

**INTERNATIONAL STANDARD FOR DIMENSIONS, TOLERANCES
AND TESTS OF HIGH FREQUENCY RESISTANCE WELDED FINNS**

(Effective June, 1990)

The worldwide growth in demand for high frequency welded fin tubing has resulted in an overwhelming number of different standards covering the manufacturing of this product. This lack of uniformity among the various standards written by both purchasers and suppliers has resulted in unnecessary costs. To solve this problem the undersigned suppliers have agreed to a new International Standard for high frequency welded finned tubes.

We respectfully submit this new International Standard for your consideration and hope it will facilitate procurement of this product in the future.

Aletas y Birlos, S.A.

Hartman Mitchell, Gen. Mgr.

Biraghi Canada Division

Muel Lago, Gen. Mgr.

Biraghi S.A.

Donnedi, Mng. Dir.

Daikure Co., Ltd.

J. Yamamoto, Pres.

Division Fintube Corp.

Jimmy E Ryan, Chairman

Enerfin, Inc.

Roger Johnson, Pres.

Escoa Division, DFC

R.C. Wiseman, Gen. Mgr.

GEA Spiro-Gills, Ltd.

M. Clifford, Mng. Dir.

Kentube Division, DFC

Leggy Peter, Gen. Mgr.

LP S.P.A.

Luigi To, Pres.

Mannesman Carnoy n.v.

F. D. Nilsen, Mng. Dir.

Shinko Hatsujo Kogyo Co.

K. Shibukawa, Pres.

Spiro-Gills, S.A.

Donnedi, Mng. Dir.

Tempco Division, DFC

Paul Mante, Gen. Mgr.

TFT, Inc.

Donald H. ..., Pres.



Tulsa Fin Tube, Inc. • P.O. Box 445 • Tulsa, OK 74101
Telephone (918) 834-2366 • Fax (918) 834-1553

**INTERNATIONAL STANDARD FOR DIMENSIONS, TOLERANCES AND
TESTS OF HIGH FREQUENCY RESISTANCE WELDED FINS**
(Effective June, 1990)

1. Scope

- 1.1** This standard covers external, high frequency resistance welded fins on tubes or pipe for use in boilers, economizers, fired heaters and other heat transfer equipment.
- 1.2** The values stated in SI units and inch-pound units are to be regarded separately as standard. Within the text, the inch-pound 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.
- 1.3** Where the term “tube” is used, material normally designated as “pipe” is also included.

2. Bare Tube Requirements

2.1 Outside Diameter

Variations in the outside diameter including ovality shall not exceed + or – 1.0 mm [0.04 in] or the applicable bare tube specification tolerance whichever is less.

2.2 Surface

To be suitable for finning, the tube surface must be free from pits, dents, laminations, gouges or other surface defects exceeding 0.3 mm [0.01 in] in depth which limit the contact of the fin edge with the tube.

2.3 Straightness

Bare tubes supplied by the customer shall be straight with a maximum deviation of 3 mm [0.1 in] in any 3 m [10 ft] section and 6 mm [0.25 in] over the total length of the tube.

3. Weld Requirements

3.1 Weld Width

The average width of the weld between the fin and the tube shall be a minimum of 90 percent of the specified fin thickness based on visual examination of the fractured surface. In the event of disagreement on the visual examination, a tensile test of the fin-to-tube weld on a representative sample yielding a minimum value of 170 MPa [25 ksi] based on the specified fin thickness shall be considered evidence of an acceptable weld.

3.2 Weld Interruptions

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 150 mm [6 in] of another interruption or the end of a finned section.

3.3 Post Weld Heat Treatment

The Heat Affected Zone in the tube wall and fin adjacent to the fin-to-tube weld is of very low penetration and results in only superficial changes in the tube and fin properties. Any changes that do occur in hardness, grain structure or other properties shall be permissible. For this reason, post weld heat treatment is not required.

4. Fin Dimensions

4.1 Thickness

The thickness of the fin material before being serrated or welded to the tube shall be in accordance with Table 1.

TABLE 1 Fin Thickness Tolerance, mm [in]

Specified Thickness		Tolerance (+ or -)	
0.81-1.00	[0.032-0.039]	0.10	[0.004]
1.01-1.60	[0.040-0.063]	0.13	[0.005]
1.61-2.00	[0.064-0.079]	0.15	[0.006]
2.01-2.50	[0.080-0.098]	0.17	[0.007]
2.51-3.5	[0.099-0.138]	0.20	[0.008]

4.2 Height

The fin height after welding shall be as specified + or – 1.0 mm [.04 in] measured perpendicular to the tube surface.

4.3 Spacing

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

4.4 Inclination

Inclination or dishing of the fin shall not exceed 10 degrees from the vertical (Fig. 1).

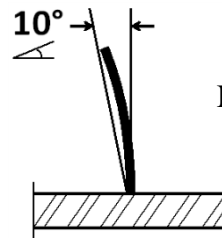


FIGURE 1 Fin Inclination

4.5 Corrugation

The total width of corrugation at the fin base, excluding any weld expulsion, shall not exceed 3 times the specified fin thickness (Fig. 2)

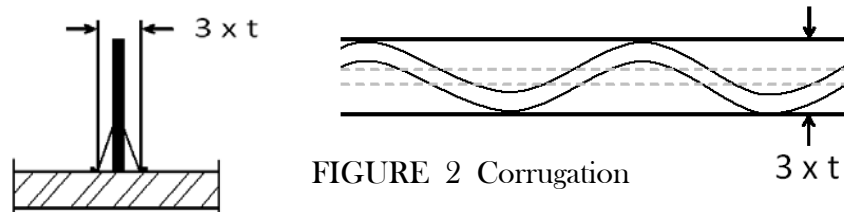


FIGURE 2 Corrugation

4.6 Segment Geometry

For segmented (serrated) fins, the segment width shall be as specified + or – 0.8 mm [0.03 in]. The cuts shall extend to a point 7 mm [0.27 in] + or – 3 mm [0.12 in] above the tube surface. The degree of twist of the individual segments shall be limited so that the apparent thickness of the fin strip is no greater than 2 times the specified thickness (Fig. 3). Standard segment widths are 4.5 mm [0.172 in] for tube diameters less than 60 mm [2.36 in] and 8 mm [0.313 in] for larger diameters.



FIGURE 3 Serrated Fin Apparent Thickness

4.7 Straightness

Finished finned tubes shall be straight with a maximum deviation of 5 mm [0.20 in] in any 3 m [10 ft] section of tube. The measurement shall be taken by placing a 3 m [10 ft] straight-edge so that both ends are in contact with the finned tube, and measuring from the most extreme deviation (Fig. 4). For tubes shorter than 3 m, the tolerance shall be reduced proportionate to the length.

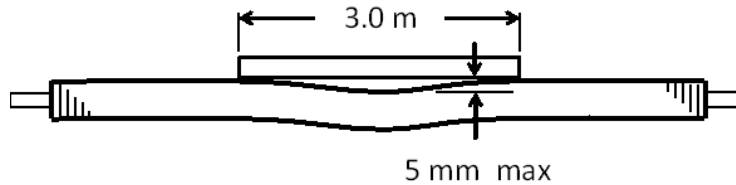


FIGURE 4 Straightness Measurement

4.8 Bare Sections

The Length and location of bare sections, as measured from one end on the finished finned tube shall be as specified + or – 6 mm [0.25 in] or one fin spacing whichever is greater.

4.9 Overall Length

Finished finned tubes shall have a length tolerance as specified in the applicable bare tube specifications.

4.10 Edge Tears

Because of variations in fin material or nicks in the fin strip edge, the fin may tear at the outer edge occasionally during wrapping and shall not require repair as long as the number of wraps showing tears is less than 10 percent of the total on any one tube.

4.11 Discoloration and Rust

Fin and tube material will usually show some discoloration due to oxidation or bluing near the weld and occasionally over the whole surface depending on the coolant and metal conditions. Finned tubes may also develop light surface rust before receipt by the customer. Either of these conditions is not considered cause for rejection since they do not adversely affect the weld or the performance of the finned tube.

