Designation: A 498 – 06

Standard Specification for Seamless and Welded Carbon Steel Heat-Exchanger Tubes with Integral Fins[1]

This standard is issued under the fixed designation A 498; 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 specification covers external helical, integral finned, seamless or welded low-carbon steel tubes for use in tubular heat exchangers, surface condensers, evaporators, superheaters, and similar heat-transfer apparatus in unfinned end diameters up to 2 in. (50.8 mm), inclusive.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 179/A 179M Specification for Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes

A 214/A 214M Specification for Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes

A 334/A 334M Specification for Seamless and Welded Carbon and Alloy-Steel Tubes for Low-Temperature Service

3. Ordering Information

3.1 The purchaser shall specify in the order the plain-tube specification and the alloy from which the finned tube is to be manufactured.

3.2 The purchaser shall specify in the order the diameter, wall thickness, and length of unfinned sections; root diameter and wall thickness of the finned section; number of fins per unit length; and the total tube length.

4. Material and Manufacture

4.1 The finned tubes shall be manufactured from plain tubes that conform to one of the following Specifications: A 179/A 179M, A 214/A 214M, or A 334/A 334M.

4.2 Any tests that are required in the plain-tube specifications that are performed on unfinned lengths of tube in accordance with this specification need not be performed on the plain tube.

4.3 The fins shall be produced by the cold forming of steel prime-surface tube. To comply with this specification, the fin and tube material must be homogeneous.

4.4 Finned tubes shall normally be furnished with unfinned ends, but may be furnished with finned ends if specified.

5. Heat Treatment

5.1 The tube after finning shall be supplied in either the *annealed* or *as-fabricated* condition, one of which shall be specified on the purchaser order.

5.2 The annealed condition is defined as having both the finned and unfinned portions of the tube conforming to the applicable heat-treatment requirements of the governing ASTM specification for the steel tube analysis involved.

5.3 The as-fabricated condition is defined as having the finned portions of the tube in the *as-finned* or cold-worked condition produced by the finning operation and the unfinned or plain tube portions of the finned tube in the as-fabricated condition suitable for rolling-in operations.

6. Chemical Composition

6.1 The steel shall conform to the chemical requirements prescribed in the governing plain-tube specification.

7. Tensile Requirements

7.1 The tube prior to the finning operation, or unfinned portions of the finned tube, shall conform to the requirements for tensile properties prescribed in the governing plain-tube specification.

[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 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.**

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8. Pressure Test

8.1 Each tube after finning shall be subjected to an internal air pressure of 250 psi (1.72 MPa) minimum for 5 s without showing evidence of leakage. Any evidence of leakage shall be cause for rejection. The test method used shall permit easy visual detection of any leakage, such as testing the tube under water or by the pressure differential method.[3]

9. Dimensions and Permissible Variations

9.1 *Diameter*—The outside diameter of the unfinned sections shall not exceed the diameter tolerances as specified in the governing prime-surface tube specification (see Fig. 1).

9.2 *Wall Thickness*—No tube at its thinnest point beneath the fins or in the plain section shall be less than the minimum thickness specified.

9.3 *Length*—The length of the tubes shall not be less than that specified when measured at a temperature of 68 °F (20 °C), but may exceed the specified value by the amounts given in Table 1.

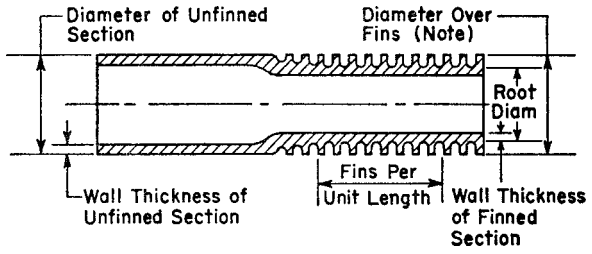
TABLE 1 Tolerances for Specified Length of Tubes

Specified Length, ft (m)	Tolerance, in. (mm)
Up to 24 (7.3), incl	+⅛ (3.2)
Over 24 to 34 (7.3 to 10.4), incl	+¼ (6.4)
Over 34 to 44 (10.4 to 13.4), incl	+⅜ (9.5)
Over 44 (13.4)	+½ (12.7) max

10. Workmanship and Finish

10.1 Finished tubes shall be reasonably straight and have smooth ends free from burrs. They shall be free from injurious defects and shall have a workmanlike finish. A slight amount of oxidation will not be considered as scale.

[3] The pressure differential method is described in *ASTM Material Research Standards*, ASTM, Vol 1, No. 7, July 1961.



NOTE 1—The diameter over the fins will not normally exceed the diameter of the unfinned section.

FIG. 1 Finned Tube Nomenclature

11. Package Marking

11.1 The name or brand of the manufacturer, name and order number of the purchaser, plain tube specification, condition (annealed or as-fabricated), Specification A 498 tube diameter, wall thickness, and tube length shall be marked on a tag securely attached to the bundle or box in which the tubes are shipped. The marking need not include the year of issue of the specification.

11.2 *Bar Coding*—In addition to the requirements stated in 11.1, bar coding is acceptable as a supplementary identification method. Bar coding should be consistent with the Automotive Industry Action Group (AIAG) standard prepared by the Primary Metals Subcommittee of the AIAG Bar Code Project Team.

12. Inspection

12.1 The inspector representing the purchaser shall have entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All required tests and inspections shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be conducted so as not to interfere unnecessarily with the operation of the works.

12.2 *Certification*—When specified in the purchase order or contract, the manufacturer shall furnish a dated report certifying that the material was manufactured, sampled, tested, and inspected in accordance with the requirements of this specification, including the year of issue of the specification.

13. Rejection

13.1 Any rejection based on tests made in accordance with this specification, and those allowed by the governing plain-tube specification, shall be reported to the manufacturer. Disposition of rejected tubing shall be a matter of agreement between the manufacturer and the purchaser.

13.2 Material that fails in the process of installation shall be set aside and the manufacturer notified for mutual evaluation of suitability of the material. Disposition of such material shall be a matter for agreement.

14. Keywords

14.1 carbon steel tube; heat exchanger tube; seamless steel tube; steel tube; welded steel tube

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SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this specification since the last issue, A 498 – 04, that may impact the use of this specification. (Approved October 1, 2006)

(*1*) Added Specification A 334/A 334M to paragraph 4.1.

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