

Calculation of Pipe Wall Thickness per ASME B 31.3

Given the following conditions, what is the required thickness of a straight section of pipe?
As determined in accordance with EQ. 1. Equations are from ASME B31.3, 2002 edition, page 19 , paragraph 304.1 and 304.1.2. The material for this sample calculation is: 14.5" O. D. **X42 with and allowable of 14,000**)

$$t_{min} = t + c$$

(EQ. 1)

$$t_{min} = 0.046 + 0.25$$

The Answer is $t_{min} = 0.296$ " (minimum wall thickness for 4 in pipe)		
t_{min}	Minimum required thickness, including mechanical, corrosion and erosion allowance.	0.296
t	Pressure design thickness, as calculated in accordance with either EQ. 3 or EQ. 4 for internal pressure or as determined in accordance with 304.1.2 of ASME B31.3	Solve for t
c	Sum of mechanical allowances plus corrosion and erosion allowances.	NONE

$$t = (PD) / (2(SE + PY))$$

(EQ. 3)

t	Pressure Design Thickness, as calculated in accordance w 304.1.2	?
T	Pipe Wall Thickness, measured or minimum per purchase specification.	?
d	Inside Diameter of the Pipe	na

P	Internal Design Gage Pressure (psi)	250 psi
D	Outside Diameter of Pipe (inches)	4.5 inches OD
E	Quality Factor from Table A-1A or A-1B	0.85
S	Stress Value for Material from ANSI B31.3 Table A-1 on page 165	14,000
Y	Coefficient from ANSI B31.3 Table 304.1.1. For intermediate temps. not found in the table, it may be interpreted from (from page 20): $Y = (d + 2c) / (D + d + 2c)$	0.4

$$t = (PD) / (2(SE + PY)) \quad (\text{EQ. 3})$$

$$t = (250 \text{ psi}) (4.5 \text{ inch}) / (2 (14,000 \text{ psi} (.85) + 250 \text{ psi} (0.4)))$$

$$t = 1,125 / (2 (11,900 \text{ psi} + 100 \text{ psi}))$$

$$t = 1,125 / (24,000 \text{ psi})$$

t = 0.046 inches is the required minimum wall thickness