

# Glossary of Acoustic Terminology

Noise is defined as unwanted sound, and the unit of measurement is the decibel (dB). Noise levels range from the threshold of hearing at 0dB to levels of over 130 dB at which point the noise becomes painful.

Sound consists of vibrations transmitted to the ear as rapid variations in air pressure. The more rapid the fluctuation the higher the frequency of the sound. However the sensitivity of the human ear varies with frequency. Therefore most every day noise is measured in dB(A), the (A) suffix indicating that the measured level has been modified to allow for this phenomenon. It has been found that changes in noise level when measured in dB(A) most closely correlate with the changes in subjective reaction.

The range of values of pressure over which the ear can hear is enormous and for convenience the decibel scale, which is logarithmic is used as the resulting numbers correspond, generally, to the noise perceived. A change in noise level of 10dB(A) represents a halving or doubling in perceived loudness.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A-1. Typical Sound Levels found in the Environment

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

## A.1

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**dB (decibel)** The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ( $2 \times 10^{-5} \text{Pa}$ ).

**dB(A)** A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

**$L_{Aeq}$**   $L_{Aeq}$  is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.

**$L_{Amax}$**   $L_{Amax}$  is the maximum A - weighted sound pressure level recorded over the period stated.  $L_{Amax}$  is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall  $L_{Aeq}$  noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

**$L_{10}$  &  $L_{90}$**  If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The  $L_n$  indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence  $L_{10}$  is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly,  $L_{90}$  is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the  $L_{10}$  index to describe traffic noise.

**Façade Level** Sound field defined 1 metre from a solid, reflecting surface, such as a building. Typically 2.5 dB higher than a free-field level.

**Free-field Level** A sound field determined at a point away from reflective surfaces other than the level ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.

## **A.2**

### ***Glossary of Vibration Terminology***

**Frequency ( $f$ )** The number of complete oscillations a vibrating particle makes about its rest position in one second, expressed in Hertz.

**Hz** Hertz is the unit of frequency and relates to the number of oscillations per second.

**PPV** The Peak Particle Velocity is the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position, measured in mm/s.