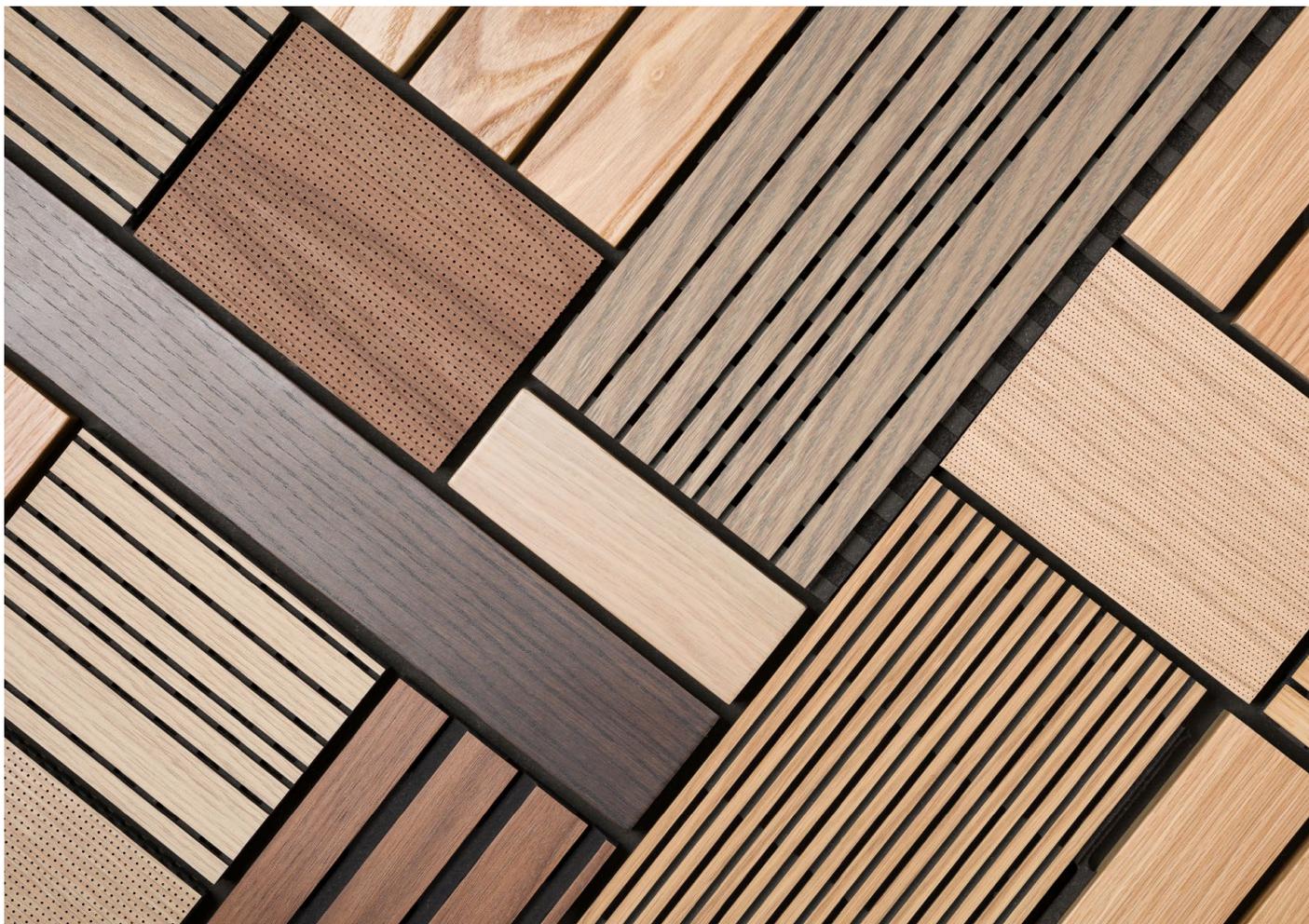


Timber acoustic solutions - Overview

Combining carpentry expertise with acoustic knowledge to give maximum control over sound and aesthetics

STIL
ACOUSTICS





**Acoustic control
and the warmth of
real wood**

Stil Acoustics timber solutions

Slatted timber page 3

Groove page 16

Perforated page 26

Special solutions page 34

Acoustics page 37

The ultimate renewable material

The ultimate renewable material for architecture is also one of the oldest, and most attractive. Wood is solid, can be bent and shaped, is easily machined, and with the used of computer-aided-design and CNC milling, timber is also continuously contemporary. These benefits make wood our preferred material for room acoustics solutions.

All our timber products can be supplied FSC® - C163652 certified.

Acoustic and design support

When acoustical requests, you can expect the support of an experienced engineer.

Our design team work on complex problem solving daily, and are well equipped to coordinate the process of integrating the concept with real-world challenges on site.

Samples can be provided as well as drawings and specification guidance.

Contact us for
further details.

Slatted timber walls and ceilings

Key features:

Acoustic performance	Up to Class A
Environmental factors	FSC certified upon request. Low emissions (E1 class)
Finishes	Veneer or solid timber with lacquer
Formats	Made to measure panels for ceilings and walls



Contact us for further details.

Slatted timber walls and ceilings



A solid White Oak slatted system for Falmouth University. These modular constructions make installation straightforward and provide high sound absorption.

We offer comprehensive range of slatted timber systems. These are available for both walls and ceilings and offer extensive customisation to allow designers to integrate a solution which is perfect for their project.

We are on hand to guide the technical details from specification through to installation, and

Striking features which compliment many spaces

Our slatted ceilings and walls enable the designer to introduce warmth and interest, with a very functional role. They integrate seamlessly into projects, and are designed to look as good as they do when installed, many years down the line.

The modular nature of their construction makes installation accurate and fast, and also enables demounting for access to services, which can be effectively concealed behind.

The range of finishes and size combinations are endless, and important considerations like durability and fire performance are addressed from the start.

Contact us for detailed support.

Slatted timber systems quick reference



Type F Walls

Overview

Slatted systems for walls with slats attached to fleece or fabric faced frame. Door covers available and panels can be applied to curved walls. Mounted on timber battens.

Design

Stil Acoustics produce drawings for sign off and installation

Fixing / suspension

Mounted on timber battens with mineral fibre in the cavity

Finish options

Solid timber with lacquer, veneer with lacquer

Panel sizes

Made to measure.
Max slat length 2950mm

Standard slat sizes

19 x 44 mm - (solid timber)
19 x 69 mm - (solid timber/veneered)
Made to measure - on request.

Sound absorption

Up to Class A

Fire performance

Euroclass B-s1-d0 components when specified

Environmental factors

FSC certified upon request.
Low emissions (E1 class)



Type VDU Ceilings

Overview

Vertical slats with interconnecting dowels. Open structure and typically non-acoustic. Fully demountable with brackets supplied for Unistrut suspension.

Design

Stil Acoustics produce drawings for sign off and installation

Fixing / suspension

Mounted on unistrut via threaded rods and dowel clips

Finish options

Solid timber with lacquer, veneer with lacquer

Panel sizes

Made to measure.
Max slat length 2950mm

Standard slat sizes

19 x 44 mm - (solid timber)
19 x 69 mm - (solid timber)
19 x (up to) 100mm - (MDF core)
26 x (up to) 125mm - (MDF core)
37 x (up to) 150mm - (MDF core)

Sound absorption

Not applicable

Fire performance

Euroclass B-s1-d0 components when specified

Environmental factors

FSC certified upon request.
Low emissions (E1 class)



Type VFU/VFM Ceilings

Overview

Vertical slats with slats attached to fleece faced frame. High acoustic performance. Suspended from Unistrut or MF grid depending on how accessible the system needs to be.

Design

Stil Acoustics produce drawings for sign off and installation

Fixing / suspension

Mounted on unistrut via proprietary Unistrut brackets or MF grid with black screws

Finish options

Solid timber with lacquer, veneer with lacquer

Panel sizes

Made to measure.
Max slat length 2950mm

Standard slat sizes

19 x 44 mm - (solid timber)
19 x 69 mm - (solid timber)
19 x (up to) 100mm - (MDF core)
26 x (up to) 125mm - (MDF core)
37 x (up to) 150mm - (MDF core)

Sound absorption

Up to Class A

Fire performance

Euroclass B-s1-d0 components when specified

Environmental factors

FSC certified upon request.
Low emissions (E1 class)



Type HFU/HFM Ceilings

Overview

Horizontal slats with slats attached to fleece faced frame. High acoustic performance. Suspended from Unistrut or MF grid depending on how accessible the system needs to be.

Design

Stil Acoustics produce drawings for sign off and installation

Fixing / suspension

Mounted on unistrut via proprietary Unistrut brackets or MF grid with black screws

Finish options

Solid timber with lacquer, veneer with lacquer

Panel sizes

Made to measure.
Max slat length 2950mm

Standard slat sizes

19 x 44 mm - (solid timber)
19 x 69 mm - (solid timber/veneered)
Made to measure - on request.

Sound absorption

Up to Class A

Fire performance

Euroclass B-s1-d0 components when specified

Environmental factors

FSC certified upon request.
Low emissions (E1 class)

Type VDU,
Type VDT,
Type VFU.

Vertical slatted ceilings

Available in acoustic and non-acoustic variants, with up to Class A absorption, these systems are made to measure for the project with our design support. Lighting is easily integrated, and services

can be hidden behind, with demountable systems providing access. All finishing details and trims are also supplied by us, to the same factory finish. Talk to us to request a design guide.



Helicon Building, London
Solid White Oak

You can specify your own slat sizes and spacings, or follow our guidance for a suitable system. Panels are supplied either as a 'grill' style, with an open structure, or with the slats mounted on frames, which conceal services and absorber to the rear.



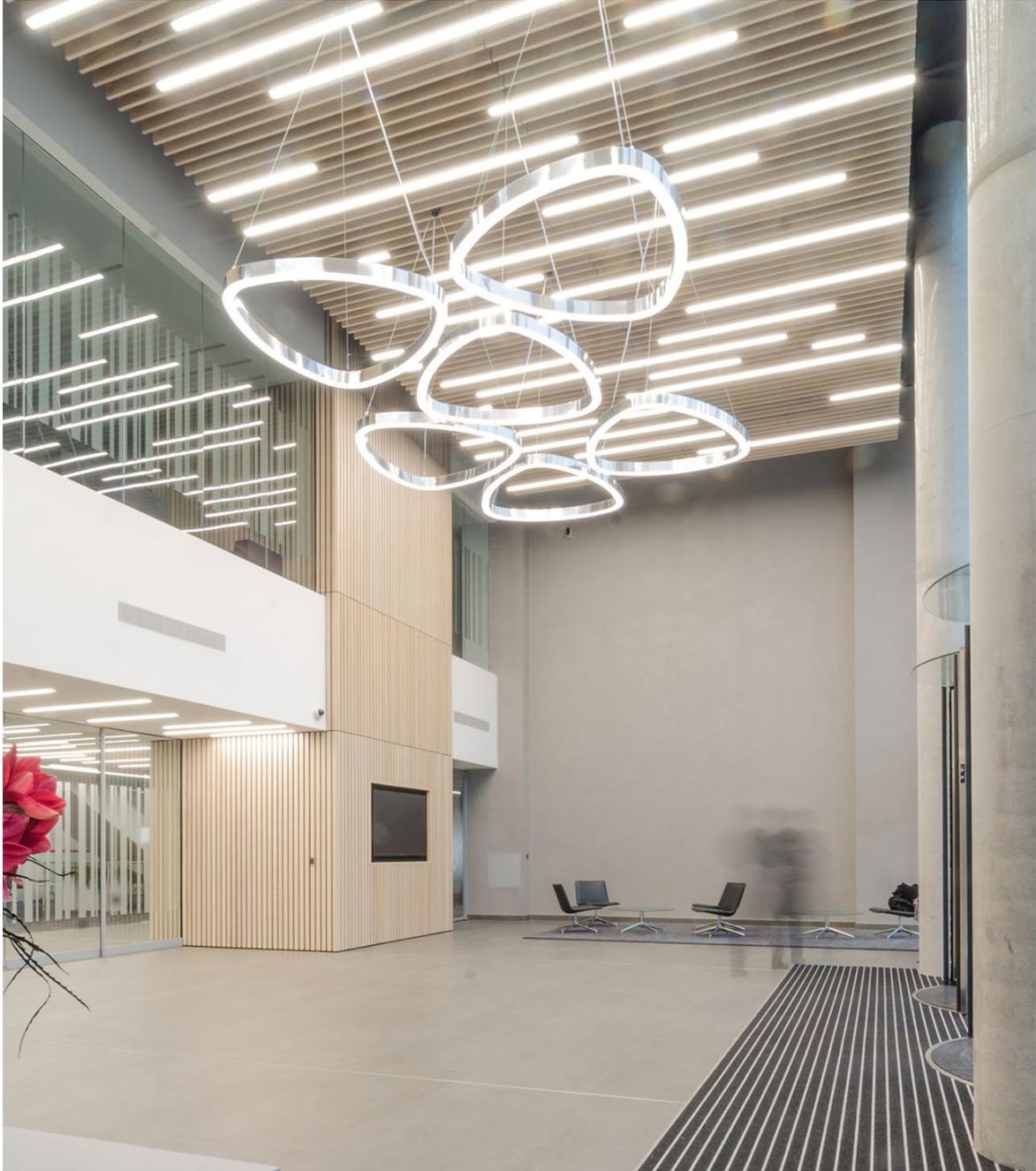


Pernod Ricard, London.
Type VDU with Oak veneer



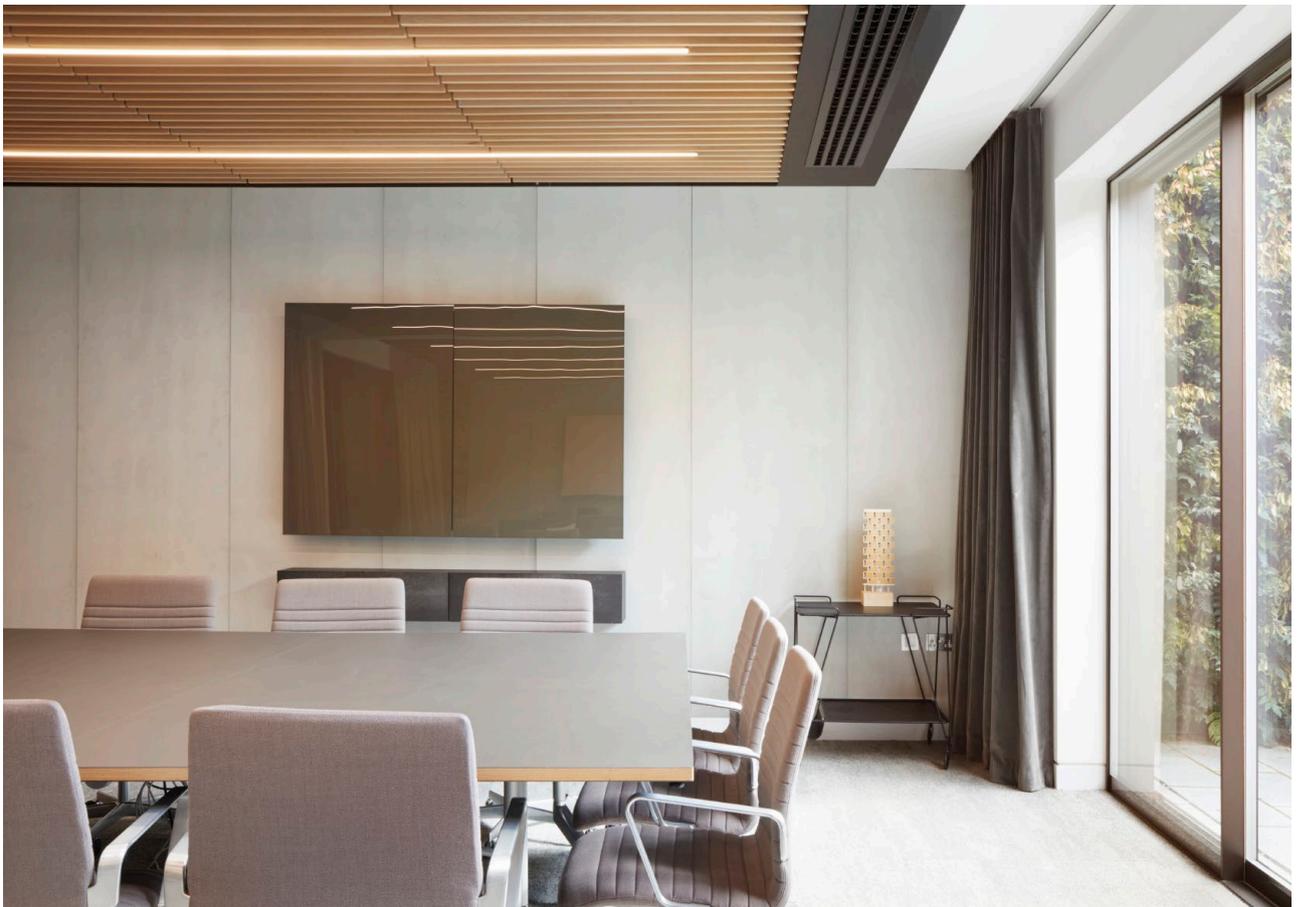
Project example

Gilead, Cambridge
Vertical slatted ceiling, White washed Ash - Type VFU





Sheppard Robson's studio, London.
Type VFU with white washed Oak veneer



Type F

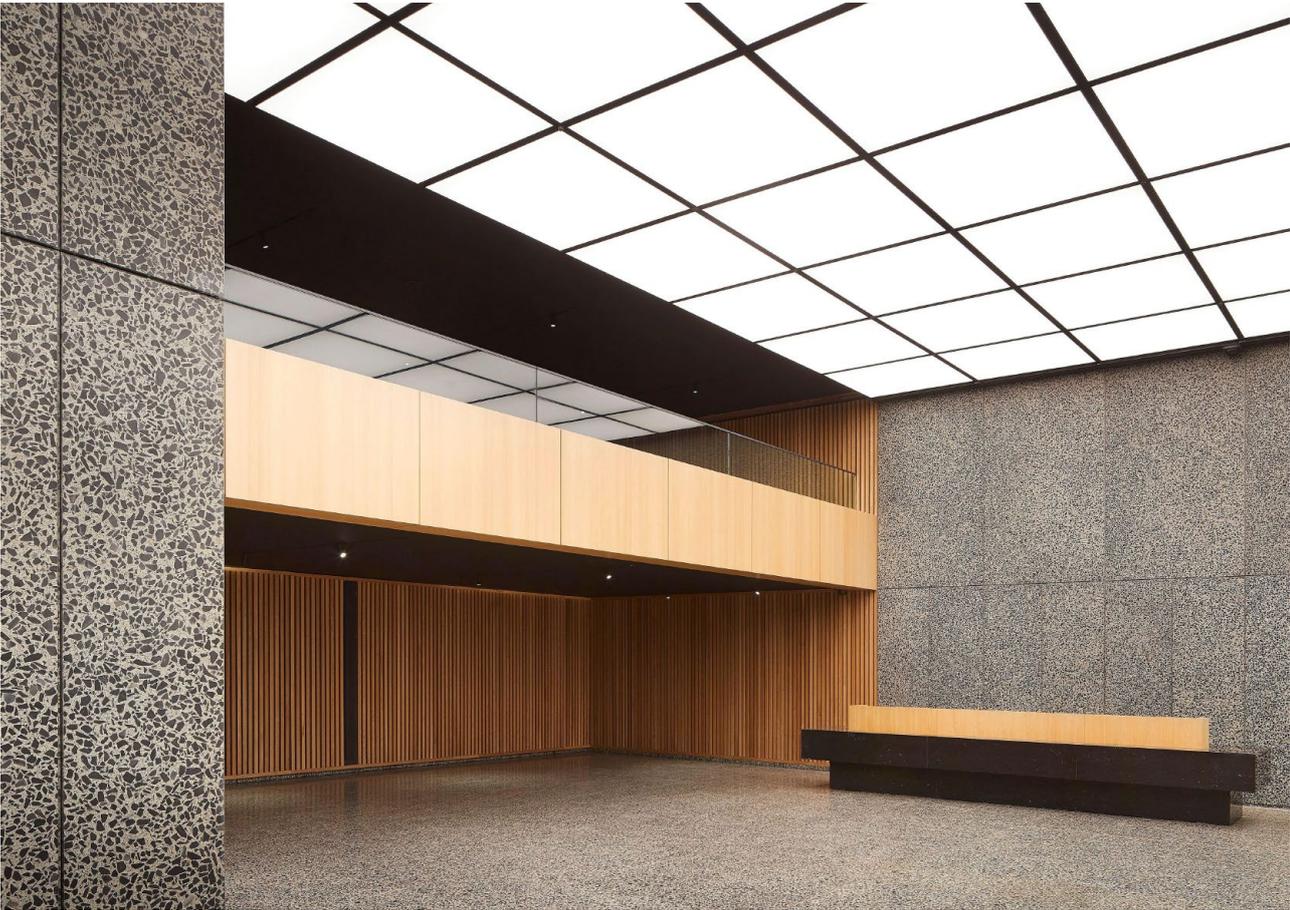
Slatted walls

Feature walls with high functional performance. These systems are durable, customisable, and can hide services in the cavity behind. Panels are mounted on secret fixing cross

battens, with either a textile or black faced absorber directly behind the slats. The same design can continue onto doors and desk fronts, and curve around bulkheads and openings.

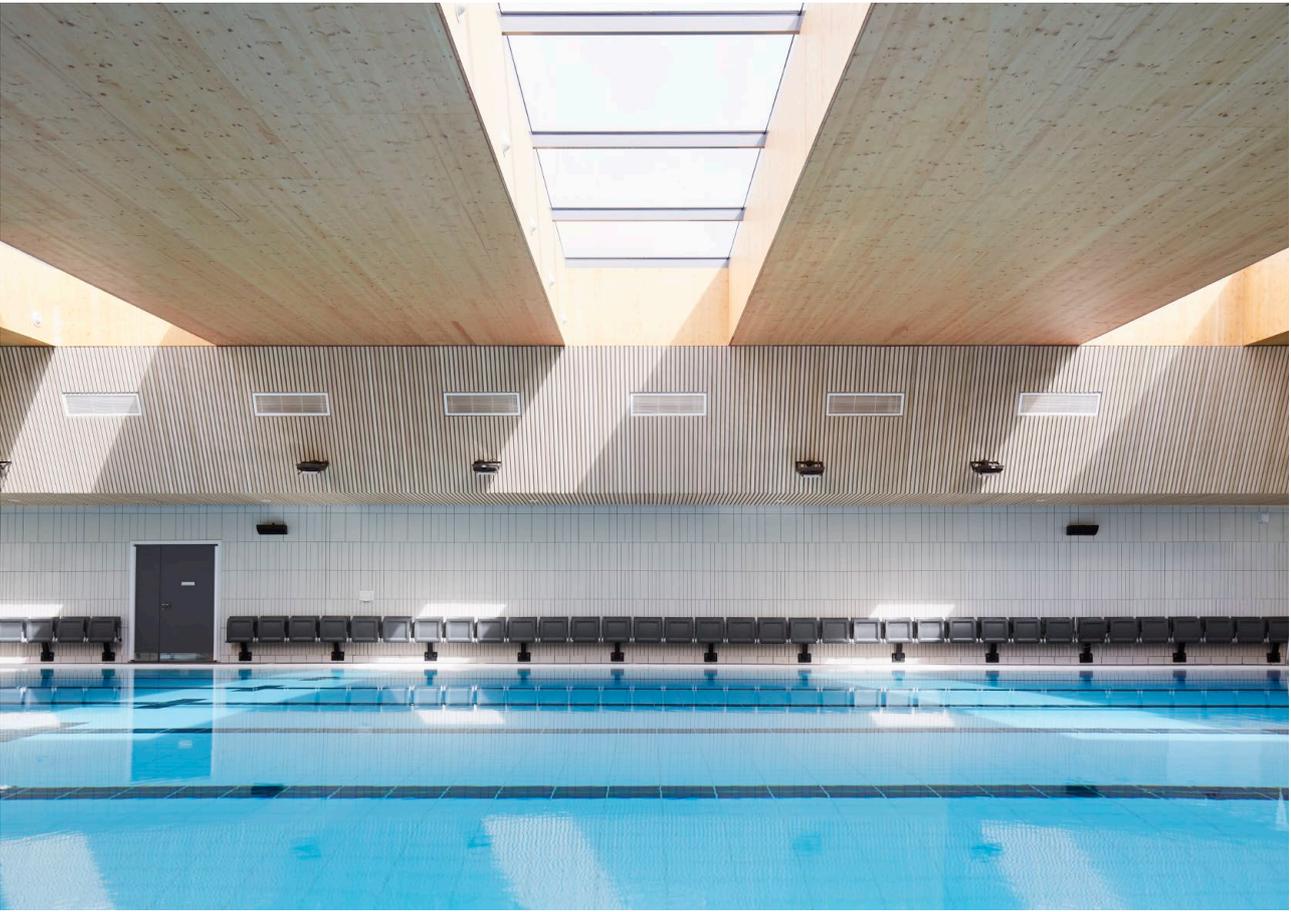


Mansfield College, Oxford University. Solid White Oak

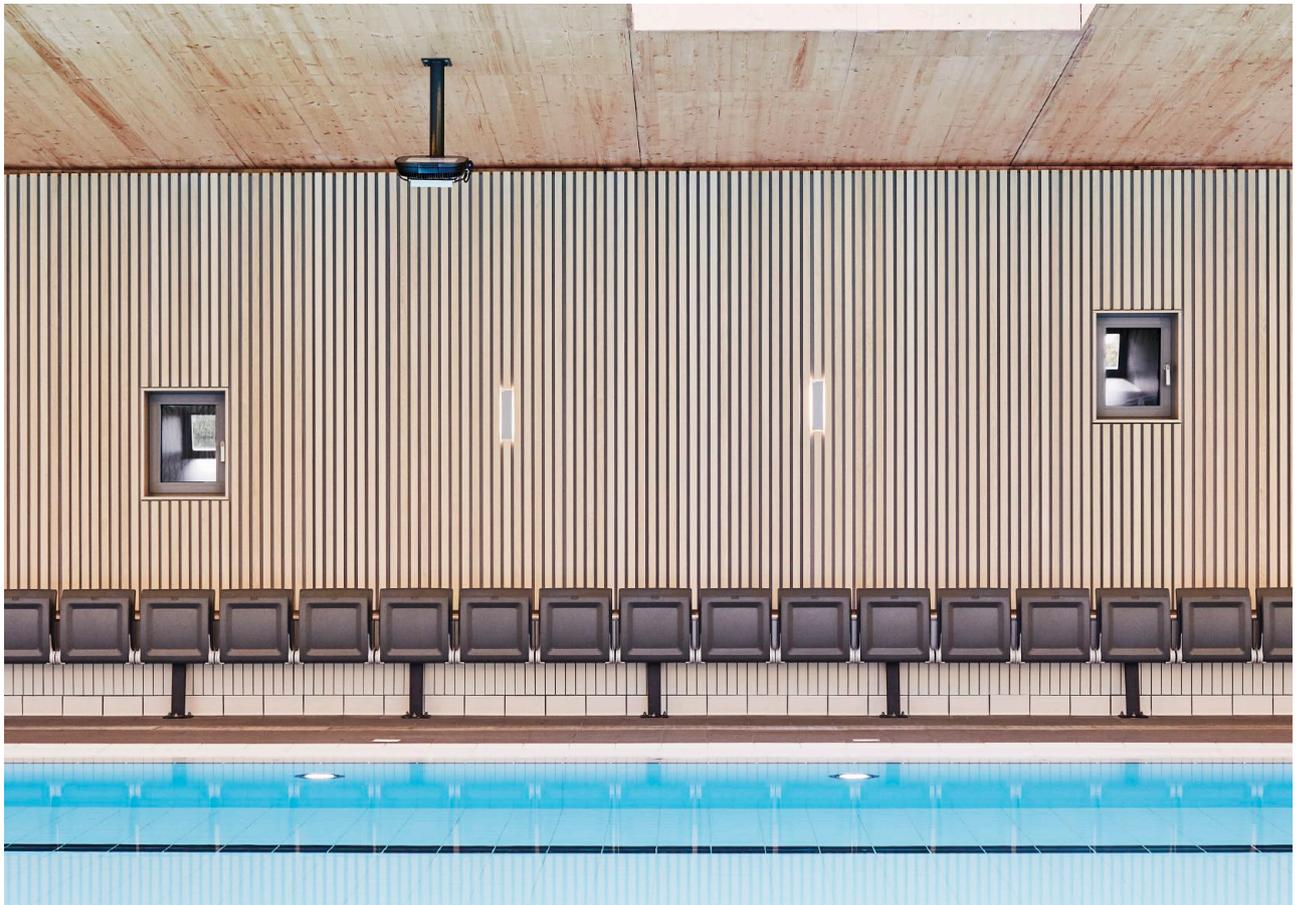


25 Cabot Square, Canary Wharf.
Type F slatted walls in Solid White Oak





Oundle Sports Centre.
Type F with Whitewashed White Oak Veneer



Type HFU,
Type HFM.

Horizontal slatted ceilings

You can specify your own slat sizes and spacings, or follow our guidance for a suitable system. Ceilings provide a large coverage area for absorption, and Class A acoustic performance is achievable.

Lighting is easily integrated, and services are hidden behind, with demountable systems providing excellent access. All finishing details and trims are also supplied by us, to the same factory finish.



One Lyric Square, London
Solid White Oak with
custom stain

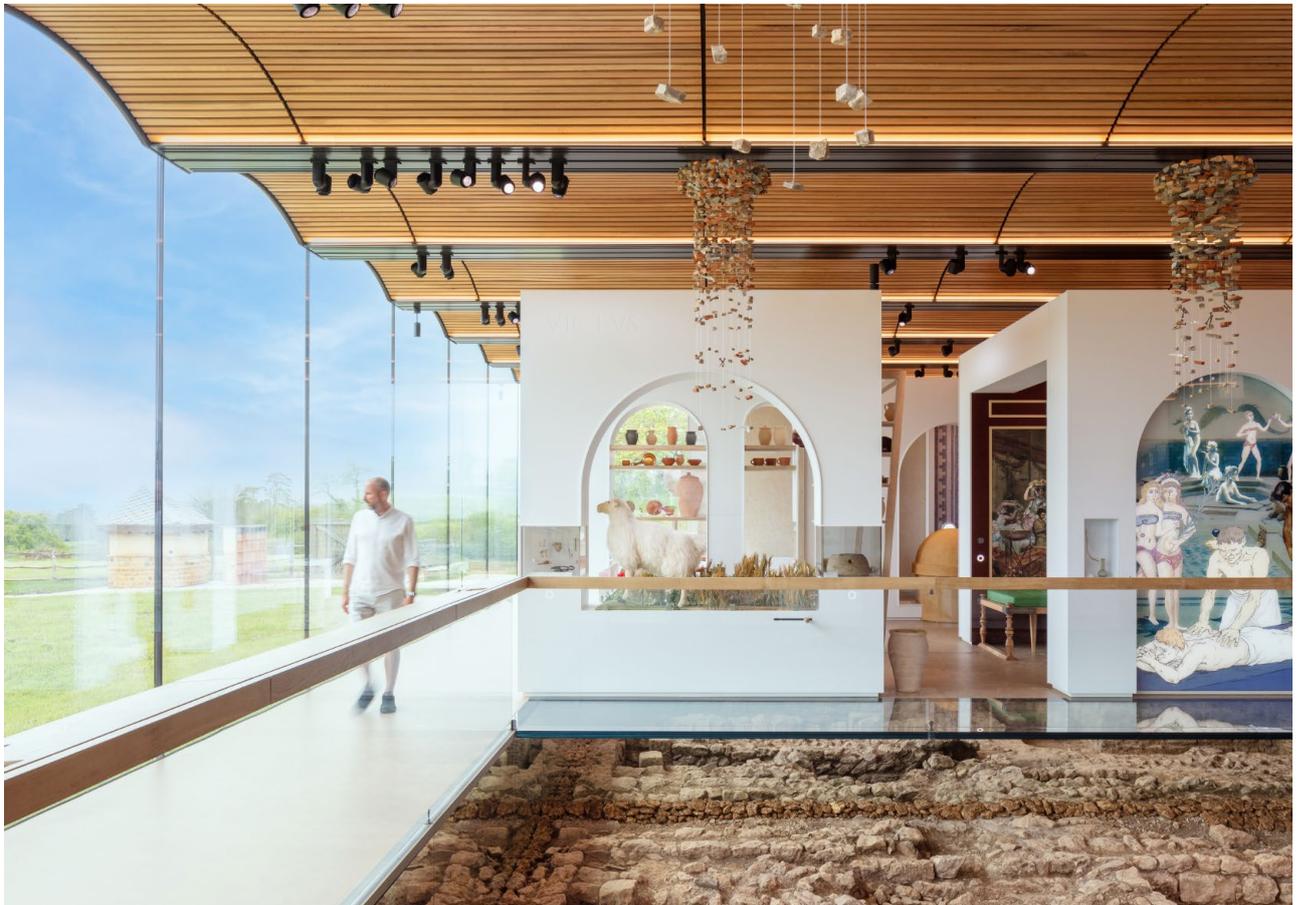
Project example

Circle Health, Birmingham
Slatted ceiling, solid Ash - Type HFU





Roman Villa, Haspen.
Type HFM slatted ceilings in Solid White Oak



**Acoustic panels
for walls and
ceilings.
Many possible
variations.**

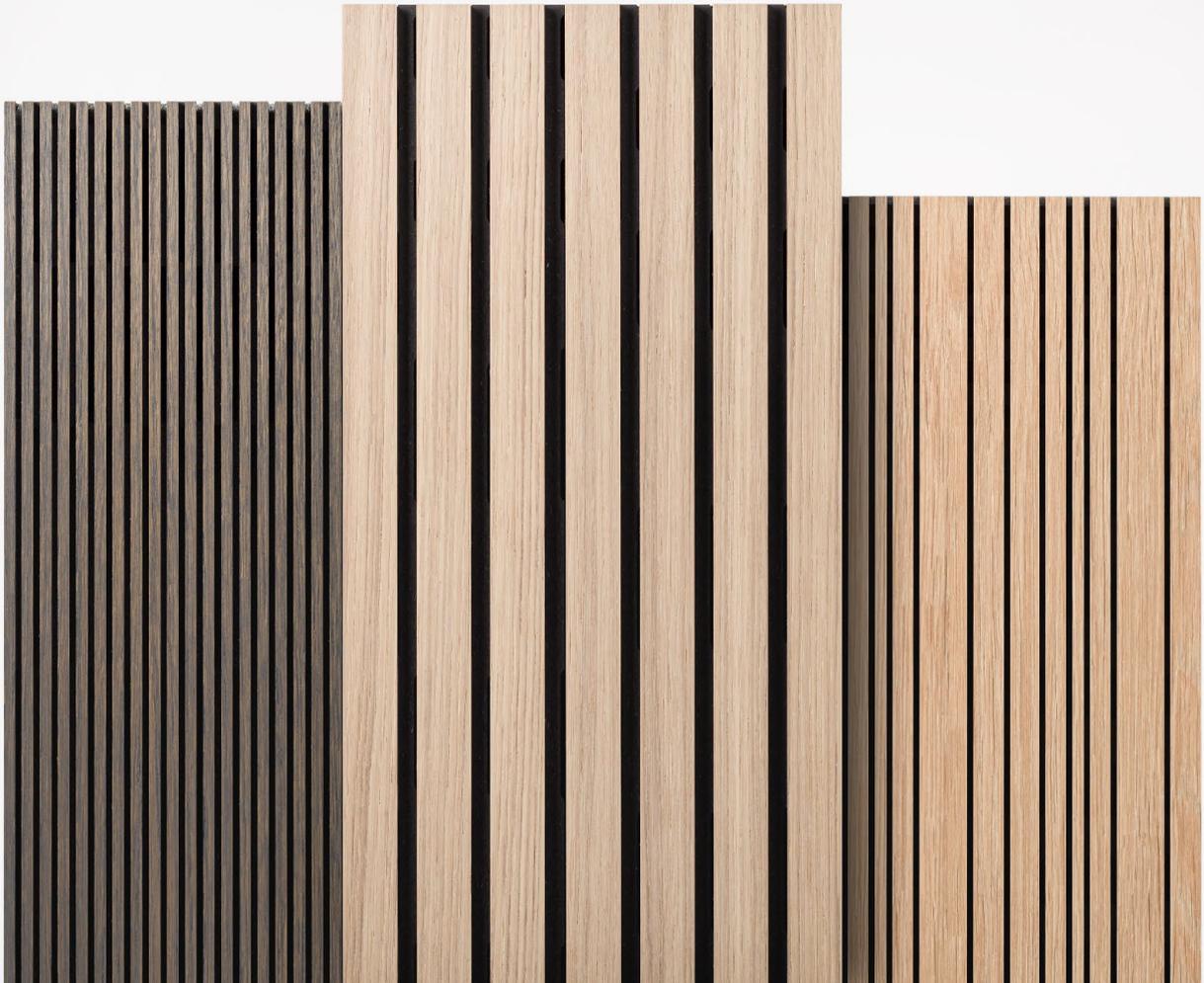
Groove

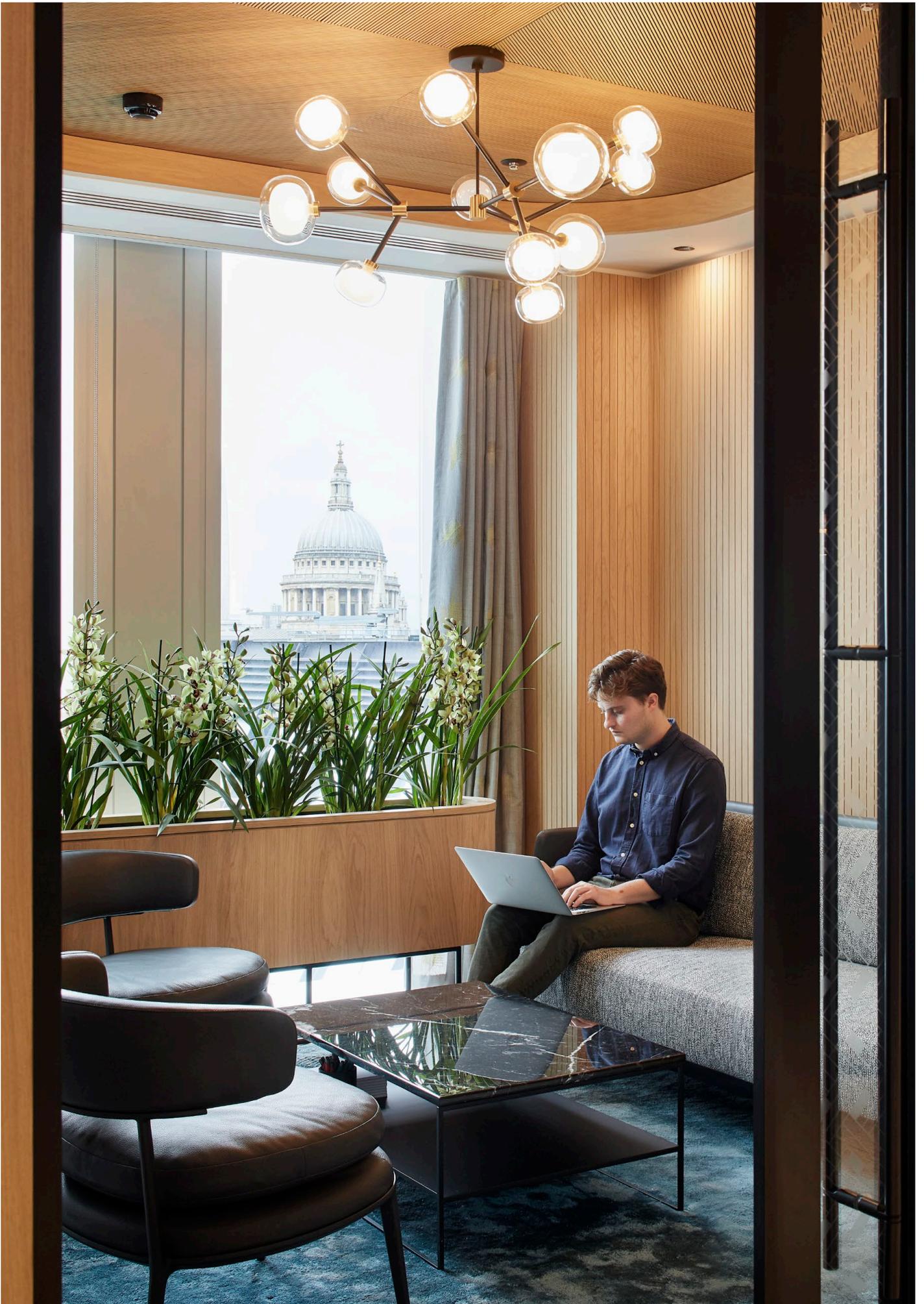
An aesthetic sound absorbing finish for walls, ceilings and doors. Typically installed to battens in a tongue and groove fashion, this creates a seamless finish.

The panels work with a combination of Helmholtz from the perforated structure and porous absorption with mineral fibre behind the panels.

Key features:

Acoustic performance	Up to Class B
Environmental factors	FSC certified upon request. Low emissions (E1 class)
Finishes	Veneer with oil, veneer with lacquer, HPL
Formats	Sheets, cupboard doors, planks, made to measure





Contact us for
detailed support.

Groove quick reference



Groove 12



Pattern

3mm slot, 12mm slat width

Finish options

HPL, veneer with oil,
veneer with lacquer

Sizes HPL

3030 x 192 x 20 sheets
3030 x 192 x 20 T&G

Sizes veneer

3030 x 192 x 19 sheets
3030 x 192 x 19 T&G

Doors available

Acoustic cupboard
Internal door covers

Sound absorption 1*

Class C

Sound absorption 2**

Class C

Fire performance

Euroclass B-s1-d0
components when specified

Environmental factors

FSC certified upon request.
Low emissions (E1 class)



Groove 24-W



Pattern

8.5mm slot, 23.5mm slat width

Finish options

HPL, veneer with oil,
veneer with lacquer

Sizes HPL

3030 x 192 x 18 sheets
3030 x 192 x 18 T&G

Sizes veneer

3030 x 192 x 17 sheets
3030 x 192 x 17 T&G

Doors available

Internal door covers

Sound absorption 1*

Class C

Sound absorption 2**

Class C

Fire performance

Euroclass B-s1-d0
components when specified

Environmental factors

FSC certified upon request.
Low emissions (E1 class)



Groove R



Pattern

3mm slot, random slat width

Finish options

HPL, veneer with oil,
veneer with lacquer

Sizes HPL

3030 x 192 x 20 sheets
3030 x 192 x 20 T&G

Sizes veneer

3030 x 192 x 19 sheets
3030 x 192 x 19 T&G

Doors available

Acoustic cupboard
Internal door covers

Sound absorption 1*

Class C

Sound absorption 2**

Class C

Fire performance

Euroclass B-s1-d0
components when specified

Environmental factors

FSC certified upon request.
Low emissions (E1 class)



Groove 5-H



Pattern

3mm slot, 5mm slat width

Finish options

HPL, veneer with oil,
veneer with lacquer

Sizes HPL

3030 x 192 x 18 sheets

Sizes veneer

3030 x 192 x 17 sheets

Doors available

Internal door covers

Sound absorption 1*

Class B

Sound absorption 2**

Class C

Fire performance

Euroclass B-s1-d0
components when specified

Environmental factors

FSC certified upon request.
Low emissions (E1 class)



Groove 24



Pattern

3mm slot, 29mm slat width

Finish options

HPL, veneer with oil,
veneer with lacquer

Sizes HPL

3030 x 192 x 20 sheets
3030 x 192 x 20 T&G

Sizes veneer

3030 x 192 x 19 sheets
3030 x 192 x 19 T&G

Doors available

Acoustic cupboard
Internal door covers

Sound absorption 1*

Class D

Sound absorption 2**

Class D

Fire performance

Euroclass B-s1-d0
components when specified

Environmental factors

FSC certified upon request.
Low emissions (E1 class)

*Sound absorption 1 = 70mm cavity filled with 50mm mineral fibre

**Sound absorption 2 = 20mm cavity filled with 20mm polyester wool





BCG Digital Ventures, London
Groove 24-W with Fair White Oak veneer

Aztec West, Bristol
Groove R with Natural Oak HPL



Groove R
Oak with clear lacquer



Groove 5-H



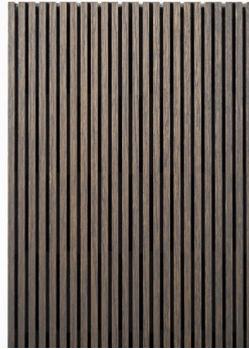
Groove 24-W
Oak with clear lacquer



Groove 24-W
Fair White Oak veneer



Groove 5-H
Black Mist Oak veneer



Groove 12
Manzano HPL



Groove R
Natural Oak HPL



Groove 24-W
White HPL



Groove 12
Fair Oak veneer



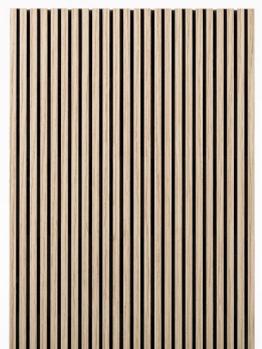
Groove 12
Walnut veneer with lacquer



Groove 24
Fair White Oak veneer



Groove 5-H
Light Oak HPL



Project example

Bath School of Management
Groove 24-W walls and Type VFM slatted ceilings
Beech effect HPL and Beech veneer

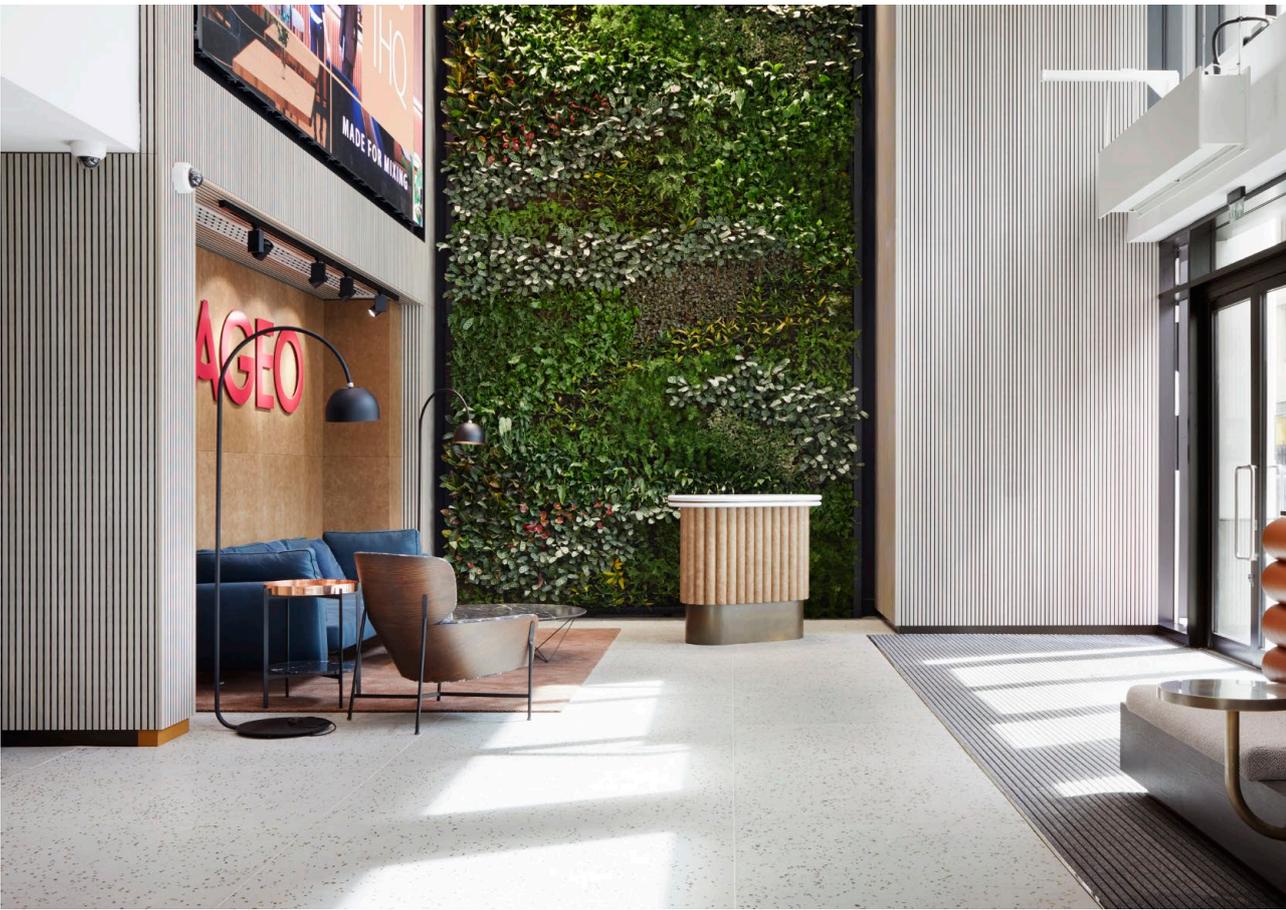




London Research Hub
Groove R with Light Oak HPL

Lossiemouth Learning Campus
Groove R with White Washed Oak HPL

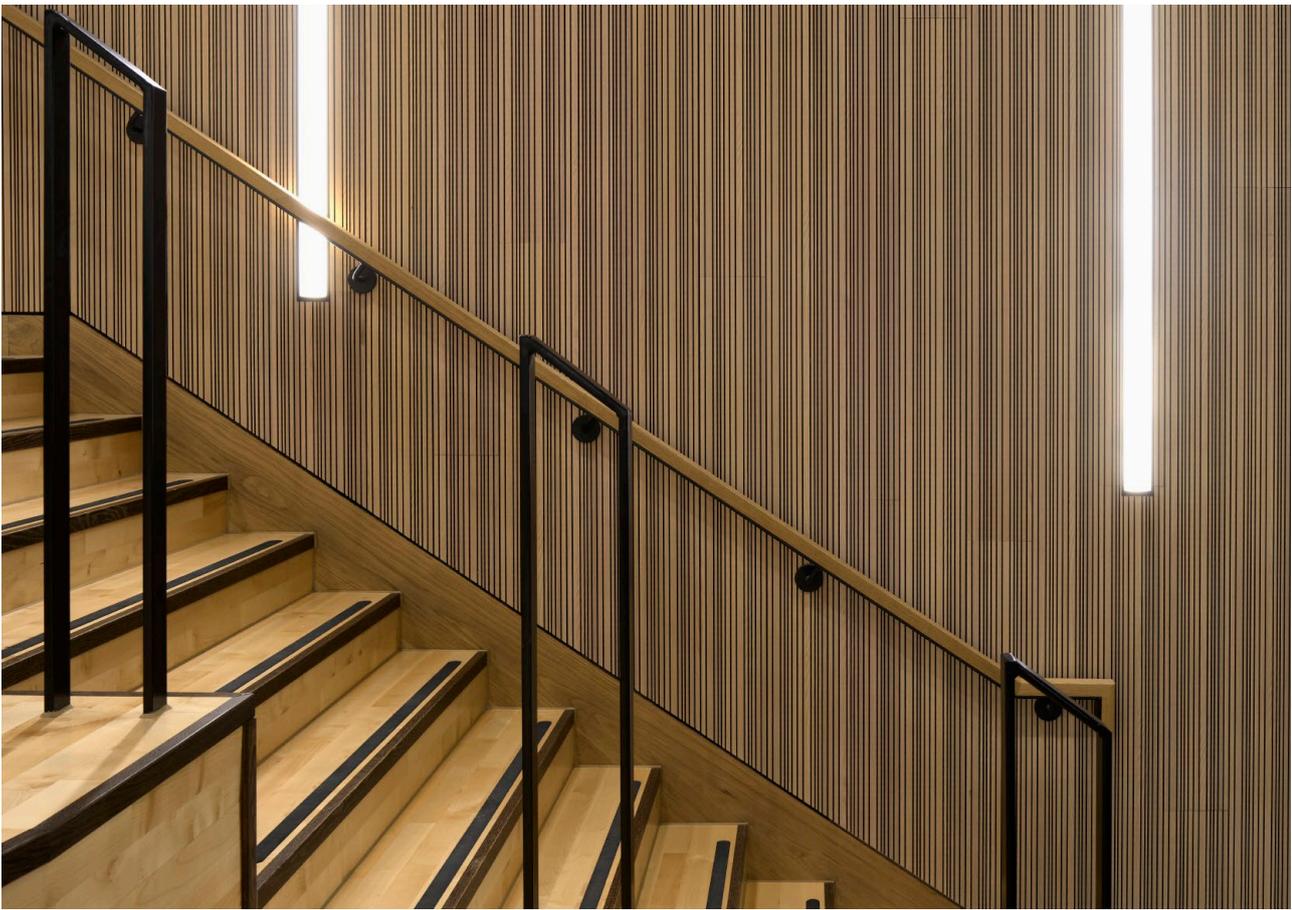




Diageo HQ, London
Groove 24-W with Grey Ash HPL

Kings Park Road, London
Groove 12 with Manzano HPL





Wallyford High School
Groove R with White Washed Oak HPL

Old Library, Tuebrook
Groove 24-W with White Washed Oak HPL



Contact us for
further details.

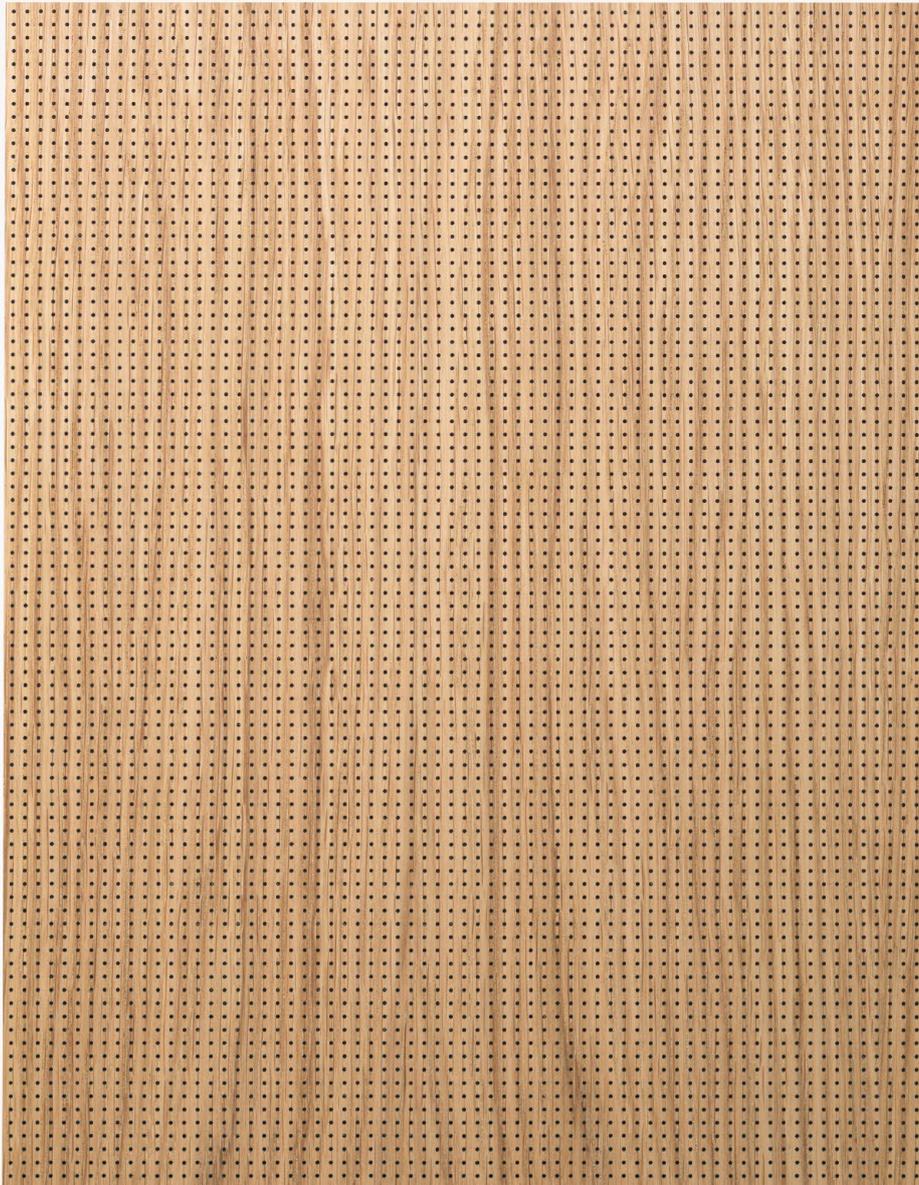
Perforated acoustic panels

Flexible systems for walls, ceilings and doors. The perforation patterns affect the acoustic performance and the makeup of the panels. Absorption ranges from Class C to Class B and finishes include HPL, veneer and plywood.

Please contact us to discuss the potential of these systems as applications included wall panels, grid mounted ceilings, rafts, cupboard doors, flexible panels and more. You will be surprised by the made-to-measure options...

Key features:

Acoustic performance	Up to Class B
Environmental factors	FSC certified upon request. Low emissions (E1 class)
Finishes	Veneer with oil, veneer with lacquer, HPL
Formats	Sheets, cupboard doors, planks, made to measure





Sunderland City Hall / VAUX
Nanoperforated ceiling planks
Fair White Douglas Fir



Pattern options.

Perforated acoustic panels

Nanoperforated NP-2

0.5mm holes at 1.97mm C/C



Acoustic performance

- Absorption - Class C

Extra options

- Acoustic cupboard doors
- Internal door covers
- Semi-concealed T-grid

Finish options

- Veneer with tinted oil
- Veneer with lacquer
- CPL colours (no fire performance)

Sizes

- Sheets veneer - 3000 x 1200 mm
- Sheets CPL - 3000 x 1200 mm
 - T&G - 3030 x 192 mm
- Ceiling T-grid - 1200 x 600 mm
- Ceiling T-grid - 600 x 600 mm
- Made to measure - on request

Microperforated MP-3

1.1mm holes at 3mm C/C



Acoustic performance

- Absorption - Class B

Extra options

- Acoustic cupboard doors
- Internal door covers
- Semi-concealed T-grid

Finish options

- Veneer with tinted oil
- Veneer with lacquer
- HPL timber effect or colour

Sizes

- Sheets veneer - 3000 x 1200 mm
- Sheets CPL - 3000 x 1200 mm
 - T&G - 3030 x 192 mm
- Ceiling T-grid - 1200 x 600 mm
- Ceiling T-grid - 600 x 600 mm
- Made to measure - on request

Perforated P16-C

8mm holes at 16mm C/C



Acoustic performance

- Absorption - Class C

Extra options

- Slots instead of round holes
- Internal door covers

Finish options

- Veneer with tinted oil
- Veneer with lacquer
- HPL timber effect or colour
- Plywood

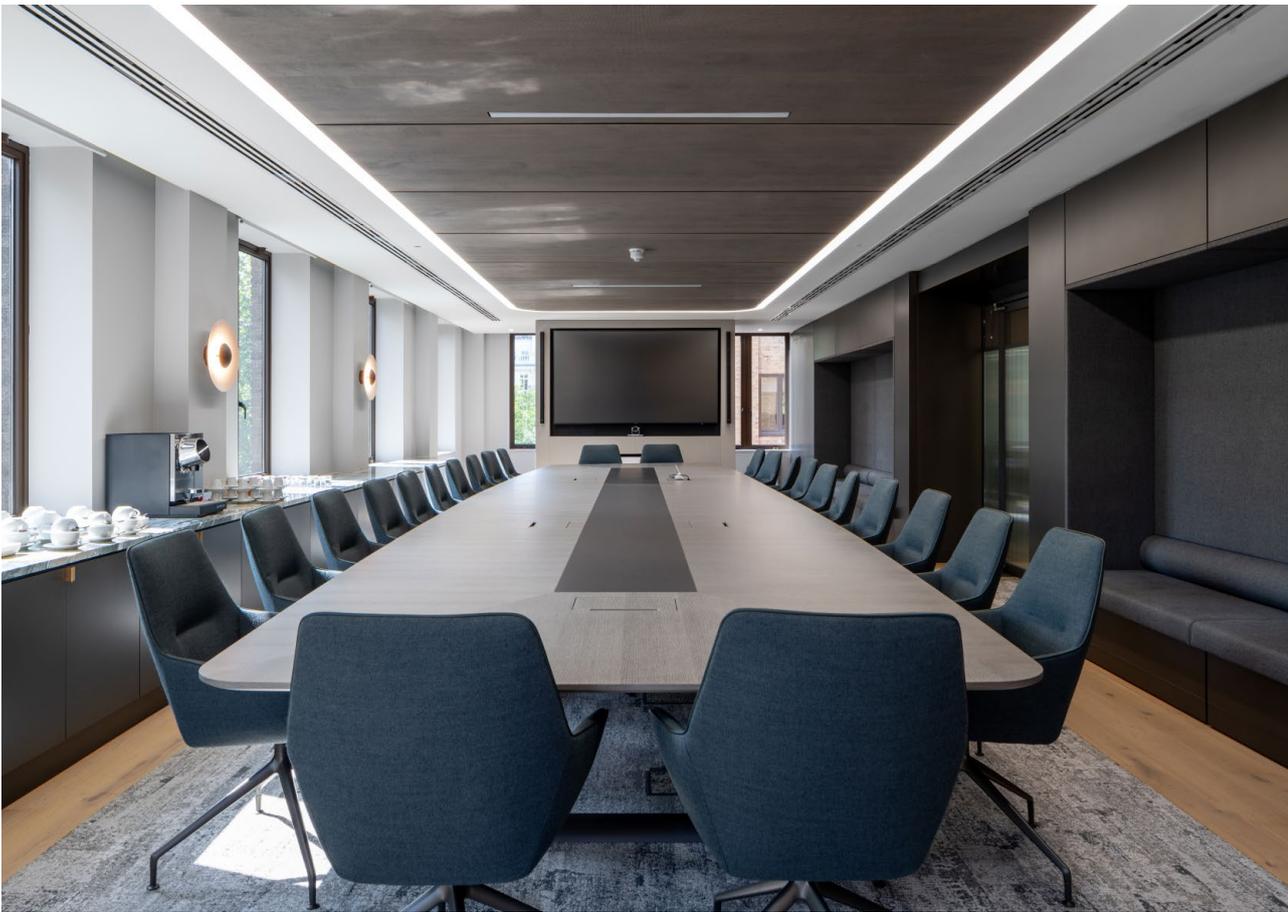
Sizes

- Sheets veneer - 3030 x 120 mm
- Sheets HPL - 3030 x 1280 mm
- Sheets Plywood - 3030 x 1280 mm
- Sheets FR Ply - 2400 x 1200 mm
- Made to measure - on request



Institute of Sport / Manchester Metropolitan University
Microperforated ceilings and walls
Oak with lacquer



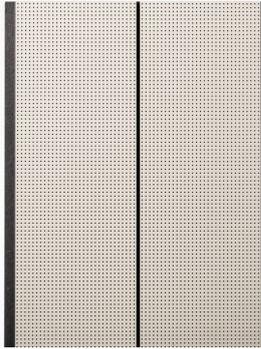


Berkeley Square, London
Microperforated Oak with custom tinted oil finish

Sutton High
Microperforated, Fair White Oak



*Microperforated MP-3 plank
Off-white HPL*



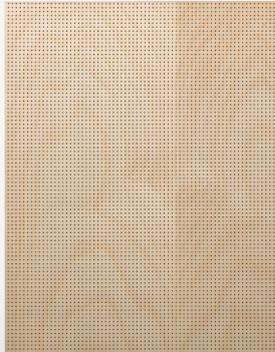
*Nanoperforated NP-2
Walnut veneer with clear lacquer*



*Perforated P16-C
Intense Black Walnut veneer*



*Microperforated MP-3 plank
Birch veneer with clear lacquer*



*Microperforated MP-3
Fair Oak veneer*



*Microperforated MP-3
Intense Black Walnut veneer*



*Microperforated MP-3
Manzano HPL*



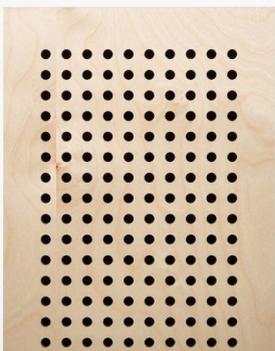
*Nanoperforated NP-2
Oak with clear lacquer*



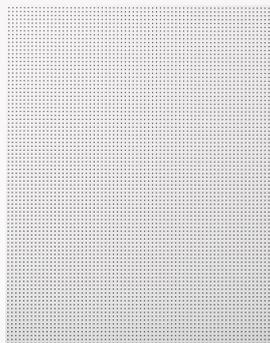
*Nanoperforated NP-2
Fair White Oak veneer*



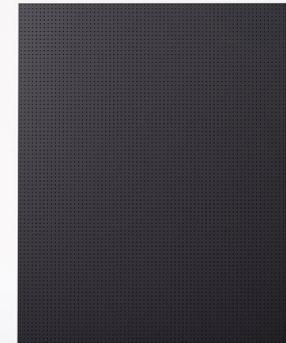
*Perforated P16-C
Birch Ply*



*Microperforated MP-3
White HPL*



*Microperforated MP-3
Ultramatt Black HPL*



Project example

Cromwell Place Art Gallery, London
Nanoperforated ceiling planks
Fair White Pine



Project example

White Eagle Lodge
Microperforated ceiling planks and acoustic cupboard doors
Fair White Ash



Available for
selected Groove
and perforated
panels

Acoustic cupboard and sliding doors

Available for:

- Microperforated
- Nanoperforated
- Groove R
- Groove 12
- Groove 24

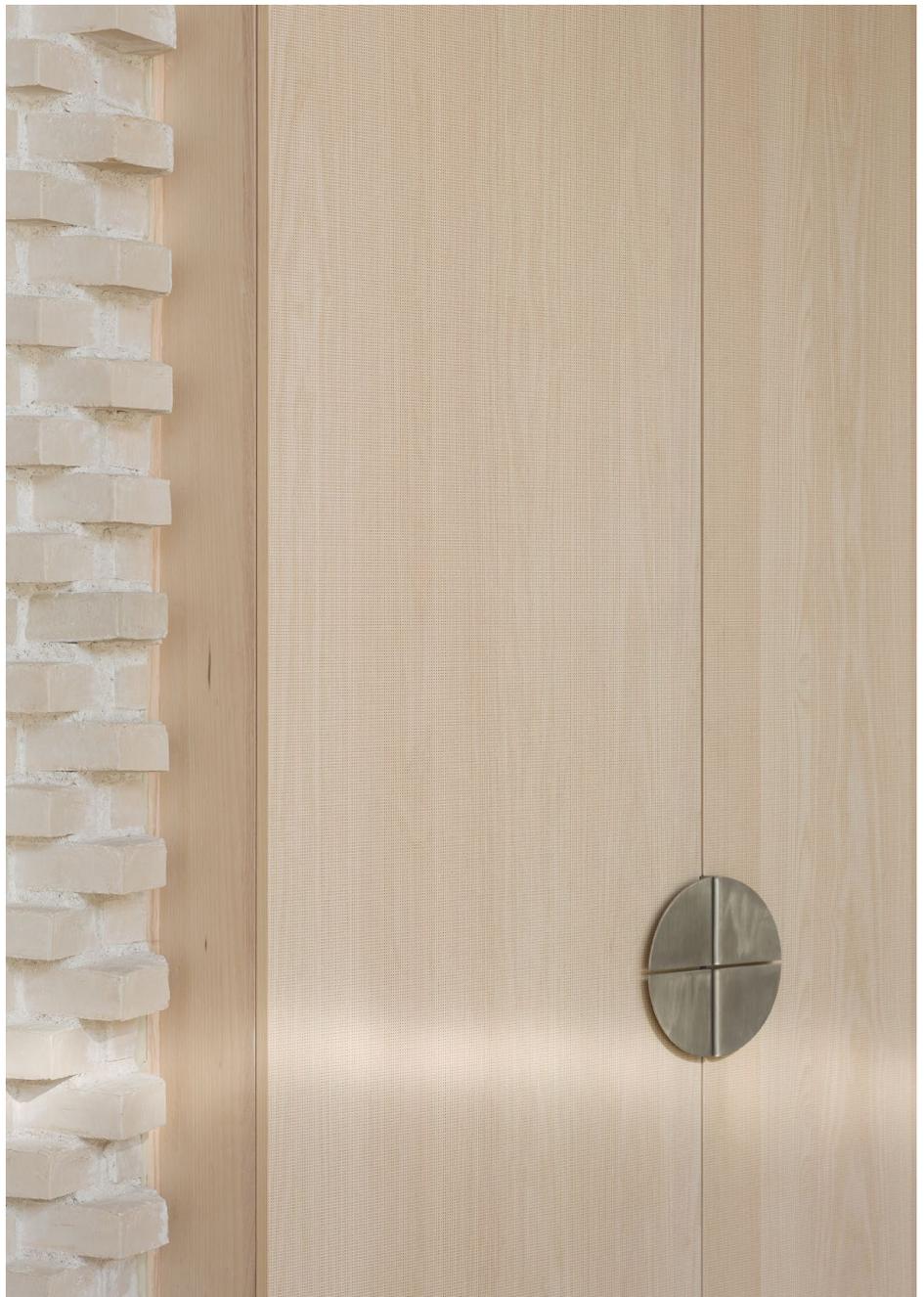
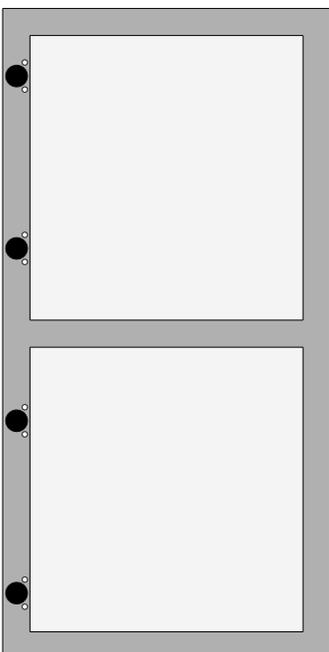
It is now possible acoustic doors which match our ceiling and wall finishes. With the Groove and perforated panel range we are can provide this multi-function solutions, made to measure with holes milled for hinges and handles, and veneer edge band or ABS edging for HPL.

Not visible externally, the core of the panels have reinforced core boards which create rigid frames and allow for many types of hinges and handles.

Sliding doors can also be supplied and installed with simple top and bottom runners.



Above - cupboard doors are supplied with holes for hinges, pre-milled.
Below - Core board has solid frames for strength.



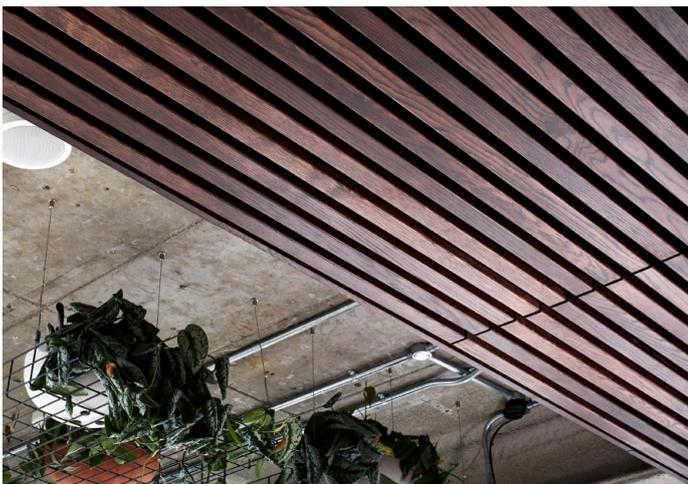
Special finishes



Ultramatt, anti-fingerprint HPL

A dramatic and contemporary look. Highly resistant to scratches and fingerprints, unlike other matt surfaces.

Left: Microperforated panel with Black Ultramatt HPL



Bespoke stain on slats

Whilst we have a wide selection of standard finishes to choose from, we also can tailor the finish to your exact requirements.

Minimum order quantities apply.

Left: Custom stain for One Lyric Square, Hammersmith, London.



Finish matching with coloured oil

Available for the Groove and Perforated ranges, coloured oil provides a matt and UV stable finish with a traditional look.

If you have a specific finish to match, we can check for something suitable.

For larger projects, a bespoke formulation can be made.

Left: matching a flooring finish for the London headquarters of an international corporation.

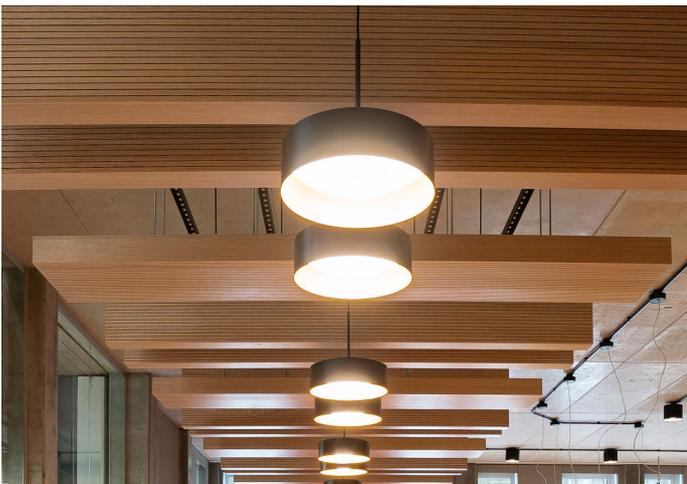
Special project solutions



Comprehensive integrated solutions

Talk to our project engineers about how to maximise the integration of acoustic panels. Matching trims, door covers, acoustic cupboards, and furniture frontage are typical options.

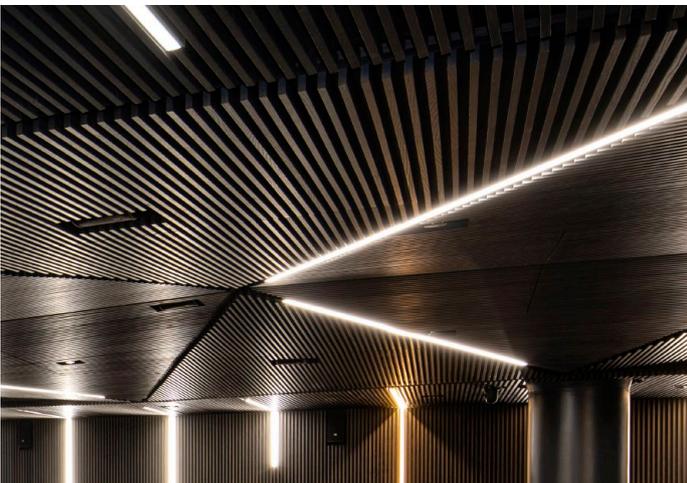
*Left: Fair White Ash
Microperforated panels with
door covers, trims and acoustic
cupboards.*



Acoustic objects

Acoustic rafts can provide a design feature whilst adding absorption which doesn't detract from the thermal mass benefits of the slab above. Dividing solutions are another option.

*Left: Groove acoustic rafts
with integrated LiFi units at
Edinburgh University.*



Complex geometry projects

Occasionally the project requirements go beyond standard details and finishes. Our varied background and experience provides us with the expertise to deliver unique solutions.

*Left: press conference room for
a major Football club.
The space was modelled in
3D and panels all made to
measure.*

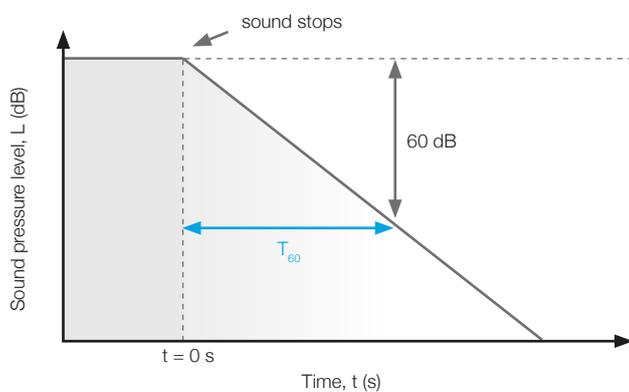
Contact us for project-specific design guidance.

Sound absorption in rooms

Reverberation time, RT60

Reverberation time is one of the key determinants of room acoustic quality, and the factor we try to control with our sound absorbing solutions. It is the time it takes for a sound to decay by 60dB in a given space. It's measured at individual frequencies, with certain frequency ranges given more importance due to the way we perceive sound, and the frequency spectrum of speech and/or other common sound sources. Often reverberation time is given as a single figure, which is based on these frequencies, and the function of the room will determine how short this time should be, with classrooms an example of a critical space due to the need for high speech intelligibility.

Fig 1. Reverberation time, $t = T_{60}$ (s)



Controlling reverberation

The principal method of reducing reverberant noise is to introduce sound absorbing surfaces, with more effective absorbers and greater coverage leading to lower reverberation times. The amount of sound energy a material will absorb is known as the absorption coefficient, and this again is measured across a frequency spectrum, with a system to give a single figure performance level, based on the most important frequency ranges.

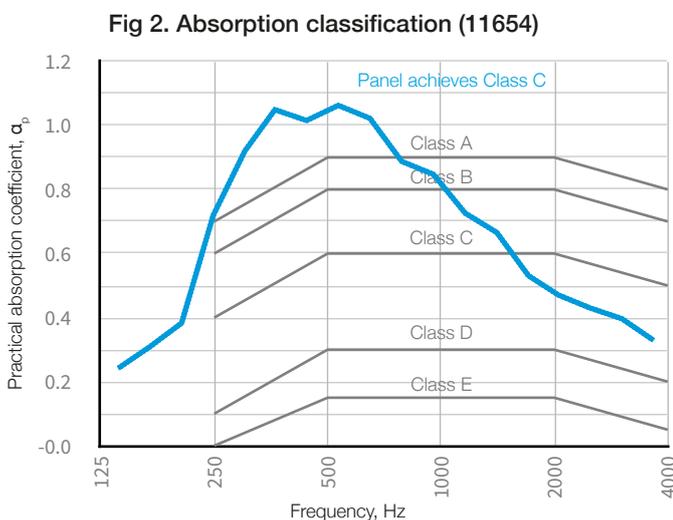


Fig 2 gives an example of measured absorption (the blue line showing a timber acoustic panel with low open-area), and the performance standards which an absorber needs to meet in order to achieve a certain performance classification. In this case, the absorption meets Class C, but in this case, due to the limit on the extent of unfavourable deviations, the absorber may have higher performance than this classification would indicate.

Weighted absorption, α_w	11654 Class
1.00 - 0.90	Class A
0.85 - 0.80	Class B
0.75 - 0.60	Class C
0.55 - 0.30	Class D
0.25 - 0.15	Class E

Predicting reverberation time

If we know the dimensions and the absorption characteristics of the finishes of a room, we can quite accurately predict the reverberation time. Wallace Clement Sabine, an American physicist who took the field of Architectural Acoustics from an art to an empirical science, developed a method of modelling this in the 1890's which is still in use today.

Practical implications for designers

Typically, an acoustic consultant will assess the appropriate reverberation time for a room, and inform the designers that a certain amount of absorption, of a given minimum performance, should be installed to fulfil this. Usually the simplified performance, i.e. Class C, will be specified, and we can then suggest suitable solutions to meet the criterion, along with the designer's aesthetic and functional requirements.

Typical reverberation time guide

Room type	Reverberation time T_{mf} seconds
Lecture halls	≤ 0.8 small room, ≤ 1.0 large room
Classrooms	≤ 0.6 primary, ≤ 0.8 secondary
Sports hall, swimming pool	$\leq 1.5 - 2.0$ dependant on size
Office	≤ 1.0
Meeting Room	≤ 0.8
Library	≤ 1.0
Restaurant	≤ 1.0
Corridors, entrance halls	Class C absorption covers ceiling area equivalent. Can be used on walls instead

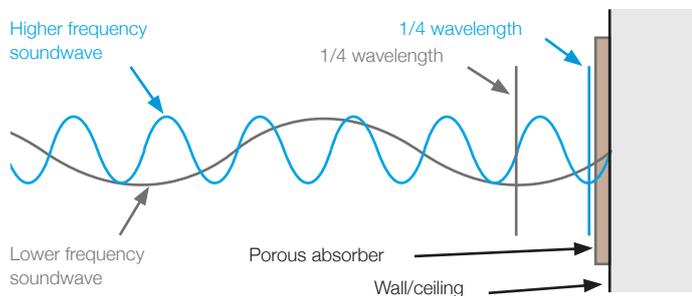
Contact us for project-specific design guidance.

Absorption Performance of timber acoustic panels

We can improve the effectiveness of timber acoustic panels by:

- increasing the open area (larger or more perforations/gaps between slats)
- adding an effective porous absorber behind the panels
- increasing the thickness of this absorber
- increasing the cavity behind the panels/absorber
- covering larger surfaces in the room (such as the ceiling)
- considering the Helmholtz resonance provided

Absorber thickness



The illustration above shows the relationship between absorber thickness and performance, and sound frequency. Maximum air movement is 1/4 wavelength from a hard surface, and the closer to this point an absorber sits, the higher the performance. Higher frequencies have shorter wavelengths, and so are easier to absorb as you require less thickness in the absorber.

This explains why in order to achieve a Class A absorber, with reasonable absorption in the mid to low frequencies, you usually need a thickness of 35-50mm.

This also explains why adding a cavity behind the absorber can increase low frequency performance, although as it doesn't increase the mass of the absorber, the increase is limited.

Porous absorption

Porous absorbers are used behind our acoustic panels to aid performance. We look for an absorber with high tortuosity (complex structure), high porosity, and good density; such as 60kg/m³. Mineral fibre is ideal here, although more sustainable options are available which also work well.

Timber acoustic panels

Timber acoustic panels require additional consideration to achieve useful absorption. Unlike a bare mineral fibre panel, they also have the hard, reflective surface to the face from the timber itself.

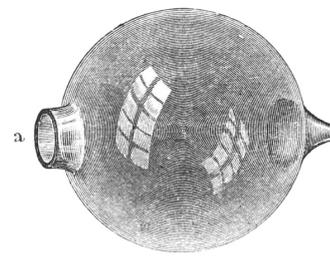
As follows then, reducing the amount of reflective surface, by increasing open area, gives better performance. This is particularly true in the high frequencies, as similar to light, the high frequencies don't go around corners very well, where low frequencies can.

Helmholtz resonant absorption

There is another absorption mechanism to timber acoustic panels, which can help us to increase the performance, without losing the look and functionality, desirable from timber panels.

This is known as Helmholtz absorption, named after physicist and acoustics pioneer, Hermann von Helmholtz.

Resonant absorption uses mass vibrating against a spring - in this case the air in the perforation or between the slat is the mass, and the absorber behind provides the damping to remove sound energy.



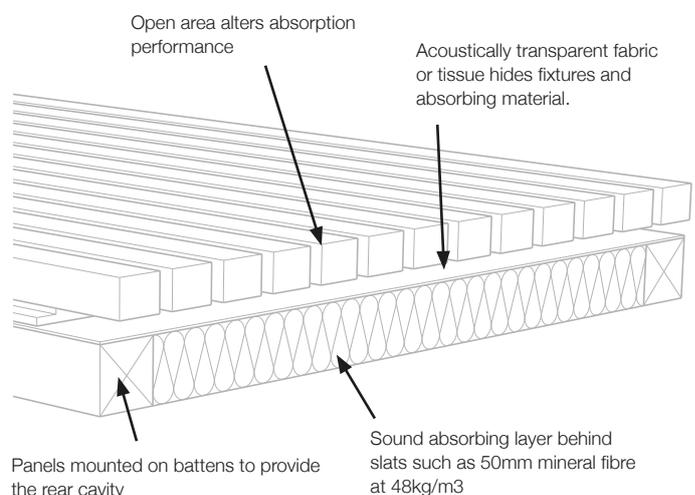
An early Helmholtz resonator.

Predicting performance

We can measure the performance of acoustic panels in a laboratory with a reverberation chamber. When designing absorbers specific to a project, we often use simulation software to make a prediction of the performance. When using standard material such as mineral fibre behind the panels, this gives accurate results, allowing acousticians to then use the data to calculate the reverberation time a room will have.

Typical buildup

The illustration below shows a typical buildup for one of our slatted timber systems, with consideration of the factors discussed.





Nanoperforated wall panels in Fair White Douglas Fir veneer with matching solid timber trims.



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