



Units of Measure and Conversions

Air Flow

1 CFM=0.0283m ³ /min (CMM)	1 CFM=1.699 m ³ /hr
1 m ³ /min=35.31 CFM	1 m ³ /min=60m ³ /hr
1 m ³ /min= 16.67 Liter/sec	1Liter/sec=0.06 m ³ / min
1 m ³ /hr=0.589CFM	1 m ³ / hr=0.0167 m ³ /min

CFM	m ³ /min(CMM)	m ³ /hr
1	0.0283	1.699
35.31	1	60
0.589	0.0167	1

Static Pressure

1 Pa=0.102 mmH ₂ O	1 Pa=0.004 inchH ₂ O
1 mmH ₂ O=0.0394 inchH ₂ O	1 mmH ₂ O=9.81 Pa
1 inchH ₂ O=249 Pa	1 inchH ₂ O=25.4 mmH ₂ O

Inch H ₂ O	mm H ₂ O	Pa
1	25.4	249
0.0394	1	9.81
0.004	0.102	1

- *The basic theory of acoustic*

Sound pressure level: SPL (dBA)

$$L_p = 20 \log \frac{P}{P_0} \text{ (dBA)} \dots\dots\dots (a) \quad P_0 = 20 \mu\text{Pa}$$

P_0 the reference sound pressure of human hearing system

L_p sound pressure level

Similarity algorithm of fan noise

$$N_2 = 50 \log \frac{r_1 P_1 m_2}{r_2 P_2 m_1} - N_1 \dots\dots\dots (b)$$

N_1 noise level measured at rpm 1

N_2 noise level calculated by equation (b) at rpm 2

The equations for the relationship between distance and noise level measured at anechoic room.

$$L_p = L_w - 20 \log(r) - 11 \text{ [dBA]} \dots\dots\dots (c)$$

$$L_w = 10 \log \left(\frac{P^2}{P_0^2} \right) + 10 \log(4 \pi r^2) \dots\dots\dots (d)$$

L_p sound pressure level

L_w sound intensity level

r distance in meter

According to equations (c) and (d), it's very clear the noise level will reduce 6 dBA when the distance doubled.

Comparatively, the noise level will also increase 6 dBA when distance shorten by half.