Designation: A480/A480M – 23

Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip[1]

This standard is issued under the fixed designation A480/A480M; 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[2] covers a group of general requirements that, unless otherwise specified in the purchase order or in an individual specification, shall apply to rolled steel plate, sheet, and strip, under each of the following specifications issued by ASTM: Specifications A240/A240M, A263, A264, A265, A666, A693, A793, and A895.

1.2 In the case of conflict between a requirement of a product specification and a requirement of this specification, the product specification shall prevail. In the case of conflict between a requirement of the product specification or a requirement of this specification and a more stringent requirement of the purchase order, the purchase order shall prevail. The purchase order requirements shall not take precedence if they, in any way, violate the requirements of the product specification or this specification; for example, by waiving a test requirement or by making a test requirement less stringent.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The SI units are shown in brackets, except that when A480M is specified, Annex A3 shall apply for the dimensional tolerances and not the bracketed SI values in Annex A2. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.4 This specification and the applicable material specifications are expressed in both inch-pound and SI units. However, unless the order specifies the applicable "M" specification designation [SI units], the material shall be furnished in inch-pound units.

1.5 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

A240/A240M Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels

A263 Specification for Stainless Chromium Steel-Clad Plate

A264 Specification for Stainless Chromium-Nickel Steel-Clad Plate

A265 Specification for Nickel and Nickel-Base Alloy-Clad Steel Plate

A342/A342M Test Methods for Permeability of Weakly Magnetic Materials

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A666 Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

A693 Specification for Precipitation-Hardening Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

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

A751 Test Methods and Practices for Chemical Analysis of Steel Products

A763 Practices for Detecting Susceptibility to Intergranular Attack in Ferritic Stainless Steels

A793 Specification for Rolled Floor Plate, Stainless Steel (Withdrawn 2023)[4]

[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 ASME Boiler and Pressure Vessel Code applications see related Specification SA-480 in Section II of that Code.

[3] 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.

[4] The last approved version of this historical standard is referenced on www.astm.org.

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

A895 Specification for Free-Machining Stainless Steel Plate, Sheet, and Strip
A923 Test Methods for Detecting Detrimental Intermetallic Phase in Duplex Austenitic/Ferritic Stainless Steels
A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys
A1084 Test Method for Detecting Detrimental Phases in Lean Duplex Austenitic/Ferritic Stainless Steels
E140 Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

2.2 *AIAG Standard:*[5]

B-5 Primary Metals Identification Tag Application Standard

2.3 *ASME Document:*[6]

ASME BPVC.IX Boiler and Pressure Vessel Code, Section IX: Welding, Brazing, and Fusing Qualifications

2.4 *Federal Standard:*[7]

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

2.5 *Military Standards:*[7]

MIL-STD-129 Marking for Shipment and Storage
MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms pertaining to this standard, not otherwise listed in 3.2, reference should be made to Terminology A941.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cold work, n*—the changing of mechanical properties by work hardening.

3.2.2 *plate, n*—material 3⁄16 in. [5.00 mm] and over in thickness and over 10 in. [250 mm] in width; finishes for *plate* are shown in Section 13.

3.2.3 *sheet, n*—material under 3⁄16 in. [5.00 mm] in thickness and 24 in. [600 mm] and over in width; finishes for *sheet* are shown in Section 11.

3.2.4 *strip, n*—cold-rolled material under 3⁄16 in. [5.00 mm] in thickness and under 24 in. [600 mm] in width; finishes are detailed in Section 12 for *strip*, and strip edges in Section 14 for cold-rolled strip.

4. Ordering Information

4.1 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:

4.1.1 Quantity (weight and number of pieces),

4.1.2 Name of material (stainless steel),

4.1.3 Condition (hot-rolled, cold-rolled, annealed, heat-treated),

4.1.4 Finish (see Section 11 for sheet, Section 12 for strip, and Section 13 for plates); in the case of polished finishes, specify whether one or both sides are to be polished,

4.1.5 Temper (if the applicable material specification requires this detail),

4.1.6 Form (plate, sheet, or strip),

4.1.7 Dimensions (thickness, width, and length),

4.1.7.1 Thickness shall be ordered to decimal or fractional thickness. The use of the gauge number is discouraged as being an archaic term of limited usefulness not having general agreement on meaning. The gauge number shall not be a basis for rejection.

4.1.7.2 Thickness, width, and length, when applicable, should be ordered in the same units, for example, 0.060 by 48 by 120 in. [1.52 by 1219 by 3048 mm].

4.1.8 Edge, strip only (see Section 14 for cold-rolled strip),

4.1.9 Type or UNS designation, refer to the applicable material specification,

4.1.10 Specification designation and date of issue,

4.1.11 Additions to specification or special requirements,

4.1.12 Restrictions (if desired) on methods for determining yield strength (see appropriate footnote to mechanical properties table of the basic material specification),

4.1.13 Marking requirements (see Section 25),

4.1.14 Preparation for delivery (see Section 25), and

4.1.15 Magnetic permeability test (when required). Refer to Section 19.

5. Process

5.1 The steel shall be manufactured/produced by the following or as specified in the applicable material specification.

5.1.1 The steel shall be made by electric-arc, electric-induction, or other suitable processes.

5.1.2 If a specific type of melting is required by the purchaser, it shall be so specified on the purchase order.

6. Heat Analysis

6.1 Methods and practices relating to chemical analysis shall be in accordance with Test Methods, Practices, and Terminology A751.

6.2 An analysis of each heat shall be made by the steel producer to determine the percentages of the elements specified in the applicable material specification. This analysis shall be made from a test sample taken during the pouring of the melt, or from the in-process product later in the manufacturing flow.

6.2.1 The heat analysis shall conform to the chemical requirements for each of the specified elements for the grade ordered, as listed in the applicable product specification.

6.2.2 All commercial metals contain small amounts of elements other than those which are specified. It is neither practical nor necessary to specify limits for unspecified elements that can be present. The producer is permitted to analyze for unspecified elements and is permitted to report such analyses. The presence of an unspecified element and the reporting of an analysis for that element shall not be a basis for

[5] Available from Automotive Industry Action Group (AIAG), 26200 Lahser Rd., Suite 200, Southfield, MI 48033-7156, http://www.aiag.org.

[6] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, http://www.asme.org.

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

rejection, unless the presence of that element causes the loss of a property typically expected for that metal, for the type and quality ordered.

6.2.3 The purchaser is permitted to require in the purchase order a maximum limit for an individual element not specified in the product specification. Such a requirement for an element not listed in the product specification, when acknowledged in the order acceptance, shall be treated as a specified element, with determination of chemical analysis and reporting of that analysis.

6.2.4 The purchaser is permitted to make the requirements for any element more stringent; that is, require higher minimums for elements having minimum requirements or ranges with minimum requirements, or requiring lower maximums for elements having specified maximums, or ranges with maximums. The purchaser is not permitted to make chemical requirements less stringent.

6.2.5 Analysis limits shall be established for specific elements rather than groups of elements, including but not limited to *all others*, *rare earths*, and *balance*, unless all elements in such a group are similar in technical effect and are associated in typical methods of chemical analysis.

6.3 Except as permitted in 6.3.1, the steel shall not contain an unspecified element for the ordered grade to the extent that the steel conforms to the requirements of another grade for which that element is a specified element having a required minimum content. For this requirement, a grade is defined as an alloy described individually and identified by its own UNS designation in a table of chemical requirements within this specification or any specification listed within the scope as being covered by the specification.

6.3.1 Unless otherwise specified to lower maximum limits on the purchase order, maximum allowances for unspecified elements will be established for Cu, Mo, Ti, and Nb for the specified grade if the amount of that element present in the material conforms with composition limits for that element in another grade. These allowances are Cu, 0.75 %; Mo, 0.75 %; Ti, 0.10 %; and Nb, 0.10 %.

6.3.2 If any allowance in 6.3.1 is used to demonstrate non-substitution, then the element involved shall be reported as if it were a specified element.

6.4 The producer is not permitted to certify that material is in compliance with an ASTM product specification when the purchase order has required that the material contain as a minimum or range an element that is neither a specified element nor an intentionally added unspecified element for the ordered grade in accordance with the definitions of Test Methods, Practices, and Terminology A751.

6.5 The names columbium (Cb) and niobium (Nb) both refer to element 41. The name Niobium is preferred, but either is acceptable for reporting composition.

7. Product Analysis

7.1 The purchaser is permitted to perform a product analysis (formerly check analysis) to verify the identity of the finished material representing each heat or lot. Such analysis shall be made by any of the commonly accepted methods that will positively identify the material.

7.2 The chemical composition determined in accordance with 7.1 shall conform to the limits of the material specification within the tolerances of Table A1.1, unless otherwise specified in the applicable material specification or the purchase order. The allowable variation of a particular element in a single sample for product analysis is permitted to be either above or below the specified range. However, percentages must exhibit the same tendencies in all samples; that is, the several determinations of any individual element in a heat shall not vary both above and below the specified range.

8. Material Test Report and Certification

8.1 A report of the results of all tests required by the product specification shall be supplied to the purchaser. This material test report shall reference the product specification designation and year date indicating that the material was manufactured, sampled, tested, and inspected in accordance with requirements of the product specification and has been found to meet those requirements. The material test report shall report the melting process when the purchase order requires either a specific type of melting or requires that the melting process used is to be reported.

8.1.1 The report shall indicate the type of steel. If certifying that the material conforms to the requirements for more than one type of steel, the manufacturer may indicate each type of steel on the report, or may issue a separate report for each type of steel.

8.2 A signature is not required on the report. However, the document shall clearly identify the organization submitting the report. Not withstanding the absence of a signature, the organization submitting the document is responsible for its content.

8.3 A material test report, certificate of inspection, or similar document printed from or used in electronic form from an electronic data interchange (EDI) transmission shall be regarded as having the same validity as a counterpart printed in the certifiers' facility. The content of the EDI transmitted document must meet the requirements of the invoked ASTM standard(s) and conform to any existing EDI agreement between the purchaser and the supplier. Notwithstanding the absence of a signature, the organization submitting the EDI transmission is responsible for the content of the report.

8.4 When finished material is supplied to a purchase order specifying the product specification, the organization supplying that material shall provide the purchaser with a copy of the original manufacturer's test report.

NOTE 1—Notwithstanding the absence of a signature, the organization submitting the report is responsible for the content of the report.

NOTE 2—The industry definition of EDI invoked herein is the computer-to-computer exchange of business information in a standard format such as ANSI ASC X12.

8.4.1 When the original manufacturer's test report was provided by EDI to the organization supplying the finished material to the purchaser, the organization supplying the finished material shall provide to the purchaser a printed form