



Designation: A 403/A 403M – 06

Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings¹

This standard is issued under the fixed designation A 403/A 403M; 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 wrought stainless steel fittings for pressure piping applications.²

1.2 Several grades of austenitic stainless steel alloys are included in this specification. Grades are designated with a prefix, WP or CR, based on the applicable ASME or MSS dimensional and rating standards, respectively.

1.3 For each of the WP stainless grades, several classes of fittings are covered, to indicate whether seamless or welded construction was utilized. Class designations are also utilized to indicate the nondestructive test method and extent of nondestructive examination (NDE). Table 1 is a general summary of the fitting classes applicable to all WP grades of stainless steel covered by this specification. There are no classes for the CR grades. Specific requirements are covered elsewhere.

1.4 This specification is expressed in both inch-pound units and in SI units. However, unless the order specifies the applicable “M” specification designation (SI units), the material shall be furnished to inch-pound units.

1.5 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.6 This specification does not apply to cast steel fittings. Austenitic stainless steel castings are covered in Specifications A 351/A 351M, A 743/A 743M, and A 744/A 744M.

2. Referenced Documents

2.1 *ASTM Standards:*³

A 351/A 351M Specification for Castings, Austenitic, for Pressure-Containing Parts

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

A 480/A 480M Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

A 743/A 743M Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application

A 744/A 744M Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

A 960/A 960M Specification for Common Requirements for Wrought Steel Piping Fittings

E 112 Test Methods for Determining Average Grain Size

E 165 Test Method for Liquid Penetrant Examination

2.2 *ASME Standards:*

ASME B16.9 Factory-Made Wrought Steel Butt-Welding Fittings⁴

ASME B16.11 Forged Steel Fittings, Socket-Welding and Threaded⁴

2.3 *MSS Standards:*

MSS SP-25 Standard Marking System for Valves, Fittings, Flanges, and Unions⁵

MSS SP-43 Standard Practice for Light Weight Stainless Steel Butt-Welding Fittings⁵

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 A01.22 on Steel Forgings and Wrought Fittings for Piping Applications and Bolting Materials for Piping and Special Purpose Applications.

Current edition approved March 1, 2006. Published March 2006. Originally approved in 1956. Last previous edition approved in 2004 as A 403/A 403M-04.

² For ASME Boiler and Pressure Vessel Code applications see related Specification SA-403 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 Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990.

⁵ Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602.



TABLE 1 Fitting Classes for WP Grades

Class	Construction	Nondestructive Examination
S	Seamless	None
W	Welded	Radiography or Ultrasonic
WX	Welded	Radiography
WU	Welded	Ultrasonic

MSS SP-79 Socket-Welding Reducer Inserts⁵

2.4 **ASME Boiler and Pressure Vessel Code:**

Section VIII Division I, Pressure Vessels⁴

Section IX, Welding Qualifications⁴

2.5 **AWS Standards:**

A 5.4 Specification for Corrosion-Resisting Chromium and Chromium-Nickel Steel Covered Welding Electrodes⁶

A 5.9 Specification for Corrosion-Resisting Chromium and Chromium-Nickel Steel Welding Rods and Bare Electrodes⁶

2.6 **ASNT:**

SNT-TC-1A (1984) Recommended Practice for Nondestructive Testing Personnel Qualification and Certification⁷

3. Common Requirements and Ordering Information

3.1 Material furnished to this specification shall conform to the requirements of Specification **A 960/A 960M** including any supplementary requirements that are indicated in the purchase order. Failure to comply with the common requirements of Specification **A 960/A 960M** constitutes nonconformance with this specification. In case of conflict between this specification and Specification **A 960/A 960M**, this specification shall prevail.

3.2 Specification **A 960/A 960M** identifies the ordering information that should be complied with when purchasing material to this specification.

4. Material

4.1 The material for fittings shall consist of forgings, bars, plates, or seamless or welded tubular products that conform to the chemical requirements in **Table 2**. See **Table 3** for a list of common names.

4.2 The steel shall be melted by one of the following processes:

4.2.1 Electric furnace (with separate degassing and refining optional),

4.2.2 Vacuum furnace, or

4.2.3 One of the former followed by vacuum or electroslag-consumable remelting.

4.3 If secondary melting is employed, the heat shall be defined as all ingots remelted from a primary heat.

5. Manufacture

5.1 **Forming**—Forging or shaping operations may be performed by hammering, pressing, piercing, extruding, upsetting,

rolling, bending, fusion welding, machining, or by a combination of two or more of these operations. The forming procedure shall be so applied that it will not produce injurious defects in the fittings.

5.2 All fittings shall be heat treated in accordance with Section 6.

5.3 Grade WP fittings ordered as Class S shall be of seamless construction and shall meet all requirements of **ASME B16.9** or **MSS SP-79**.

5.4 Grade WP fittings ordered as Class W shall meet the requirements of **ASME B16.9** and:

5.4.1 Shall have all pipe welds made by mill or the fitting manufacturer with the addition of filler metal radiographically examined throughout the entire length in accordance with the Code requirements stated in **5.5**, and,

5.4.2 Radiographic inspection is not required on single longitudinal seam welds made by the starting pipe manufacturer if made without the addition of filler metal; and

5.4.3 Radiographic inspection is not required on longitudinal seam fusion welds made by the fitting manufacturer when all of the following conditions have been met:

5.4.3.1 No addition of filler metal,

5.4.3.2 Only one welding pass per weld seam, and,

5.4.3.3 Fusion welding from one side only.

5.4.4 In place of radiographic examination, welds made by the fitting manufacturer may be ultrasonically examined in accordance with the Code requirements stated in **5.6**.

5.5 Grade WP fittings ordered as Class WX shall meet the requirements of **ASME B16.9** and shall have all welds, whether made by the fitting manufacturer or the starting material manufacturer, radiographically examined throughout their entire length in accordance with Paragraph UW-51 of **Section VIII, Division I, of the ASME Boiler and Pressure Vessel Code**.

5.6 Grade WP fittings ordered as Class WU shall meet the requirements of **ASME B16.9** and shall have all welds, whether made by the fitting manufacturer or the starting material manufacturer, ultrasonically examined throughout their entire length in accordance with Appendix 12 of **Section VIII, Division 1 of ASME Boiler and Pressure Vessel Code**.

5.7 The radiography or ultrasonic examination of welds for this class of fittings may be done at the option of the manufacturer, either prior to or after forming.

5.8 Personnel performing NDE examinations shall be qualified in accordance with **SNT-TC-1A**.

5.9 Grade CR fittings shall meet the requirements of **MSS SP-43** and do not require nondestructive examination.

5.10 All fittings shall have the welders, welding operators, and welding procedures qualified under the provisions of **Section IX of the ASME Boiler and Pressure Vessel Code** except that starting pipe welds made without the addition of filler metal do not require such qualification.

5.11 All joints welded with filler metal shall be finished in accordance with the requirements of Paragraph UW-35 (a) of **Section VIII, Division I, of the ASME Boiler and Pressure Vessel Code**.

⁶ Available from American Welding Society (AWS), 550 NW LeJeune Rd., Miami, FL 33126.

⁷ Available from American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlington Ln., Columbus, OH 43228-0518.