

This Technical Note is one of four on building envelope acoustics. The series comprises:

TN 37 Introduction to building envelope acoustics

TN 38 Acoustic performance of windows

TN 39 Sound transmission through building envelopes

TN 40 Sound environment behind a building envelope

Introduction

This Technical Note introduces the reader to the basic principles of acoustics that are required to understand the acoustic performance of building envelopes.

Information is given on methods of measurement, material properties and general design principles.

A guide to relevant UK legislation and standards is also given.

Sound and noise

Sound is the human perception of vibrations in the air around us. Noise is unwanted sound.

Noise can be annoying, can interfere with the enjoyment of everyday activities and in the extreme can be harmful. It may also be beneficial at low levels where it can serve to mask sounds and aid privacy.

Sound Characteristics

Sound originates when air is vibrated. It travels outwards from the source as pressure waves just as ripples travel outwards on a still pond.

A “pure” sound is characterised by its frequency and its sound pressure level.

Frequency determines the pitch of the sound. It is the number of vibrations that occur in one second and is measured in Hertz (Hz). The distance between consecutive waves is the wavelength measured in metres.

Sound pressure level (SPL) is a measure of the peak pressure created as a sound pressure wave passes. Sound pressure levels are expressed in decibels (dB), a logarithmic scale.

Decibels

Table 1 below shows typical sound pressure levels in dB.

	Sound pressure level (dB)
Live pop concert	115
Pneumatic drill at 3m	100
Noisy factory	90
Heavily trafficked street	80
Lightly trafficked street	70
Restaurant/store	60
Public office	50
Bedroom at night	30
Recording studio	10
Threshold of hearing	0

Table 1. Sound pressure levels