

The following is a cut/paste from a mathcad file used to determine the leakage rate of a generator volume. The values are representative of an actual pressure decay test;

rated pressure	Prated := 60
volume of generator	v := 5280
duration of test hours	h := 4
intial pressure psi	m1 := 60.02
final pressure	m2 := 59.85
intial barometric , in.Hg	b1 := 29.60
final barometric	b2 := 29.76
intial temperture F	t1 := 68.3
final temperture	t2 := 70.5

$$L := 238 \cdot \frac{v}{h} \cdot \left[\frac{(m1 \cdot 2.036) + (b1)}{273 + \left(\frac{t1 - 32}{1.8} \right)} - \frac{m2 \cdot 2.036 + b2}{273 + \frac{t2 - 32}{1.8}} \right]$$

$$L = 874 \quad \text{daily cubic feet loss of air}$$

The current constant (238) makes a correction for the variable time units in hours to provide the solution in days. The Units of volume in the variable will provide the same in the solution. Thus to make the solution time units the same as the variable the 238 becomes 9.917.

Inserting the parameters from the eng-tip posting;

volume of generator	v := 10.9
duration of test sec	s := 8
intial pressure psi	m1 := 8.600
final pressure	m2 := 8.592
intial barometric in-Hg	b1 := 29.93
final barometric	b2 := 29.93
intial temperture F	t1 := 68
final temperture	t2 := 68

$$L := 9.917 \cdot \frac{v}{s} \cdot \left[\frac{(m1 \cdot 2.036) + (b1)}{273 + \left(\frac{t1 - 32}{1.8} \right)} - \frac{m2 \cdot 2.036 + b2}{273 + \frac{t2 - 32}{1.8}} \right]$$

$$L = 0.000751 \quad \text{cubic inches per sec}$$

Simplifying the equation given the barometric and temperature are assumed constant during the eng-tips leak test:

$$L_r = 9.917 \cdot \frac{v}{t} \cdot \left(\frac{p_1 \cdot 2.036 + b_1}{293} - \frac{p_2 \cdot 2.036 + b_1}{293} \right)$$

$$L_r = (0.0689113) \cdot v \cdot \frac{(p_1 - p_2)}{t}$$

Using the eng-tips variables and the two simplified equations, the leak rate for a given pressure drop or the pressure drop for a given leak rate can be calculated

$$dP := .008$$

$$v := 10.9$$

$$t := 8$$

$$L_r := (0.0689113) \cdot v \cdot \frac{(dP)}{t}$$

$$L_r = 0.00075113$$

$$dP := 14.511408143512021976 \cdot \frac{L_r}{v} \cdot t$$

$$dP = 0.008$$