



Ambient noise

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What can the human ear detect?

The typical hearing range with regard to sound pressure level and frequency is between 20 Hz and 20,000 Hz. The lower frequency is harder to detect. In sound metrics, the A-weighted decibel is used to account this effect. The weighing expresses the frequency in one number, the A-weighted decibel, dB(A). Figure 1 shows common dB(A) sound levels.

Figure 1. Common dB(A) soundlevels (van Deventer2014)

Common outdoor Sound levels	Noise level dB(A)	Common indoor Sound levels
	120	Threshold of pain
Pneumatic hammer	110	
	100	
Diesel truck at 50 feet	90	Food blender
Car at 50 feet	80	
	70	Vacuum cleaner
Urban daytime	60	Group conversation
Urban nighttime	50	
Rural daytime	40	Library
Rural nighttime	30	Whispering
	20	Bedroom at night
	10	
	0	Threshold of hearing

If two sources of noise with equal frequency (Hz) are compared, the human ear will judge the sound with the highest sound pressure level as the sound with the highest loudness (Ruijgrok, 1993). In the case of the A-weighted dB, two sounds of 70 dB(A) give a total sound exposure level of 73 dB(A). The second sound will account for 3 dB(A).

When two sounds are audible with a sound level of 70 dB(A) and 65 dB(A), the total sound exposure level is 1,2dB(A) higher than the highest sound. In this case 71,2 dB(A). Under controlled laboratory settings, a person can barely detect a sound level change of 1 decibel in the mid-frequency range (OAK, 2006). The healthy human ear can detect a change of 3 dB(A) for an ordinary noise. A 5 dB(A) change is noticeable while a 10 decibel change is judged by most people as a doubling of the sound. It is considered that a 3dB(A) change is discernable (OAK, 2006).

Ambient noise

The British Standard (BS4142) defines ambient noise as an all-encompassing sound at a given location, at a given time, usually composed of sounds from different sources near and far (British Standard, 1997). This definition implies that all sounds together form the ambient sound level. The target and background noise are divided in the definition of the World Health Organisation: "The term background noise can be defined as the level of noise that is not the target noise for measurement purposes" (World Health Organisation, 2009). In other words, ambient noise includes any noise, other than that from the target noise source, which is present in the environment.

The level of ambient noise differs between rural and urban locations. This quietness theory assumes that residents who live in quiet areas are the types of people who value quietness. Residents, who choose to live in a city or near a busy highway, are assumed to place less value on quietness and are thus less sensitive to a second noise.

The difference in impact of noise on rural or urban areas is acknowledged in the British Standard (BS4142) for industrial purposes, and is recognised by the International Organisation for Economic Co-operation and Development (OECD) for transportation purposes. The OECD recommends limits on sound levels in dB(A) for transportation noise sources in urban and rural outdoor locations (table 2, page 5).