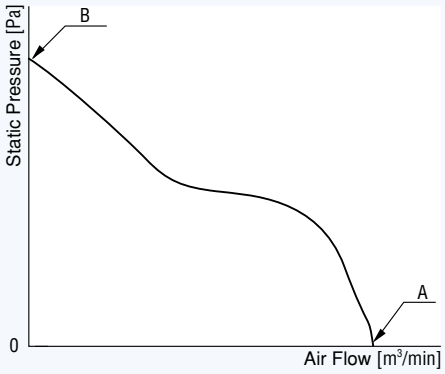
Glossary

For Cooling Fans

1. Air Flow vs. Static Pressure Characteristics

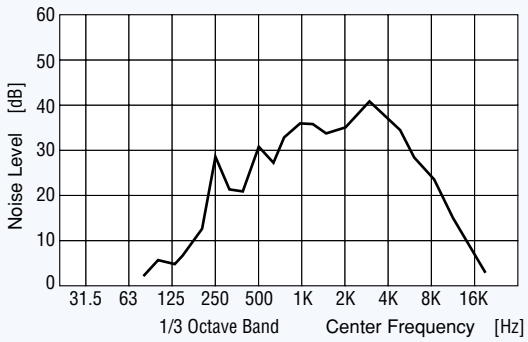
Air flow vs. static pressure curves show the rate of air flow on the horizontal axis and static pressure on the vertical axis. These graphs are used to determine how much static pressure a fan is capable of achieving for a certain rate of air flow. The figure below shows the typical air flow vs. static pressure curve for an axial flow fan. The static pressure (=resistance) is 0 at point A, indicating totally unobstructed air flow. The rate of air flow at this point is called the "maximum air flow". Point B, however, indicates the point where air flow has come to a standstill. This corresponds to the situation where a fan blows into a totally enclosed chamber. The resistance, and therefore the static pressure, reaches its peak value called the "maximum static pressure". In a practical application, the components to be cooled will offer resistance to the air flowing from the fan to the ventilation openings, thus representing a mid-point with respect to the extreme points A and B. These two points, however, are still useful when the characteristics of different fans are to be compared; they are therefore listed with the technical data of all fans.



Air flow - static pressure curve

2. Audible Noise Frequency Analysis

The type of noise that causes concern with is not a pure sound at a particular frequency like one generated by a tuning fork, but rather a composite sound composed of many frequencies. The 1/3 octave band frequency analysis shown in the figure below is used to determine exactly of which frequencies this composite sound consists. An octave is the interval from one frequency to double that frequency. If the frequency is slightly off, the average human ear cannot detect it; only when the frequency is off by about 1/3 of an octave can the difference begin to be heard. The 1/3 octave band frequency analysis measures sound pressure levels for each 1/3 octave interval as an average value and then graphs those measurements. This allows noise analysis data to mimic human hearing.



3. Decibel (dB)

Noise level is expressed in decibel units (dB). This logarithmic scale is used because it is difficult to express the loudness of noise on a linear scale. For example, if 1 represented the minimum noise audible by the human ear, then the maximum bearable level of noise would be about 5,000,000. In contrast, if noise (level of acoustic pressure) is expressed in decibels, then

$$\text{Sound pressure level} = 20 \log P/P_0$$

where,

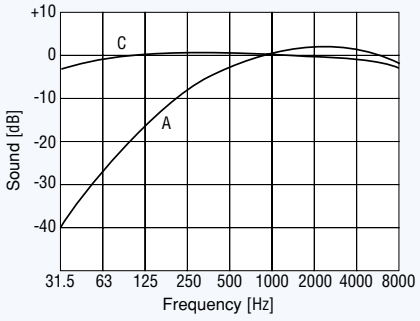
P = Actual acoustic pressure

P_0 = Minimum sound pressure perceptible by the human ear

Therefore, the audible range of sound pressure can be conveniently expressed as 0 ~ 130dB.

4. A Range

It is generally said that the audible range of the human ear is between 20Hz and 20kHz. Another characteristic of human hearing is that sounds at some frequencies are not perceived as loud and irritating. For this reason, an accurate indication of loudness as perceived by the human ear cannot be achieved simply by measuring sound pressure without taking frequency into account. Therefore, measurements of the level of acoustic pressure must be corrected according to frequency in order to accurately reflect human perception of loudness. This corrected range of measured acoustic pressure values is called the A range, which is shown in the graph below. This graph compares the frequency-corrected measured values (A range) with the uncorrected measured values (C range).



Comparison of Sound Pressure Level

5. Flammability Classification

In general, the flammability class of plastic materials used in equipment parts is expressed in UL94 (standard for tests for flammability of plastic materials for parts in devices and appliances). UL standards evaluate flammability in terms of factors such as burning rate after applying a flame and ignition by flaming drops. UL94 classifies flammability as follows.

Classification	Flammability
V-0	High
V-1	↑
V-2	↑
HB	Low

ORIX.FAN uses blades and frames with materials that receive the highest grade in this classification, V-0