



Standard Specification for General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes¹

This standard is issued under the fixed designation A 1016/A 1016M; 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 a group of requirements that, unless otherwise specified in an individual specification, shall apply to the ASTM product specifications noted below.

Title of Specification	ASTM Designation ^A
Seamless Carbon-Molybdenum Alloy-Steel Boiler and Superheater Tubes	A 209/A 209M
Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes	A 213/A 213M
Welded Austenitic Steel Boiler, Superheater, Heat-Exchanger, and Condenser Tubes	A 249/A 249M
Electric-Resistance-Welded Ferritic Alloy-Steel Boiler and Superheater Tubes	A 250/A 250M
Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service	A 268/A 268M
Seamless and Welded Austenitic Stainless Steel Tubing for General Service	A 269
Seamless and Welded Austenitic Stainless Steel Sanitary Tubing	A 270
Seamless and Welded Carbon and Alloy-Steel Tubes for Low-Temperature Service	A 334/A 334M
Seamless and Electric-Welded Low-Alloy Steel Tubes	A 423/A 423M
Welded Austenitic Stainless Steel Feedwater Heater Tubes	A 688/A 688M
Austenitic Stainless Steel Tubing for Breeder Reactor Core Components	A 771
Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service	A 789/A 789M
Welded Ferritic Stainless Steel Feedwater Heater Tubes	A 803/A 803M
Austenitic and Ferritic Stainless Steel Duct Tubes for Breeder Reactor Core Components	A 826
High-Frequency Induction Welded, Unannealed Austenitic Steel Condenser Tubes	A 851

^A These designations refer to the latest issue of the respective specifications.

1.2 In the case of conflict between a requirement of a product specification and a requirement of this general requirements specification, the product specification shall prevail. In the case of conflict between a requirement of the product specification or a requirement of this general requirements specification and a more stringent requirement of the purchase order, the purchase order shall prevail.

1.3 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 exact equivalents; therefore, each System must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification. The inch-pound units shall apply unless the “M” designation (SI) of the product specification is specified in the order.

2. Referenced Documents

2.1 ASTM Standards:

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products³

A 530/A 530M Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe³

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment⁴

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products³

A 941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys³

D 3951 Practice for Commercial Packaging⁵

E 92 Test Method for Vickers Hardness of Metallic Materials⁶

E 213 Practice for Ultrasonic Examination of Metal Pipe and Tubing⁷

E 273 Practice for Ultrasonic Examination of Longitudinal Welded Pipe and Tubing⁷

E 309 Practice for Eddy-Current Examination of Steel Tubular Products Using Magnetic Saturation⁷

E 426 Practice for Electromagnetic (Eddy-Current) Testing of Seamless and Welded Tubular Products, Austenitic Stainless Steel and Similar Alloys⁷

E 570 Practice for Flux Leakage Examination of Ferromagnetic Steel Tubular Products⁷

2.2 ASME Boiler and Pressure Vessel Code: Section IX, Welding Qualifications⁸

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 A01.10 on Stainless and Alloy Steel Tubular Products.

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² For ASME Boiler and Pressure Vessel Code applications see related Specification SA XXX in Section II of that Code.

³ Annual Book of ASTM Standards, Vol 01.01.

⁴ Annual Book of ASTM Standards, Vol 01.05.

⁵ Annual Book of ASTM Standards, Vol 15.09.

⁶ Annual Book of ASTM Standards, Vol 03.01.

⁷ Annual Book of ASTM Standards, Vol 03.03.

⁸ Available from the American Society of Mechanical Engineers, 345 E. 47th St., New York, NY 10017.

2.3 Federal Standard:

Fed. Std. No. 183 Continuous Identification Marking of Iron and Steel Products⁹

2.4 Military Standards:

MIL-STD-271 Nondestructive Testing Requirements for Metals⁹

MIL-STD-163 Steel Mill Products Preparation for Shipment and Storage⁹

MIL-STD-792 Identification Marking Requirements for Special Purpose Equipment⁹

2.5 Steel Structures Painting Council:

SSPC-SP6 Surface Preparation Specification No.6 Commercial Blast Cleaning¹⁰

2.6 Other Documents:

SNT-TC-1A Recommended Practice for Nondestructive Personnel Qualification and Certification¹¹

AIAG Bar Code Symbology Standard¹²

3. Terminology

3.1 Definitions:

3.1.1 The definitions in A 370, A 751, and A 941 are applicable to this specification and to those listed in 1.1.

3.1.2 *heat, n*—in secondary melting, all of the ingots remelted from a single primary heat.

3.1.3 *imperfection, n*—any discontinuity or irregularity found in a tube.

4. Manufacture

4.1 The steel shall be made by any process.

4.2 The primary melting is permitted to incorporate separate degassing or refining and is permitted to be followed by secondary melting, such as electroslag remelting or vacuum-arc remelting.

4.3 When steel of different grades is sequentially strand cast, the resultant transition material shall be removed using an established procedure that positively separates the grades.

5. Ordering Information

5.1 It is the responsibility of the purchaser to specify all requirements that are necessary for product ordered under the product specification. Such requirements to be considered include, but are not limited to, the following:

5.1.1 Quantity (feet, metres, or number of pieces),

5.1.2 Name of material (stainless steel tubing),

5.1.3 Method of manufacture, when applicable (seamless or welded),

5.1.4 Grade or UNS number,

5.1.5 Size (outside diameter and average or minimum wall thickness),

5.1.6 Length (specific or random),

5.1.7 End finish if required,

5.1.8 Optional requirements,

5.1.9 Specific type of melting, if required,

5.1.10 Test report requirements,

5.1.11 Specification designation and year of issue, and

5.1.12 Special requirements or any supplementary requirements, or both.

6. Chemical Composition

6.1 *Chemical Analysis*—Samples for chemical analysis, and method of analysis, shall be in accordance with Test Methods, Practices, and Terminology A 751.

6.2 *Heat Analysis*—An analysis of each heat of steel shall be made by the steel manufacturer to determine the percentages of the elements specified. If secondary melting processes are employed, the heat analysis shall be obtained from one remelted ingot or the product of one remelted ingot of each primary melt. The chemical composition thus determined, or that determined from a product analysis made by the tubular product manufacturer, shall conform to the requirements specified in the product specification.

6.3 *Product Analysis*—Product analysis requirements and options, if any, shall be as contained in the product specification.

7. Tensile Properties

7.1 The material shall conform to the tensile property requirements prescribed in the individual product specification.

7.2 The yield strength, when specified, shall be determined corresponding to a permanent offset of 0.2 % of the gage length or to a total extension of 0.5 % of the gage length under load.

7.3 If the percentage of elongation of any test specimen is less than that specified and any part of the fracture is more than 3/4 in. [19.0 mm] from the center of the gage length, as indicated by scribe marks on the specimen before testing, a retest shall be allowed.

8. Standard Mass per Unit Length

8.1 The calculated mass per foot, based upon a specified minimum wall thickness, shall be determined by the following equation (see Note 1):

$$W = C(D-t)t \quad (1)$$

where:

C = 10.69 [0.0246615],

W = mass per unit length, lb/ft [kg/m],

D = specified outside diameter, in. [mm], and

t = specified minimum wall thickness, in. [mm].

NOTE 1—The calculated masses given by Eq 1 are based on the masses for carbon steel tubing. The mass of tubing made of ferritic stainless steels may be up to about 5 % less, and that made of austenitic stainless steel up to about 2 % greater than the values given. Mass of ferritic/austenitic (duplex) stainless steel will be intermediate to the mass of fully austenitic and fully ferritic stainless steel tubing.

8.2 The permitted variations from the calculated mass per foot [kilogram per meter] shall be as prescribed in Table 1.

9. Permitted Variations in Wall Thickness

9.1 Variations from the specified minimum wall thickness shall not exceed the amounts prescribed in Table 2.

⁹ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

¹⁰ Available from Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh, PA 15213.

¹¹ Available from American Society for Nondestructive Testing, 1711 Arlington Plaza, Columbus, OH 43228.

¹² Available from Automotive Industry Action Group, 26200 Lahser, Suite 200, Southfield, MI 48034.