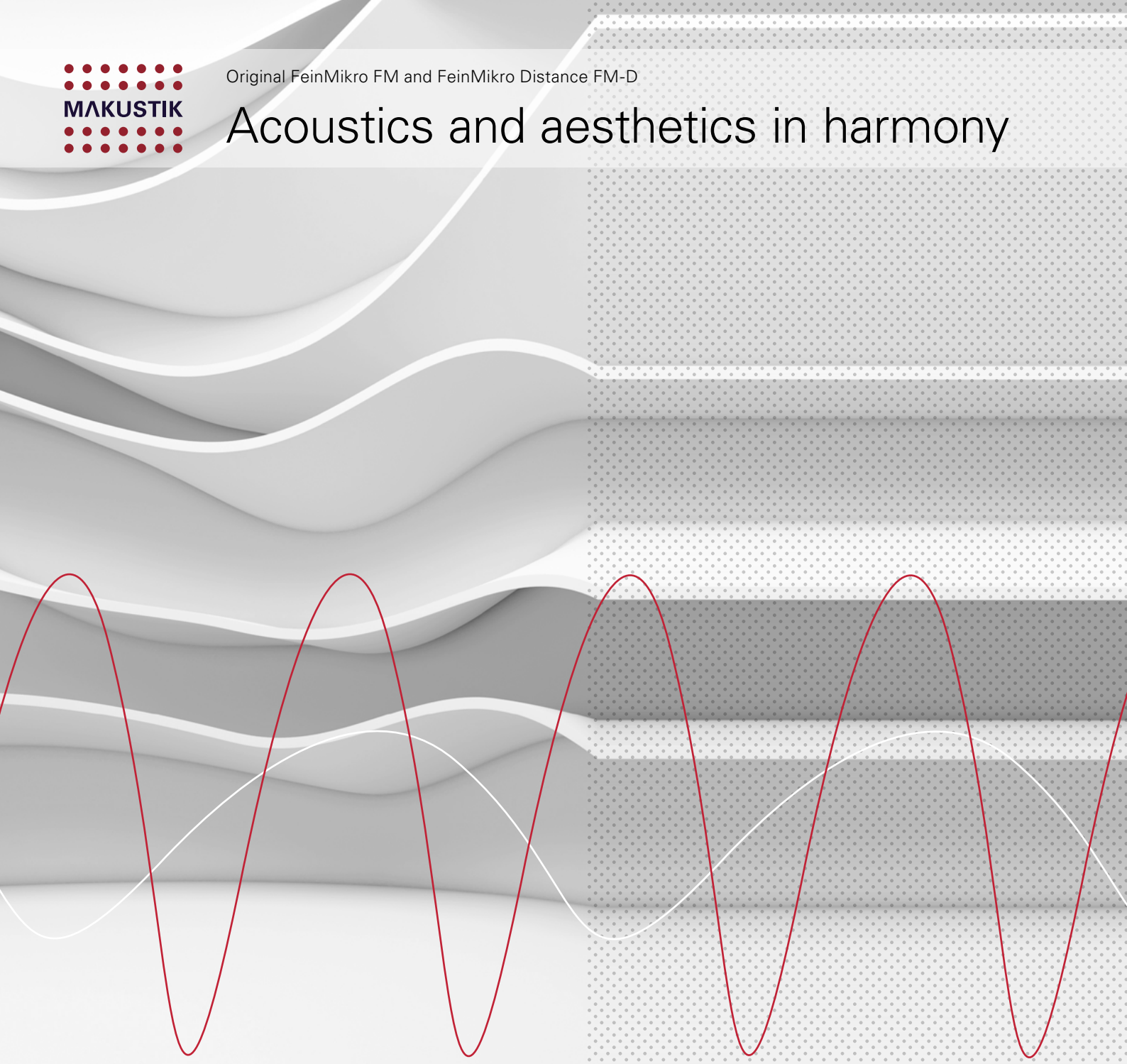
MAKUSTIK

Original FeinMikro FM and FeinMikro Distance FM-D

Acoustics and aesthetics in harmony



Akustik & Raum AG

JUST THE RIGHT TONE

Innovative, invisible – and incredibly effective

FeinMikro – The Original from MAKUSTIK

Although the physical principles of microabsorbers had been known for many decades, it was a long time before they could be implemented technically. The acoustic rules and systems were developed and patented at the Fraunhofer Institut für Bauphysik IBP in Stuttgart. Akustik & Raum AG, a development partner of IBP, has been putting these theories in practice since 2004.

The result is the aesthetically sophisticated and technically very precise Original FeinMikro sound absorber, manufactured in wood, plastic, laminate or glass and marketed under the MAKUSTIK brand.

With Original FeinMikro FM sound absorber, our engineers and developers were able to convert their passion and innovatory drive into a product that unites form, function and effect in a most impressive manner.

The new Original FeinMikro Distance FM-D sound absorber with a spacer, with its scarcely visible microholes and audibly increased sound absorption, now fulfils the aesthetic and acoustic room requirements even better.

"In addition to pioneering work and unrivalled technology, even more goes into products from MAKUSTIK. For example great passion, a highly developed drive to innovate and the ever-present urge to continue to endow the history of sound absorption with a new chapter."

ROBERT BÄHLER
Managing Director Akustik & Raum AG

MAKUSTIK

All FeinMikro innovations from Akustik & Raum AG are marketed under the MAKUSTIK brand.

Such small holes, such fine perforations, such great effect – with Original FeinMikro FM and Original FeinMikro Distance FM-D, from now on architects and interior designers can call upon sustainable sound absorbers that set new standards in acoustics while remaining scarcely visible.

Good arguments for Original FeinMikro FM and Original FeinMikro Distance FM-D

- Optimum blend of design and room acoustic functionality
- Aesthetic room design with highly effective sound absorbers
- Outstanding room acoustics, adjusted to suit the dimensions, materials and desired effect
- Highest intelligibility of speech, adjusted to suit needs and dimensions
- Great freedom of design with respect to form, colour and material
- Fulfilment of current fire protection requirements
- Camera compatibility and avoidance of distracting Moiré patterns
- Fulfilment of the highest demands for hygiene and sustainability
- Installation during construction or retrofit
- Product retains value and requires little maintenance

State Theatre Stuttgart, Theatre

The Dolder Grand, Zurich

Ballroom wall cladding with surfaces in American walnut

Aesthetics and diversity

Aesthetics

The practically invisible perforations unlock a huge freedom of form in design – with an impressive spectrum of materials, colours and shapes. The extremely fine perforations allow graphic designs in the veneers, or the printing of 3D images. The predefined surface textures of the architectural space are not affected by FM or FM-D absorbers.

Camera compatibility

When a camera photographs a wall with a visible hole pattern on it, overlaying of the grids creates interference patterns known as Moiré patterns. Using extremely fine perforations prevents the Moiré effect and the resulting flickering of the picture from occurring – the surface textures of the FM and FM-D absorbers are so fine that they cannot be captured by cameras. By incorporating a spacer, the visual signs of the base boards are avoided.

Microtextured coating

Each hole has a diameter in the micro-range and is therefore hardly visible. In addition to the size of individual holes, the micro-grid is chosen such that it does not cause any detrimental visual effects. Because people are more aware of an isometric grid than a set of intersecting skewed lines of holes, a pattern grid was developed as an alternative. The tapered-off perforations of FM and FM-D absorbers avoids colour and texture differences.

Material diversity

The coating materials specified in the interior design, such as real wood veneers or decorative laminates along with base materials such as MDF or fibre-reinforced gypsum plasterboard, are processed according to the needs and preferences of the customer. Plastic honeycomb elements or mineral glass for transparent applications are also available.

Hygiene and sustainability

No dust can penetrate the FM and FM-D absorbers thanks to the minimal dimensions of the perforations. If extremely small mineral fibres would be a problem in cleanrooms, these fibres can be dispensed with locally without any perceptible reduction in absorption performance. In contrast to other absorbers, FM and FM-D require no maintenance and no age-related reduction in absorption is to be expected.

Acoustics and construction

FeinMikro sound absorption

As is generally known, microabsorbers work by friction in narrow holes. Sound is turned into heat energy. However, this effect is limited in conventional absorbers. Through their special construction, FM and FM-D absorbers work in two different ways at once – as resonators through the perforated coatings and base layers and as fibre absorbers through the backing of mineral fibres. The integral spacer ensures that the multitude of microholes are up to 100 per cent active.

Wide-band sound absorbers

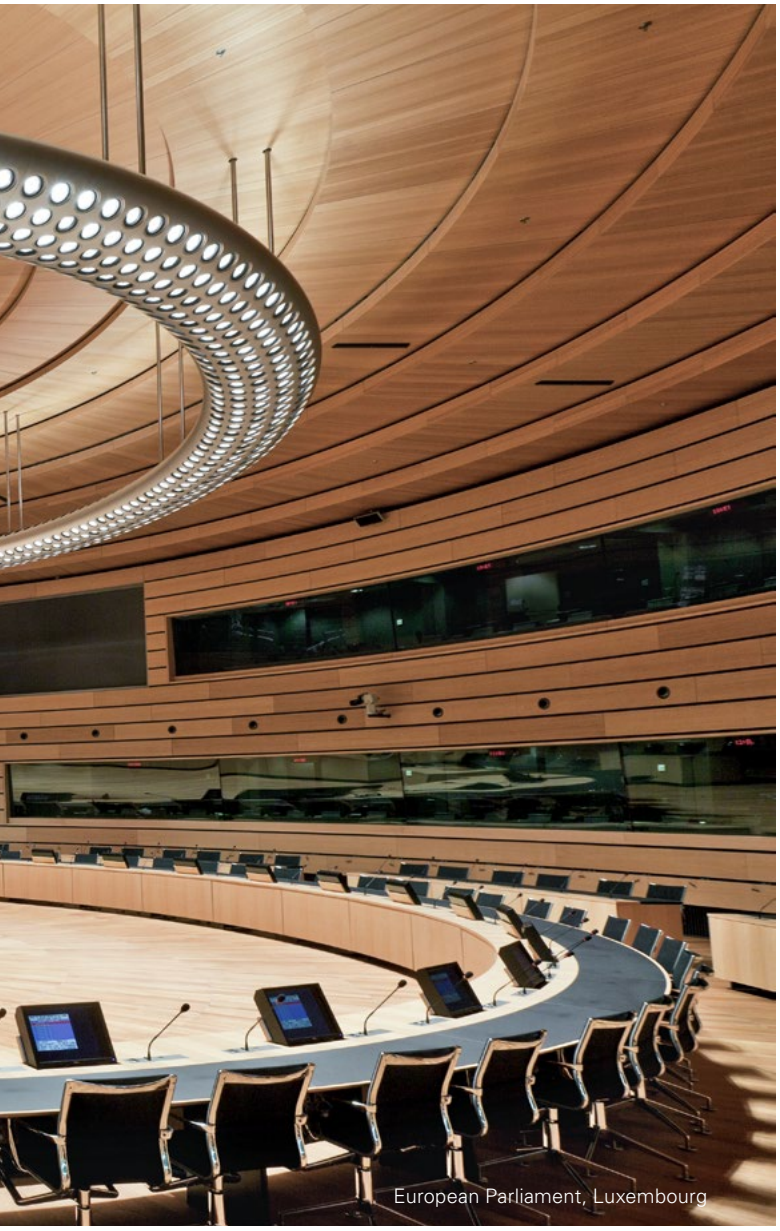
Absorbers with a consistent effect across all frequency ranges are desirable for acoustics, whereas architects prefer to create as uniform an appearance as possible. These objectives can be optimally fulfilled by our Original FeinMikro products. The innovative spacer plays a direct role in achieving a consistently high sound absorption value in the low, middle and high frequency ranges. A uniform appearance is ensured by the perfect FeinMikro surface texture.

Intelligibility of speech

Offices, conference and meeting rooms, classrooms and training rooms, airports and railway stations, entrance areas and foyers, canteens and restaurants, hospitals and healthcare facilities all have something in common – people communicate in them. For communication to function well acoustically, the reverberation time, disturbing noise levels and therefore the intelligibility of speech must be appropriately controlled. FM and FM-D absorbers are particularly suitable for this task.

Construction

Perfect design, a wide range of installation options – the manifold requirements on the optimum absorber with respect to acoustics, design, installation and fire protection can be satisfied by the systematic construction of FM and FM-D absorbers with a variety of materials. Differential expansion and hygroscopic changes are evened out by presence of the spacer.



European Parliament, Luxembourg

Fire protection

The behaviour in fire of the sound absorber is primarily determined by the base material used. Compressed fibre-reinforced gypsum plasterboard provides a substantial base layer for fire protection. The insubstantial decorative layers of wood, CPL or PC are kept very thin for fire safety reasons. The original requirements for strength and sound absorption are maintained in a composite coating in conjunction with incombustible mineral layers. The incombustible material is tested together with the fire-optimised coating as a composite unit. MAKUSTIK is the first to be using composite tested and certified products – more to follow.

Screening from electromagnetic radiation

The new composite coatings of Original FM and FM-D sound absorbers with mineral layers act as an effective screen against electromagnetic radiation in the low frequency range. Original FeinMikro FM and FM-D sound absorbers are excellent at screening electromagnetic radiation and for sound absorption over larger areas. The conversion into heat energy is as effective on the damaging energy from electromagnetic fields as it is on sound energy. It is simply ingenious how an aesthetic wall and ceiling cladding are able to bring sound and electromagnetic energy under control.

Innovative technology

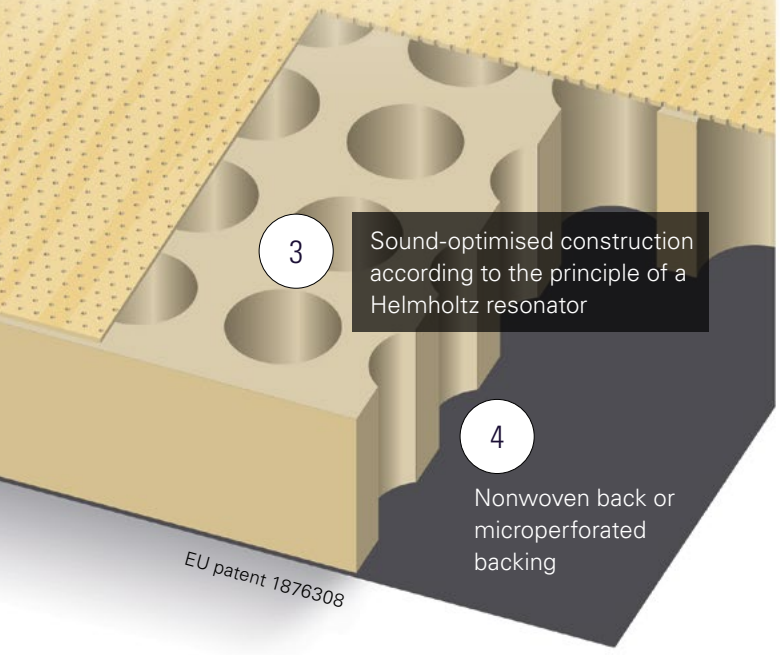
Original FeinMikro FM

1

Microperforated coating, with almost invisible holes of less than 500 microns in diameter

2

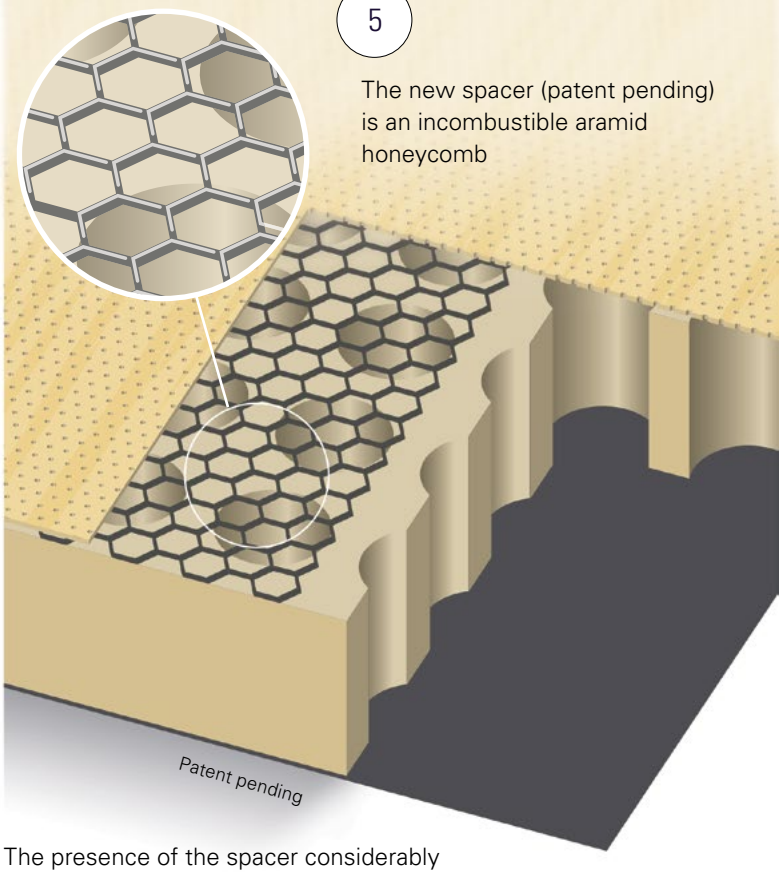
The continuous perforation grid ensures the surface has an even, harmonious appearance



Original FeinMikro Distance FM-D

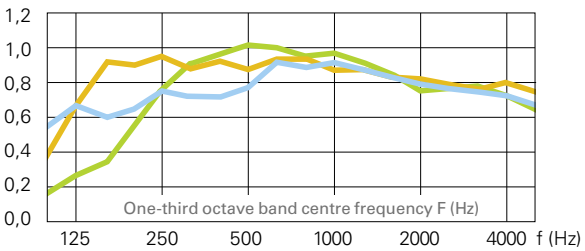
5

The new spacer (patent pending) is an incombustible aramid honeycomb



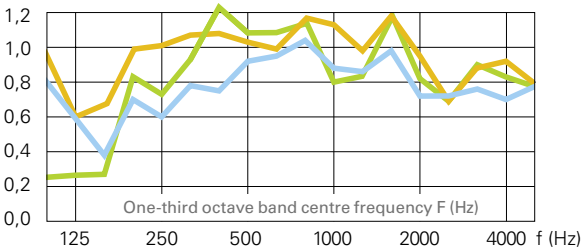
The presence of the spacer considerably increases the sound absorption value and avoids visible signs of the base boards.

Absorption values of
Original FeinMikro FM



Installation height
- 46 mm EN 11654 αw 0.85|B
- 216 mm EN 11654 αw 0.85|B
- 366 mm EN 11654 αw 0.80|B

Absorption values of
Original FeinMikro Distance FM-D



Installation height
- 46 mm EN 11654 αw 0.95|A
- 216 mm EN 11654 αw 1.00|A
- 366 mm EN 11654 αw 0.85|B

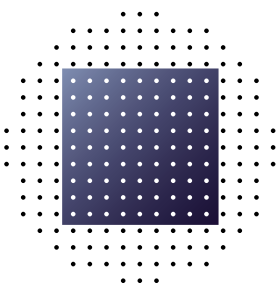
Impressive absorption

The additional advantages of Original FeinMikro Distance FM-D

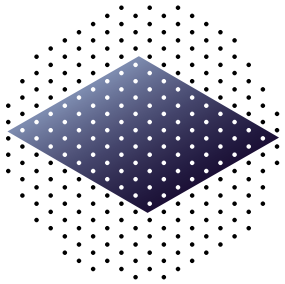
Now with the new spacer, Original FeinMikro FM absorber has been improved once more. In particular with real wood materials, hygroscopic changes in the room can lead to swelling or shrinkage. Original FeinMikro Distance FM-D absorber compensates for this effect – with an innovative aramid spacer positioned between the microperforated coating and the drilled base board. At the same time, the sound absorption values are improved once more compared with Original FeinMikro FM absorber.

ICRC, Geneva

Perforation pattern

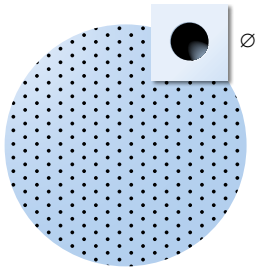


Isometric
343,000 punched holes/m²

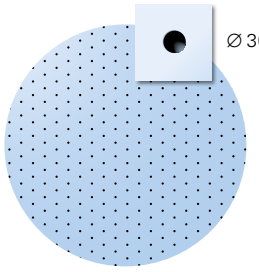


Texture
309,000 punched holes/m²

Perforation dimensions

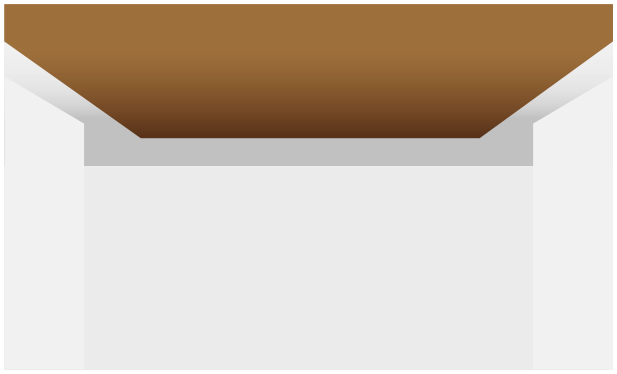


500 µm (Fig. 1:1)
6% open surface

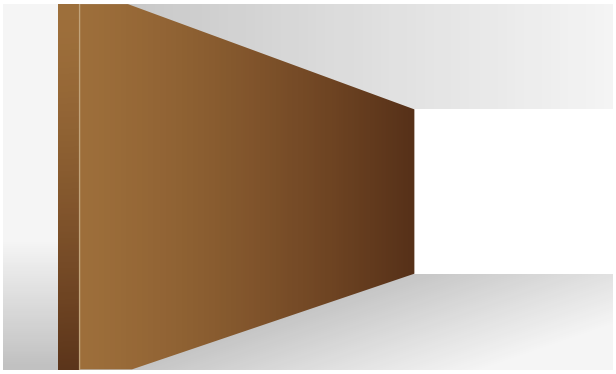


300 µm (Fig. 1:1)
2.2% open surface

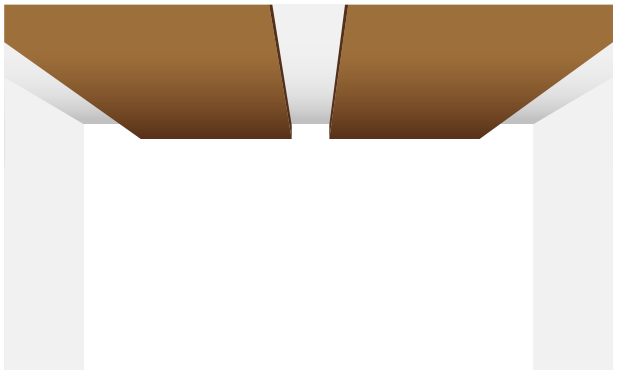
Applications in interior design



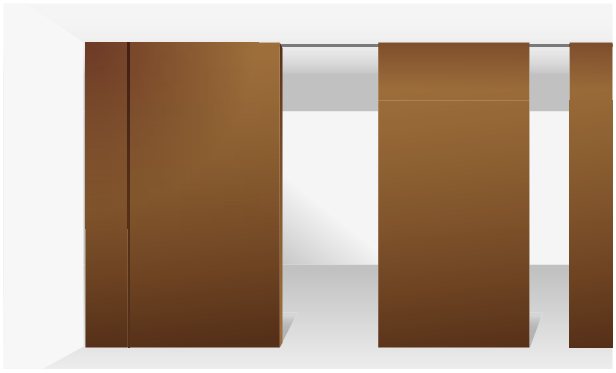
Closed/open ceiling



Wall

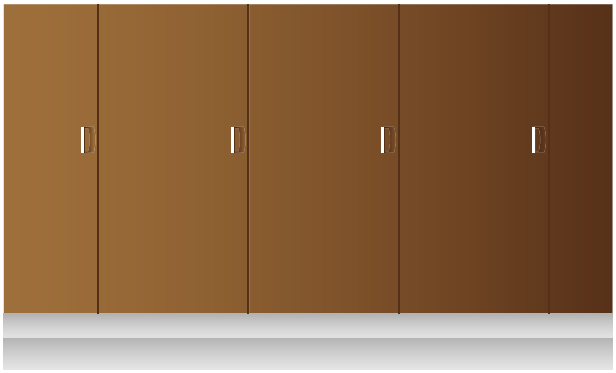


Ceiling sails

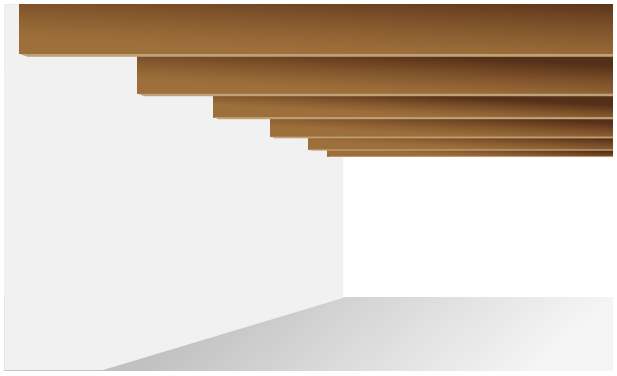


Sliding partitions/partition walls

Illuminated ceilings



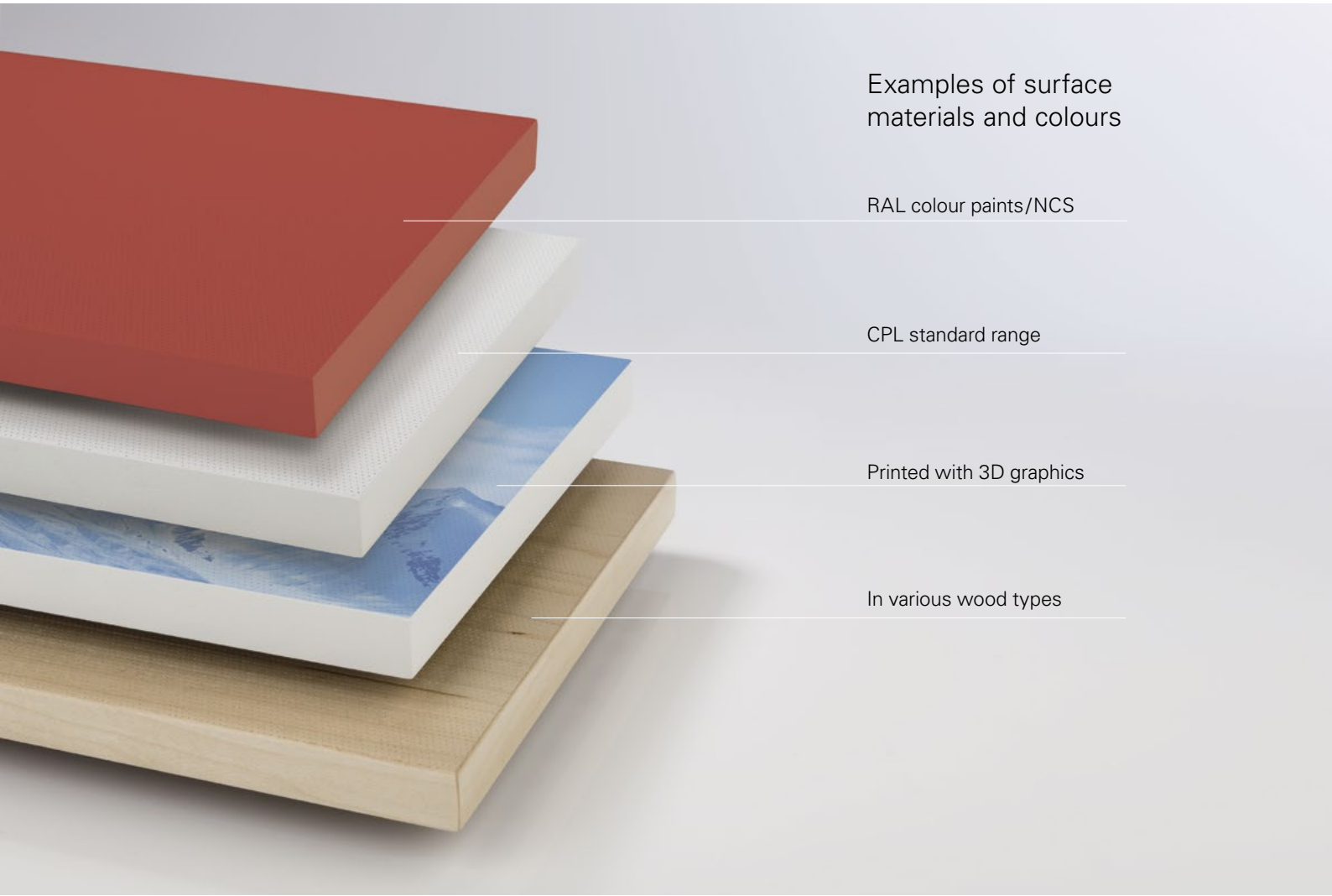
Wall cupboard



Baffles

Wall murals

Individuality, design and advice



Free choice, one-to-one advice

With Original FeinMikro FM and Original FeinMikro Distance FM-D, you can choose the perfect materials and colours from an almost unlimited selection. The considerable range of wood veneers gives you lots of scope for creativity. And thanks to the free choice from the NCS and RAL colour palette, you do not have to be limited in any way when it comes to the colour of CPL surfaces. The already wide spectrum is further enhanced by the various surface treatments, such as varnishes, oils and other preparations, as well as the possibility of printing high-quality 3D graphics on the surfaces.

How your Original FeinMikro FM and Original FeinMikro Distance FM-D products should look lies fully and completely in your hands. Let yourself be inspired, make your choices and discuss the best option with your architect. Until the definitive decision is made and confirmed, your wishes and needs set the direction for the project. Our trained and experienced team of advisors supports you all the way through the design and project phases to completion and beyond with reliable service whenever required.

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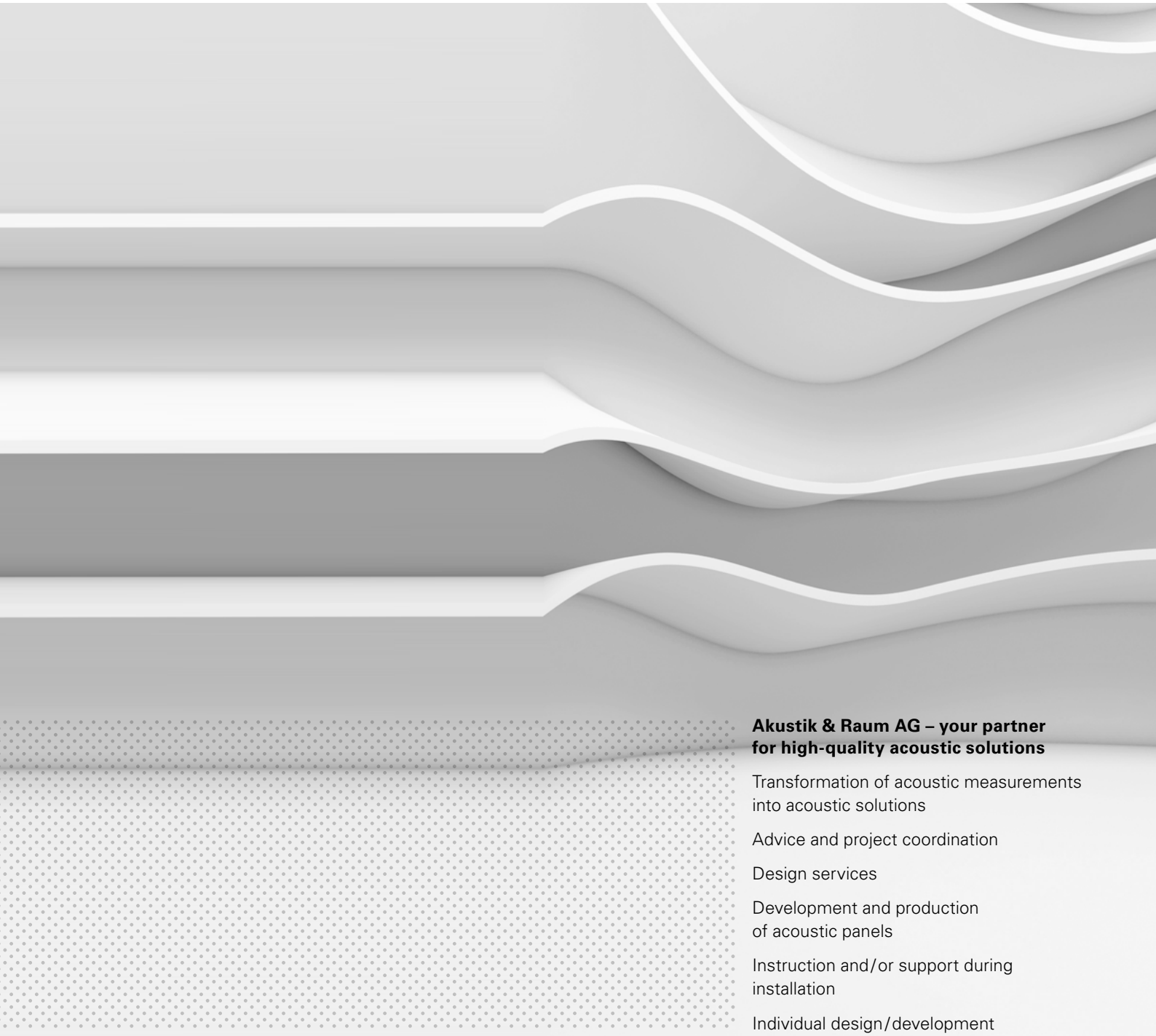

Akustik & Raum AG – your partner for high-quality acoustic solutions

Transformation of acoustic measurements into acoustic solutions

Advice and project coordination

Design services

Development and production of acoustic panels

Instruction and/or support during installation

Individual design/development

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