

TECHNICAL UPDATE - TU-9002

SUBJECT: Welded or Seamless Stainless Steel in Dekoron Unitherm Traced Tubing Bundles

Many corrosion resistant steel tubing products are available as either “welded” or “seamless”. This update gives a brief explanation of the two processes and discusses reasons a customer may wish to specify one or the other in his bundle.

Welded

Welded tubing begins as a strip of steel. The strip is rolled into a tube and automatically welded along the longitudinal seam. Two methods are used to weld the seam: Metal Inert Gas, or “MIG” welding, uses a metal filler rod that is continuously fed into the weld seam to join the materials; Tungsten Inert Gas, “TIG” welding, has a tungsten electrode and uses no filler metal in the weld. Both MIG and TIG welding are performed under a blanket of an inert gas such as argon to prevent oxidation of the material around the weld. Tubing purchased for Dekoron Unitherm bundles is all produced using the TIG welding process.

Once welded, the tubing is fed through a series of devices to help size the tube and improve the surface on the ID and OD. Then, the tube is annealed to reduce stresses generated in the forming and welding process, quenched to set the material properties, and packaged for inspection and shipment.

Seamless

Seamless tubing begins its life as a steel billet, which is shaped and pierced to become a “hollow”.

The hollow is drawn through a series of rolls or dies, each reducing the size of the hollow and increasing the length. A number of intermediate draws are used to bring the tube to its final size. Since each draw work hardens the material, a number of intermediate annealing process must also be performed.

Without the intermediate anneal, the steel would become too brittle to draw. A final anneal finishes the process. All annealing is in an inert atmosphere to prevent oxidation of the metal.

Why Choose Seamless or Welded?

In the past, seamless tube was specified because the seam in the welded tube would prevent a secure seal when a compression fitting or socket weld fitting was used on the tube. Current manufacturing technology eliminates this problem. It is almost impossible to see or feel the weld seam on the outside of a properly fabricated welded tube.

Ovality, wall thickness tolerance, diameter tolerance and material properties are all equal between welded and seamless tube, so they are not reasons for selection.

A customer may wish to specify seamless tube for two distinct reasons: First, the pressure rating for a seamless tube is slightly higher than for a welded tube of the same size and wall thickness. The table of tube working pressures found in ANSI B31.3 shows the working pressure for 3/8" OD x .035" Wall Type 316 stainless steel tube produced to ASTM A-269 is 3305 psig for welded tube and 3892 psig for seamless tube at a tube temperature of 400°F.

Another reason for selecting seamless tubing is corrosion protection. The weld area in a welded tube is more prone to corrosion damage than the balance of the tube. This is not generally a problem, specially in a sealed tubing bundle. Customer history may, however, show the need in specific applications.

Welded tubing may be specified when the customer is looking for long continuous lengths. It is not unusual to see production lengths of welded tubing greater than 1000 feet. Seamless tubes are limited to the length that can be obtained by stretching a billet.

Welded tube is generally lower in cost and more readily available than seamless tubing, for most sizes and materials. The relatively low cost of welded tube mills has allowed a number of small suppliers to form to meet specific markets. Seamless tube is confined to a few large mills that must serve world-wide customers.

Welded tube can also be easily line marked to show composition, heat number, specification, and so on. Seamless tubing is usually batch annealed in a coil, whereas welded tube is in-line annealed. The line marker can be added in the production line for welded tube, where seamless tube must be respooled.

The table below summarizes the thoughts presented in this update.

Tubing Property	Welded Tubing	Seamless Tubing
Pressure Rating	good	better
Corrosion Protection	weld more susceptible to attack	no material change
Continuous Length Available	>1000 ft	usually 1000 ft or less
Line Marking	no problem	must be respooled
Cost	lowest cost tubing	considerably higher than welded

The customer should review his application to determine which type of tubing is best for their application.

