



Designation: ~~A423/A423M – 09 (Reapproved 2014)~~ A423/A423M – 19

Standard Specification for Seamless and Electric-Welded Low-Alloy Steel Tubes¹

This standard is issued under the fixed designation A423/A423M; 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~~ Scope*

1.1 This specification² covers minimum-wall-thickness, ~~seamless and electric-resistance welded~~, low-alloy steel tubes for pressure containing parts such as economizers or other applications where corrosion resistance is important.

1.2 The tubing sizes and thicknesses usually furnished to this specification are ½ to 5 in. [12.7 to 127 mm] in outside diameter and 0.035 to 0.500 in. [0.9 to 12.7 mm] inclusive, in minimum wall thickness. Tubing having other dimensions may be furnished, provided such tubes comply with all other requirements of this specification.

1.3 Mechanical property requirements do not apply to tubing smaller than ¼ in. [3.2 mm] in inside diameter or 0.015 in. [0.4 mm] in thickness.

1.4 This specification covers three grades, two types, and two manufacture finishes:

1.4.1 Grades 1, 2, and 3 are identified in **Table 1** (Chemical Requirements), and **Table 3** (Tensile Requirements),

1.4.2 Type (seamless or electric-resistance welded),

1.4.3 Manufacture (hot finished or cold finished).

1.5 ~~An optional supplementary requirement is~~ Optional supplementary requirements S1 and S2 are provided and, when desired, shall be so stated in the order.

1.6 The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the 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 of this specification is specified in the order.

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

[A450/A450M Specification for General Requirements for Carbon and Low Alloy Steel Tubes](#)

[E213 Practice for Ultrasonic Testing of Metal Pipe and Tubing](#)

[E273 Practice for Ultrasonic Testing of the Weld Zone of Welded Pipe and Tubing](#)

3. Ordering Information

3.1 Orders for material under 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~~ Type of material (seamless or electric-resistance-welded tubes),

3.1.3 Grade 1, 2, or 3 (**Table 1** and **Table 3**),

3.1.4 Manufacture (hot finished or cold finished),

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 A01.09 on Carbon Steel Tubular Products.

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² For ASME Boiler and Pressure Vessel Code applications see related Specification SA-423 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.

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



TABLE 1 Chemical Requirements

	Composition, %		
	Grade 1	Grade 2	Grade 3
Carbon, max	0.15	0.15	0.06
Manganese	0.55 max	0.50–1.00	0.70–1.40
Phosphorus	0.06–0.16	0.04 max	0.020 max
Sulfur, max	0.060	0.05	0.020
Silicon	0.10 min	...	0.55 max
Copper	0.20–0.60	0.30–1.00	0.25–0.45
Chromium	0.24–1.31
Nickel	0.20–0.70	0.40–1.10	0.50 max
Molybdenum	...	0.10 min	0.20 max
Antimony	0.05–0.15

TABLE 3 Tensile Requirements

	Grades 1 and	Grade 3
	2	
Tensile strength, min, ksi [MPa]	60 [415]	55 [380]
Yield strength, min, ksi [MPa]	37 [255]	33 [230]
Elongation in 2 in. or 50 mm, min, %	25	35
For longitudinal strip tests a deduction for each 1/32 in. [0.8 mm] decrease in wall thickness below 5/16 in. [8 mm] from the basic minimum elongation of the following percentage points shall be made	1.25 ^A	1.25 ^A

^A Calculated elongation requirements shall be rounded to the nearest whole number.

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3.1.5 Size (outside diameter and minimum wall thickness),

3.1.6 Length (specific or random),

3.1.7 ~~Optional requirements~~ Required test options (hydrostatic or electric test, 11.7+3.7),

3.1.8 Test report required (see Certification Section of Specification A450/A450M),

3.1.9 Specification designation, designation (including year of issue), and

3.1.10 Special requirements and any supplementary requirements selected.

4. Manufacture

4.1 Tubes made by the seamless process may be hot finished or cold finished.

5. Heat Treatment

5.1 All tubes shall be normalized or given such heat treatment as may be necessary to conform to the requirements of this specification.

6. Chemical Composition

6.1 The steel shall conform to the requirements as to chemical composition prescribed in Table 1.

7. Product Analysis

7.1 An analysis of either one billet, one length of flat-rolled stock or one tube shall be made from each heat. The chemical composition thus determined shall conform to the requirements specified.

7.2 If the original test for product analysis fails, retests of two additional billets, lengths of flat-rolled stock, or tubes shall be made. Both retests, for the elements in question shall meet the requirements of the specification; otherwise all remaining material in the heat or lot (Note 1) shall be rejected or, at the option of the producer, each billet, length of flat-rolled stock or tube may be individually tested for acceptance. Billets, lengths of flat-rolled stock or tubes which do not meet the requirements of the specification shall be rejected.

NOTE 1—For flattening, flaring, and flange requirements, the term *lot* applies to all tubes prior to cutting of the same nominal size and wall thickness that are produced from the same heat of steel. When final heat treatment is in a batch-type furnace, a lot shall include only those tubes of the same size and from the same heat which are heat treated in the same furnace charge. When the final heat treatment is in a continuous furnace the number of tubes of the same size and from the same heat in a lot shall be determined from the size of the tubes as prescribed in Table 2.