



## **Fintube, LLC Standard Specification for Standard Frequency Electric-Resistance-Welded Spiral Fins**

### **1. Scope**

1.1 This specification covers external, spiral wound, standard frequency electric-resistance-welded segmented fins on tubes for use in boilers, fired heaters and other heat transfer equipment.

1.2 The tube and fin materials specified must be suitable for standard frequency electric-resistance-welding.

1.3 The values stated in 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.

1.4 Where the term "tube" is used, material normally designated as "pipe" is also included.

### **2. Manufacture**

2.1 The attachment of the fins to the tube will be by the standard frequency (60 Hz) electric-resistance-welding process.

2.2 The fins are considered to be nonpressure-bearing attachments with essentially no load-carrying function welded to a pressure part by an automatic welding process.

2.3 Finned tubes will be supplied in the "as-welded" condition without post weld heat treatment.

### **3. Chemical Composition**

3.1 For tube material supplied by Fintube, the chemical composition as shown on the mill test report will conform to the requirements for the grade or type specified.

3.2 The chemical composition of carbon steel fins will conform to the requirements of A 1008 or A 1011.

3.3 The chemical composition of alloy fin materials will be in accordance with A 240 or other applicable specification for the grade or type specified.

3.4 Where fin material other than carbon steel is specified, Fintube will supply certification that the chemical composition conforms to the grade or type specified.

### **4. Dimensions and Permissible Variations**

4.1 To be suitable for finning, the base tube must meet the following additional requirements:



4.1.1 The outside surface of the base tubes supplied by the purchaser must be free of any heavy coating or scale and have an average roughness not exceeding 250  $\mu\text{in.}$  [6.3  $\mu\text{m}$ ];

4.1.2 Base tubes supplied by the purchaser must be straight with a maximum deviation of 0.1 in. [3 mm] in any 10 ft. [3 m] section and 0.25 in. [6 mm] over the total tube length for tubes under 40 ft. [12 m], 0.38 in. [10 mm] for tubes 40 ft. [12 m] to 60 ft. [18 m] and 0.5 in. [12 mm] for tubes 60 ft [18 m] and longer.

#### 4.2 Fin Tolerances:

4.2.1 The thickness of the fins will be as specified within the tolerance shown in Table 1 measured at the edge of the fin.

Table 1. Fin Thickness Tolerance, in. [mm]

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Specified Thickness	Tolerance (+ or -)
0.020-0.030 [0.50-0.80]	0.003 [0.08]
0.031-0.039 [0.81-1.00]	0.004 [0.10]
0.040-0.063 [1.01-1.60]	0.005 [0.13]

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4.2.2 The fin height after welding, measured perpendicular to the tube surface will be as specified  $\pm 0.04$  in. [1.0 mm].

4.2.3 The number of fins per unit length of tube will be as specified + 5 percent, -2 percent measured over at least 12 in. [300 mm] of welded fins.

4.2.4 The fins will be welded 90 degrees to the tube surface. Inclination of the fins will not exceed 10 degrees from the vertical.

4.2.5 The segment width will be 0.078 in. [2.0 mm], 0.156 in.[4.0 mm], or 0.313 in.[8.0 mm]  $\pm 0.02$  in. [0.5 mm] as specified by the purchaser. The cuts will extend to the base of the fin. The degree of twist of the individual segments will be limited so that the apparent thickness of the fins is no greater than 2 times the specified thickness.

4.2.6 Interruptions in welding are permissible provided they do not exceed 2.5 percent of the finned length on any one tube, do not exceed 5 consecutive wraps and do not occur within 6 in. [150 mm] of another interruption or the end of a finned section.

#### 4.3 Finned Tube Tolerances:

4.3.1 Finished finned tubes will be straight with a maximum deviation of 0.2 in. [5 mm] in any 10 ft. [3 m] section of tube. For tubes shorter than 10 ft. [3 m], the tolerance will be reduced proportionate to the length.

4.3.2 The location of each end of each finned section on a tube as measured from the starting end of the tube will be as specified  $\pm 0.25$  in. [6 mm] or one fin spacing whichever is greater.



4.3.3 Unless specified otherwise by the purchaser, finished finned tubes will have a length tolerance of  $\pm 0.12$  in. [3 mm].

4.3.4 Fin and tube materials will usually show some discoloration due to oxidation or bluing near the weld and occasionally over the whole surface. Finned tubes may also develop light surface rust before receipt by the purchaser. Either of these conditions is not considered cause for rejection.

4.3.5 After finning, any imperfections on the bare tube surface or variations in the base tube end outside diameter including ovality will not exceed those allowed by the base tube specification.

## **5. Inspection and Tests**

5.1 During production, a minimum of one tube from each lot as defined in 5.2 will be tested by removing 1 in. [25 mm] of fin from the last welded wrap on the end of the tube by bending the fin and fracturing the fin-to-tube weld. The fractured surface on the fin foot or the tube surface will be visually inspected and the average width of the weld as evidenced by the white metal exposed on the fractured surface shall be no less than 90 percent of the specified fin thickness.

5.2 A lot consists of no more than 300 ft. [100 m] of tube. All tubes within a lot must have the same tube material specification, tube outside diameter, fin material specification, fin height, fin spacing and fin thickness and shall have been manufactured on the same machine during a continuous time period.

5.3 In addition, the fin thickness, fin height, fin inclination and fin spacing on the tube will also be inspected.

5.4 Insufficient weld width or dimensions outside of tolerance will result in rejection of the tube and an additional two tubes from the lot will then also be inspected. If either of the additional two tubes fail, the entire lot will be rejected and each tube must be individually inspected to be accepted.

## **6. Product Marking and Packing**

6.1 Finned tubes will be identified with weather resistant labels showing the Fintube job number, the tube material heat number or code, the purchaser's name, purchase order number and mark number.

6.2 Finned tubes will be furnished with protective end caps and separated from each other by wooden blocks in frame type packing unless otherwise specified by the purchaser. When specified, finned tubes will be packed in wooden boxes and/or sprayed with a rust inhibiting coating.