



Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods¹

This standard is issued under the fixed designation A 555/A 555M; 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 general requirements that shall apply to stainless wire and wire rods. Wire rods are a semifinished product intended primarily for the manufacture of wire. Wire is intended primarily for cold forming, including coiling, stranding, weaving, heading and machining as covered under the latest revision of each of the following ASTM specifications: A 313/A 313M, A 368, A 478, A 492, A 493, A 580/A 580M and A 581/A 581M.

1.2 In case of conflicting requirements, the individual material specification and this general requirement specification shall prevail in the order named.

1.3 General requirements for flat products other than wire are covered in Specification A 480/A 480M.

1.4 General requirements for bar and billet products are covered in Specification A 484/A 484M.

1.5 The values stated in inch-pound units or SI (metric) units are to be regarded separately as standard; within the text and tables, the SI units are shown in brackets ([]). The values stated in each system are not exact equivalents; therefore, each system must be used independent of the other. Combining values from the two systems may result in nonconformance with the specification.

1.6 Unless the order specifies the applicable metric specification designation, the material shall be furnished in the inch-pound units.

2. Referenced Documents

2.1 ASTM Standards:

A 262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels²

A 313/A 313M Specification for Stainless Steel Spring Wire²

A 368 Specification for Stainless and Heat-Resisting Steel Wire Strand³

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products²

A 478 Specification for Chromium-Nickel Stainless and Heat-Resisting Steel Weaving and Knitting Wire²

A 480/A 480M Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip²

A 484/A 484M Specification for General Requirements for Stainless and Heat-Resisting Bars, Billets, and Forgings³

A 492 Specification for Stainless Steel Rope Wire³

A 493 Specification for Stainless Steel for Cold Heading and Cold Forging Wire²

A 580/A 580M Specification for Stainless and Heat-Resisting Steel Wire²

A 581/A 581M Specification for Free-Machining Stainless and Heat-Resisting Steel Wire and Wire Rods²

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment³

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products²

E 112 Test Methods for Determining Average Grain Size⁴

2.2 Federal Standard:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)⁵

2.3 Military Standards:

MIL-STD-129 Marking for Shipment and Storage⁵

MIL-STD-163 Preservation of Steel Products for Domestic Shipment⁵

2.4 Other Standard:

Primary Metals Bar Code Standard⁶

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *bar*—wire that has been straightened and cut (see

¹ This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.17 on Flat Stainless Steel Products.

Current edition approved March 10, 1997. Published November 1997. Originally published as A 555 – 65. Last previous edition A 555/A 555M – 94a.

² *Annual Book of ASTM Standards*, Vol 01.03.

³ *Annual Book of ASTM Standards*, Vol 01.05.

⁴ *Annual Book of ASTM Standards*, Vol 03.01.

⁵ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094. Attn: NPODS.

⁶ Automotive Industry Action Group, 26200 Lahser Road, Suite 200, Southfield, MI 48034.

Specification A 484/A 484M). However, a straightened and cut small diameter product is often called straightened and cut wire.

3.1.2 *wire*—as covered by this specification and the specifications itemized in 1.1, is any round or shaped cold-reduced product, in coils only, produced by cold-finishing coiled wire rod.

3.1.3 *wire rods*—semifinished product intended primarily for the manufacture of wire. They are hot rolled generally to an approximate round cross section in continuous length coils.

4. Materials and Manufacture

4.1 The material may be furnished in one of the conditions detailed in the applicable material specification, that is, annealed, bright annealed, cold worked, or as otherwise specified on the purchase order.

4.2 A variety of finishes, coatings, and lubricants are available. The particular type used is dependent upon the specific end use. Unless otherwise specified, the finish, coating, and lubricant will be furnished as required by the individual material specification or purchase order.

5. Chemical Composition

5.1 *Heat or Cast Analysis*—The chemical analysis of each heat shall be determined in accordance with the applicable material specification and Test Methods, Practices, and Terminology A 751.

5.2 *Product Analysis*—When required, a product analysis shall be determined in accordance with Test Methods, Practices, and Terminology A 751. The chemical composition thus determined shall conform to the tolerances shown in Table 1.

5.3 The steel shall not contain an unspecified element for

TABLE 1 Product Analysis Tolerances

NOTE— This table specifies tolerances over the maximum limits or under the minimum limits of the chemical requirements of the applicable material specification (see 1.1); it does not apply to heat analysis.

Element	Upper Limit or Maximum of Specified Range, %	Tolerances over the Maximum (Upper Limit) or Under the Minimum (Lower Limit)	Element	Upper Limit or Maximum of Specified Range, %	Tolerances over the Maximum (Upper Limit) or Under the Minimum (Lower Limit)
Carbon	to 0.010, incl	0.002	Cobalt	over 0.05 to 0.50, incl	0.01
	over 0.010 to 0.030, incl	0.005		over 0.50 to 2.00, incl	0.02
	over 0.030 to 0.20, incl	0.01		over 2.00 to 5.00, incl	0.05
	over 0.20 to 0.60, incl	0.02		over 5.00 to 10.00, incl	0.10
Manganese	over 0.60 to 1.20, incl	0.03	over 10.00 to 15.00, incl	0.15	
	to 1.00, incl	0.03	over 15.00 to 22.00, incl	0.20	
	over 1.00 to 3.00, incl	0.04	over 22.00 to 30.00, incl	0.25	
	over 3.00 to 6.00, incl	0.05	Columbium + tantalum	to 1.50, incl	0.05
	over 6.00 to 10.00, incl	0.06		over 1.50 to 5.00, incl	0.10
over 10.00 to 15.00, incl	0.10	over 5.00	0.15		
over 15.00 to 20.00, incl	0.15	Tantalum	to 0.10, incl	0.02	
Phosphorus	to 0.040, incl	0.005	Copper	to 0.50, incl	0.03
	over 0.040 to 0.20, incl	0.010	over 0.50 to 1.00, incl	0.05	
Sulfur	to 0.040, incl	0.005	over 1.00 to 3.00, incl	0.10	
	over 0.040 to 0.20, incl	0.010	over 3.00 to 5.00, incl	0.15	
	over 0.20 to 0.50, incl	0.020	over 5.00 to 10.00, incl	0.20	
Silicon	to 1.00, incl	0.05	Aluminum	to 0.15, incl	-0.005, +0.01
	over 1.00 to 3.00, incl	0.10		over 0.15 to 0.50, incl	0.05
Chromium	over 4.00 to 10.00, incl	0.10		over 0.50 to 2.00, incl	0.10
	over 10.00 to 15.00, incl	0.15		over 2.00 to 5.00, incl	0.20
	over 15.00 to 20.00, incl	0.20		over 5.00 to 10.00, incl	0.35
	over 20.00 to 30.00, incl	0.25	Nitrogen	to 0.02, incl	0.005
Nickel	to 1.00, incl	0.03		over 0.02 to 0.19, incl	0.01
	over 1.00 to 5.00, incl	0.07		over 0.19 to 0.25, incl	0.02
	over 5.00 to 10.00, incl	0.10		over 0.25 to 0.35, incl	0.03
	over 10.00 to 20.00, incl	0.15		over 0.35 to 0.45, incl	0.04
	over 20.00 to 30.00, incl	0.20	Tungsten	to 1.00, incl	0.03
over 30.00 to 40.00, incl	0.25	over 1.00 to 2.00, incl		0.05	
over 40.00	0.30	over 2.00 to 5.00, incl		0.07	
Molybdenum	over 0.20 to 0.60, incl	0.03		over 5.00 to 10.00, incl	0.10
	over 0.60 to 2.00, incl	0.05		over 10.00 to 20.00, incl	0.15
	over 2.00 to 7.00, incl	0.10	Vanadium	to 0.50, incl	0.03
	over 7.00 to 15.00, incl	0.15		over 0.50 to 1.50, incl	0.05
over 15.00 to 30.00, incl	0.20	Selenium	all	0.03	
Titanium	to 1.00, incl		0.05		
	over 1.00 to 3.00, incl		0.07		
	over 3.00	0.10			