Stainless Steel Tube & Pipe – Pressure Ratings

Worked Example:

Taking the simplest equation: $t = \frac{PD}{2SE}$

A. If you wish to calculate what wall thickness should be used in a design for the following situation:

P = Internal Design Pressure – For this example lets say 2000 pounds per square inch = 2ksi

D = Outside Diameter – For this example lets say 4 inch nominal bore = 4.5 inches

S = Stress Value for material from table below taking into account operating temperature – For this example lets take ASTM A312 TP 316L operating at 500^{O}C for which S = 14.4 ksi

(1ksi = 1,000 psi / psi = Pounds Pressure per Square Inch)

E = Quality Factor from table below according to manufacturing specification – For this example we are using ASTM A312 TP 316L Seamless for which E = 1.0

So this gives: $t = \frac{2 \times 4.5}{2 \times 14.4 \times 1.0} = 0.313$ inches

Thus we would use 4 inch Nominal Bore Schedule 80S which has a wall thickness of 0.337 inches

If the wall thickness calculation leads to a heavier wall than is available then the pipe diameter must be increased. Depending upon the design of the system this may also reduce the pressure.

A. If you wish to calculate what design pressure could be permitted for the following situation:

D = Outside Diameter – For this example lets say 4 inch nominal bore = 4.5 inches

t = Wall Thickness – For this example lets say Schedule 40S = 0.237 inches

S = Stress Value for material from table below taking into account operating temperature – For this example lets take ASTM A312 TP 316L operating at 500^{O}C for which S = 14.4 ksi

(1ksi = 1,000 psi / psi = Pounds Pressure per Square Inch)

E = Quality Factor from table below according to manufacturing specification – For this example we are using ASTM A312 TP 316L Seamless for which E = 1.0

So this gives: $0.237 = \frac{P \times 4.5}{2 \times 14.4 \times 1.0}$

Thus P = 1.51ksi = 1,510 pounds per square inch