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SOUNDPROOFING

Sports halls acoustics can be particularly harsh. Sports halls and gymnasiums spaces are normally oversized, hollow and comprised of durable, yet hard and reflective surfaces. The result is an echo chamber of harsh noise, with reverberation times that can easily reach over 5 seconds. Throw into the mix large crowds, a highly vocal environment and intense sporting activity and you can have a very hostile sound environment. Poor sports hall acoustics can mean that instructors are unable to be heard, personal training sessions can lack privacy, and an unfriendly user environment is created. Additional challenges are posed to school sports halls, which must meet strict BB93 compliance guidelines and should create acoustic comfort for a multitude of uses – assemblies, plays and exams etc.

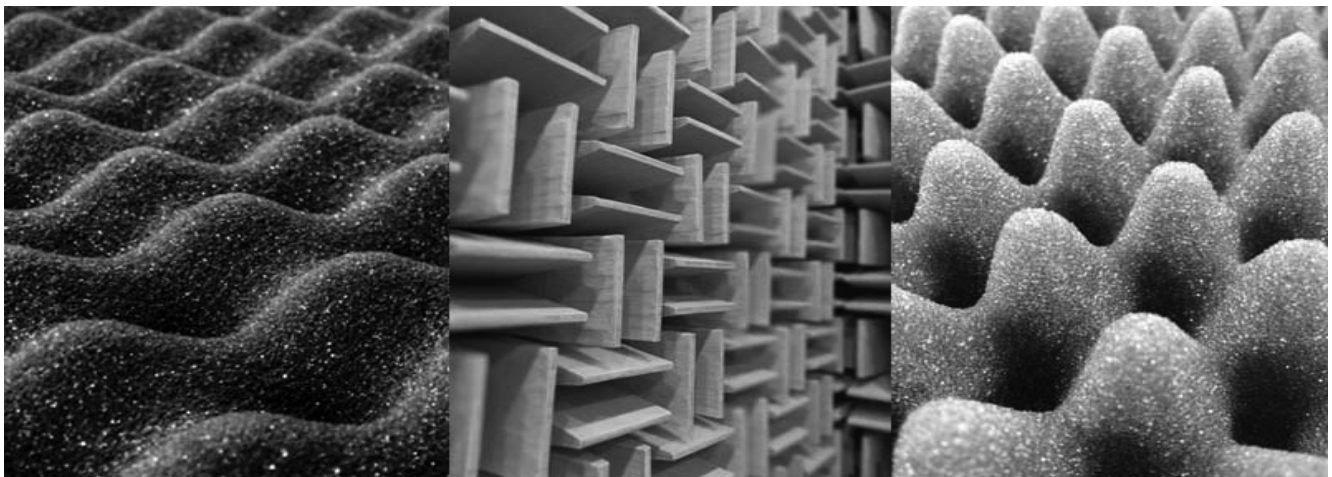
How Do Wall & Ceiling Panels Work In Sports Halls?

The most simple and cost effective way to reduce noise in a sports hall is through the installation of sports

hall acoustic wall panels or ceiling panels. The correct concentration and placement of panels minimises the number of hard, reverberant surfaces in sports halls and can trap up to 90% of background noise. Depending on the size, design and pre-existing noise environment of the sports hall in question, a bespoke acoustic panelling solution should be installed.

Resonics offers a free assessment survey of your space that includes a calculation of the reverberation time in the room. This will help determine the correct materials – and their distribution and quantity – needed in order to deliver the perfect sound environment.

The tailored installation will capture the correct amount of reverberant noise to the acceptable level of below 1.5 seconds for sports halls. Acoustic wall panels and ceiling panels in sports halls muffle noise upon impact, reducing the ability of sound waves to reach other reverberant surfaces and extend reverberation time.





that you can choose from, for various applications.

Each of these materials has different best use scenarios, and they work by means of one or more of the soundproofing principles outlined above.

Let's go over them in more detail to highlight key aspects of the material and how and when they are best used:

Acoustic Isolation Membrane

There are quite a few 'acoustic membranes' on the marketplace, with some being better than others.

The most advanced membrane in this category is the unique Acoustiblok Isolation Membrane which is the thinnest and highest performing material available, mm for mm.

It is considerably lighter and enables a higher thermal conversion of energy from an acoustic energy into a less problematic heat energy and transfer through itself.

This material which is available in 3mm and 6mm thicknesses, is commonly installed within walls, ceilings and floors to mitigate airborne and impact sound.

Remarkably, it helps to block sound transfer more effectively than a sheet of lead and is ideal for sound insulation.

It is polymer-based and thus very flexible, adaptable and easy to install.

It offers effective acoustic insulation without increasing the thickness of walls or ceiling, or loading with excessive weight for example.

Some other materials are known as Mass Loaded Vinyl (MLV) which are simply a rubber compound impregnated to increase mass and density. These are much heavier materials and rely heavily on a deflective principle.

Open Cell Cavity Insulation

This material is typically installed into cavities, and tends



Thermal Conversion

Acoustiblok Isolation Membrane is a material which works by converting sound energy into trace heat energy.

When sound waves come into contact with the membrane, it vibrates the molecules of the materials which in turn creates friction which is cleverly converted to a trace heat energy.

Thus the material works by converting a more problematic acoustic energy into a less problematic heat energy which is simply transferred through the material sideways to reduce flanking transmissions.

In any serious or advanced strategy to isolate sound, this is an absolute must to work in tandem with the other principles.

At only 3mm thick, the depth of the material is hardly noticeable in the grand scheme of things, but the benefits to uplift acoustic performance are immense.

The material has an optimum balance of mass and flexibility, however it does not rely only on its mass for acoustic performance, making it a unique and standalone sound proofing material.

Constrained Layer Damping

Constrained layer damping is a principle of using specific materials in particular ratios to reduce the natural resonant frequencies of the structure, thus reducing the resulting flanking transmissions through from one side of the structure to the other.

Damping compounds are effective when applied between two rigid panels, such as drywall or plasterboard for example.

As a result, when the sound hits it, shearing forces between the panels creates friction in the damping layer and the sound ceases as it is converted to heat, in essence thermal conversion occurs.

This solution is ideal for low-frequency noises.

These essential principles of soundproofing outlined above work independently of each other, but can also complement one another.

Often, combining different methods by using two, three, four or more of these principles offers the best results.

Types of Soundproofing Materials

There's an extensive list of soundproofing materials



Soundproof Windows

Soundproof Doors

Acoustic Panels

Acoustic Fabrics

Acoustic Foam

30 Best Soundproofing Materials

1. Acoustic Membrane
2. Acoustic Mineral Wool Cavity Insulation
3. Fibreglass
4. Resilient Channels
5. Acoustic Hangers (Mounts)
6. Soundproof Drywall (Plasterboard)
7. Dense Board (OSB, Plywood, Particle Board, Fire Board)
8. Soundproof Floor Underlay
9. Anti-Vibration Soundproof Floor Mats
10. Acoustic Sealants
11. Acoustic Caulk
12. Acoustic Putty
13. Acoustic Plaster
14. Soundproof Spray
15. Soundproof Paint
16. Soundproof Wallpaper
17. Acoustic Wall Covering
18. Acoustic Glass (Soundproof Windows & Frames)
19. Soundproof Doors / Frames
20. Door Seals, Sweeps & Gaskets
21. Acoustic Foam
22. Sound Absorber Panels
23. Acoustic Ceiling Systems & Tiles
24. Soundproof Curtains
25. Soundproof Blankets
26. Furniture & Finishings
27. Acoustic Fencing (External)
28. Acoustic Absorber Panels (External)
29. Industrial Acoustic Soundproof Panels
30. Acoustic Louvres

Soundproofing vs Sound Absorption

Before exploring soundproofing materials, it is advised to firstly understand the key differences between sound absorption and soundproofing.

It's a common misconception to think that sound absorption is the same as soundproofing.

In reality they are not one and the same.

Sound absorption is in actual fact one element of sound proofing and is used in two ways:

The result is restored auditory clarity. The installation may call for wall panels to be installed on opposing walls to eliminate the possibility of slapback echoes travelling through dead space.

Soundproofing is a specialism that revolves around effectively controlling unwanted noise, with various soundproofing materials used to mitigate the effects of noise.

Anything from people who want a quieter home and tranquility from noisy next door neighbours, to businesses who need to reduce the noise impact that they make on surrounding areas, soundproofing comes with a long list of causes and solutions.

In fact, there are a myriad of soundproofing materials that one can choose from to apply to different uses.

Some are more suitable or effective than others, which greatly depends on the type of noise created, the source of the noise, the structure of the building, wall construction, and various other key factors.

To understand soundproofing materials and how they perform, it is important to mention that sound is a form of energy.

Sound travels from a source, and during the distance that it travels it causes vibrations whenever it hits air and any objects in its path.

These sound waves then reach the recipient's ears and stimulate the brain.

Soundproofing materials work to reduce the sound pressure created from the source to the receptor.

In this in-depth article, we'll explore the 30 best known soundproofing materials in more detail, how they perform and where they are best used.

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These panels are another type of sound absorption board, commonly referred to as AcoustiCloud Panels and AcoustiWall Absorber Panels and are installed invariably on the surface or near the surface of ceilings and walls.

Again these are used more so for controlling internal acoustics to equalise and calibrate.

They are reasonably effective when positioned correctly and cover sufficient volume and surface area as well as being aesthetically pleasing on the eye.

Acoustic panels are seen as a decorative alternative to acoustic foam and come in a range of colours, shapes and designs.

Acoustic Fabrics

Typically used for theatre curtains, blackout curtains and studio blankets, acoustic fabrics are a very thick type of fabric which are effective when it comes to dealing with acoustics in large rooms or halls.

They are also used as a wall lining to increase acoustic equalisation within rooms such as cinemas.

Acoustic Foam

Acoustic foam, also commonly known as Studio Foam, is wall mounted foam panels that can be flat, chamfered, convoluted, wedged or have pyramidal shapes protruding from them.

They mostly help to improve audio quality in studios and music rooms.

Acoustic foam works on the principle of sound absorption and re-calibration of internal acoustics, and so they are not as effective as other materials when it comes to blocking sound.

They should make a noticeable difference to internal acoustics and the audible values, but if you are looking for a sound blocking solution, there are far better materials you should consider.

It's important to note that the thickness and densities of these foams vary, which in conjunction with correct positioning, plays a significant part in their effectiveness and performance.

You should also take into account the type and amount of surface area to be covered.

We will read in the next issue of the magazine::

30 Best Soundproofing Materials

to be made from rock wool, stone wool, mineral wool or fibreglass. QuietFibre is an example of a stone wool. They are designed to fit snugly between wall studs, ceilings and floors and uses the principle of sound absorption.

By doing so they will effectively pack out the airspace usually found in these areas, and so the transmission of sounds are impeded or considerably reduced by their presence.

Decoupling Products

Based on the principle of decoupling materials through which sound is transmitted.

Resilient Channels – there are varying types from simple timber battens to aluminium metal rails that are specially designed to lay over soundproofing insulation once they are mounted across wall studs or ceiling joists.

Acoustic Hangers – which are isolation mounts which mechanically fix to the main structure and act as a gasket between the structure and the resilient channel / cross batten.

Acoustic Flooring

The principle of decoupling comes into play here.

This material is used to decouple the main floor surface from the subfloor, and thus reduce noise transmission.

Common materials for acoustic flooring include Acoustiblok, rubber based crumb, cork and felt for example.

Soundproof Windows

Specialist types of soundproof windows use the principle of decoupling to reduce the sound that enters or leaves a room where installed.

These windows typically have thick glass panes and a layer of air trapped in between each layer.

Soundproof Doors

This is another type of architectural soundproofing solution.

Much like soundproof windows, soundproof doors are designed to use the principle of increased depth and mass as well as decoupling to reduce sound transmission.

Acoustic Panels



so effective with impact noise such as foot fall, which is usually associated with stronger power, pressure and therefore vibration.

As sound waves strike the mass and dense materials, vibration will occur and in doing so will pass the energy from one side to the other through the materials' own rigidity.

This is the principle of flanking transmission noise – a common problem with all structural scenarios.

Absorption

Open cell woven types of material such as QuietFibre Stone Wool Cavity Insulation, which provides a soaking up or absorption of the acoustic energy entering it.

These are available in differing thicknesses and densities for an increasing effect and are usually installed in open cavities where the depth of material can be tolerated.

Not only do these types of absorptive materials offer absorption, but it is also important to know that by filling a cavity they can also prevent the potential of additional resonance, reverberation or amplification of sound waves that could be created if the cavity were to be left completely empty.

Decoupling

The principle of decoupling is to reduce the area of direct mechanical linkage between the substrate or structure, say for example of a wall, and the finishing materials.

This process is a way of interrupting sound vibrations or flanking transmissions that travel through the structures' own connectivity or rigidity from one side to the other.

This may well be by a complete decoupling of an internal structure such as what is commonly called a 'room within a room' or a 'cell within a cell' or may simply be a decoupling by counter battening or resilient channels.

A good example is the use of acoustic brackets, acoustic hangers or resilient channels, which will help to decouple drywall from the rest of the building's structure.

As a result, the strength of the acoustic vibrations are reduced, thus slowing their potential passage through the wall.

Decoupling is best done during the construction phase of a building.

Firstly, as part of a soundproofing system, as a material which is invariably added within a structure such as between the voids created in a stud wall, which can reverberate sound, adding sound absorption can prevent this.

Secondly, when sound absorbing materials are added to the surface of a wall or ceiling, it absorbs sound waves and reduces resonance and regeneration of the sound back into the room.

In doing so, improves the acoustics of a room which is called acoustic calibration.

For example, a noisy restaurant with hard surfaces typical of industrial influenced design of today's trendy eateries, can result in a cacophony of sound from clattering cutlery and chattering diners.

This noise can be softened with panels of sound absorbing materials which equalize and balance the internal acoustics of a room which is acoustic calibration. Hopefully this explanation is reasonably clear, but in a nutshell, sound 'absorbing' materials reduce the resonance and reverberation of sound waves within a space or room.

Sound 'proofing' materials prevent sound waves from passing in or out of the room.

Key Principles of Soundproofing

Soundproofing is acoustic isolation – the prevention of sound waves passing in or out of a room.

In order to understand soundproofing or acoustic isolation, it is best to start by highlighting the key principles, namely:

Deflection

Deflection of sound is achieved by adding mass and density to any structure such as a wall, floor or ceiling.

All solid materials which have a thick consistency and are dense or somewhat heavy, can help to block sound. By adding mass and dense materials between the source of the sound and the receiving point will offer additional bulk that the sound wave will have to pass through and in doing so will reduce its energy.

Increased mass and density of a wall 's construction can be achieved with concrete for example, or dense finishing boards such as ply, OSB, drywall or plasterboard.

Deflection with mass and density proves more effective with airborne sounds such as voices or music, and not