

MACSTEEL VRN

STAINLESS STEEL PIPE, TUBE AND FITTINGS PIPING GRADES 304L AND 316Ls

PIPING DESIGN AND PRESSURE ESTIMATION

The rules for designing a piping system are given in various national codes, eg. ANSI B31, BS 3351, ASME Section 3.

The code specifications which are applicable will be determined by the general service for the piping system and will dictate the minimum requirements in respect of dimensional standards, materials etc. Flow rate, pressure drop, external forces, thermal stresses and deadweight are some of the parameters to be taken into account.

Two useful computations which can be used for seamless and welded pipe, but which are not substitutes for design codes are:

$$\text{Wall Thickness } T = \frac{PD}{2C + 2YP} + C$$

$$\text{Internal Pressure } P = \frac{2S(T-C)}{D - 2Y(T-C)}$$

- Where
- T = design thickness of the pipe (122 % less than the nominal wall thickness of any given pipe size), inches
 - P = internal design pressure, PSIG
 - D = outside diameter of pipe, inches
 - S = allowable stress of materials at service temperature, PSI
 - C = allowance for mechanical and corrosion, inches (zero for our calculations)
 - Y = a coefficient having values as follows:
 - For austenitic stainless steels -
 - 0.4 up to and including 1050°F
 - 0.5 for 1100°F
 - 0.7 for 1150°F
 - For non ferrous metals-
 - 0.4 up to and including 900°F

Note: Conversion Factors

- 1 Bar = 14.5 psi
- 1 MPa = 10 Bars = 145 psi
- 1 inch = 25.4mm
- °F = (°C x 9/5) + 32

For allowable stress, S

Temp. (°F)	Grade				
	304L	304	316L	316	321
	(Psi)	(304L value multiplied by)			
Upto 300°F	14 200	x 1.20	x 1.00	x 1.20	x 1.20
400 °F	13 400	x 1.19	x 0.98	x 1.22	x 1.18
500 °F	12 500	x 1.18	x 0.98	x 1.22	x 1.17
600 °F	11 850	x 1.18	x 0.97	x 1.22	x 1.17



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