



Designation: A781/A781M – 21

# Standard Specification for Castings, Steel and Alloy, Common Requirements, for General Industrial Use<sup>1</sup>

This standard is issued under the fixed designation A781/A781M; 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.

## 1. Scope\*

1.1 This specification covers a group of requirements that are mandatory requirements of the following steel casting specifications issued by ASTM. If the product specification specifies different requirements, the product specification shall prevail.

| ASTM Designation           | Title of Specification                                                                                                |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <a href="#">A27/A27M</a>   | Steel Castings, Carbon, for General Application                                                                       |
| <a href="#">A128/A128M</a> | Steel Castings, Austenitic Manganese                                                                                  |
| <a href="#">A148/A148M</a> | Steel Castings, High Strength, for Structural Purposes                                                                |
| <a href="#">A297/A297M</a> | Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat Resistant, for General Application                       |
| <a href="#">A447/A447M</a> | Steel Castings, Chromium-Nickel-Iron Alloy (25-12 Class), for High-Temperature Service                                |
| <a href="#">A494/A494M</a> | Castings, Nickel and Nickel Alloy                                                                                     |
| <a href="#">A560/A560M</a> | Castings, Chromium-Nickel Alloy                                                                                       |
| <a href="#">A743/A743M</a> | Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application                           |
| <a href="#">A744/A744M</a> | Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service                                               |
| <a href="#">A747/A747M</a> | Steel Castings, Stainless, Precipitation Hardening                                                                    |
| <a href="#">A890/A890M</a> | Castings, Iron-Chromium-Nickel-Molybdenum Corrosion-Resistant, Duplex (Austenitic/Ferritic) for General Application   |
| <a href="#">A915/A915M</a> | Steel Castings, Carbon and Alloy, Chemical Requirements Similar to Standard Wrought Grades                            |
| <a href="#">A958/A958M</a> | Steel Castings, Carbon and Alloy, with Tensile Requirements, Chemical Requirements Similar to Standard Wrought Grades |
| <a href="#">A1002</a>      | Castings, Nickel-Aluminum Ordered Alloy                                                                               |

1.2 This specification also covers a group of supplementary requirements that may be applied to the above specifications as indicated therein. These are provided for use when additional testing or inspection is desired and apply only when specified individually by the purchaser in the order.

1.3 The requirements of the individual material specification and this general specification shall prevail in the sequence named.

<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 A01.18 on Castings.

Current edition approved May 1, 2021. Published May 2021. Originally approved in 1980. Last previous edition approved in 2020 as A781/A781M – 20a. DOI: 10.1520/A0781\_A0781M-21.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. 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 nonconformance with the standard.

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:<sup>2</sup>

- [A27/A27M](#) Specification for Steel Castings, Carbon, for General Application
- [A128/A128M](#) Specification for Steel Castings, Austenitic Manganese
- [A148/A148M](#) Specification for Steel Castings, High Strength, for Structural Purposes
- [A297/A297M](#) Specification for Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat Resistant, for General Application
- [A370](#) Test Methods and Definitions for Mechanical Testing of Steel Products
- [A380/A380M](#) Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
- [A447/A447M](#) Specification for Steel Castings, Chromium-Nickel-Iron Alloy (25-12 Class), for High-Temperature Service
- [A488/A488M](#) Practice for Steel Castings, Welding, Qualifications of Procedures and Personnel
- [A494/A494M](#) Specification for Castings, Nickel and Nickel Alloy
- [A560/A560M](#) Specification for Castings, Chromium-Nickel Alloy

<sup>2</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



**A609/A609M** Practice for Castings, Carbon, Low-Alloy, and Martensitic Stainless Steel, Ultrasonic Examination Thereof

**A743/A743M** Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application

**A744/A744M** Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service

**A747/A747M** Specification for Steel Castings, Stainless, Precipitation Hardening

**A751** Test Methods and Practices for Chemical Analysis of Steel Products

**A800/A800M** Practice for Estimating Ferrite Content of Stainless Steel Castings Containing Both Ferrite and Austenite

**A802/A802M** Practice for Steel Castings, Surface Acceptance Standards, Visual Examination

**A890/A890M** Specification for Castings, Iron-Chromium-Nickel-Molybdenum Corrosion-Resistant, Duplex (Austenitic/Ferritic) for General Application

**A915/A915M** Specification for Steel Castings, Carbon, and Alloy, Chemical Requirements Similar to Standard Wrought Grades

**A941** Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys

**A958/A958M** Specification for Steel Castings, Carbon and Alloy, with Tensile Requirements, Chemical Requirements Similar to Standard Wrought Grades

**A967/A967M** Specification for Chemical Passivation Treatments for Stainless Steel Parts

**A991/A991M** Test Method for Conducting Temperature Uniformity Surveys of Furnaces Used to Heat Treat Steel Products

**A1002** Specification for Castings, Nickel-Aluminum Ordered Alloy

**A1058** Test Methods for Mechanical Testing of Steel Products—Metric

**A1067/A1067M** Specification for Test Coupons for Steel Castings

**A1080/A1080M** Practice for Hot Isostatic Pressing of Steel, Stainless Steel, and Related Alloy Castings

**E29** Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

**E94/E94M** Guide for Radiographic Examination Using Industrial Radiographic Film

**E125** Reference Photographs for Magnetic Particle Indications on Ferrous Castings

**E165/E165M** Practice for Liquid Penetrant Testing for General Industry

**E186** Reference Radiographs for Heavy-Walled (2 to 4½ in. (50.8 to 114 mm)) Steel Castings

**E280** Reference Radiographs for Heavy-Walled (4½ to 12 in. (114 to 305 mm)) Steel Castings

**E340** Practice for Macroetching Metals and Alloys

**E353** Test Methods for Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

**E354** Test Methods for Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys

**E446** Reference Radiographs for Steel Castings Up to 2 in. (50.8 mm) in Thickness

**E709** Guide for Magnetic Particle Testing

2.2 *SAE Standard*:<sup>3</sup>

**AMS 2750** Pyrometry

### **3. Terminology**

#### **3.1 Definitions:**

3.1.1 The definitions in Test Methods and Definitions **A370**, Test Methods, Practices, and Terminology **A751**, Terminology **A941**, and Test Methods **A1058** are applicable to this specification and to those listed in **1.1**.

3.1.2 *test coupon, n*—the part from which the test specimen will be extracted.

3.1.3 *test specimen, n*—the part that will be acted upon in a test.

### **4. Materials and Manufacture**

4.1 *Melting Process*—The steel shall be made by open-hearth or electric furnace process with or without separate refining, such as argon-oxygen-decarburization (AOD), unless otherwise specified in the individual specification.

#### **4.2 Heat Treatment:**

4.2.1 Castings shall be heat treated in the working zone of a furnace that has been surveyed in accordance with Test Method **A991/A991M** or **AMS 2750**.

4.2.2 When using furnaces surveyed in accordance with Test Method **A991/A991M**, the following requirements apply for heat treatments above 2000 °F [1100 °C]. When castings are heat treated at temperatures above 2000 °F [1100 °C], then the working zone shall have been established by a survey performed at not more than 25 °F [15 °C] below nor more than 200 °F [110 °C] above the minimum heat treatment temperature specified for the grade. If a minimum heat treatment temperature is not specified for the grade, then the survey temperature shall be not more than 50 °F [30 °C] below nor more than 175 °F [100 °C] above the furnace set point used.

4.2.3 When using furnaces surveyed in accordance with **AMS 2750**, there are no additional requirements beyond those stated in **AMS 2750**.

4.2.4 The maximum variation in measured temperature, as determined by the difference between the highest temperature and the lowest temperature, shall be as agreed between the purchaser and producer, except that during production heat treatment no portion of the furnace shall be below the minimum specified temperature nor above the maximum specified temperature for the grade being processed.

### **5. Chemical Composition**

5.1 *Chemical Analysis*—Chemical analysis of materials covered by this specification shall be in accordance with Test Methods, Practices, and Terminology **A751**.

<sup>3</sup> Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, <http://www.sae.org>.