

Technical Bulletin



Calculation of Room Pressure (Example)

Given condition:

Room volume: 40ft x 40ft x 10ft = 16000 cu. Ft

Available OA (Outside air), RA (return air), SA (supply air) & EA (exhaust air) ducting

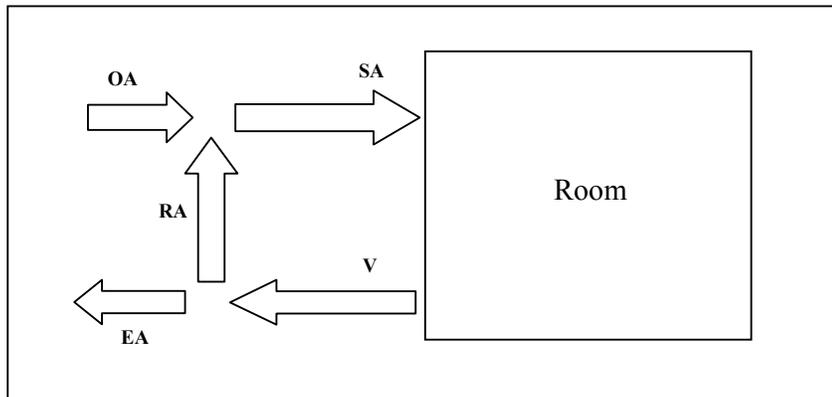
EA : RA ratio is at 1 : 9

Room leakage: 5%

Require condition:

Room pressurization = +ve 15Pa

ACH = 6



Calculation:

$$ACH = (V \times 60) / Vol$$

Where Vol = room volume (cu ft.) & V = total outlet air flow (cfm)

$$V = (ACH \times Vol) / 60$$

$$\text{Which is } V = (6 \times 16000) / 60$$

$$V = 1600\text{cfm}$$

*1,600cfm must be removed from the room to achieve min 6 Air Change Per Hour (ACH).

Where $V = RA + EA = \underline{1600 \text{ cfm}}$

Given condition, EA : RA = 1 : 9

$$\underline{EA = 160 \text{ cfm}}$$

$$\underline{RA = 1440 \text{ cfm}}$$

According to require condition, the room must be in positive (+ve) pressurized.

So, Supply air (SA) must be more than total outlet air flow (V). $SA > V$.

$$SA > 1600\text{cfm}$$

But what should be the additional air flow to pressurize the room up to 15Pa.

Assuming Atmospheric pressure, $P_{atm} = 101.325kPa$

Total pressure, $P_{total} = P_{atm} + P_{room}$

$$P_{total} = 101.325kPa + 0.015kPa = 101.34kPa$$

Total additional room air volume requires:

$$P_{total} / P_{atm} = V_{total} / V_{room}$$

$$\frac{101.34}{101.325} \times 16000 = 16002.4 \text{ cu. ft.}$$

Additional air volume requires pressurizing room up to 15Pa (without leakage):

$$16000 - 16002.4 = 2.4 \text{ cu ft.}$$

With 5% leakage consider: $2.4 * 1.05 = 2.52 \text{ cu ft.}$ additional air volume require.

If we require pressurizing the room within 5 second:

$$\text{Total additional air flow (PA)} = 2.52 \text{ cu ft.} / 5s = 0.504 \text{ cu ft.} / s = \underline{\underline{30.24 \text{ cfm}}}$$

Then total supply air (SA) as below:

$$SA = OA + RA$$

$$\text{Where } OA = V - RA + PA = 1600 - 1440 + 30.24 = \underline{\underline{190.24 \text{ cfm}}}$$

$$\text{So, } SA = 190.24 + 1440 = \underline{\underline{1630.24 \text{ cfm}}}$$

