



## Designation: A505 – 16 (Reapproved 2021)

# Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements for<sup>1</sup>

This standard is issued under the fixed designation A505; 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 ( $\epsilon$ ) 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 a group of common requirements that, unless otherwise specified in the material specification, apply to hot-rolled and cold-rolled alloy steel sheet and strip under each of the following specifications: **A506**, **A507**, and **A873/A873M**.

1.2 In case of any conflict in requirements, the requirements of the individual material specification shall prevail over those of this general specification.

1.3 The purchaser may specify additional requirements which do not negate any of the provisions of this general specification or of the individual material specification. Such additional requirements, the acceptance of which are subject to negotiation with the supplier, must be included in the order information (see **4.1.9**).

1.4 For purposes of determining conformance with this specification and the various material specifications referenced in **1.1**, values shall be rounded to the nearest unit in the right-hand place of figures used in expressing the limiting values in accordance with the rounding provisions of Test Methods and Definitions **A370** and Test Methods, Practices, and Terminology **A751**.

1.5 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.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee **A01** on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee **A01.19** on Steel Sheet and Strip.

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## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

**A370** Test Methods and Definitions for Mechanical Testing of Steel Products

**A506** Specification for Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled

**A507** Specification for Drawing Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled

**A700** Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment

**A751** Test Methods and Practices for Chemical Analysis of Steel Products

**A873/A873M** Specification for Steel Sheet and Strip, Chromium-Molybdenum Alloy, for Pressure Vessels (Withdrawn 1997)<sup>3</sup>

**A919** Terminology Relating to Heat Treatment of Metals (Withdrawn 1999)<sup>3</sup>

**A1073/A1073M** Practice for Using Hand Micrometers to Measure the Thickness of Uncoated Steel Sheet and Nonmetallic and Metallic-Coated Steel Sheet

### 2.2 Federal Standard:<sup>4</sup>

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

### 2.3 Military Standard:<sup>4</sup>

**MIL-STD-129** Marking for Shipment and Storage

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *sheet and strip, n*—hot-rolled and cold-rolled alloy steel sheet and strip is classified as shown in **Table 1(a)** and **Table 1(b)**.

3.1.2 *exclusive, adj*—when used in relation to ranges, as for ranges of thicknesses in the tables of permissible variations in dimensions, the term “exclusive” is intended to exclude only

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>4</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

the greater value of the range. Thus a range from 60 to 72 in. (1524 to 1829 mm) *exclusive* includes 60 in. but does not include 72 in.

3.1.3 *manufacturer (material manufacturer)*, *n*—an organization that performs or directly controls one or more operations, such as melting, rolling, coiling, and heat treatment, that affects the chemical composition or mechanical properties of the material.

## 4. Ordering Information

4.1 Orders shall include the following information, as necessary, to describe adequately the desired material:

- 4.1.1 Specification designation, including year of issue,
- 4.1.2 Chemical composition (grade),
- 4.1.3 Classification of the material (that is, hot-rolled sheet),
- 4.1.4 Dimensions (thickness, width, length) in decimal inches,
- 4.1.5 Quantity (weight or number of pieces),
- 4.1.6 Condition (that is, “hot-rolled,” “cold-rolled”),
- 4.1.7 Heat treatment required, if any,
- 4.1.8 Type of edge,
- 4.1.9 Additional information as specified in the individual material specification,
- 4.1.10 Any special requirements not specified in the individual material specification, and
- 4.1.11 Whether certification of compliance or test reports are required.

## 5. Materials and Manufacture

5.1 *Melting Process*—Unless otherwise specified in the individual material specification, the steel may be made by any process that produces material that conforms to the specified requirements.

5.2 *Hot or Cold Rolling*—The sheet and strip shall be produced by hot rolling or cold rolling, as specified in the individual material specification and as specified on the order.

5.3 *Heat Treatment*—When heat treatment is required, it shall be performed in accordance with the requirements specified in the individual material specification. Heat treatment may be performed by either the manufacturer or the purchaser; however, if the purchaser intends to perform the heat treatment, it shall be so stated on the order.

5.3.1 Heat treatment terms shall be in accordance with Terminology [A919](#).

## 6. Chemical Requirements

6.1 *Cast or Heat Analysis* of each cast or heat shall be made by the manufacturer to determine the percentage of elements specified in the individual material specification. This analysis shall be made from a test specimen preferably taken during the teeming of the cast or heat. The chemical composition thus determined shall be reported to the purchaser or his representative upon request, and shall conform to the cast or heat analysis requirements of the applicable material specification.

6.2 *Product or Verification Analysis*—An analysis may be made by the purchaser from finished material representing each cast or heat. The composition thus determined shall conform to

the requirements for product analysis specified in the individual material specification or on the order; however, if only cast or heat analysis requirements are specified in the material specification or on the order, the composition determined on product analysis shall conform to those requirements subject to the product analysis tolerances specified in [Table 2](#).

6.3 *Referee Analysis*—In case referee analysis is required to resolve a dispute concerning the results of a chemical analysis, the procedures for performing the referee analysis shall be in accordance with Test Methods, Practices, and Terminology [A751](#).

## 7. Metallurgical Structure

7.1 The requirements for metallurgical structure, if any, shall be as specified in the individual material specification.

## 8. Mechanical Property Requirements

8.1 *Requirements*—The requirements for mechanical properties, if any, shall be as specified in the individual material specification.

8.2 *Number of Tests*—The number of specimens shall be as specified in the individual material specification.

8.3 *Location and Orientation of Tension Test Specimens*—Unless otherwise specified in the individual material specification, tension test specimens shall be the full thickness of the material. The test coupons shall be taken from the material in its finished condition except as otherwise provided in [8.4](#); shall be taken approximately midway between the edge and centerline of the sheet or strip; and shall be taken such that the long axis of the test specimen will be transverse to the final direction of rolling.

### 8.4 Heat Treatment of Test Coupons:

8.4.1 When heat treatment is required by the material specification and is to be performed by the purchaser or his agent, and the material is to be supplied by the manufacturer in a condition other than that required by the material specification, the material shall be qualified on the basis of tests made on specimens taken from coupons, obtained from the material in its as-shipped condition, that have been heat treated in accordance with the requirements specified in the material specification or on the order. If the heat-treatment temperatures are not specified, the manufacturer shall heat treat the coupons under conditions he considers appropriate.

8.4.2 When specified on the order, the test coupons may be subjected to additional heat treatment to simulate thermal treatments that will be used during fabrication.

8.4.3 The purchaser shall be informed of the procedures followed in heat treating the test coupons.

### 8.5 Test Methods:

8.5.1 All tests shall be conducted in accordance with Test Methods and Definitions [A370](#).

8.5.2 Yield strength shall be determined either by the 0.2 % offset method or by the 0.5 % extension-under-load method.

## 9. Quality

9.1 *General*—Sheet and strip furnished under this specification shall be clean, sound, and free of internal or external