

Required Wall Thickness of Pipes and Tubes For T962

R Sanders

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Introduction

This document determines minimum wall thickness for pipes and tubes different pressure as per the piping code B31.3. The formula used for straight pipe under internal pressure is, as per ASME B31.3 section 304.1.2:

$$t_r = \frac{PD}{2(SE + PY)}$$

Where t is the required wall thickness, D is the outside diameter and P is the internal pressure. The value for the weld quality of seamless pipe is:

$$E = 1.0$$

For austenitic steel less than 900F, the coefficient Y from B31. table 304.1.1 is:

$$Y = 0.4$$

The stress value S , for austenitic stainless steel below 80 F, is:

$$S = 20000 \text{ psi}$$

Non Vacuum Jacketed Piping

Design pressure:

$$P = 30 \text{ psi}$$

1/4 inch outside diameter tube, the required wall thickness t_r is

$$D = \frac{1}{4} \text{ in}$$

$$t_r = 0.1873e-3 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.

1/2 inch outside diameter tube, the required wall thickness t_r is

$$D = \frac{1}{2} \text{ in}$$

$$t_r = 0.3747e-3 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.

3 inch outside diameter tube, the required wall thickness tr is

$$D = 3 \text{ in}$$

$$t_r = 0.2248e-2 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.

6 inch outside diameter tube, the required wall thickness tr is

$$D = 6 \text{ in}$$

$$t_r = 0.4497e-2 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.

Outside diameter 1 1/2 in pipe, the required wall thickness tr is

$$D = 1.900 \text{ in}$$

$$t_r = 0.1424e-2 \text{ in}$$

Schedule 10 pipe wall thickness of 0.109 is acceptable.

Vacuum Jacketed Piping

Design pressure, allowing for 30 psig internal pressure and full vacuum in the vacuum jacket:

$$P = 30 \text{ psi} + 15 \text{ psi}$$

1/4 inch outside diameter tube, the required wall thickness tr is

$$D = \frac{1}{4} \text{ in}$$

$$t_r = 0.281e-3 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.

1/2 inch outside diameter tube, the required wall thickness tr is

$$D = \frac{1}{2} \text{ in}$$

$$t_r = 0.562e-3 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.

3 inch outside diameter tube, the required wall thickness tr is

$$D = 3 \text{ in}$$
$$t_r = 0.3372e-2 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.

6 inch outside diameter tube, the required wall thickness tr is

$$D = 6 \text{ in}$$
$$t_r = 0.6744e-2 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.

Fill Line Piping

Design pressure, 350 psig internal pressure:

$$P = 350 \text{ psi}$$

1/8 inch outside diameter tube, the required wall thickness tr is

$$D = \frac{1}{8} \text{ in}$$
$$t_r = 0.1086e-2 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.

3 inch outside diameter tube, the required wall thickness tr is

$$D = 3 \text{ in}$$
$$t_r = 0.2606e-1 \text{ in}$$

A tube with 0.035 inch wall or thicker is acceptable.