



Designation: A580/A580M – 13b

Standard Specification for Stainless Steel Wire¹

This standard is issued under the fixed designation A580/A580M; 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 U.S. Department of Defense.

1. Scope*

1.1 This specification covers stainless steel wire, except the free-machining types. It includes round, square, octagon, hexagon, and shape wire in coils only for the more commonly used types of stainless steels for general corrosion resistance and high-temperature service. For bars in straightened and cut lengths, see Specifications [A276](#) or [A479/A479M](#).

NOTE 1—For free-machining stainless wire, designed especially for optimum machinability, see Specification [A581/A581M](#).

1.2 Unless the order specifies the applicable “M” specification designation, the material shall be furnished to the inch-pound units.

1.3 The values stated in either SI units or inch-pound 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 the standard.

2. Referenced Documents

2.1 *ASTM Standards:*²

[A276](#) Specification for Stainless Steel Bars and Shapes

[A370](#) Test Methods and Definitions for Mechanical Testing of Steel Products

[A479/A479M](#) Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels

[A555/A555M](#) Specification for General Requirements for Stainless Steel Wire and Wire Rods

[A581/A581M](#) Specification for Free-Machining Stainless Steel Wire and Wire Rods

[E527](#) Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

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.

2.2 *Society of Automotive Engineers Standard:*³
[J 1086](#) Numbering Metals and Alloys

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 Name of material (stainless steel),

3.1.3 Type or UNS designation ([Table 1](#)),

3.1.4 Condition ([4.1](#)),

3.1.5 Finish ([4.2](#)),

3.1.6 Cross section (round, square, etc.),

3.1.7 Applicable dimensions including size, thickness, and width.

3.1.8 ASTM designation A580/A 580M and date of issue.

3.1.9 Coil diameter (inside or outside diameter, or both) and coil weight.

3.1.10 Special requirements.

NOTE 2—A typical ordering description is as follows: 5000 lb [2000 kg] Type 304, wire, annealed and cold drawn, ½ in. [13 mm] round, ASTM Specification A580/A 580M dated _____. End use: machined hydraulic coupling parts.

4. Manufacture

4.1 *Condition* ([Table 2](#)):

4.1.1 *Condition A*—Annealed as a final heat treatment. Material in Condition A may be given a final cold drawing for size control or finish, or both, slightly raising tensile strength.

4.1.2 *Condition B*—Cold worked to higher strength.

4.1.3 *Condition T*—Heat treated to an intermediate temper generally by austenitizing, quenching, and tempering at a relatively low temperature.

4.1.4 *Condition H*—Heat treated to a hard temper generally by austenitizing, quenching, and tempering at a relatively low temperature.

4.2 *Finish:*

³ Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, <http://www.sae.org>.

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



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TABLE 1 Chemical Requirements^A

| UNS Designation ^B | Type | Composition, % | | | | | | | | | |
|-------------------------------------|-------------------|----------------|------------|-------------|---------|-----------|-----------|-----------|------------|-----------|--|
| | | Carbon, | Manganese, | Phosphorus, | Sulfur, | Silicon, | Chromium | Nickel | Molybdenum | Nitrogen | Other Elements |
| Austenitic Grades | | | | | | | | | | | |
| N08926 | ... | 0.020 | 2.00 | 0.030 | 0.010 | 0.50 | 19.0–21.0 | 24.0–26.0 | 6.0–7.0 | 0.15–0.25 | Cu 0.50–1.50 |
| N08367 | ... | 0.030 | 2.00 | 0.040 | 0.030 | 1.00 | 20.0–22.0 | 23.5–25.5 | 6.0–7.0 | 0.18–0.25 | Cu 0.75 max |
| N08700 | ... | 0.040 | 2.00 | 0.040 | 0.030 | 1.00 | 19.0–23.0 | 24.0–26.0 | 4.3–5.0 | ... | Cu 0.50 max Cb 8xC-0.40 |
| S20161 | ... | 0.15 | 4.0–6.0 | 0.040 | 0.040 | 3.0–4.0 | 15.0–18.0 | 4.0–6.0 | ... | 0.08–0.20 | ... |
| S20910 | XM-19 | 0.06 | 4.0–6.0 | 0.040 | 0.030 | 1.00 | 20.5–23.5 | 11.5–13.5 | 1.50–3.00 | 0.20–0.40 | Cb 0.10–0.30 V 0.10–0.30 |
| S21400 | XM-31 | 0.12 | 14.0–16.0 | 0.045 | 0.030 | 0.30–1.00 | 17.0–18.5 | 1.00 | ... | 0.35 | ... |
| S21800 | ... | 0.10 | 7.0–9.0 | 0.060 | 0.030 | 3.5–4.5 | 16.0–18.0 | 8.0–9.0 | ... | 0.08–0.18 | ... |
| S21900 | XM-10 | 0.08 | 8.0–10.0 | 0.060 | 0.030 | 1.00 | 19.0–21.5 | 5.5–7.5 | ... | 0.15–0.40 | ... |
| S21904 | XM-11 | 0.04 | 8.0–10.0 | 0.060 | 0.030 | 1.00 | 19.0–21.5 | 5.5–7.5 | ... | 0.15–0.40 | ... |
| S24000 | XM-29 | 0.08 | 11.5–14.5 | 0.060 | 0.030 | 1.00 | 17.0–19.0 | 2.3–3.7 | ... | 0.20–0.40 | ... |
| S24100 | XM-28 | 0.15 | 11.0–14.0 | 0.040 | 0.030 | 1.00 | 16.5–19.0 | 0.5–2.50 | ... | 0.20–0.45 | ... |
| S28200 | ... | 0.15 | 17.0–19.0 | 0.045 | 0.030 | 1.00 | 17.0–19.0 | ... | 0.75–1.25 | 0.40–0.60 | Cu 0.75–1.25 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0.10 | ... |
| S30200 | 302 | 0.15 | 2.00 | 0.045 | 0.030 | 1.00 | 17.0–19.0 | 8.0–10.0 | ... | 0.10 | ... |
| S30215 | 302B | 0.15 | 2.00 | 0.045 | 0.030 | 2.00–3.00 | 17.0–19.0 | 8.0–10.0 | ... | ... | ... |
| S30400 | 304 | 0.08 | 2.00 | 0.045 | 0.030 | 1.00 | 18.0–20.0 | 8.0–10.5 | ... | 0.10 | ... |
| S30403 | 304L ^C | 0.030 | 2.00 | 0.045 | 0.030 | 1.00 | 18.0–20.0 | 8.0–12.0 | ... | 0.10 | ... |
| S30500 | 305 | 0.12 | 2.00 | 0.045 | 0.030 | 1.00 | 17.0–19.0 | 10.5–13.0 | ... | ... | ... |
| S30800 | 308 | 0.08 | 2.00 | 0.045 | 0.030 | 1.00 | 19.0–21.0 | 10.0–12.0 | ... | ... | ... |
| S30900 | 309 | 0.20 | 2.00 | 0.045 | 0.030 | 1.00 | 22.0–24.0 | 12.0–15.0 | ... | ... | ... |
| S30908 | 309S | 0.08 | 2.00 | 0.045 | 0.030 | 1.00 | 22.0–24.0 | 12.0–15.0 | ... | ... | ... |
| S30940 | 309Cb | 0.08 | 2.00 | 0.045 | 0.030 | 1.00 | 22.0–24.0 | 12.0–16.0 | ... | 0.10 | Cb+Ta 10xC min, 1.10 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| S31000 | 310 | 0.25 | 2.00 | 0.045 | 0.030 | 1.50 | 24.0–26.0 | 19.0–22.0 | ... | ... | ... |
| S31008 | 310S | 0.08 | 2.00 | 0.045 | 0.030 | 1.50 | 24.0–26.0 | 19.0–22.0 | ... | ... | ... |
| S31400 | 314 | 0.25 | 2.00 | 0.045 | 0.030 | 1.50–3.00 | 23.0–26.0 | 19.0–22.0 | ... | ... | ... |
| S31277 | ... | 0.020 | 3.00 | 0.030 | 0.010 | 0.50 | 20.5–23.0 | 26.0–28.0 | 6.5–8.0 | 0.30–0.40 | Cu 0.50–1.50 |
| S31600 | 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 | ... |
| S31603 | 316L ^C | 0.030 | 2.00 | 0.045 | 0.030 | 1.00 | 16.0–18.0 | 10.0–14.0 | 2.00–3.00 | 0.10 | ... |
| S31700 | 317 | 0.08 | 2.00 | 0.045 | 0.030 | 1.00 | 18.0–20.0 | 11.0–15.0 | 3.0–4.0 | 0.10 | ... |
| S32100 | 321 | 0.08 | 2.00 | 0.045 | 0.030 | 1.00 | 17.0–19.0 | 9.0–12.0 | ... | ... | Ti 5xC min |
| S34700 | 347 | 0.08 | 2.00 | 0.045 | 0.030 | 1.00 | 17.0–19.0 | 9.0–13.0 | ... | ... | Cb+Ta 10xC min |
| S34751 | 347LN | 0.005–0.020 | 2.00 | 0.045 | 0.030 | 1.00 | 17.0–19.0 | 9.0–13.0 | ... | 0.06–0.10 | Cb 0.20–0.50, 15xC, min |
| S34800 | 348 | 0.08 | 2.00 | 0.045 | 0.030 | 1.00 | 17.0–19.0 | 9.0–13.0 | ... | ... | Cb+Ta 10xC min Ta 1.10 Co 0.20 |
| Austenitic-Ferritic (Duplex) Grades | | | | | | | | | | | |
| S32202 | ... | 0.030 | 2.00 | 0.040 | 0.010 | 1.00 | 21.5–24.0 | 1.00–2.80 | 0.45 | 0.18–0.26 | ... |
| S82441 | ... | 0.030 | 2.50–4.00 | 0.035 | 0.005 | 0.70 | 23.0–25.0 | 3.0–4.5 | 1.00–2.00 | 0.20–0.30 | Cu 0.10–0.80 |
| Ferritic Grades | | | | | | | | | | | |
| S40500 | 405 | 0.08 | 1.00 | 0.040 | 0.030 | 1.00 | 11.5–14.5 | ... | ... | ... | Al 0.10–0.30 |
| S40976 | ... | 0.030 | 1.00 | 0.040 | 0.030 | 1.00 | 10.5–11.7 | 0.75–1.00 | ... | 0.040 | Cb 10x(C+N) –0.80 |
| S43000 | 430 | 0.12 | 1.00 | 0.040 | 0.030 | 1.00 | 16.0–18.0 | ... | ... | ... | ... |
| S44400 | ... | 0.025 | 1.00 | 0.040 | 0.030 | 1.00 | 17.5–19.5 | 1.00 | 1.75–2.50 | 0.035 | [Ti+Cb] 0.20+4(C+N)–0.80 |
| S44600 | 446 | 0.20 | 1.50 | 0.040 | 0.030 | 1.00 | 23.0–27.0 | ... | ... | 0.25 | ... |
| S44700 | ... | 0.010 | 0.30 | 0.025 | 0.020 | 0.20 | 28.0–30.0 | 0.15 | 3.5–4.2 | 0.020 | C+N 0.025 Cu 0.15 |
| S44800 | ... | 0.010 | 0.30 | 0.025 | 0.020 | 0.20 | 28.0–30.0 | 2.00–2.50 | 3.5–4.2 | 0.020 | C+N 0.025 Cu 0.15 |
| S44535 | ... | 0.030 | 0.30–0.80 | 0.050 | 0.020 | 0.50 | 20.0–24.0 | ... | ... | ... | Cu 0.50, Al 0.50 La 0.04–0.20 Ti 0.03–0.20 |
| Martensitic Grades | | | | | | | | | | | |
| S40300 | 403 | 0.15 | 1.00 | 0.040 | 0.030 | 0.50 | 11.5–13.0 | ... | ... | ... | ... |
| S41000 | 410 | 0.15 | 1.00 | 0.040 | 0.030 | 1.00 | 11.5–13.5 | ... | ... | ... | ... |
| S41400 | 414 | 0.15 | 1.00 | 0.040 | 0.030 | 1.00 | 11.5–13.5 | 1.25–2.50 | ... | ... | ... |
| S42000 | 420 | over 0.15 | 1.00 | 0.040 | 0.030 | 1.00 | 12.0–14.0 | ... | ... | ... | ... |
| S43100 | 431 | 0.20 | 1.00 | 0.040 | 0.030 | 1.00 | 15.0–17.0 | 1.25–2.50 | ... | ... | ... |
| S44002 | 440A | 0.60–0.75 | 1.00 | 0.040 | 0.030 | 1.00 | 16.0–18.0 | ... | 0.75 | ... | ... |
| S44003 | 440B | 0.75–0.95 | 1.00 | 0.040 | 0.030 | 1.00 | 16.0–18.0 | ... | 0.75 | ... | ... |
| S44004 | 440C | 0.95–1.20 | 1.00 | 0.040 | 0.030 | 1.00 | 16.0–18.0 | ... | 0.75 | ... | ... |

^A Maximum, unless otherwise indicated. Where ellipses appear in this table, there is no requirement and the element need not be analyzed for or reported.

^B New designation established in accordance with Practice E527 and SAE J 1086.

^C For some applications, the substitution of Type 304L for Type 304, or Type 316L for Type 316 may be undesirable because of design, fabrication, or service requirements. In such cases, the purchaser should so indicate on the order.

4.2.1 *Cold Drawn*—A finish resulting from a final cold drawing pass, generally with cold drawing lubricant left on. Special bright finishes, lubricant removal, etc., for special end uses must be negotiated with the producer.

4.2.2 *Annealed and Pickled*—A dull matte appearance necessarily associated with the dead-soft condition when no final cold drawing is permitted.

5. Chemical Composition

5.1 The steel shall conform to the requirements as to chemical composition specified in Table 1.

6. Mechanical Requirements

6.1 The material shall conform to the mechanical test requirements specified in Table 2.

6.2 The martensitic grades shall be capable of meeting the hardness requirements, after heat treating, as specified in Table 3.

7. General Requirements for Delivery

7.1 In addition to the requirements of this specification, all requirements of the current edition of Specification A555/

TABLE 3 Response to Heat Treatment

| Type ^A | Heat Treatment ^B Temperature °F [°C] | Quenchant | Hardness HRC, min |
|-------------------|---|-----------|----------------------|
| 403 | 1750 [955] | Air | 35 |
| 410 | 1750 [955] | Air | 35 |
| 414 | 1750 [955] | Oil | 42 |
| 420 | 1825 [1000] | Air | 50 |
| 431 | 1875 [1025] | Oil | 40 |
| 440A | 1875 [1025] | Air | 55 |
| 440B | 1875 [1025] | Oil | 56 |
| 440C | 1875 [1025] | Air | 58 |

^A Samples for testing shall be in the form of a section not exceeding 3/8 in. (9.50 mm) in thickness.

^B Temperature tolerance is ±25°F [±15°C].

A555M shall apply. Failure to comply with the general requirements of Specification A555/A555M constitutes non-conformance with this specification.

8. Keywords

8.1 stainless steel; wire

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