

Acoustic Plaster

Application Note

Rev. 1.2 | 21-10-2021

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Introduction

It's impossible to ignore the affect acoustics have on the feel of a space, and prime developments are increasingly turning to acoustic plaster systems to help promote wellbeing and provide a sense of luxury, even in spaces with typically harsh acoustics.

Walls of standard construction types tend to reflect sound around a room, but acoustic plaster systems are designed to absorb as much acoustic energy as possible giving spaces less reverberation time, increased intelligibility and overall a more calm and pleasant space to be in - all while maintaining a clean aesthetic.

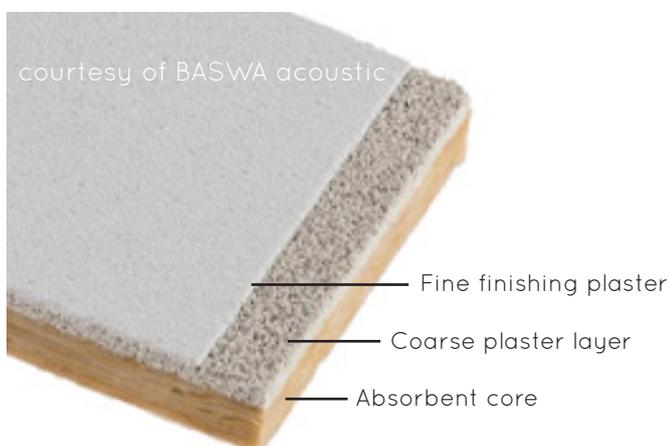


image courtesy of BASWA acous-

Clearly there is a strong synergy between discreet, high quality loudspeaker solutions and high performing, monolithic acoustic treatment; both working in spaces together to create a superior audio and visual experience. This application note discusses the installation of invisible, plaster-over loudspeakers into acoustic plaster systems, and the factors in achieving a clean looking, great sounding space.

Overview

Acoustic plaster systems come in a number of different forms from a number of suppliers, each with their own installation processes. The fundamental basis of these systems is usually a build-up of different layers: A core layer of a dense, acoustically absorbent material like compressed mineral wool provides sound absorption, and is attached to a stable substrate (such as plasterboard, or in some cases a metal frame). The core is usually bonded together with a layer of coarse plaster that also provides a flat surface for the finishing plaster to be applied to. This coarse plaster is sometimes applied with a toothed trowel blade or sprayed on, and when dry is porous, allowing air (or soundwaves) to permeate the plaster and be absorbed by the core.



The coarse bonding layer is covered with a finer, thin finishing layer that is usually sprayed on. This layer is again porous once dry, allowing soundwaves to be absorbed by the core material. The finishing layer is usually the thinnest, varying between 2mm and 6mm in different plaster systems. The finishing plaster layer can't usually be painted, as this would seal the air gaps that make the system effective. Instead, the plaster is pigmented to give different colour finishes, and re-finishing would require another layer of finishing plaster to be applied.

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Speaker Considerations

The particular properties of the finishing plaster are important factors when planning to install invisible loudspeakers, affecting both the performance of the loudspeaker and the quality of finish.

The correct invisible speaker model for this application must be designed to perform properly with a full plaster covering, such as Amina's Mobius range of invisible loudspeakers. The capacity to receive a plaster coat allows for the speakers to be coated at the same time as the rest of the surface, making achieving a truly invisible finish particularly straightforward.

In terms of performance, we should be aware that due to the inclusion of many tiny air gaps, acoustic finishing plaster is a little less dense and a little lighter when compared to standard multi-finish type plaster. This means that instead of the 1.5mm - 2mm of plaster skim thickness usually required for Mobius speakers, acoustic finishing plaster can have a greater thickness. For example, in Baswaphon acoustic plaster systems, Amina speakers can be covered with up to 6mm of plaster.

In terms of finish, the properties of the plaster give the finished surface an attractive, consistent texture. For this reason, when choosing an invisible plaster-in loudspeaker, plaster-up-to types that are not designed to be fully covered should be avoided, since the speaker will clearly be visible due to the difference in texture. It should be noted that because the plaster allows air to move through it, impurities in the air can be deposited in the plaster layer. Over the course of many, many years, this can result in a slight dulling of the finish, and in areas with speakers installed close to the surface this ageing is likely to happen at a slightly slower rate. With speakers installed at a depth of 6mm the plaster finish should age consistently.

Sound Transmission

'Acoustic treatment' and 'acoustic isolation' are different issues: Acoustic treatment is intended to condition the sound within a space, whereas acoustic isolation aims to minimise sound leakage between different spaces. Depending on the underlying construction, acoustic plaster systems often provide superior sound isolation between spaces when compared to properties of standard construction, even though they primarily aim to affect the acoustics within a space. If isolation is an important factor, the construction's suitability should be evaluated and adapted if necessary. For more information on sound isolation, please see the [Sound Transmission application note](#).

Installation

In general, the standard Mobius installation principles apply with a little adaptation for the different build up of materials in the construction of the acoustic system:

Substrate

Most acoustic plaster systems are applied to a substrate of some kind; usually fixing to a plasterboard layer, which this guide will focus on. Some systems instead use a metal frame grid system to attach the core absorption material to. In order for speakers to be installed in metal frame systems, a section of plasterboard should be attached to the top/back of the frame to provide a fixing point, and it is important that all tracks are firmly fixed (using conformant gaskets if possible) to eliminate the possibility of unwanted rattles or vibrations arising from metal-on-metal contact.

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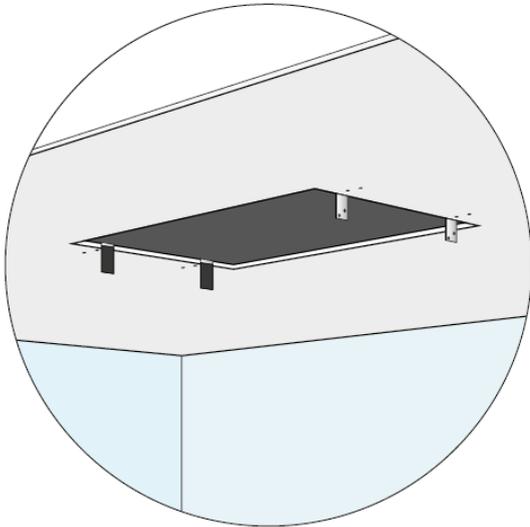
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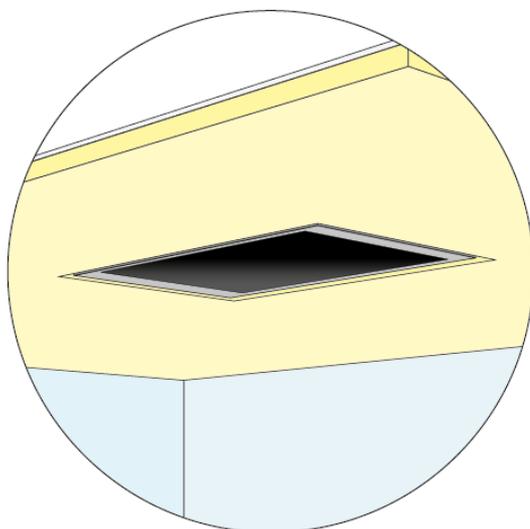
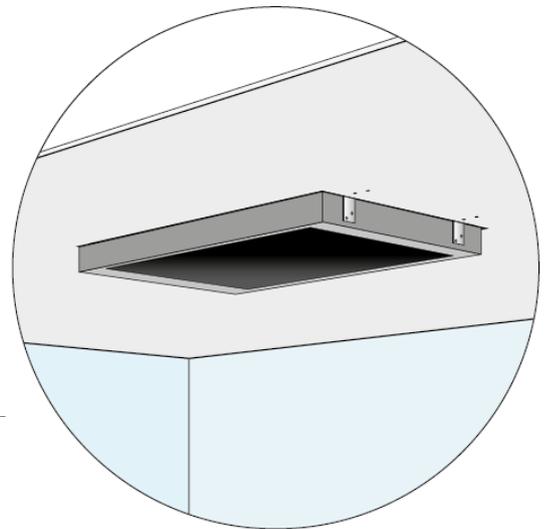
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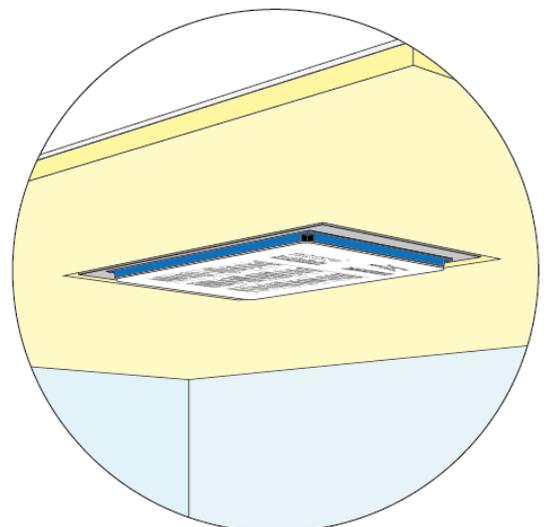
Backboxes are strongly recommended in order to provide mounting points for the speaker, protection from dust and debris, as well as reducing rearward sound transmission. Due to the thickness of the acoustic materials on the plasterboard substrate, the backbox will ideally need to be mounted on or through the plasterboard rather than behind it. To facilitate this, aluminium angle brackets can be used to fix the backbox to the plasterboard.

The brackets should have rubber or foam gaskets applied to avoid unwanted noise/vibration resulting from metal-on-metal contact areas. The speaker alignment can be determined by mounting the backbox further forward or backward in the aperture. Care should be taken to ensure the mounting of the backbox is completely parallel with the substrate to ensure the speaker is mounted square.



The total depth of the plaster system will be defined in its documentation, and ultimately in Baswaphon systems the face of the Mobius speaker must be recessed between 3mm and 6mm from the finished plaster level. Speaker shims can be used to fine-tune the alignment by pushing the speaker forward from the backbox in 1mm increments, meaning a little margin for error can be left when fixing the backbox to the brackets. Once the backbox is mounted, the acoustic absorption layer can be applied.

Taking care to ensure the backbox is completely free of dust and debris, the speaker can be connected, mounted and at this stage must be tested with a tone sweep test. (Please see [the tone sweep testing application note](#) for more details) Now is also a good opportunity to double-check the speaker alignment relative to the acoustic absorption layer, as once we move to the next stage any adjustment will be very difficult.



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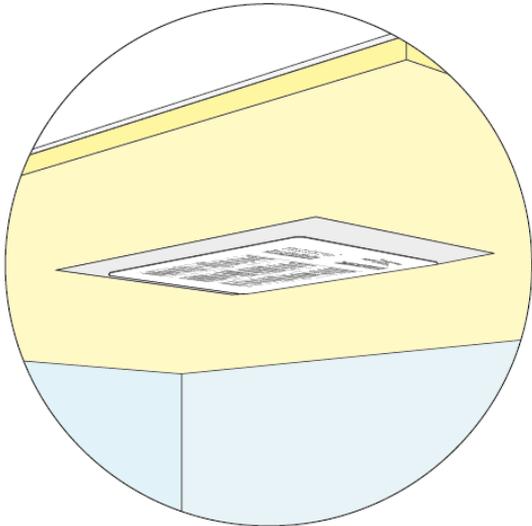
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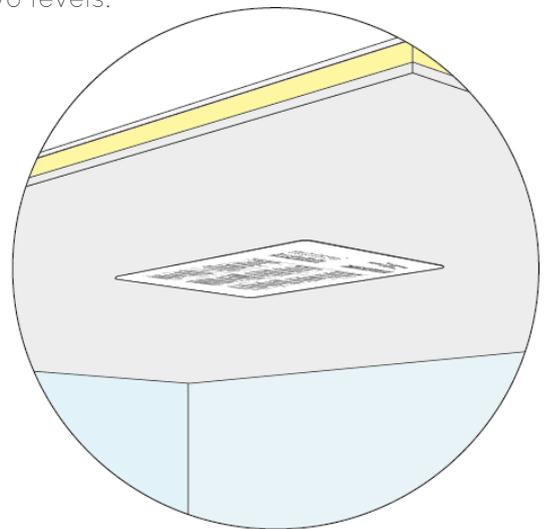
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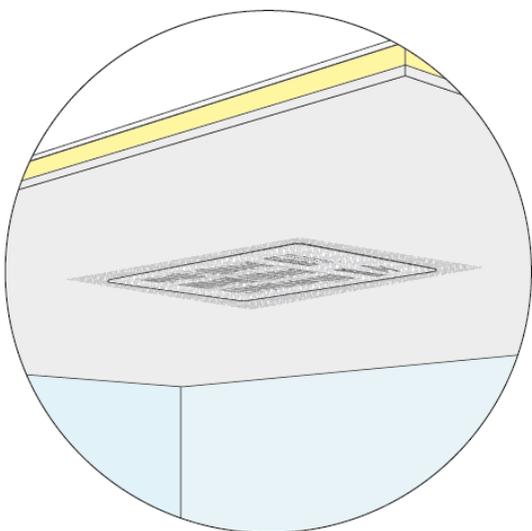


A hard-setting jointing compound can be pushed into the gap to provide a strong bond between the backbox and surrounding materials. If the speaker is aligned slightly forward of the coarse plaster layer, the jointing compound should be used to transition from one level to the other, with a gentle angle of incline between the two levels.

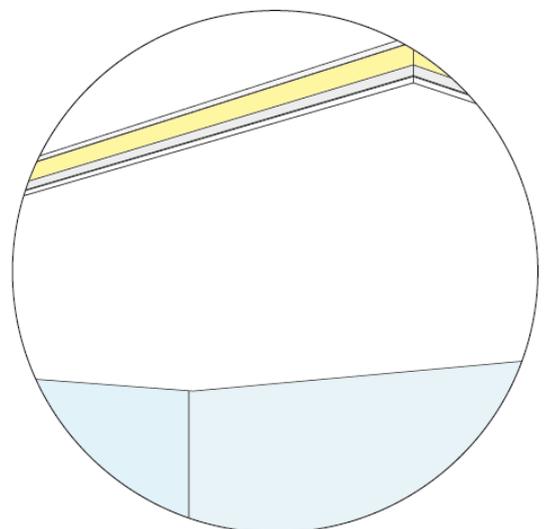
Once the edge-fill is fully dry, the coarse plaster layer can be applied according to the manufacturers guidelines. Different plaster systems will have different properties - Amina speakers have been tested with a total 6mm of Baswa acoustic plaster covering (including the finishing layer), plaster weight and thickness for other systems may vary.



Once the coarse plaster layer has fully dried, scrim tape should be applied across the face of the speaker, overlapping the coarse plaster by around 30mm - 50mm on all sides. Acoustic plaster solution providers will often supply a range of installation accessories for different installation circumstances: Special primers are usually part of this offering, which are recommended to aid the plaster application.



Once fully prepared, the finishing layer can be applied. For more information please contact Amina technical support.



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