



Standard Specification for Higher-Strength Martensitic Stainless Steel Plate, Sheet, and Strip¹

This standard is issued under the fixed designation A1010/A1010M; 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 martensitic stainless steels for various structural, architectural, pressure vessel, and heat-resisting applications. The mechanical properties of these steels are customarily, but not necessarily, developed by a suitable heat treatment generally referred to as tempering.

1.2 Steel products under this specification are available in two grades:

| Grade | Yield Strength, min, ksi [MPa] |
|----------|--------------------------------|
| 40 [275] | 40 [275] |
| 50 [345] | 50 [345] |

1.3 The maximum thickness of plates is limited only by the capacity of the composition to meet the specified mechanical property requirements; however, current practice normally limits the maximum thickness of plates furnished under this specification to 2 in. [50 mm].

1.4 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

[A480/A480M Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip](#)

[A673/A673M Specification for Sampling Procedure for Impact Testing of Structural Steel](#)

[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.

Current edition approved Oct. 1, 2013. Published October 2013. Originally approved in 2000. Last previous edition approved in 2009 as A1010/A1010M – 01 (2009). DOI: 10.1520/A1010_A1010M-13.

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 Other Document:

[SAE J1086 Recommended Practice for Numbering Metals and Alloys³](#)

3. General Requirements

3.1 The following requirements for orders for material furnished under this specification shall conform to the applicable requirements of the current edition of Specification [A480/A480M](#).

- 3.1.1 Terminology,
- 3.1.2 Ordering Information,
- 3.1.3 Process,
- 3.1.4 Heat Analysis,
- 3.1.5 Product Analysis,
- 3.1.6 Finish for Sheet,
- 3.1.7 Finish for Strip,
- 3.1.8 Finish for Plates,
- 3.1.9 Test Specimens,
- 3.1.10 Number of Tests,
- 3.1.11 Test Methods,
- 3.1.12 Retests and Retreatment,
- 3.1.13 Dimensions and Permissible Variations,
- 3.1.14 Workmanship,
- 3.1.15 Packaging, Marking, and Loading,
- 3.1.16 Inspection,
- 3.1.17 Rejection and Rehearing, and
- 3.1.18 Material Test Report and Certification.

4. Chemical Composition

4.1 The steel shall conform to the requirements as to chemical composition specified in [Table 1](#), and shall conform to applicable requirements specified in the current edition of Specification [A480/A480M](#).

5. Heat Treatment

5.1 The material shall be heat-treated by tempering to meet the requirements of this specification. The tempering temperature shall not exceed 1400°F [760°C]. Prior to tempering, the steel shall be in the as-rolled, normalized or quenched condition.

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

TABLE 1 Chemical Composition Requirements, %^A

| UNS Designation ^B | Type | Carbon | Manganese | Phosphorus | Sulfur | Silicon | Chromium | Nickel | Molybdenum | Nitrogen | Other Elements |
|------------------------------|------|--------|-----------|------------|--------|---------|-----------|--------|------------|----------|----------------|
| S41003 | ... | 0.030 | 1.50 | 0.040 | 0.010 | 1.00 | 10.5-12.5 | 1.50 | ... | 0.030 | ... |

^A Maximum, unless range or minimum is indicated.

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

TABLE 2 Mechanical Test Requirements

| Grade | Yield Strength, min, ksi [MPa] | Tensile Strength, min, ksi [MPa] | Elongation in 2 in. [50 mm], min, % | Cold Blend |
|-------|--------------------------------|----------------------------------|-------------------------------------|--------------|
| 40 | 40 [275] | 66 [455] | 18 | not required |
| 50 | 50 [345] | 70 [485] | 18 | not required |

6. Mechanical Properties

6.1 The material shall conform to the mechanical properties specified in **Table 2**.

7. Keywords

7.1 architectural steel; martensitic; plate; stainless steel; steel; structural steel; tempered

SUPPLEMENTARY REQUIREMENTS

Supplementary requirements shall not apply unless specified on the purchase order. Requirements other than those shown in this section may be specified subject to agreement between the supplier and the purchaser. The following supplementary requirements are suitable for use with this specification.

S1. Charpy V-Notch Impact Test

S1.1 Charpy V-notch impact tests shall be conducted in accordance with Specification **A673/A673M**.

S1.2 The frequency of testing, the test temperature to be used, and the absorbed energy requirements shall be as specified on the order.

S2. Ultrasonic Examination

S2.1 The material shall be ultrasonically examined in accordance with the requirements specified on the order.

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A1010/A1010M – 01R09) that may impact the use of this standard. (Approved Oct. 1, 2013.)

- (1) Revised all references to 350 Mpa to 345 Mpa.
 (2) Revised paragraph 1.3, changed normal maximum thickness from 1 in. [25 mm] to 2 in. [50 mm].

- (3) Changed sulfur in Table 1 to 0 .010.
 (4) Deleted hardness from the mechanical properties Table 2.

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