



Designation: **A336/A336M – 23**

Standard Specification for Alloy Steel Forgings for Pressure and High-Temperature Parts¹

This standard is issued under the fixed designation A336/A336M; 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 specification² covers ferritic steel forgings for boilers, pressure vessels, high-temperature parts, and associated equipment.

1.2 Forgings made of steel grades listed in Specification **A335/A335M** may also be ordered under this specification. The chemical, tensile, heat treatment, and marking requirements of Specification **A335/A335M** shall apply, except the forging shall conform to the chemical requirements of Tables 1 and 2 of Specification **A335/A335M** only with respect to heat analysis. On product analysis they may deviate from these limits to the extent permitted in **Table 1** of this specification.

1.3 Supplementary Requirements S1 to S10 are provided for use when additional testing or inspection is desired. These shall apply only when specified individually by the purchaser in the order.

1.4 Unless the order specifies the applicable “M” specification designation, the material shall be furnished to the inch-pound units.

1.5 Specification A336/A336M formerly included austenitic steel forgings, which are now found in Specification **A965/A965M**.

1.6 The values stated in either SI units or inch-pound units are to be regarded separately as standard. 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.

1.7 *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

A275/A275M Practice for Magnetic Particle Examination of Steel Forgings

A335/A335M Specification for Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A788/A788M Specification for Steel Forgings, General Requirements

A965/A965M Specification for Steel Forgings, Austenitic, for Pressure and High Temperature Parts

E165/E165M Practice for Liquid Penetrant Testing for General Industry

2.2 ASME Boiler and Pressure Vessel Code:⁴

Section III Nuclear Power Plant Components

Section IX Welding and Brazing Qualifications

2.3 AWS Specifications:⁵

A5.5/A5.5M Low-Alloy Steel Electrodes for Shielded Metal Arc Welding

A5.23/A5.23M Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

A5.28/A5.28M Low-Alloy Steel Electrodes for Gas Shielded Arc Welding

A5.29/A5.29M Low-Alloy Steel Electrodes for Flux Cored Arc Welding

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 **A01.06** on Steel Forgings and Billets.

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² For ASME Boiler and Pressure Vessel Code applications, see related Specification SA-336/SA-336M 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, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁵ Available from American Welding Society (AWS), 8669 NW 36 St., #130, Miami, FL 33166-6672, <http://www.aws.org>.

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



TABLE 1 Tensile Requirements

	Ferritic Steels																			
	Grade																			
	F1	F11, Class 2	F11, Class 3	F11, Class 1	F12	F5	F5A	F9	F6	F6NM	F21, Class 3	F21, Class 1	F22, Class 3	F22, Class 1	F91, Type 1 and Type 2	F911	F92	F3V	F3VCb	F22V
Tensile strength, ksi [MPa]	70–95 [485–660]	70–95 [485–660]	75–100 [515–690]	60–85 [415–585]	70–95 [485–660]	60–85 [415–585]	80–105 [550–725]	85–110 [585–760]	85–110 [585–760]	115–140 [790–965]	75–100 [515–690]	60–85 [415–585]	75–100 [515–690]	60–85 [415–585]	90–110 [620–760]	90–120 [620–830]	90–120 [620–830]	85–110 [585–760]	85–110 [585–760]	85–110 [585–760]
Yield strength, min, ksi [MPa]	40 [275]	40 [275]	45 [310]	30 [205]	40 [275]	36 [250]	50 [345]	55 [380]	55 [380]	90 [620]	45 [310]	30 [205]	45 [310]	30 [205]	60 [415]	64 [440]	64 [440]	60 [415]	60 [415]	60 [415]
Elongation in 2 in. or 50 mm, min, %	20	20	18	20	20	20	19	20	18	15	19	20	19	20	20	20	20	18	18	18
Reduction of area, min, %	40	40	40	45	40	40	35	40	35	45	40	45	40	45	40	40	45	45	45	45