



Closed Tube

Shortest tube: $L_1 = \frac{1}{4}\lambda$

Spacing: $\Delta L = \frac{1}{2}\lambda$

node to node →

$$L_n = (2n-1) \frac{\lambda}{4}$$

* $f_n = (2n-1)f_1$
(for a fixed length)

Open Tube

Shortest tube: $L_1 = \frac{1}{2}\lambda$

Spacing: $\Delta L = \frac{1}{2}\lambda$

antinode to antinode →

$$L_n = n \frac{\lambda}{2}$$

* $f_n = nf_1$
(for a fixed length)

