2 are produced to check, product, or verification analysis tolerances shown in Table 4.

NOTE 5—Standard alloy steels can be produced with a lead range of 0.15 to 0.35 %. Such steels are identified by inserting the letter “L” between the second and third numerals of the Grade number, for example, 41L40. Lead is reported only as a range of 0.15 to 0.35 % since it is added to the mold as the steel is poured.

UNS Designation	Grade No.	Chemical Composition, Ranges and Limits, %							
		Carbon	Manganese	Phosphorus, max	Sulfur, max	Silicon	Nickel	Chromium	Molybdenum
STANDARD ALLOY STEELS									
G13300	1330	0.28 to 0.33	1.60 to 1.90	0.035	0.040	0.15 to 0.30	...	...	...
G13350	1335	0.33 to 0.38	1.60 to 1.90	0.035	0.040	0.15 to 0.30	...	...	...
G13400	1340	0.38 to 0.43	1.60 to 1.90	0.035	0.040	0.15 to 0.30	...	...	...
G13450	1345	0.43 to 0.48	1.60 to 1.90	0.035	0.040	0.15 to 0.30	...	...	...
G40120	4012	0.09 to 0.14	0.75 to 1.00	0.035	0.040	0.15 to 0.30	...	...	0.15 to 0.25
G40230	4023	0.20 to 0.25	0.70 to 0.90	0.035	0.040	0.15 to 0.30	...	...	0.20 to 0.30
G40240	4024	0.20 to 0.25	0.70 to 0.90	0.035	0.035 to 0.050	0.15 to 0.30	...	...	0.20 to 0.30