



# HVAC fundamentals

## Noise categories

Any moving or vibrating parts in a product can produce noise; this varies with the operation of the product. The noise is generated by the mechanical system i.e. the fan noise and can be classified into 5 categories.

### Airborne

Radiated from the air handling unit/fan, the noise is transmitted through the air and directly through walls, windows, doors or ceilings into adjoining spaces.

### Case breakout

The first type of break out noise is generated by high speed or turbulent air in ducts that cause the duct walls to vibrate and radiate a low frequency noise. The second is low frequency noise from a remote source, such as a fan in the AHU and can traverse down the duct into spaces or breaks out through the case or ductwork.

### Duct-borne

Originated at a noise-generating source (i.e. the fan) the noise is carried down the ducted air path to receivers in rooms located remote from the source.

### Self-generated

Produced as air moves through a confined duct system, noise is generated at points of turbulence such as dampers, elbows, T-junctions and air terminal devices. Self-generated noise increases with air velocity and the number of turbulent air points within a system.

### Structure-borne

Generated from rotating or vibrating equipment such as framework or doors, which vibrates part of a building.

### Noise

- Noise produced might be broadband, containing sound energy in several frequency bands, but no audibly distinct components in one frequency band.
- Noise that whines or hums at particular frequencies can produce an audible tone that can be annoying to the receiver.
- In ventilation the rotational fan speed causes an annoying low frequency hum between 100-250 Hz known as fan 'Blade Pass Frequency'.
- The fan 'Blade Pass Frequency' noise can be very intense – varying with the number of blades and rotation velocity.
- Understanding the noise sources and frequency pitches allows for a better understanding of how that particular noise will be transmitted in a real application.

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