Understanding Glass Partition Acoustics

Optima

About us

Founded in 1986, Optima is a world-leading designer, manufacturer and installer of glass partitions and doors, with manufacturing sites in the UK and Malaysia. With an international reach, we have offices throughout Europe, the Middle East and the APAC region.

Dedicated to innovation, the company's expert team of in-house technical designers and project managers are on hand to ensure its glass partition systems work seamlessly to achieve the design and specification standards of your project. From acoustics to fire-rated glass, the company has a range of glazed solutions for office, education and commercial projects. With a focus on design excellence, quality of product, outstanding customer service and a reputation that is second to none in the industry, Optima continues to set the standard for glass partitioning and consistently delivers award-winning projects on-time and within budget. Optima operates worldwide and is proud to have worked with some of the world's leading design practices, and in many iconic buildings.

Overview

This eBook provides an overview of the sound insulation of partitions and doors to help readers develop an understanding of the following:

- What is noise and how is it measured?
- How do we manage noise?
- What level of sound insulation is actually needed?
- How and why do we test in a laboratory?
- Unraveling and presenting the test data
- What if the partition has a door in it?
- Delivering acoustics on-site

What is noise?

A sound, especially one that is loud or unpleasant or that is annoying and causes disturbance.

In order to express levels of sound, noise levels are measured in **decibels dB(A).**

How loud is loud?

0 dB(A)	near total silence
15 dB(A)	whisper
40-50 dB(A)	private office
50-60 dB(A)	normal conversation
70 dB(A)	busy office
75 dB(A)	classroom
90 dB(A)	shouting

The smallest audible sound, or near total silence is 0 dB, a whisper is 15 dB whilst normal conversation levels vary between 50 and 60 dB. At the higher end of the range shouting is around 90 dB and a car horn can be 110 dB.

Don’t forget!

A doubling of sound source does not mean twice the noise level.

How do we manage noise?

It’s important to use materials which will achieve good acoustics. Whether it is a busy circulation space or a private office, a material should either keep the noise out or the noise in. In other words, we need to prevent noise intrusion from a busy circulation space into a private office, whilst at the same time preventing privacy loss from the office to external space, or from one office to another.

There are three main considerations for managing noise:

1. Background noise levels
2. Absorptive surfaces, such as ceilings, wall panels and carpets
3. The sound insulating qualities of the dividing partition

1 Background noise levels

It's important to consider the types of noise in your environment and what the actual requirements are for managing the different sounds.

Background noise can be environmental such as traffic or bioacoustic, for example people talking, noise from animals or birds and mechanical noise from devices such as air conditioning, fridges or power supplies. Sometimes background noise in an office can be conducive to a comfortable working environment whereas other noises will need to be dealt with.

2 Absorptive surfaces

Sound absorption is the loss of sound energy when sound waves come into contact with an absorbent material such as ceilings, acoustic wall panels, carpets, soft furnishings and even people. As a result, the sound is not reflected back into the space. When sound hits the surface of a material, some will be reflected, some will be absorbed by the material and some will be transmitted through it. For instance insulated fabric panels can have a significant effect on the sound reduction in a room.

According to the International WELL Building Institute, the intent of sound reducing surfaces is to reduce sound reverberation and maintain comfortable sound levels through absorptive ceiling and wall surfaces. Good design takes into account absorptive surfaces in order to manage sound transmission. The sound absorption classes are designated A-E where absorption class A has the highest sound absorption.

3 Sound insulating qualities

The prevention of the passage of sound from one space to another is known at attenuation. The ability of a partition or door to prevent the passage of airborne sound is known as the sound insulation, and is normally referred to as the Sound Reduction Index (SRI).

The SRI is measured by testing a partition sample for resistance to the passage of airborne sound in an acoustic laboratory in accordance with EN ISO 10140-1 and 2. The result is expressed in dB(R_w) in accordance with EN ISO 717-1.

What level of sound insulation performance is actually needed?

The level of sound insulation performance needed varies depending on many factors; project requirements, client preferences and employee wellbeing for example.

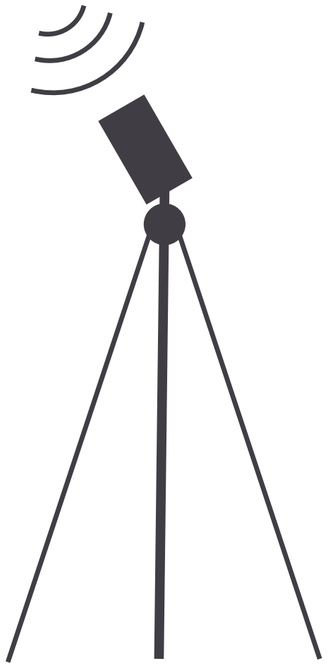
BREEAM or WELL can provide general guidance for the level of acoustic performance required. Acoustic consultants are able to advise on specific projects and clients may provide specifications.

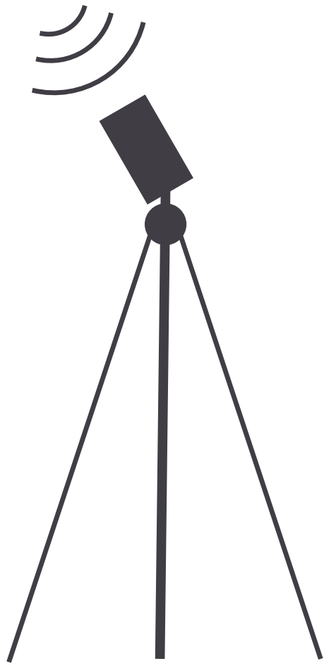
Performance may be specified using either a laboratory value R_w or as a site measured sound level difference D_w.

"Privacy between offices and between an office and an occupied space requires effective insulation and moderate background noise to mask intruding speech. In order to achieve unintelligible speech from another office, the minimum sound insulation between offices needs to be approx. D_w = 38 dB. Where privacy is important the minimum sound insulation should be D_w = 48 dB." - BREEAM

How and why do we test in a laboratory?

Controlled laboratory conditions allow the direct comparison of similar products in two acoustically isolated rooms – the **source room** and the **receiving room**. Between the two rooms is the testing aperture, into which the partition sample is installed.





Noise from a sound source is measured across a proscribed frequency spectrum in both source and receiving rooms. The difference between the two measurements is the Sound Reduction Index (SRI)

Remember!
With SRI values, the bigger the difference, the better the performance. So, the higher the SRI, the better the performance. Results are expressed as a **dB(R_w)** rating for a partition system or door.

Unravelling different acoustic test data

- Make sure the test certificate states that the sample size applies to a properly dimensioned partition, rather than a small window-sized sample (test data for glass only is not representative of a fully glazed partitioning system)
- Modelling software can provide a guide to acoustic performance but this acoustic rating data is not proof of actual performance and has a high margin of error
- For an acoustic rating to be credible make sure it has been obtained from a UKAS accredited laboratory

Don’t forget!
Data that relates to a test of a sample that is not exactly the same as the specified partition will not necessarily give the same performance in practice.

Presenting the test data

Test data should include the following:

- A full set of data with the graph and the weighted SRI
- A technical description of the sample tested
- The date of the test and laboratory test reference
- The test specimen area (m^2), showing full-sized partition

What if the partition has a door in it?

When a partition has a door in it, it is possible to merge the performance of the partition with that of the door to get an approximate composite value.

For example, a partition with an overall width of **3 metres**, a door with an acoustic rating of **41 dB(R_w)** and a screen with an acoustic rating of **51 dB(R_w)** will result in the composite value of **45 dB(R_w)**.

To ensure an effective sound reduction a continuous drop down seal at the base of the door is essential.

Our extensive research and development has lead to pioneering glass doors which have fewer weak points. With the acoustic performance of glass doors now on a par with timber doors and partitions, they have become a practical and popular choice for specifiers.

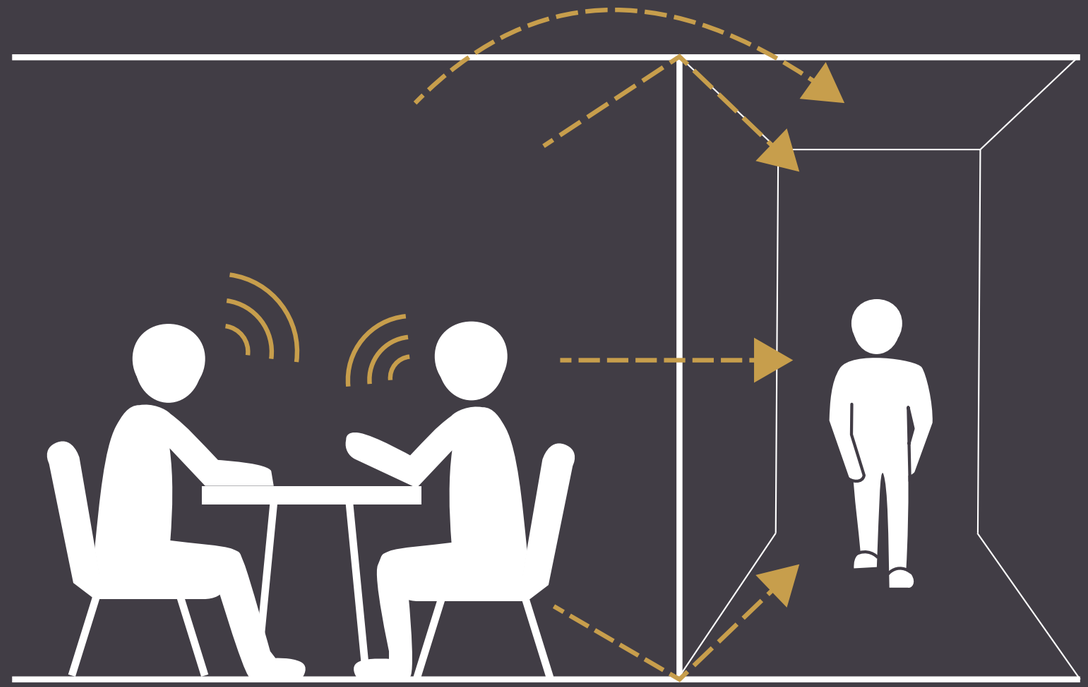
Delivering acoustics on-site

This is referred to as a dB(D_w) rating. There are a number of factors in an interior fit-out that can cause the partition performance to appear lower than specified.

Sound will not only pass through the partition but it will also pass around the partition by way of the ceiling, the floor, the adjacent structure and any common mechanical and electrical services.

This is known as flanking transmission.

Although it cannot be avoided completely, by consulting an acoustic expert and identifying your unique project needs, flanking can be minimised.



Summary

Understanding the fundamentals of glass partition acoustics enables you to accurately compare the effectiveness of a wide range of products. Remember, when defining the acoustic performance required within a design, the dB(R_w) value is the result of a laboratory test and you should ensure this is a full size test. The D_w value is measured on-site and will normally be lower than that taken from the laboratory for various reasons. It's important to take not only the laboratory tested values for sound reduction when designing and predicting office acoustics. Take into consideration the complete office environment such as background noise, absorptive surfaces and other sound insulating qualities.

The more you know, the better prepared you will be when specifying.

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Want to find out more?

Book our RIBA approved CPD
“Understanding Partition Acoustics”

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