



Designation: ~~A493-95 (Reapproved 2004)~~ Designation: A 493 – 09

Standard Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging¹

This standard is issued under the fixed designation A 493; 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 cold-finished and hot-finished stainless steel wire and wire rods for cold heading or cold forging for applications, such as fasteners, where corrosion resistance is a factor.

~~1.2 The values stated in inch-pound units are to be regarded as the standard. The SI equivalents are in parentheses and may be approximate.~~

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

2.1 *ASTM Standards:*²

A 262 [Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels](#)

A 555/A 555M [Specification for General Requirements for Stainless Steel Wire and Wire Rods](#)

A 751 [Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products](#)

3. Ordering Information

3.1 It is the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this specification. Such requirements may include, but are not limited to the following:

3.1.1 Quantity (weight),

3.1.2 Size (diameter),

3.1.3 Type or UNS number (see Table 1),

3.1.4 Name (wire or wire rods),

3.1.5 ASTM designation and issue date,

3.1.6 Condition (see 5.2), <http://www.astm.org/catalog/standards/sist/e4b34c28-f915-4a14-b8a9-f04a730c78fb/astm-a493-09>

3.1.7 Coating (see 5.3),

3.1.8 Coil size (inside and outside diameter),

3.1.9 Special requirements, and

3.1.10 Supplementary requirements.

4. General Requirements for Delivery

4.1 In addition to the requirements of this specification, all requirements of the current editions of Specification A 555/A 555M/~~A555M~~ shall apply. Failure to comply with the general requirements of Specification A 555/A 555M/~~A555M~~ constitutes nonconformance with this specification.

NOTE 1—A typical ordering description is as follows: 5000 lb (2268 kg) 0.225 in. (5.72 mm) round Type 305 cold heading wire, lightly drafted, copper coated, 32 in. (813 mm) max OD—22 in. (559 mm) min ID, coils, ASTM Specification A 493 – XX. End use: hex head machine bolts.

5. Manufacture

5.1 *Heat Treatment:*

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 A01.17 on Flat-Rolled and Wrought Stainless Steel.

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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.

*A Summary of Changes section appears at the end of this standard.

TABLE 1 Chemical Requirements

Grade		Composition, %										
UNS Designation	AISI Type	Carbon, max ^A	Manganese, max	Phosphorus, max	Sulfur, max	Silicon, max	Chromium	Nickel	Copper	Molybdenum	Nitrogen, max ^A	Other Elements
Austenitic Grades												
S 30200	302	0.15	2.00	0.045	0.030	1.00	17.0–19.0	8.0–10.0	1.00 max	-	0.10	-
S 30200	302	0.15	2.00	0.045	0.030	1.00	17.0–19.0	8.0–10.0	1.00 max	-	0.10	-
S 30400	304	0.08	2.00	0.045	0.030	1.00	18.0–20.0	8.0–10.5	1.00 max	-	0.10	-
S 30400	304	0.08	2.00	0.045	0.030	1.00	18.0–20.0	8.0–10.5	1.00 max	-	0.10	-
S 30403	304L	0.030	2.00	0.045	0.030	1.00	18.0–20.0	8.0–12.0	1.00 max	-	0.10	-
S 30403	304L	0.030	2.00	0.045	0.030	1.00	18.0–20.0	8.0–12.0	1.00 max	-	0.10	-
S 30430		0.03	2.00	0.045	0.030	1.00	17.0–19.0	8.0–10.0	3.0–4.0	-	-	-
S 30500	305	0.04	2.00	0.045	0.030	1.00	17.0–19.0	10.5–13.0	1.00 max	-	-	-
S 31600	316	0.08	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	-	2.00–3.00	0.10	-
S 31600	316	0.08	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	-	2.00–3.00	0.10	-
S 31603	316L	0.030	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	-	2.00–3.00	0.10	-
S 31603	316L	0.030	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	-	2.00–3.00	0.10	-
S 38400	384	0.04	2.00	0.045	0.030	1.00	15.0–17.0	17.0–19.0	-	-	-	-
Ferritic Grades												
S 40940		0.06	1.00	0.045	0.040	1.00	10.5–11.7	0.50 max	-	-	-	Cb 10XC–0.75
S 42900	429	0.12	1.00	0.040	0.030	1.00	14.0–16.0	-	-	-	-	-
S 43000	430	0.04	1.00	0.040	0.030	1.00	16.0–18.0	-	-	-	-	-
S 44401	...	0.025	1.00	0.040	0.030	...	17.5–19.5	1.00 max	-	1.75–2.50	0.035	Ti+Cb 0.20+4× (C+N)–0.80
S 44625 ^B	...	0.010 ^B	0.40	0.020	0.020	0.40	25.0–27.5	0.50 max	0.2 max	0.75–1.50	0.015 ^B	Ni+Cu 0.5 max
S 44700 ^B	...	0.010 ^B	0.30	0.025	0.020	0.20	28.0–30.0	0.15 max	0.15 max	3.5–4.2	0.020 ^B	C+N 0.025 max
S 44800 ^B	...	0.010 ^B	0.30	0.025	0.020	0.20	28.0–30.0	2.00–2.50	0.15 max	3.5–4.2	0.020 ^B	C+N 0.025 max
Martensitic Grades												
S 41000	410	0.15	1.00	0.040	0.030	1.00	11.5–13.5	-	-	-	-	-
S 42010	...	0.15–0.30	1.00	0.040	0.030	1.00	13.5–15.0	0.35–0.85	-	0.40–0.85	-	-
S 42030	...	0.30	1.00	0.040	0.030	1.00	12.0–14.0	-	2.00–3.00	1.00–3.00	-	-
S 43100	431	0.20	1.00	0.040	0.030	1.00	15.0–17.0	1.25–2.50	-	-	-	-
S 44004	440C	0.95–1.20	1.00	0.040	0.030	1.00	16.0–18.0	-	-	0.75 max	-	-

^A Maximum, unless otherwise indicated.

^B Product analysis tolerance over the maximum limit for carbon and nitrogen to be 0.002 %.

5.1.1 Austenitic grades shall be annealed at 1800°F (980°C) minimum, so that grain boundary carbides enter into solution, and rapidly quenched to prevent grain boundary precipitation of carbides that would cause susceptibility to intergranular corrosion. See Supplementary Requirements.

5.1.2 Ferritic and martensitic grades shall be annealed to meet the requirements for mechanical properties.

5.2 Condition:

5.2.1 Wire shall be furnished in one of the following conditions:

5.2.1.1 Lightly drafted (normal condition and need not be specified if this is condition desired),

5.2.1.2 Annealed, or

5.2.1.3 Drafted to a specified tensile strength range (as agreed upon between purchaser and producer).

5.2.2 Rods shall be furnished in the annealed condition, scale removed.

5.3 Coatings and Lubricants:

5.3.1 Coatings are necessary for most cold-heading or forming operations. An electroplated copper coating is often used. The following coatings may be specified: copper, lime, or special (as agreed upon between purchaser and producer).

5.3.2 Lubricants are applied over the coating during the final drafting operation performed by the producer. Soap is generally used. The following lubricants may be specified: soap, grease, or special (as agreed upon between purchaser and producer).

6. Chemical Requirements

6.1 The steel shall conform to the requirements for chemical composition specified in Table 1.

6.2 Methods and practices relating to chemical analysis required by this specification shall be in accordance with Test Methods, Practices, and Terminology A 751.

7. Mechanical Requirements

7.1 The material shall conform to the requirements as to mechanical properties specified in Table 2. Material can be manufactured to tensile strength ranges other than those shown in Table 2. The producer should be consulted when material is