

**Modular Wall**  
systems

# Human Perception of Sound

The threshold of perception of the human ear is approximately three decibels, and a five-decibel change is considered to be clearly noticeable to the ear. This is primarily due to the logarithmic measuring metric typically associated with decibels.

As the table below demonstrates, a 10-decibel change would be perceived to be twice as loud.

Perceived Change in Decibel Levels	
Change in Sound Level	Perceived change to the Human Ear
± 1dB	Not Perceptible
± 3dB	Threshold of Perception
± 5dB	Clearly Noticeable
±10dB	Twice (or Half) as Loud
± 20dB	Fourfold (4x) change

## DISTANCE ATTENUATION ESTIMATIONS

When the distance is doubled from a Line source the sound level decreases three decibels.

Example:

If a sound level is: 70 decibels at 15 meters it will be  
67 decibels at 30 meters, and  
64 decibels at 60 meters.

When the distance is doubled from a Point source the sound level decreases six decibels.

Example:

If a sound level is: 95 decibels at 15 meters it will be  
89 decibels at 30 meters, and  
83 decibels at 60 meters.

## SIMPLIFIED UNDERSTANDING OF DECIBEL SCALES

The following is a simplified explanation on how to understand Decibel (dB) ratings and how the number (i.e. 50 dB) relates to a common noise we can associate with, in our environment.

On the decibel scale, the smallest audible sound (near total silence) is 0 dB. A sound 10 times more powerful is 10 dB. A sound 100 times more powerful than near total silence is 20 dB. A sound 1,000 times more powerful than near total silence is 30 dB. Here are some common sounds and their decibel ratings:

Any sound above 85 dB can cause hearing loss, and the loss is related both to the power of the sound as well as the length of exposure.

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You know that you are listening to an 85-dB sound if you have to raise your voice to be heard by somebody else.

Eight hours of 90-dB sound can cause damage to your ears; any exposure to 140-dB sound causes immediate damage (and causes actual pain).

### **DECIBEL LEVELS OF COMMON NOISE SOURCES**

Many different properties affect the noise level of a specific source type. For example, three lawn mowers may have three different noise levels because of differences in each specific piece of equipment. Noise level also depends on the distance from the noise source and the attenuation of the surrounding environment.

<b>Decibel Levels of Common Sounds</b>	
140dB	Jet Engine at 5 metres
130dB	Jet Aircraft at 100 metres
120dB	Rock Concert
110dB	Pneumatic Chipper
100dB	Jointer/Planer
90dB	Chainsaw
80dB	Heavy Truck Traffic
70dB	Business Office
60dB	Conversational Speech
50dB	Library
40dB	Bedroom
30dB	Secluded Woods
20db	Whisper

### **RULES OF THUMB**

#### **WHEN A SOUND INCREASES BY 10 DECIBELS, THE SUBJECTIVE RESPONSE IS A DOUBLING OF LOUDNESS**

Example:

60 decibels to 70 decibels = twice as loud

PERCEIVED CHANGE IN LOUDNESS

+ 1 dB - UNNOTICEABLE

+ 3 dB - BARELY PERCEPTIBLE

+ 5 dB - QUITE NOTICEABLE

+10 dB - SOUNDS TWICE AS LOUD

+20 dB - SOUNDS FOUR TIMES AS LOUD

#### **WHEN THE DISTANCE IS DOUBLED FROM A "POINT" SOURCE, THE SOUND LEVEL DECREASES BY SIX DECIBELS**

Example:

15 meters = 60 decibels

30 meters = 54 decibels

60 meters= 48 decibels

## WHEN THE DISTANCE IS DOUBLED FROM A “LINE” SOURCE THE SOUND LEVEL DECREASES BY THREE DECIBELS

Example:

15 meters = 70 decibels

30 meters = 67 decibels

60 meters = 64 decibels

## A DOUBLING OF ENERGY YIELDS AN INCREASE OF THREE DECIBELS

Example:

85 decibels + 3 decibels = 88 decibels

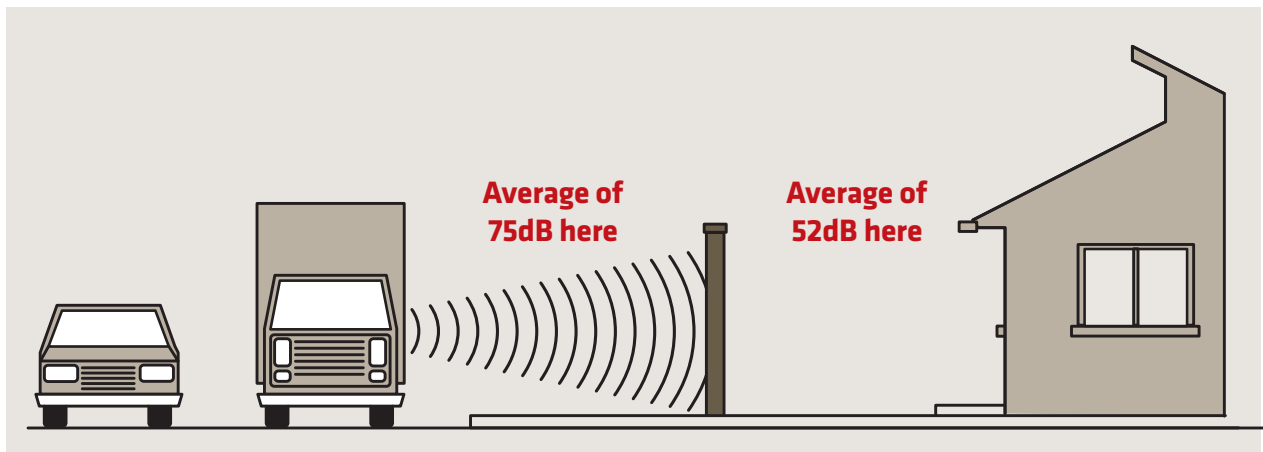
## DECIBEL LEVELS OF COMMON NOISE SOURCES

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## WHAT DOES THIS MEAN FOR YOU!?

On average you will achieve somewhere in the order of a 20+ dB (subject to many varying factors) reduction with an appropriate height Modular wall from say a four lane road generating normal traffic noise.

Based upon actual ‘in field testing’ you can see the results illustrated below.



**The 23dB reduction depicted above means you will notice a minimum FOUR fold reduction in the noise level on the inside of the wall!**

Further ‘Real World’ examples can be viewed on PDF attachment ‘Acoustic Field test’.