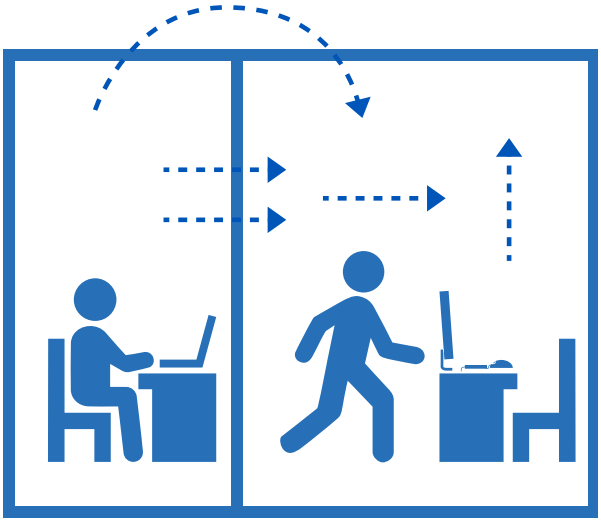
SOUND INSULATION



Sound Insulation* is the measure of how effectively sound is limited when passing through a building element. Sound insulation is important for glazing, partitioning and ceiling systems where the passage of sound from one space to another needs to be controlled.

Two definitions of sound insulation are used depending on the product and its installation; Single Pass and Double Pass:

Single Pass | Sound Reduction

The first of these definitions is sound reduction, which is a measure of how effectively sound is blocked by an element – a 'single pass'. As with sound absorption, it is not the same for all types of sound and is normally worst at the low frequencies. If the sound reduction performance is stated as a single figure it uses the R for reduction and a subscript 'w' which stands for 'weighted'. As such, a Rw figure is a simplified indication of how much direct sound is stopped from getting through a building element. It is used to describe glazing and partitions.

Double Pass | Sound Reduction

In addition to the direct 'straight through' definition, sound insulation is also quantified in terms of a 'flanking' route – the so-called 'double pass'. The abbreviation used is $D^{n}fw$ which means a sound level difference via a flanking route that is normalized and weighted (this supersedes $D^{n}cw$ where the 'c' is an abbreviation for ceiling).

It basically defines how much sound is blocked by passing through the same element twice. This is a relevant metric for ceilings which span more than one room and have a common void.

Sound Insulation Explained

Sound is able to pass through solid elements like doors and partitions. This is possible because the vibrating air particles cause the solid element to vibrate also, albeit on a very small scale. The vibrating element then causes the air particles on the opposite side to vibrate and this is perceived as sound.

It can be intuitively understood that heavier elements will offer more sound insulation because they are more difficult to move (Newton's second law of motion). In fact there are well established relationships between mass/area and sound insulation. Sound energy is dissipated as it moves from one medium to another. For this reason, multi-layered constructions are efficient at providing sound insulation even if they are lightweight.

A plasterboard partition is a good example of a laminate construction which can offer similar sound insulation to an homogeneous element that is much heavier, like a concrete block wall.

*** Please Note:** Sound Insulation is sometimes referred to as Sound Attenuation.
line with a doubling of 'visible' area. This argument ignores the importance of where a raft or baffle is placed within a room.