



STANDARD SPECIFICATION
WELDED LONGITUDINAL FINNED TUBE

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WELDED LONGITUDINAL FINNED TUBE

1.0 SCOPE

- 1.1 This specification governs materials, fabrication and tolerances (where required) applicable to welded longitudinal finned tubes fabricated by Vulcan Finned Tubes, L.P. ("Vulcan").
- 1.2 Where the term "tube" is used herein, the specification also applies to tubular goods normally designated as "pipe".
- 1.3 Tube and fin materials may be carbon, ferritic alloy or austenitic alloy steel and can be of similar or dissimilar material combinations.

2.0 ORDERING INFORMATION

- 2.1 The purchaser is responsible for specifying all information necessary for ordering the required materials. If purchaser supplies tubes, Vulcan will specify the lengths of tubes supplied and the number of spares required.
- 2.2 Tube material information will include quantity, tube specification, OD and wall thickness, over-all tube length and tube end preparation.
- 2.3 Fin material information will include fin specification, fin height, fin thickness, number of fins per tube, length of finned length and length of tube bare ends. If cut & twist is required, center to center dimensions will be specified.

3.0 TUBE SPECIFICATIONS

- 3.1 The tube may be supplied by the purchaser or by Vulcan, as agreed between the two parties.
- 3.2 If purchaser supplies the tubes, they must send mill test reports with the tube material. Mill test reports or other acceptable manufacturer's certification shall be provided to the purchaser for all tubes supplied by Vulcan.
- 3.3 The tube's chemical and physical characteristics shall be per the specification chosen by the purchaser unless otherwise specified.
- 3.4 The tube material shall be compatible with and suitable for standard frequency resistance welding (SF) to the specified fin material.

- 3.5 To be suitable for finning, any protective coating, lacquer, rust or scale must be able to be removed by abrasive belt sanding without infringing into specified minimum tube wall and the tube outside surface must be free from any pitting, dents or other surface defects that would interfere with welding of the fin to tube.
- 3.6 To be suitable for finning, the tubes must be straight with a maximum deviation of 1/8 in. in any 10 ft. section.
- 3.7 Length tolerance for tubes cut to length by Vulcan shall be as follows:

Tube Length	Plus Tolerance	Minus Tolerance
Less than or equal to 50 ft.	.25 in.	0 in.
Greater than 50 ft.	.5 in.	0 in.

- 3.8 Tube end preparation shall be square-cut and deburred or beveled, as specified by the purchaser. If beveled ends are specified, the bevel angle shall be 37-1/2 degrees, with a .065 in. land at the tube inside diameter unless otherwise specified.

4.0 FIN STRIP SPECIFICATIONS

- 4.1 Vulcan shall supply fin strip material.
- 4.2 The fin strip material’s chemical characteristics shall be per the fin strip specification chosen by the purchaser unless otherwise specified.
- 4.3 The fin strip material shall be compatible with and suitable for standard frequency (SF) resistance welding to the specified tube material.
- 4.4 If requested by customer at time of order, Vulcan shall furnish mill test reports or other acceptable manufacturer’s certification for fin strip materials.
- 4.5 Fin strip thickness tolerance, measured before the strip is formed around and welded to the tube, shall be as follows:

Nominal fin strip thickness (in.)	Thickness tolerance (+/- in.)
0.032 – 0.039	0.004
0.040 – 0.063	0.005

5.0 FABRICATION

- 5.1 The tube outside surface shall be prepared by abrasive belt sanding to ensure that the fin-to-tube weld will be sound.
- 5.2 The fin strip is formed into a U-shaped channel, cut to specified length and then welded longitudinally along the length of the outside surface of the tube. The welding process utilized is a fully automatic standard frequency (SF) resistance weld process.

- 5.3 The U-shaped fin channels are spaced as uniformly as possible. Uneven spacing of the fin channels at their base where it is attached to the tube is permissible.
- 5.4 Splicing of fin channels where one fin channel ends and another begins is permissible.
- 5.5 Fin channels will usually show some discoloration, bluing or burning due to the heat of the finning process, as well as a light surface rust from exposure to the elements during storage and transportation to final destination. These conditions are not grounds for rejection.
- 5.6 Large diameter, heavy tubes with high fin heights (over 1" high) may exhibit waviness on the fin tips. In cases such as these, the fin channel must support the weight of the tube during production process. The heavier the tube and the higher the fin height, the more likely fin deformation will occur. In these cases, fin tip waviness is not considered grounds for rejection.
- 5.7 Fin height after welding shall be as specified by the purchaser, plus or minus .04 in. as measured from the outside diameter of the tube to the outside edge of the fin.
- 5.8 Finished finned tubes shall be straight with a maximum deviation of 1/4 in. in any 10 ft. section of tube.
- 5.9 The quality of the fin-to-tube weld shall be determined by way of pull test performed randomly throughout the production process.
- 5.10 Length of any unfinned (bare) sections on the finished finned tube shall be as specified by the purchaser, within the following tolerances:

Total Tube Length	Bare Section Length Tolerance (+/-)
Less than or equal to 40 ft.	.25 in.
Over 40 feet but less than or equal to 60 ft.	.5 in.
Greater than 60 ft.	1 in.

- 5.11 The fin is considered to be non-load bearing and non-pressure containing part attached to the tube by an automatic machine welding process.
- 5.12 The heat affected zone (HAZ) 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 material properties. Any changes in hardness, grain structure, or other properties that occur in the HAZ shall be considered permissible. For this reason, post weld heat treatment is not required.

6.0 INSPECTION

- 6.1 Upon receipt at Vulcan's shop, tubes shall be visually inspected to verify dimensions and material specification and to ensure no obvious defects. Tube material having any defects that may effect weld quality will be separated, returned to vendor or scrapped. After inspection, conforming tube materials will be separated by shop order and placed in their proper location.
- 6.2 Prior to production, fin material shall be visually inspected to verify dimensions and material specification and to ensure no obvious defects. Fin material having any defects that may affect weld quality will be separated, returned to vendor or scrapped.
- 6.3 All finned tubes are visually inspected at machine setup and randomly throughout the finning process to ensure they meet Standard Specifications. A final inspection is provided before the product is packaged. All finned tubes shall meet Standard Specifications and have a workmanlike finish and be free from obvious defects.

7.0 PRODUCT MARKING

- 7.1 Traceability on tube material shall be maintained throughout the fabrication process. After each length of tube has been finned an adhesive trace label shall be attached near one end of the tube. Trace labels shall report tube size, tube grade, and tube heat number.

8.0 PRODUCT PACKAGING

- 8.1 Standard packaging options are fully enclosed steel-banded wooden crates; or steel-banded wooden support collars. Other options such as export quality crating and fumigation can be provided upon request.