



**STANDARD SPECIFICATION**  
**WELDED HELICAL SERRATED FINNED TUBE**

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**WELDED HELICAL SERRATED FINNED TUBE**

**1.0 SCOPE**

- 1.1 This specification governs materials, fabrication and tolerances (where required) applicable to welded helical serrated 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.
- 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 type (solid or serrated), fin specification, segment width, fin height, fin thickness, fin pitch (number of fins per inch), length of finned length and length of tube bare ends.

**3.0 TUBE SPECIFICATIONS**

- 3.1 The tube may be supplied by the purchaser or by Vulcan, as agreed between the two parties. If purchaser supplies tubes, Vulcan will specify the lengths of tubes supplied and the number of spares required.
- 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 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.

3.5 To be suitable for finning, the tubes must be straight with a maximum deviation of 1/8 in. in any 10 ft. section, or 1/4 in. over the total length of the tube.

3.6 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.

3.7 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 gas metal arc (GMAW) 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
0.064 – 0.079	0.006
0.080 – 0.098	0.007
0.099 – 0.138	0.008

#### 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 Tubes with 3% - 9% Chromium content will receive 200° F preheat (as indicated with temperature indicator stick) prior welding of the fins.

- 5.3 The fin strip is cut or serrated at equally spaced intervals. The serrations shall extend from the outside edge of the fin strip to approximately .25 in. from the base of the fin strip. Segment width, or distance between serrations shall be .280 in. unless otherwise specified.
- 5.4 The fin strip is helically wound on edge around the outside surface of the tube and attached to the tube with a continuous fillet weld on one side of the fin. The welding process utilized is a fully automatic gas metal arc (GMAW) using the proper wire and gas combination for the tube and fin materials.
- 5.5 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.
- 5.6 The number of fins per inch shall be as specified (+ 5% or - 2%), measured over at least 12 in. of finned length.
- 5.7 Inclination of the fin resulting from forming the fin around the tube shall not exceed 10 degrees from the vertical.
- 5.8 Total width of corrugation at fin base shall not exceed three times the specified fin thickness.
- 5.9 Finished finned tubes shall be straight with a maximum deviation of 1/4 in. in any 10 ft. section of tube.
- 5.10 Interruptions in the fin-to-tube weld shall not exceed more than 2.5% of the total length of fin-to-tube weld on any one finned tube and shall not exceed 5 consecutive fin wraps.
- 5.11 Splices in the fin strip will occur when the fin strip is interrupted during the finning process (for example, when a coil of fin material is finished and a new coil started), the new section of fin strip shall be placed end-to-end with the previously welded section, and the welding process continued. Fin splices are an inherent part of the process and are grounds for rejection.
- 5.12 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.

- 5.13 Finned tubes will usually show some discoloration or bluing 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. Neither of these conditions is considered grounds for rejection.

- 5.14 The fin is considered to be non-load bearing and non-pressure containing part attached to the tube by an automatic machine welding process.
- 5.15 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 affect 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.