

acoustic**comfort**<sup>™</sup>  
NOISE CONTROL FOR YOUR OFFICE



**reverb**  
SOUND ABSORBING SOLUTIONS

Provided by  
**screen**solutions****<sup>®</sup>

# reverb



## **A high quality, aesthetic solution to reduce noise and reverberation.**

Reverb is designed to significantly reduce reverberation and noise in enclosed spaces. This is achieved through an ability to absorb sound highly efficiently, enabling it to create clarity in challenging environments.

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# 72%

of workers are dissatisfied with their speech privacy.

University of California at Berkeley study

# 64%

of office workers are interrupted up to 20 times a day.

Brother research

# 70%

of workers said they could be more productive in a less noisy office environment.

ASID study

# Reverberation: how it affects us all

Today's modern workplace is now an open plan area covered with smooth, hard materials such as marble, Corrian, glass, laminates, painted plasterboard and wooden flooring. It may give a great interior aesthetic but these surfaces also provide the ideal conditions for sound to travel.

## Reverberation in open plan environments

The problem with hard surfaces is that they reflect virtually all of the sound energy that hits them. It bounces backwards and forward across the space many times until it finally dissipates.

In highly populated spaces where numerous conversations are taking place, such as a busy restaurant or call centre, the noise level is often too high.

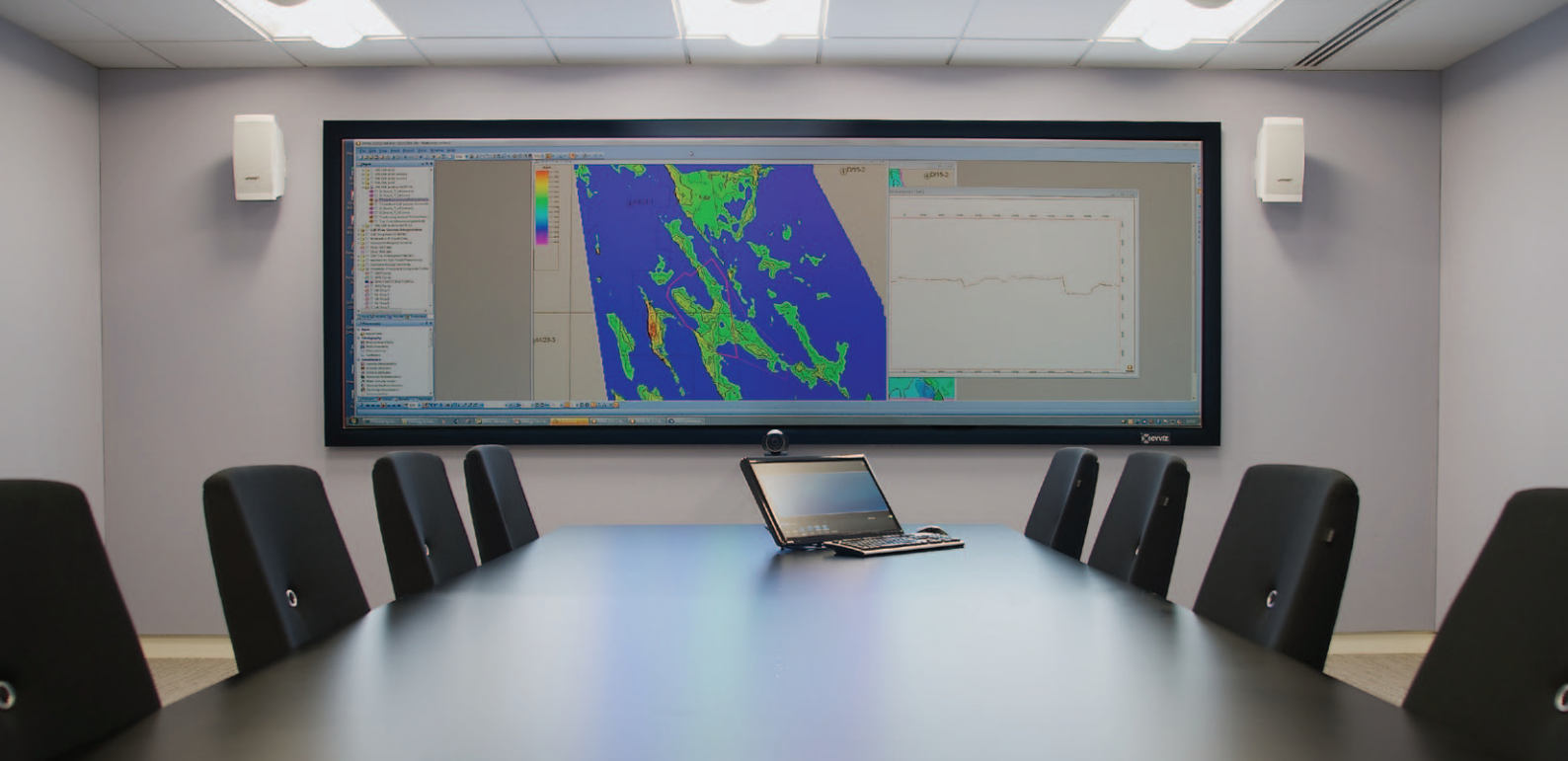
Take two individuals conversing at a normal speaking volume in an office as an example. If another couple start their own conversation, they will raise their volume a little to make themselves heard above the first conversation. This in turn makes the first pair raise theirs to compete. This involuntary tendency of speakers to increase the intensity of their voice to make themselves heard is known as the Lombard Effect.

As more people converse the space soon fills with large numbers trying to speak and listen at the same time. Eventually a volume level is reached where no one can hear properly due to the high background noise level created by all the conversations.

In quiet spaces with a low background noise level, like a library, the reverse happens. As soon as someone starts talking the sound energy created bounces around the space, making the conversation intelligible over long distances. This results in the other occupants in the space receiving unwanted information, disrupting their concentration.

To overcome both these situations the human brain needs to use more of its metabolic energy to shut out the unwanted information and concentrate on the task in hand. People subjected to this kind of environment for long periods find themselves mentally exhausted with adverse affects on their health.





## Reverberation in conferencing

Communicating via video conferencing means businesses can reduce travel expenditure, whilst still enabling staff in different locations to see and communicate with each other without leaving their offices.

But to make sure the experience is effective and that equipment provides clarity for both the speaker and the listener, the reverberation time of these video conferencing rooms should be no higher than 0.5 seconds.

Higher than this and the sensitive microphones will capture not only the speakers voice but all the reflected sounds of the speakers voice from any hard surfaces in the room. Although only milliseconds apart, the equipment will continue sending these signals resulting in the listener receiving a distorted signal that is difficult to understand.

With their brain struggling to convert this poor quality signal into audible

speech the listener will begin to turn off and become detached from the process, negating potential benefits to the business.

Any space containing a presenter and listeners can suffer from this issue. Using Reverb reduces reverberation time to acceptable levels which benefits spaces like classrooms, lecture theatres, training rooms, board rooms and auditoriums.

### Why is reverberation so undesirable?

Reverberation can make it difficult to hear speech. If the reverberation from one syllable overlaps the next syllable it may make it impossible to hear. For instance, "cat", "cab", and "cap", will all sound the same.

In a room with multiple occupants all talking at the same time this problem is amplified further and it may become extremely difficult to hold a clearly understood conversation. Add in other common office noises from electronic equipment and air conditioning systems and workers quickly find it leads to a general annoyance and frustration in their working lives.



# Create clarity in challenging environments

From boardrooms to ballrooms, classrooms to lecture halls, Reverb is unobtrusive yet flexible enough to meet virtually any requirement or application.



## Features

- Excellent sound absorbency properties.
- Reverb 50 is A rated – the highest possible class.
- Fully printable with graphics and images.
- Seamless construction allows entire walls to be covered without joins.
- Surfaces that may be covered by Reverb are unlimited in size.
- Easily changed outer fabric – no need to remove the system from the wall.
- Designed to look discreet and blend into any environment.
- No visible frame – all fabric is wrapped and tucked in.
- Stain resistant – any spillages and marks can be easily wiped away.
- Class 1 fire rated (subject to the choice of fabric).

## Options

Available in two product types

- Reverb Panels: for cladding walls and ceilings.
- Reverb Art: individually framed wall art.

Available in two thickness

- Reverb 50 (50mm thickness, ISO 354:2003 class A rated).
- Reverb 25 (25mm thickness, ISO 354:2003 class B rated).



Sleepy, Sneezzy and the other one. Russ Tamblin and Bros. Yul, Steve, Charles, James, Robert, Brad and Horst. Wrath, Greed, Sloth, Pride, Lust, Envy and Gluttony. Kurosawa and Co. Enid's kids. Youssou's timeframe. Celestial perfection. Freddie's water works. Brad and Morgan. The full spectrum. Magpie's confidence. Terrain of an empire. Creation schedule. Nation's renegades. Norma's irritation. Sean, David, George, Roger, Timothy, Pierce and Daniel. Duran's shabby cat. Bowie's Eastern visit. Bashful!



## reverb PANELS

Acoustic cladding for walls and ceilings with a fully printable outer fabric.

## reverb ART

Individually framed acoustic wall art printed with your own choice of images.

# Discover Reverb

Reverb is available in two product types, providing a choice of solutions that meet individual acoustic and aesthetic requirements. Both are available in either 50mm or 25mm thicknesses.

## Use Reverb in...

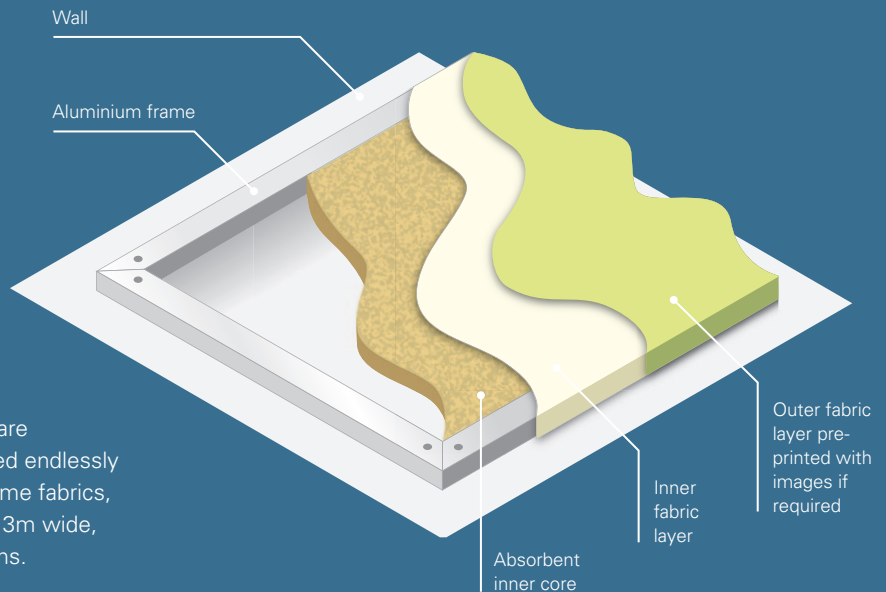
- ✓ Atriums
- ✓ Board rooms
- ✓ Ballrooms
- ✓ Broadcasting areas
- ✓ Cinemas
- ✓ Classrooms
- ✓ Conference rooms
- ✓ Court rooms
- ✓ Dining rooms
- ✓ Restaurants
- ✓ Editing studios
- ✓ Elevator lobbies
- ✓ Feature walls
- ✓ Foyers
- ✓ Reception
- ✓ Hospital wards
- ✓ Lecture halls
- ✓ Meeting rooms
- ✓ Recording studios
- ✓ Open & closed offices



## Construction

The Reverb system comprises a number of extruded sections, an absorbing core and a fabric covering. The covering fabric allows customers the choice from a huge variety of colours and textures. Acoustic Comfort will advise on suitability of fabrics for both acoustics and fire rating.

The surfaces that may be covered by Reverb are unlimited in size. The system may be expanded endlessly but costs vary depending on fabric widths. Some fabrics, including printed solutions, are available up to 3m wide, allowing whole walls to be treated without joins.

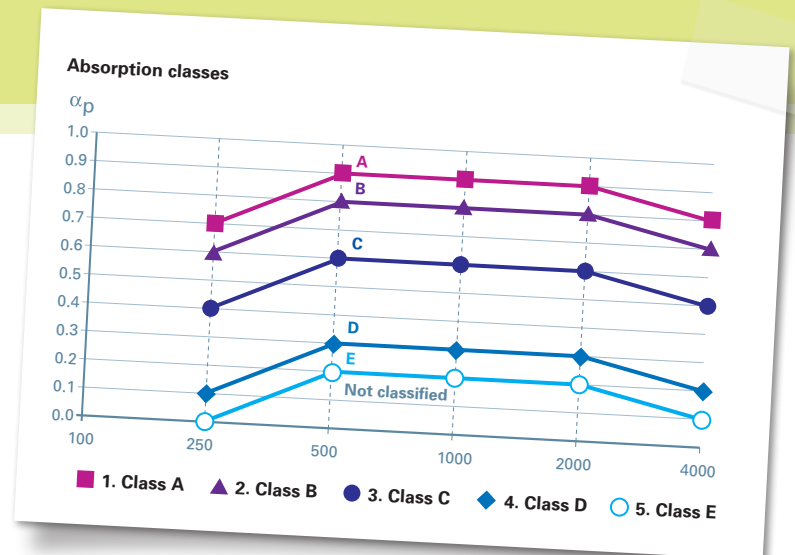


## Acoustic performance

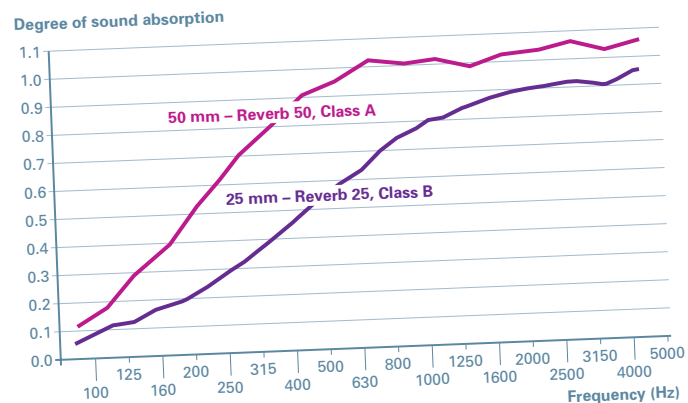
Reverb has been rated according to ISO 364:2003. This international standard specifies a method of measuring the sound absorption coefficient of acoustical materials used as wall or ceiling treatments, or the equivalent sound absorption area of objects, such as furniture, persons or space absorbers, in a reverberation room.

Using this standard, materials are given an absorption class rating on a scale of A to E, with classes A to C generally preferred when improving acoustic performance in a room. Reverb 50 has obtained the highest possible class A rating and Reverb 25 a class B rating.

By using materials with a better absorption class (Class A or Class B) the required minimum surface area of the absorption material is reduced. These results can be used for direct comparison between materials and are very useful for design calculation with respect to room acoustics and noise control.



**Degree of sound absorption of Reverb as a function of the thickness, according to DIN EN ISO 354 (reverberation room)**



- Suitable for numerous wall based applications
- Discreet design benefits aesthetics
- Fully printable with any colour or image

# reverb

## PANELS



Reverb acoustic wall panelling is an architectural system of sound absorbing wall panelling designed to control reverberation levels in space where they are too high. The discreet design allows interior designers to concentrate on the space aesthetic without compromise to the overall creative solution.

Reverb panels consist of PVC extrusions that form an unobtrusive framework around acoustic absorber panels. Base and finishing fabrics layers hide the absorber panels, neatly retained by the underlying frame.

The first fabric layer is an unbleached Calico base fabric covering the absorber panels and framework. A finishing HT Polyester fabric layer which can be white, pre-printed with a block colour or any image or graphic design of your choice is then applied (see page 16). This finishing fabric can be easily removed for cleaning or replaced, allowing new colours, images and graphics to be installed.

Available as a 25mm thick system providing a high end class B absorber or a 50mm thick system with a class A absorber for maximum acoustic absorbency.





## Case study – Shaftesbury School



*“Acoustic Comfort has achieved the transformation ...to a venue fit for purpose in a twenty first century setting.”*

D.J. Booth, Headteacher

Acoustic Comfort applied Reverb panels to the multi-use school hall which was surrounded by wooden panels that promoted unacceptably high levels of volume and echo. The treatment has transformed the entire area.

- Wall art designed to control reverberation
- Aluminium framed or frameless option
- Manufactured to your size specification

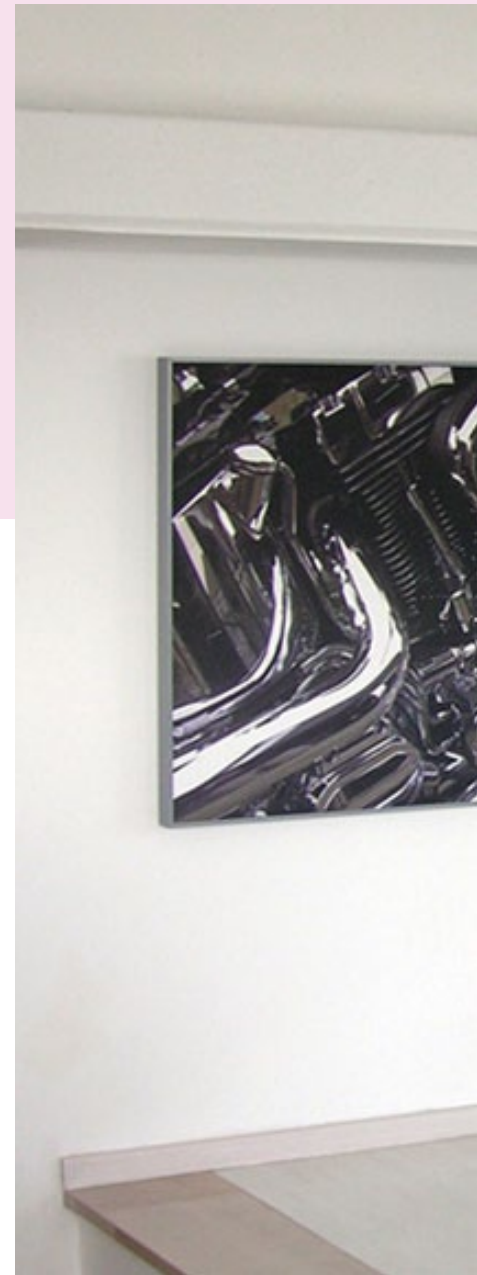
# reverb

## ART

Reverb Art is designed to control reverberation times in spaces with hard reflective surfaces. The art panels can be kept frameless or framed in aluminium finished in a choice of RAL colours or chrome.

Independent of walls, Reverb Art can be hung in the normal way with wall fixings or suspended on stainless steel wires from the ceiling to avoid damage to walls.

All panels are manufactured to your size specification and contain a class A rated absorber. Reverb art is printed with the image or graphic of your choice (see page 16).





## Case study – ICON



*"It was a bit of a leap of faith but the acoustic environment is the best it can be and we all benefit from it"*

Peter Gray CEO, ICON

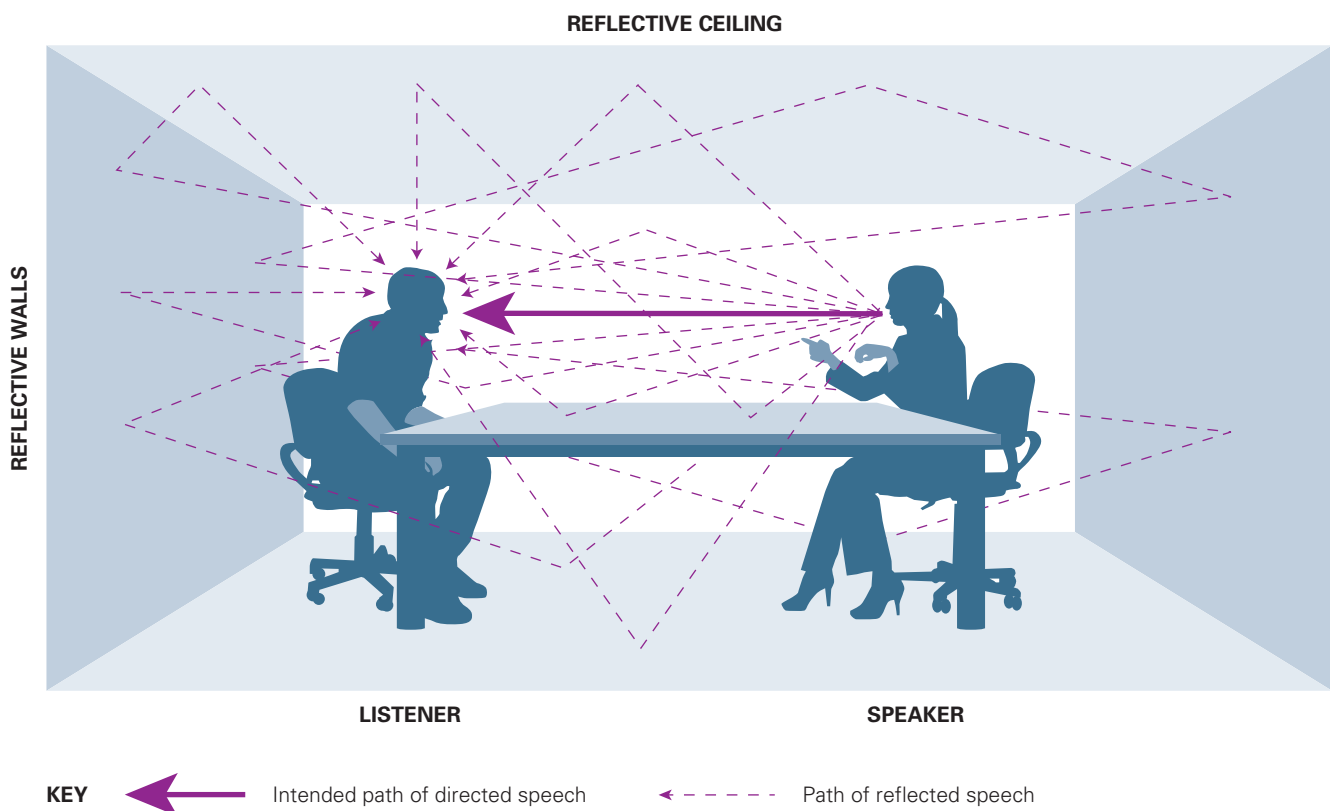
Acoustic Comfort provided four large 9m<sup>2</sup> Reverb Art panels to reduce reverberation in a large glass covered atrium at ICON's Dublin headquarters, which contained both reception and canteen areas.

ICON PLC, is a global provider of outsourced development services to the pharmaceutical, biotechnology and medical device industries.

# Sounds good! How does it work?

Reverberant sound has already been shown to be a powerful distracting force. Here we illustrate how Reverb makes received speech clearer for the listener in a closed office.

## Office without Reverb



## Result

**Confused signal**  
**Poor speech clarity**

Sound waves reflect off hard surfaces such as wood, glass, metal, stone, marble and other poorly absorbing materials, resulting in a high level of sound energy being reflected back into the space it originated from.

A small amount of energy is absorbed, but the decay of sound pressure in the space is slow because the

wave is reflected off many surfaces, bouncing back and forth many times. This leaves the listener struggling with poor speech clarity due to a confusion of numerous signals.

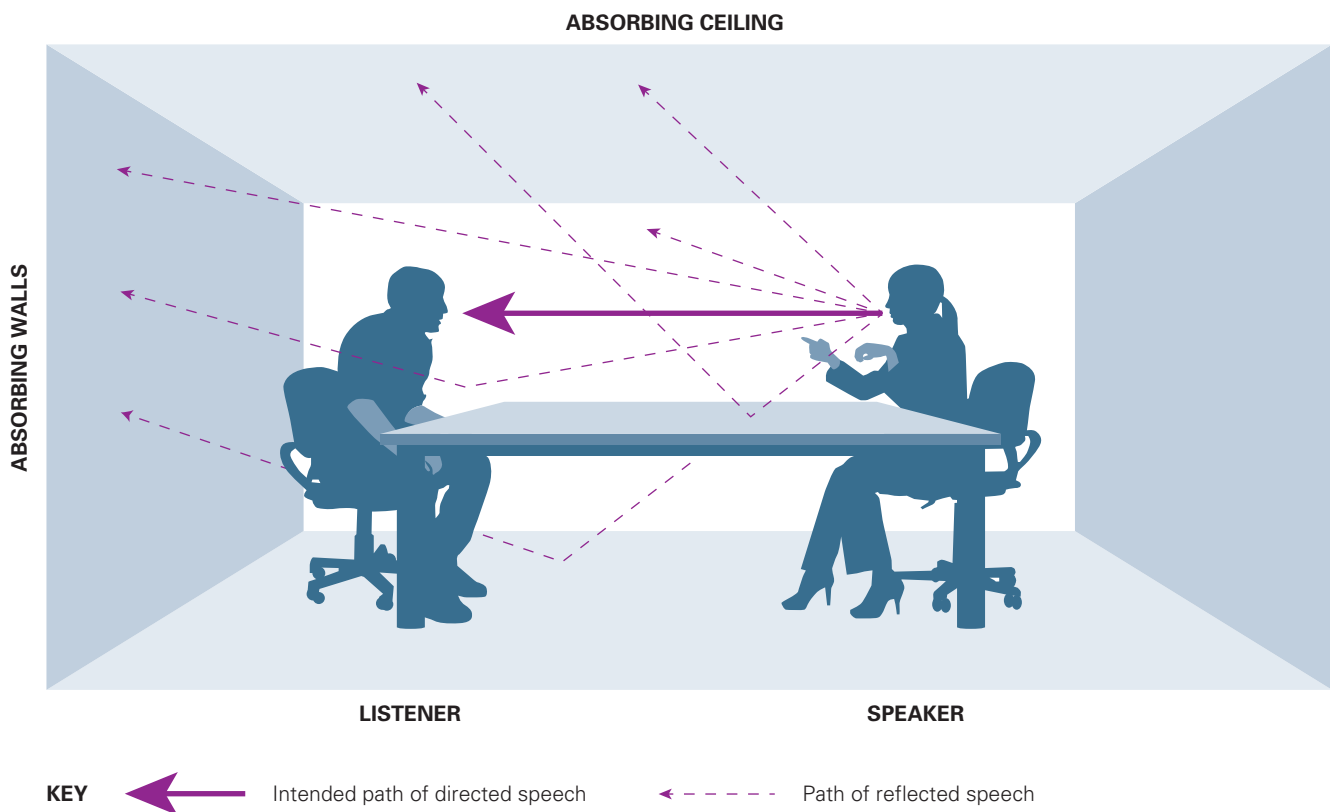
Many factors including size, shape and construction materials will impact on how sound behaves within a room.

### Did you know...

In medieval times, decorative tapestries on the walls of halls and churches, produced the unexpected benefit of reducing echo.

The discovery that using softer material could control the behaviour of sound is the same principle on which Reverb is based today.

## Office with Reverb



## Result

**Clear signal**  
**Good speech clarity**

Adding Reverb reduces reverberation time by increasing the decay of sound pressure, thus improving the acoustical quality of the space. Sound waves are more readily absorbed by Reverb and the resultant wave contains less sound energy. Some energy is absorbed by the outer fabric, but most is absorbed

by the exceptionally effective inner core. Only a small amount of energy is reflected back into the space it originated from. This results in a rapid decay of sound pressure in the space, allowing for good speech clarity and no discernible reverberant distraction.



## Bring walls to life

Reverb Art and Reverb Panels are available in a selection of fabric colours and can also be printed with images or graphics to create a truly stunning environment.

### Printed option

Could the reception area benefit from a dynamic focal point to engage new clients. Perhaps a soothing landscape would provide a restful background to a break-out zone. Whatever your idea, we are able to print it onto Reverb.

Using a dye sublimation printing process, images and graphics can be digitally reproduced at a large scale onto both Reverb Art and Reverb Panel. It's easy to apply your favourite images or corporate graphics to walls and ceilings and because the outer fabric is easy to change, images can be replaced when you fancy a change.

### Choice of fabrics

We offer a wide selection of fabric colours including the Second Nature range from Camira made from recycled and renewably sourced fibres. Please contact us for our current range of swatches.

White fabrics can be printed in solid colour to match a specified Pantone® reference if adherence to specific corporate colour guidelines is important.



## General guidance for customers supplying their own images

Customers may provide their own images and designs or alternatively Acoustic Comfort can source images from its extensive library. We are also able to offer a design and artwork service for anyone who requires it.

### What size should my image be?

When creating images that are to be printed on a large scale, making them full size is not often practical. For this reason we suggest images are supplied at 10% of their final size. To obtain the optimum print quality we require the image resolution to be no less than 300dpi at 10% final size. Files should be supplied in the correct proportion and include bleed equivalent to 100mm all round at the finished size. Files may be supplied to other scales such as 25 or 50% if necessary.

### How do I ensure a good quality print?

The reproduction of any image on a large scale will depend on the quality of the original and in general the higher the resolution the better. The widths of our panel artworks are often 4, 5, or 6 metres, sometimes more. As an example, an A3 image at 300dpi, would be considered a good size for such a large area.

To obtain the correct size you may need to resample your image a little. However, simply increasing the image resolution of a small image will not guarantee a suitable quality. Enlarging by a great amount can lead to a fuzzy, blurry or pixelated quality and unless this is the effect you are after may not look good on a wall. For example, low resolution images grabbed from the web are unlikely to reproduce acceptably on a large scale and such images may be rejected if we don't think they will provide a good finished result.

### Colour

Images will be printed out of CMYK and any RGB files will be converted to this colour model. A colour proof and Pantone® references should be supplied if colours are critical. Approximations to RAL colours can be made on vector files only, but we cannot guarantee an exact match due to the limitations of the technology. Matching to metallic colours is not possible.



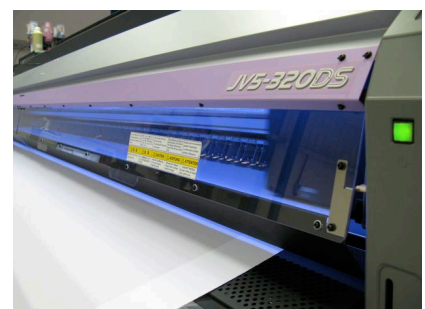
### Anything else to consider

Due to the nature of the printing process the material can stretch very slightly. This can make it difficult to achieve precise matching of intricate designs across multiple panels and should be taken into consideration during the design process. The maximum single printed panel width achievable is 3m x 10m.

### Send it to us

When your file is ready to send, a high resolution PDF format is preferred as the smaller physical size in megabytes takes up little space and allows faster downloading from FTP sites and email attachments. We also accept JPEG, TIF and EPS formats.

A full artwork specification sheet is available on request.



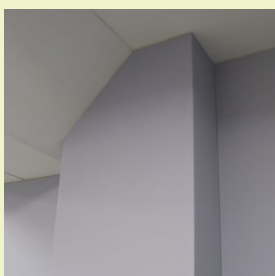
# Installation

Installation of all Reverb products is carried out by Screen Solutions dedicated in-house technicians. We can help in the design and installation of all elements from the very start of a project.

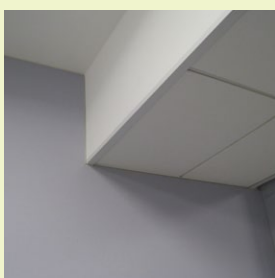


**Reverb Panels** are installed in three stages.

- First a PVC frame is attached to the wall.
- A sound absorbing material is then mounted into the frame.
- Finally, two layers of acoustic fabric are dressed into the frame, the top layer having been pre-printed with images if required.



The finished design looks discreet and no frame is visible once completed as all fabric is wrapped and tucked in. This layered construction technique makes for easy changing of the outer fabric if required as there is no need to remove the system from the wall.



**Reverb Art** normally arrives ready made and can simply be fixed straight onto the wall.

# A background to sound

## Sound or noise

Technically, sound is a form of energy, just like electricity and light, made when air molecules vibrate and move in waves. These pressure waves spread outwards from the source of the sound and are different both in loudness and pitch, often known as frequency, measured in Hertz (Hz).

Noise is any unwanted sound, and depending on individual perception, is what people seek to eliminate or minimize.

## How is the loudness of sound measured?

The loudness of sound is described by its sound pressure level and measured in decibels (dB) – a logarithmic scale. However, not all sound pressures are equally loud because the human ear does not respond equally to all frequencies.

To compensate for this inequality, sound meters are usually fitted with a filter whose response to frequency is a bit like that of the human ear. This produces Decibels Adjusted or dB(A), which is easy to measure and widely used.

## What causes reverberation?

Reverberation is the persistence of a sound in an enclosed space caused by many reflections of sound energy from the surfaces. In some cases a small amount of reverberation can be desirable, but if it is excessive, the sound becomes muddled and garbled and is referred to as reverberant noise.

Adding materials with absorbing qualities to a space will serve to reduce the reverberant noise by helping to dissipate the sound energy.

## What is reverberation time?

Reverberation time is defined as the time it takes – in seconds – for the sound pressure level to drop by 60dB after a source stops generating the sound. The ideal reverberation time varies depending on the room, but in most situations, a short reverberation time improves acoustic comfort and intelligibility. Speech is best understood with short reverberation times and without echo. It is generally agreed that an acceptable reverberation time for an open plan office is less than 0.5 seconds.

## Measuring reverberation

The ability of a material to absorb or reflect sound energy is measured on the sound absorption coefficients scale. All materials have some absorptive qualities, but many like concrete, glass and steel are low on the absorption scale. Noise energy is easily reflected off of these materials producing echo or reverberation.

Values on the sound absorption coefficients scale range from 0 to 1. If a surface were a perfect reflector it would have a coefficient of 0. If it completely absorbs sound energy it would have an absorption coefficient of 1.

### Absorption coefficients for common materials used in construction

	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Carpet	0.01	0.02	0.06	0.15	0.25	0.45
Concrete floor (unpainted, rough finish)	0.01	0.02	0.04	0.06	0.08	0.1
Marble floor	0.01	0.01	0.01	0.01	0.02	0.02
Wood flooring on joists	0.15	0.11	0.1	0.07	0.06	0.07
Brick wall	0.03	0.03	0.03	0.04	0.05	0.07
Doors (solid wood panels)	0.1	0.07	0.05	0.04	0.04	0.04
Glass (6mm plate, large pane)	0.18	0.06	0.04	0.03	0.02	0.02
Plasterboard stud wall (12mm panelling)	0.29	0.1	0.06	0.05	0.04	0.04
Plasterboard ceiling (12mm) in suspended grid	0.15	0.11	0.04	0.04	0.07	0.08



## FAQs

### **Do Acoustic Comfort carry out installation of Reverb products**

Yes. All Reverb products are installed by Acoustic Comfort.

### **How much Reverb do I need?**

The amount of absorption material required will be different for every room and will depend on the size and shape of the room as well as the surfaces of the wall, floor and ceiling. Screen Solutions are able to provide you with an accurate estimate through reverberation testing. The amount required will also depend on what the room is used for, with adjustments made to suit the purpose.

### **How do I know if I am complying with Building Regulations?**

Screen Solutions can advise you on any technical matters and an acoustic report will be carried out that will demonstrate compliance to the relevant regulations.

### **Will Reverb provide sound insulation?**

Reverb is only designed to reduce echo and reverberation in individual rooms and is not a suitable treatment for sound insulation. To prevent sound passing between adjacent rooms either high density sound insulation material or sound masking technology is required. The Acoustic Comfort consultancy service can help with this.

### **If I install Reverb will it prevent sound travelling to neighbouring areas?**

Applying Reverb to walls and ceilings will only have a very small effect in terms of preventing sound from travelling into or out of the room to neighbouring areas. The Acoustic Comfort consultancy service can help with these issues.

### **Will my walls and ceiling be strong enough to support the weight of Reverb?**

Yes. Reverb is constructed from lightweight materials which will be easily supported by all walls in a reasonable condition.



# Is noise a nuisance in your office?

**Reduce distractions, maintain privacy, improve clarity. It's time to enjoy some acoustic comfort.**

Acoustic Comfort is a specialist consultancy service provided by Screen Solutions. It provides managed noise control that helps eliminate common noise related problems in the workplace, resulting in a more comfortable working environment.

Our consultative approach enables us to identify all acoustic issues, providing a balanced overall solution that improves privacy, clarity and comfort.

The process can solve existing issues and provide cost saving solutions in a new build or fit out and many businesses already enjoy the benefits of our specialist knowledge and experience.

## **Privacy**

Maintain speech privacy in business areas which are particularly sensitive and classified, such as human resources, legal, medical and financial sectors. Reduce the risk of potentially damaging confidentiality breaches.

## **Clarity**

Create an effective and more productive working environment. Improve intelligibility between colleagues and enhance customer communication experiences in open plan environments.

## **Comfort**

Prevent noise travelling from one area to the other by creating a balanced background sound level. Problems are typical in busy, open plan offices located in close proximity to quiet cellular offices or confidential meeting rooms.

**For more information, see our case studies or to arrange a consultation, please call +44 (0)1273 589922 and ask to speak to one of the Acoustic Comfort team.**

**acousticcomfort**<sup>™</sup>  
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