

Table 7-1—Two Examples of the Calculation of Maximum Allowable Working Pressure (MAWP) Illustrating the Use of the Corrosion Half-Life Concept

Example 1:	
Design pressure/temperature	500 psig/ 400°F (3447 kPa/204°C)
Pipe description	NPS 16, standard weight, A 106-B
Outside diameter of pipe, D	16 in. (406 mm)
Allowable stress	20,000 psi (137,900 kPa)
Longitudinal weld efficiency, E	1.0
Thickness determined from inspection	0.32 in. (8.13 mm)
Observed corrosion rate (see 7.1.1)	0.01 in./yr. (0.254 mm/yr.)
Next planned inspection	5 yrs.
Estimated corrosion loss by date of inspection	= 5 x 0.01 = 0.05 in. (5 x 0.254 = 1.27 mm)
MAWP	= $2SE_t/D$
In U.S. units	$\left[ \frac{2 \times (20,000) \times (1.0) \times (0.32 - (2 \times 0.05))}{16} \right] = 550 \text{ psig}$
In S.I. units	$\left[ \frac{2 \times (137,900) \times (1.0) \times (8.13 - (2 \times 1.27))}{406} \right] = 3747 \text{ kPa}$
Conclusion: OK	
Example 2:	
Next planned inspection	7 yrs.
Estimated corrosion loss by date of next inspection	= 7 x 0.01 = 0.07 in. (7 x 0.254 = 1.78 mm)
MAWP	= $2SE_t/D$
In U.S. units	$\left[ \frac{2 \times (20,000) \times (1.0) \times (0.32 - (2 \times 0.07))}{16} \right] = 450 \text{ psig}$
In S.I. units	$\left[ \frac{2 \times (137,900) \times (1.0) \times (8.13 - (2 \times 1.78))}{406} \right] = 3104 \text{ kPa}$

Conclusion: Must reduce inspection interval or determine that normal operating pressure will not exceed this new MAWP during the seventh year, or renew the piping before the seventh year.

Note:

1. psig = pounds per square inch gauge; psi = pounds per square inch
2. The formula for MAWP is from ASME B31.3, Equation 3b, where  $t$  = corroded thickness