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Society of the Valve and Fittings Industry
Used in USDOE-NE Standards

Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service[1]

This standard is issued under the fixed designation A182/A182M; 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 forged low alloy and stainless steel piping components for use in pressure systems. Included are flanges, fittings, valves, and similar parts to specified dimensions or to dimensional standards, such as the ASME specifications that are referenced in Section 2.

1.2 For bars and products machined directly from bar (other than those directly addressed by this specification; see 6.4), refer to Specifications A479/A479M and A739 for the similar grades available in those specifications. Products made to this specification are limited to a maximum weight of 10 000 lb [4540 kg]. For larger products and products for other applications, refer to Specifications A336/A336M and A965/A965M for the similar ferritic and austenitic grades, respectively, available in those specifications.

1.3 Several grades of low alloy steels and ferritic, martensitic, austenitic, and ferritic-austenitic stainless steels are included in this specification. Selection will depend upon design and service requirements. Several of the ferritic/austenitic (duplex) grades are also found in Specification A1049/A1049M.

1.4 Supplementary requirements are provided for use when additional testing or inspection is desired. These shall apply only when specified individually by the purchaser in the order.

1.5 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.

1.6 The values stated in either SI units or inch-pound units are to be regarded separately as the standard. Within the text, the SI units are shown in brackets. 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 In addition to the referenced documents listed in Specification A961/A961M, the following list of standards apply to this specification.

2.2 *ASTM Standards:*[3]

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

A275/A275M Practice for Magnetic Particle Examination of Steel Forgings

A336/A336M Specification for Alloy Steel Forgings for Pressure and High-Temperature Parts

A388/A388M Practice for Ultrasonic Examination of Steel Forgings

A479/A479M Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels

A484/A484M Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings

A739 Specification for Steel Bars, Alloy, Hot-Wrought, for Elevated Temperature or Pressure-Containing Parts, or Both

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

A788/A788M Specification for Steel Forgings, General Requirements

A923 Test Methods for Detecting Detrimental Intermetallic

[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.

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[2] For ASME Boiler and Pressure Vessel Code applications see related Specification SA-182 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.

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

Phase in Duplex Austenitic/Ferritic Stainless Steels
A961/A961M Specification for Common Requirements for Steel Flanges, Forged Fittings, Valves, and Parts for Piping Applications
A965/A965M Specification for Steel Forgings, Austenitic, for Pressure and High Temperature Parts
A1049/A1049M Specification for Stainless Steel Forgings, Ferritic/Austenitic (Duplex), for Pressure Vessels and Related Components
A1084 Test Method for Detecting Detrimental Phases in Lean Duplex Austenitic/Ferritic Stainless Steels
E92 Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials
E112 Test Methods for Determining Average Grain Size
E165 Practice for Liquid Penetrant Examination for General Industry
E340 Practice for Macroetching Metals and Alloys

2.3 *ASME Standards:*[4]
B16.11 Forged Steel Fittings, Socket Welding, and Threaded
2.4 *ASME Boiler and Pressure Vessel Code:*[4]
Section IX
2.5 *AWS Specifications*[5]
A5.4/A5.4M Specification for Stainless Steel Electrodes for Shielded Metal Arc Welding
A5.5/A5.5M Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding
A5.9/A5.9M Specification for Bare Stainless Steel Welding Electrodes and Rods
A5.11/A5.11M Specification for Nickel and Nickel-Alloy Welding Electrodes for Shielded Metal Arc Welding
A5.14/A5.14M Specification for Nickel and Nickel-Alloy Bare Welding Electrodes and Rods
A5.23/A5.23M Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding
A5.28/A5.28M Specification for Low-Alloy Steel Electrodes for Gas Shielded Arc Welding
A5.29/A5.29M Low-Alloy Steel Electrodes for Flux Cored Arc Welding

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Specification A961/A961M.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *hardened condition, n*—for F23, the metallurgical condition achieved after normalizing and cooling to room temperature but prior to tempering.

4. Ordering Information

4.1 It is the purchaser's responsibility to specify in the purchase order information necessary to purchase the needed material. In addition to the ordering information guidelines in Specification A961/A961M, orders should include the following information:

4.1.1 Additional requirements (see 7.2.1, Table 2 footnotes, 9.3, and 19.2), and

4.1.2 Requirement, if any, that manufacturer shall submit drawings for approval showing the shape of the rough forging before machining and the exact location of test specimen material (see 9.3.1).

5. General Requirements

5.1 Product furnished to this specification shall conform to the requirements of Specification A961/A961M, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification A961/A961M constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A961/A961M, this specification shall prevail.

6. Manufacture

6.1 The low-alloy ferritic steels shall be made by the open-hearth, electric-furnace, or basic-oxygen process with the option of separate degassing and refining processes in each case.

6.2 The stainless steels shall be melted by one of the following processes: *(a)* electric-furnace (with the option of separate degassing and refining processes); *(b)* vacuum-furnace; or *(c)* one of the former followed by vacuum or electroslag-consumable remelting. Grade F XM-27Cb may be produced by electron-beam melting.

6.3 A sufficient discard shall be made to secure freedom from injurious piping and undue segregation.

6.4 The material shall be forged as close as practicable to the specified shape and size.

6.4.1 Flanges of any type, elbows, return bends, tees, and header tees shall not be machined directly from bar stock.

6.4.2 Cylindrically-shaped parts may be machined from forged or rolled solution-annealed austenitic stainless steel bar without additional hot working.

6.4.3 Cylindrically-shaped low alloy, martensitic stainless, ferritic stainless, and ferritic-austenitic stainless steel parts, NPS-4 [DN 100] and under, may be machined from forged or rolled bar, without additional hot working.

6.5 Except as provided for in 6.4, the finished product shall be a forging as defined in the Terminology section of Specification A788/A788M.

7. Heat Treatment[6]

7.1 After hot working, forgings shall be cooled to a temperature below 1000 °F [538 °C] prior to heat treating in accordance with the requirements of Table 1.

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

[5] Available from American Welding Society (AWS), 550 NW LeJeune Rd., Miami, FL 33126, http://www.aws.org.

[6] A solution annealing temperature above 1950 °F [1065 °C] may impair the resistance to intergranular corrosion after subsequent exposure to sensitizing conditions in F 321, F 321H, F 347, F 347H, F 348, and F 348H. When specified by the purchaser, a lower temperature stabilizing treatment or a second solution annealing shall be used subsequent to the initial high temperature solution anneal (see Supplementary Requirement S10).