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## Standard Specification for Seamless and Electric-Welded Low-Alloy Steel Tubes<sup>1</sup>

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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope

~~1.1 This specification\*~~

1.1 This specification<sup>2</sup> 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 An optional supplementary requirement is provided and, when desired, shall be so stated in the order.

1.5 The values stated in either ~~inch-pound~~SI units or ~~SI~~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 ~~are~~may not be exact equivalents; therefore, each system ~~must~~shall be used independently of the other. Combining values from the two systems may result in non-conformance with the ~~specification standard~~. The inch-pound units shall apply unless the “M” designation of this specification is specified in the order.

### 2. Referenced Documents

2.1 *ASTM Standards*:<sup>3</sup>

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 Examination 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 of material (seamless or electric-resistance-welded tubes),

3.1.3 Grade (Table 1),

3.1.4 Manufacture (hot finished or cold finished),

3.1.5 Size (outside diameter and minimum wall thickness),

3.1.6 Length (specific or random),

3.1.7 Optional requirements (hydrostatic or electric test, 13.7),

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

3.1.9 Specification designation, 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.

<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.

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<sup>2</sup> For ASME Boiler and Pressure Vessel Code applications see related Specification SA-423 in Section II of that Code.

<sup>3</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.

**TABLE 1 Chemical Requirements**

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

## 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.

NOTE 2—For tensile and hardness test requirements, the term *lot* applies to all tubes prior to cutting, of the same nominal diameter 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 the same heat which are heat treated in the same furnace charge. When the final heat treatment is in a continuous furnace, a lot shall include all tubes of the same size and heat, heat treated in the same furnace at the same temperature, time at heat, and furnace speed.

## 8. Tensile Requirements

8.1 The material shall conform to the requirements as to tensile properties prescribed in Table 3.

**TABLE 2 Number of Tubes in a Lot Heat Treated by the Continuous Process**

Size of Tube	Size of Lot
2 in. [50.8 mm] and over in outside diameter and 0.200 in. [5.1 mm] and over in wall thickness	not more than 50 tubes
Less than 2 in. [50.8 mm] but over 1 in. [25.4 mm] in outside diameter or over 1 in. [25.4 mm] in outside diameter and under 0.200 in. [5.1 mm] in wall thickness	not more than 75 tubes
1 in. [25.4 mm] or less in outside diameter	not more than 125 tubes