

Seamless vs. Welded Tubing

The difference in the basic manufacturing method is obvious from the names. Seamless tube is extruded and drawn from a billet while welded tube is produced from a strip that is roll formed and welded to produce a tube. Welded tube is considerably less expensive than seamless tube and is readily available in long continuous lengths.

Although the working pressure of welded tube is 20% less than that for a similar seamless tube, working pressure is not the determining factor for choosing seamless tube over welded tube for analyzer sample lines. The difference in potential impurities, which reduce the corrosion resistance of the finished tube, is why seamless tube is specified.

The weld area is considered to be inhomogeneous thus exhibiting different malleability and less corrosion resistance as well as greater dimensional variation. Drawing welded tube reduces these anomalies.

Most tubing (seamless and welded) is drawn to produce final dimensional tolerances. Drawing is an operation, which “pulls” a tube through a die. There are different methods for drawing a tube however they can be thought of as sunk drawn and a plug drawn. The difference is seen in the ID surface roughness. A sunk drawn tube is done without internal support. Sink drawn tube reduces the diameter without controlling the wall thickness. There is some “crunching” of the ID and the tube develops a “sun burst” cross section and wrinkles circumferentially along the inside surface. This can be especially noticeable around the weld on welded tubing. Plug or rod drawn tube is pulled through a die with internal support and produces a much smoother inner surface.

Rod or plug drawing breaks up the weld bead on welded tubing and removes any dimensional indication. Final annealing further promotes a homogeneous tube. The term “full finished” refers to welded tubes that have been rod or plug drawn and annealed sufficiently to both remove any dimensional indication of the weld area and also break up the dendritic structure of the weld bead and expedite homogenization. Often it is very difficult to see the difference between welded and seamless tubing.

By code the allowable working pressure of welded tubing is reduced by 20%.

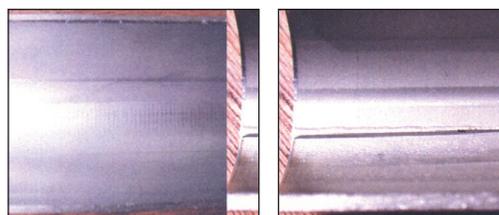
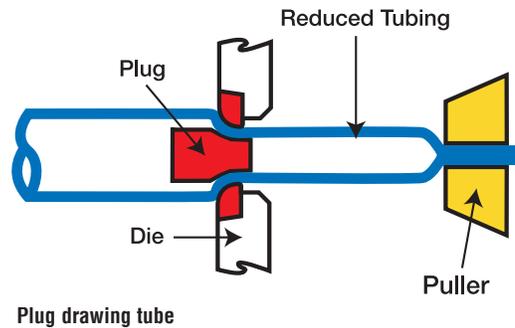
Working pressure in PSIG for seamless 316SS tubing at 70°F.

| Tube OD | Tube Wall Thickness | | |
|---------|---------------------|--------|-------|
| | 0.028 | 0.035 | 0.049 |
| 1/8" | 8,500 | 10,900 | — |
| 1/4" | — | 5,100 | 7,500 |
| 3/8" | — | 3,300 | 4,800 |
| 1/2" | — | 2,600 | 3,700 |

For welded tubing multiply pressure rating by 0.80.
Temperature Conversion for 400°F: multiply above by 0.96

While it is true that most welded tubing cannot be detected by the naked eye recognized standards for working the weld area of tubing are very open and allow great latitude in the degree of homogeneity in the final product.

The basis for much of today’s bias regarding seamless vs. welded tubing probably stems from early manufacturing processes when the weld area was not reworked to provide a homogeneous tube wall. Even today the standard for working the weld area is very open allowing great variance in the final product. Seamless tubing simply avoids the potential for any defect in the corrosion resistance of the weld area.



Fully worked welded tube

As welded tube