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Endorsed by Manufacturers Standardization  
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<sup>1</sup>

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 ( $\epsilon$ ) 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<sup>2</sup> 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 or hollow bar (other than those directly addressed by this specification; see 6.4), refer to Specifications [A479/A479M](#), [A739](#), or [A511/A511M](#) for the similar grades available in those specifications.

1.3 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.

1.4 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](#).

1.5 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.

1.6 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.

1.7 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.

1.8 *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 In addition to the referenced documents listed in Specification [A961/A961M](#), the following list of standards apply to this specification.

### 2.2 ASTM Standards:<sup>3</sup>

- [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, Shapes, and Forgings](#)

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

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<sup>2</sup> For ASME Boiler and Pressure Vessel Code applications see related Specification SA-182 in Section II of that Code.

<sup>3</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.

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



- A511/A511M** Specification for Seamless Stainless Steel Mechanical Tubing and Hollow Bar
- 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 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/E165M** Practice for Liquid Penetrant Testing for General Industry
- E340** Practice for Macroetching Metals and Alloys
- 2.3 *ASME Standards*.<sup>4</sup>
- B16.11** Forged Steel Fittings, Socket Welding, and Threaded
- 2.4 *ASME Boiler and Pressure Vessel Code*.<sup>4</sup>
- Section IX**
- 2.5 *AWS Specifications*<sup>5</sup>
- 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**.

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

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

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

3.2.1 *hardened condition, n*—for F 23, 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 Except as permitted in 6.4.2 and 6.4.3, the material shall be forged as close as practicable to the specified shape and size.

6.4.1 Flanges, elbows, return bends, tees, and header tees shall not be machined directly from bar stock. Other parts whose longitudinal axis is not parallel to the longitudinal axis of the hollow bar or forged or rolled bar shall not be machined directly from bar.

6.4.2 Parts may be machined from hollow bar or forged or rolled solution-annealed austenitic stainless steel bar without additional hot working provided the longitudinal axis of the part is parallel to the longitudinal axis of the bar.

6.4.3 Low alloy, martensitic stainless, ferritic stainless, and ferritic-austenitic stainless steel parts, NPS-4 [DN 100] and under, may be machined from hollow bar or forged or rolled bar, without additional hot working provided the longitudinal axis of the part is parallel to the longitudinal axis of the bar.