

Why do we want to measure sound or noise?

Firstly we need to define what is sound and noise.

Sound is an energy that is transmitted by pressure waves in air or other materials and is converted by the ear to the sensation of hearing.

Noise is unwanted sound. However this can be subjective: some sounds are considered noise by some but not by others, e.g. certain music, church bells, sounds of playing children, birds, wind, sea, etc. Noise can also be any un-meaningful or unintended sound.

Because noise can be quite subjective, we need a reliable way of quantifying it. To be able to do this we need a reliable piece of equipment that can measure the noise.

This piece of equipment is called a sound level meter; they come in varying shapes and sizes depending on the use and type. However they all consist of three main parts: microphone, filters and display.

The microphone picks up the noise, the filters process the signal from the microphone and the display tells the operator what the level is.

More sophisticated meters can store measurements taken over many days for further analysis. This is quite common for environmental noise measurements. A typical example is road traffic noise, when different road conditions and vehicle densities vary over time.

To try and keep the measurement of sound or noise consistent, there have been many standards developed, covering every aspect of acoustics. For environmental noise measurement in New Zealand we use *Measurement of Sound NZS 6801:1991* and *Assessment of Environmental Sound NZS 6802: 1991*

Acoustics has its own terminologies, abbreviations and symbols, used to define any noise event, which may include the duration, how loud it is and what frequencies the noise was made up of.

- **Decibel (dB)** A logarithmic measurement unit that describes a sound's relative loudness. In sound, decibels generally measure a scale from 0 (the threshold of hearing) to 120-140 dB (the threshold of pain). A 3dB difference equates to a doubling of power.
- **dBA** A weighting filter or weighting curve is a type of linear filter used in audio signal processing to approximate the response of the human ear to a given sound pressure level.
- **SPL** Sound pressure level. The measurement of the amplitude (loudness) of sound. The unit of measurement is the decibel.
- **L_{eq}** Equivalent continuous sound pressure. A measure of the average sound pressure level during a period of time.
- **L_{max}** Maximum Sound Level, the maximum sound level (dB) during a particular noise event or period of time.
- **L₁₀** The sound level exceeded for 10% of the measurement time.
- **L₉₅** The sound level exceeded for 95% of the measurement time.