HVAC fundamentals

Frequency (Hz)

The number of pressure fluctuations per second, or frequency of the sound is measured in Hertz (Hz). These frequency changes cause pitch changes similar to a musical note having different pitches from different instruments - low frequency has a low tone and high frequency has a high tone.

The normal hearing frequency range for most people extends from a low frequency of about 20-50 Hz (a 'rumbling' sound), up to high frequency of about 10,000 - 15,000 Hz (a 'hissy' sound).

Sounds are typically a combination of a range of different frequencies. It is beneficial to separate the sound levels for different frequencies, in order to show how and at what frequency a particular sound source produces more noise.

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> **Providing information for each frequency band means that noise migration solutions can be tailored to individual products**

Different pieces of electrical equipment and mechanical equipment produce different amounts of low, medium and high frequency noise. Usually low frequency is more difficult to control and therefore more expensive.

When an electrical or mechanical device operates at a constant speed and has some repetitive mechanism, noise can be concentrated at the principle frequency of operation of the device.

In ventilation the rotational fan speed causes an annoying low frequency hum, generally between 100-250 Hz, known as the fan 'Blade Pass Frequency' (BPF). These frequencies are designed 'discrete frequencies' or 'pure tones', when the sounds are clearly tonal in character, where the frequency is usually calculable.

Fan Blade Pass Frequency equation:

BPF = n t / 60

BPF = Blade Pass Frequency (Hz)
n = Rotation velocity (rpm)
t = Number of blades

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