



Designation: A450/A450M – 23

# Standard Specification for General Requirements for Carbon and Low Alloy Steel Tubes<sup>1</sup>

This standard is issued under the fixed designation A450/A450M; 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 specification<sup>2</sup> covers a group of requirements which, with the exceptions of 6.3 and Sections 7, 8, 19, 20, 21, 22, 23, 24, and 25, are mandatory requirements to the following ASTM tubular product specifications:<sup>3</sup>

| Title of Specification                                                                     | ASTM Designation <sup>4</sup> |
|--------------------------------------------------------------------------------------------|-------------------------------|
| Electric-Resistance-Welded Carbon Steel and Carbon-Manganese Steel Boiler Tubes            | A178/A178M                    |
| Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes                    | A179/A179M                    |
| Seamless Carbon Steel Boiler Tubes for High-Pressure Service                               | A192/A192M                    |
| Seamless Medium-Carbon Steel Boiler and Superheater Tubes                                  | A210/A210M                    |
| Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes                 | A214/A214M                    |
| Seamless and Electric-Welded Low-Alloy Steel Tubes                                         | A423/A423M                    |
| Specification for Seamless and Welded Carbon Steel Heat-Exchanger Tubes with Integral Fins | A498/A498M                    |
| Seamless Cold-Drawn Carbon Steel Feedwater Heater Tubes                                    | A556/A556M                    |
| Seamless, Cold-Drawn Carbon Steel Tubing for Hydraulic System Service                      | A822/A822M                    |

<sup>4</sup> These designations refer to the latest issue of the respective specifications.

1.2 One or more of Sections 6.3, 7, 8, 19, 20, 21, 22, 22.1, 24, and 25 apply when the product specification or purchase order has a requirement for the test or analysis described by these sections.

1.3 In case of conflict between a requirement of the product specification and a requirement of this general requirement specification only the requirement of the product specification need be satisfied.

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

<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 A01.09 on Carbon Steel Tubular Products.

Current edition approved Nov. 1, 2023. Published November 2023. Originally approved in 1961. Last previous edition approved in 2021 as A450/A450M – 21. DOI: 10.1520/A0450\_A0450M-23.

<sup>2</sup> For ASME Boiler and Pressure Vessel Code applications see related Specification SA-450 in Section II of that Code.

<sup>3</sup> Annual Book of ASTM Standards, Vols 01.01 and 01.04.

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. The inch-pound units shall apply unless the “M” designation (SI) of the product specification is specified in the order.

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>4</sup>

- A178/A178M Specification for Electric-Resistance-Welded Carbon Steel and Carbon-Manganese Steel Boiler and Superheater Tubes
- A179/A179M Specification for Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes
- A192/A192M Specification for Seamless Carbon Steel Boiler Tubes for High-Pressure Service
- A210/A210M Specification for Seamless Medium-Carbon Steel Boiler and Superheater Tubes
- A214/A214M Specification for Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes
- A370 Test Methods and Definitions for Mechanical Testing of Steel Products
- A423/A423M Specification for Seamless and Electric-Welded Low-Alloy Steel Tubes
- A498/A498M Specification for Seamless and Welded Carbon Steel Heat-Exchanger Tubes with Integral Fins
- A530/A530M Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe
- A556/A556M Specification for Seamless Cold-Drawn Carbon Steel Feedwater Heater Tubes

<sup>4</sup> 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.

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

- A700** Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment
- A751** Test Methods and Practices for Chemical Analysis of Steel Products
- A822/A822M** Specification for Seamless Cold-Drawn Carbon Steel Tubing for Hydraulic System Service
- A941** Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys
- A1047/A1047M** Test Method for Pneumatic Leak Testing of Tubing
- A1058** Test Methods for Mechanical Testing of Steel Products—Metric
- D3951** Practice for Commercial Packaging
- E92** Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials
- E213** Practice for Ultrasonic Testing of Metal Pipe and Tubing
- E273** Practice for Ultrasonic Testing of the Weld Zone of Welded Pipe and Tubing
- E309** Practice for Eddy Current Examination of Steel Tubular Products Using Magnetic Saturation
- E426** Practice for Electromagnetic (Eddy Current) Examination of Seamless and Welded Tubular Products, Titanium, Austenitic Stainless Steel and Similar Alloys
- E570** Practice for Flux Leakage Examination of Ferromagnetic Steel Tubular Products
- 2.2 *SAE Aerospace Material Specifications:*
- SAE-AMS2806** Identification Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat-Resistant Steels and Alloys<sup>5</sup>
- 2.3 *Military Standards:*
- MIL-STD-792** Identification Marking Requirements for Special Purpose Equipment<sup>6</sup>
- NAVSEA T9074-AS-GIB-010/271** Requirements for Non-destructive Testing Methods<sup>7</sup>
- 2.4 *ASME Boiler and Pressure Vessel Code:*
- Section IX**<sup>8</sup>
- 2.5 *Steel Structures Painting Council:*
- SSPC-SP 6** Surface Preparation Specification No. 6 Commercial Blast Cleaning<sup>9</sup>
- 2.6 *Other Document:*
- SNT-TC-1A** Recommended Practice for Nondestructive Personnel Qualification and Certification.

### 3. Terminology

3.1 *Definitions of Terms*—For definitions of terms used in this standard that are not included in 3.2, refer to:

3.1.1 Terminology **A941** for general steel terminology,

3.1.2 Test Methods and Definitions **A370** or Test Methods **A1058** for mechanical testing of steel products terminology, and

3.1.3 Test Methods and Practices **A751** for chemical analysis of steel products terminology.

3.2 *Definitions of Terms Specific to This Standard:*

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

3.2.2 *thin-wall tube*—a tube meeting the specified outside diameter and specified wall thickness set forth as follows:

| Specified Outside Diameter   | Specified Wall Thickness                  |
|------------------------------|-------------------------------------------|
| 2 in. [50.8 mm] or less      | 2 % or less of specified outside diameter |
| Greater than 2 in. [50.8 mm] | 3 % or less of specified outside diameter |
| Any                          | 0.020 in. [0.5 mm] or less                |

### 4. Ordering Information

4.1 It is the purchaser's responsibility to specify in the purchase order all ordering information necessary to purchase the needed material. Examples of such information include, but are not limited to, the following:

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

4.1.2 Specification number with grade or class, or both, as applicable and year date,

4.1.3 Manufacture (hot-finished or cold-finished),

4.1.4 Size (outside diameter and minimum wall thickness),

4.1.5 Length (specific or random),

4.1.6 Choice of testing track from the options listed in Test Methods **A1058** when material is ordered to an M suffix (SI units) product standard. If the choice of test track is not specified in the order, then the default ASTM test track shall be used as noted in Test Methods **A1058**.

4.1.7 Supplementary Requirements, and

4.1.8 Additional requirements.

### 5. Process

5.1 The steel may be made by any process.

5.2 If a specific type of melting is required by the purchaser, it shall be as stated on the purchase order.

5.3 The primary melting may incorporate separate degassing or refining and may be followed by secondary melting, such as electroslag remelting or vacuum-arc remelting.

5.4 Steel may be cast in ingots or may be strand cast. When steel of different grades is sequentially strand cast, identification of the resultant transition material is required. The producer shall remove the transition material by an established procedure that positively separates the grades.

### 6. Chemical Composition

6.1 Samples for chemical analysis, and method of analysis shall be in accordance with Test Methods and Practices **A751**.

6.2 *Heat Analysis*—If the heat analysis reported by the steel producer is not sufficiently complete for conformance with the heat analysis requirements of the applicable product specification to be fully assessed, the manufacturer may complete the assessment of conformance with such heat analysis requirements by using a product analysis for the specified elements

<sup>5</sup> Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, <http://www.sae.org>.

<sup>6</sup> Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.

<sup>7</sup> Available from Naval Inventory Control Point, Code 1 Support Branch, 700 Robbins Ave., Philadelphia, PA 19111-5094.

<sup>8</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>9</sup> Available from Society for Protective Coatings (SSPC), 40 24th St., 6th Floor, Pittsburgh, PA 15222-4656, <http://www.sspc.org>.