



Standard Specification for Centrifugally Cast Austenitic Steel Pipe for High- Temperature Service¹

This standard is issued under the fixed designation A 451/A 451M; 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 specification² covers austenitic alloy steel pipe for use in high-temperature, corrosive, or nuclear pressure service.

1.2 Several grades of austenitic stainless steel are covered as indicated in Table 1.

1.3 Optional supplementary requirements are provided when additional testing may be required.

1.4 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 exactly equivalents; therefore, each system must be used independently of each other. Combining values from the two systems may result in nonconformance with the specification.

NOTE 1—This specification is not intended to cover centrifugal pipe made from alloys containing more than 0.20 % carbon, such as are covered by Specification A 297.

2. Referenced Documents

2.1 ASTM Standards:

A 297 Specification for Steel Castings, Iron-Chromium and Iron-Chromium-Nickel, Heat Resistant, for General Application³

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products⁴

A 530/A530M Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe⁵

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance With Specifications⁶

E 94 Guide for Radiographic Examination⁷

E 165 Test Method for Liquid Penetrant Examination⁷

E 186 Reference Radiographs for Heavy-Walled (2 to 4½-in. [51 to 114-mm]) Steel Castings⁷

E 280 Reference Radiographs for Heavy-Walled (4½ to 12-in. [114 to 305-mm]) Steel Castings⁷

E 446 Reference Radiographs for Steel Castings up to 2 in. [51 mm] in Thickness⁷

2.2 ANSI Standard:

B46.1 Surface Texture⁸

3. Ordering Information

3.1 Orders for material to this specification shall include the following, as required, to describe the desired material adequately:

3.1.1 Quantity (feet, metres, or number of lengths),

3.1.2 Name of material (centrifugally cast pipe),

3.1.3 Grade (Table 1),

3.1.4 Size (outside or inside diameter and minimum wall thickness in inches or millimetres),

3.1.5 Length (specific or random, Specification A 530/A 530M),

3.1.6 End Finish of Specification A 530/A 530M,

3.1.7 Optional Requirements (9.4 and Supplementary Requirements S1 through S7),

3.1.8 Test Report Required (Section 14), and

3.1.9 Special Requirements or Additions to Specification.

4. Materials and Manufacture

4.1 *Heat-Treatment*—The pipe shall receive a heat-treatment at the temperature and time specified in Table 2, followed by a quench in water or rapid cool by other means.

4.2 *Machining*—The pipe shall be machined on the inner and outer surfaces to a roughness value no greater than 250-μin. [6.35-μm] arithmetical average deviation (AA) from the mean line, as defined in American National Standard B46.1.

5. Chemical Analysis

5.1 *Heat Analysis*—An analysis of each heat shall be made by the manufacturer to determine the percentages of elements specified in Table 1. The analysis shall be made on a test

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 A01.18 on Castings.

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² For ASME Boiler and Pressure Vessel Code applications see related specification SA-451 in Section II of that Code.

³ *Annual Book of ASTM Standards*, Vol 01.02.

⁴ *Annual Book of ASTM Standards*, Vol 01.03.

⁵ *Annual Book of ASTM Standards*, Vol 01.01.

⁶ *Annual Book of ASTM Standards*, Vol 14.02.

⁷ *Annual Book of ASTM Standards*, Vol 03.03.

⁸ Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

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