BAFFLE

75 % Metal Baffle Ceilings
25 % Metal Ceilings
10 × Best Practice Baffle

One-piece baffle | Trzesniewski Bistro, Vienna (AT)

Sustainability is the new standard

» What is preventing building professionals from making sustainability the new standard?
It's remarkable the creativity with which people are still looking for
reasons are still being sought as to why something is once again not possible ... «

(Dr. Christine Lemaitre from School construction 02-2019)

WHY METAL CEILINGS?

- The components already have a **finished surface** at the time of delivery.
- Delivery and assembly are **dust-free**.
- Both the ceilings and the substructures stand out due to their **durability**.
- Thanks to their continuous paint surface, metal ceilings are **especially hygienic**.
- The paint surfaces can be **easily cleaned, dry or wet**.
- For school rooms and sports venues, our ceilings can be designed to be **ball-proof**.
- Our metal ceiling systems can be easily **serviced**.
- There is a possibility of **simple dismantling**.
- Our products are winners owing to their **reusability**.
- All our components allow mono-material recycling.
- We have a **large portfolio** of possible perforations.
- The **integration** of technical elements can be done **easily and precisely**.
- Our metal ceiling systems offer **optimal conditions for the combination** with heating and cooling elements.
- We manufacture precise and **aesthetic** products.
- Modular pre-production **allows for a short construction time.**

Acoustics

Heating and cooling

Fire protection

Hygiene

Design

Sustainability

Parzifal®

Baffle

One-piece baffle | Lights of Vienna, Guntramsdorf (AT)

WE THINK IN ARCHITECTURE

We think in the categories of **city, building, space and users** and not in running metres of baffle ceiling. We take you and your projects seriously and look for the best solution together with you, particularly if the project is to be worked out from scratch. We see ourselves as your system partner for **high-quality architecture components** and look forward to working with you!

In the end, all of us are happy about the result we achieved and will enjoy it for many years.

"Baffles open up a wide range of design possibilities: By varying the height of the baffles or the space above and below the baffle, many different impressions can be produced."

(Hans Niedermaier, FUN Architekten)

One-piece baffle | Lights of Vienna, Guntramsdorf (AT)

WE DESIGN WITH WELL-BEING IN MIND

Metal baffle ceilings have also proven their worth in the hospitality sector for optimizing room acoustics. They can be combined with sprinkler systems, and various lighting and ventilation systems can likewise be integrated between the baffles.

One-piece baffle | Trzesniewski Bistro, Vienna (AT)

Restaurant | Merian Iselin Spital, Basel (CH)

ACOUSTICS

Acoustics as a decisive factor

One of the most important human senses is the sense of hearing. Especially in buildings such as schools, office complexes or hospitals, acoustics are a decisive factor in being able to work effectively and feel comfortable. Acoustic concepts are therefore essential and should already be included in the planning phase of a project.

Why metal acoustic ceilings?

Although metal ceilings are hard, they work perfectly as absorbers due to the materials and processing steps used.

The starting point is steel and aluminum sheets with a low material thickness. In combination with various perforations, the acoustic fleece and the ceiling void above, this results in very good sound absorption values.

All-in

Our systems combine excellent acoustic characteristics and a high-quality appearance with functionality and durability, ensuring a holistic sense of well-being.

Acoustic ceilings can also be equipped with additional functions such as heating, cooling, ventilation or suitable lighting. It is also possible to customize and expand the product characteristics. For example, solutions can be designed that also incorporate fire protection or hygiene aspects.

Variety

All metal ceiling systems from Fural Metalit Dipling can also be used as acoustic ceilings. A variety of perforations in combination with an acoustic fleece or an overlay, which can consist of mineral wool, mineral wool welded into PE foil, foam, sheep's wool or polyester wool, offer perfect acoustics for your project.

Handbook »Certified Acoustics«

For more information see our Handbook »Certified Acoustics« and our homepage: www.fural.com/de/metalldecken/akustik/10

ACOUSTICS TERMINOLOGY

Sound and sound level

The term "sound" refers to localised vibration and the propagating waves. These can occur in air (**airborne sound**) or in solid materials (**structure-borne sound**). If floors, ceilings and stairs are stimulated to vibrate by footfall, this is referred to as **impact sound**.

The sound intensity is designated with sound level L and specified in the decibel (dB) unit.

Acoustic quality

The term "acoustic quality" describes the interaction of the acoustic factors of a room for such sound events as music or speech with reference to the individual location of the person listening.

Rather than any physical properties of the room, the acoustic quality describes audio-physiological and audio-psychological effects on the listeners.

Acoustic quality is therefore not a clearly ascertainable quantity. It also depends on individual and subjective factors, for example on hearing capacity and listening experience.

However, the aim of a good acoustic plan should also be to include people with poorer hearing and therefore to achieve generally good average audibility.

Sound absorption area

The so-called **equivalent sound absorption area**, A, of a component is calculated by multiplying its area with the sound absorption coefficient, α.

All boundary surfaces, S_i, of a room have individual sound absorption coefficients, α_i, which allows the equivalent sound absorption area, A_i, to be determined for each partial area:

$$A_i = \alpha_i \times S_i (m^2)$$

The total equivalent sound absorption area, A, is calculated by adding up the individual amounts:

$$A_{total} = \alpha_1 \times S_1 (m^2) + \alpha_2 \times S_2 (m^2) + \ldots$$

Reverberation time

The reverberation time, T_{60}, is a measure of the time required for the sound pressure to reduce to 1/1000 of its initial value after the sound source becomes silent.

This value is usually determined for a centre frequency (500 Hz or 1000 Hz) and specified accordingly.

The reverberation time increases in proportion to the volume of the room and in inverse proportion to the equivalent sound absorption area, A.

Sabine formula

In the field of technical acoustics, reverberation time T is calculated with the "Sabine formula":

$$T = V \div A \times 0.163$$

"V" describes the room volume and "A" the equivalent sound absorption area in m^2.

What do abbreviations α_s, α_p, α_w and NRC A stand for?

α_s ($alpha_s$) describes the so-called **one-third-octave** value. In a close spacing of thirds, 18 different sound absorption values are measured between 100 and 5000 Hz (100 Hz, 125 Hz, 160 Hz, 200 Hz, 250 Hz, 315 Hz, 400 Hz, 500 Hz, 630 Hz, 800 Hz, 1000 Hz, 1250 Hz, 1600 Hz, 2000 Hz, 2500 Hz, 3150 Hz, 4000 Hz and 5000 Hz). A value of 1.0 means complete absorption, while a value of 0.0 means complete reflection.

α_p ($alpha_p$) describes the so-called **practical sound absorption coefficient**. Three on-third-octave values α_s are used to calculate an **octave value** α_p. In addition 6 frequencies are represented (125 Hz, 250 Hz, 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz).

α_w ($alpha_w$) describes the so-called **weighted sound absorption coefficient**. This is frequency-dependent and specified as a single-number value rounded to the nearest 0.05. The α_w value can be supplemented with so-called "shape indicators". These state that the measured values in the low (L), mid (M) or high (H) frequency range are better than those identified by the α_w value (see index word "shape indicators").

NRC A specifies the average of the sound absorption at octave values 250 Hz, 500 Hz, 1000 Hz and 2000 Hz, rounded to the nearest 0.05. A noise reduction coefficient of 0.80 stands for an average sound absorption of 80%.

Shape indicators (L/M/H)

The weighted sound absorption coefficient, α_w, can be supplemented with so-called "shape indicators", expressed by the letters L, M and H (low, mid, high), in which frequency ranges the sound absorption level is particularly high.

- L Particularly good absorption up to 250 Hz
- M Particularly good absorption at 500 Hz to 1000 Hz
- H Particularly good absorption at 2000 Hz to 4000 Hz

Absorber classes

According to DIN EN 11654, acoustic elements are assigned to absorber class A, B, C, D or E based on their sound absorption coefficient.

- A Extremely absorbent α_w 0.90–1.00
- B Highly absorbent α_w 0.80-0.85
- C Very absorbent α_w 0.60-0.75
- D Absorbent α_w 0.30-0.55
- E Slightly absorbent α_w 0.15-0.25

Longitudinal sound insulation $D_{n,f,w}$

In buildings with a skeleton construction – typically nearly all new office buildings today – the individual rooms are separated by lightweight partition walls. The ceilings are suspended.

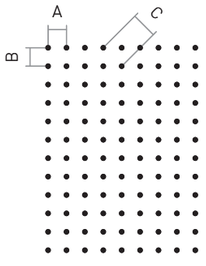
The cavity that this creates between raw ceiling and suspended ceiling acts as a sound transmission path which must be compensated for with longitudinal sound insulation.

The longitudinal sound insulation can be implemented with vertical or horizontal compartmentalisation.

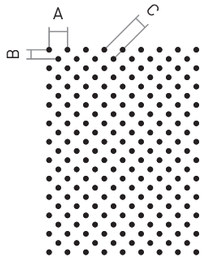
The longitudinal sound insulation is determined according to EN ISO 717-1 and specified as a weighted normalised flanking sound level difference $D_{n,f,w}$ in **dB** units.

Here "$D_{n,f}$" describes the normalised flanking level difference for flanking components (e.g. suspended ceilings). "$_w$" means that the measured values have been weighted in accordance with normative specifications. The specified numerical value is the value read from the reference curve at 500 Hz.

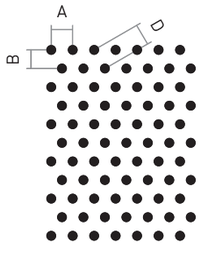
The reference curve is not shown in the test report diagrams.



Rg



Rd



Rv

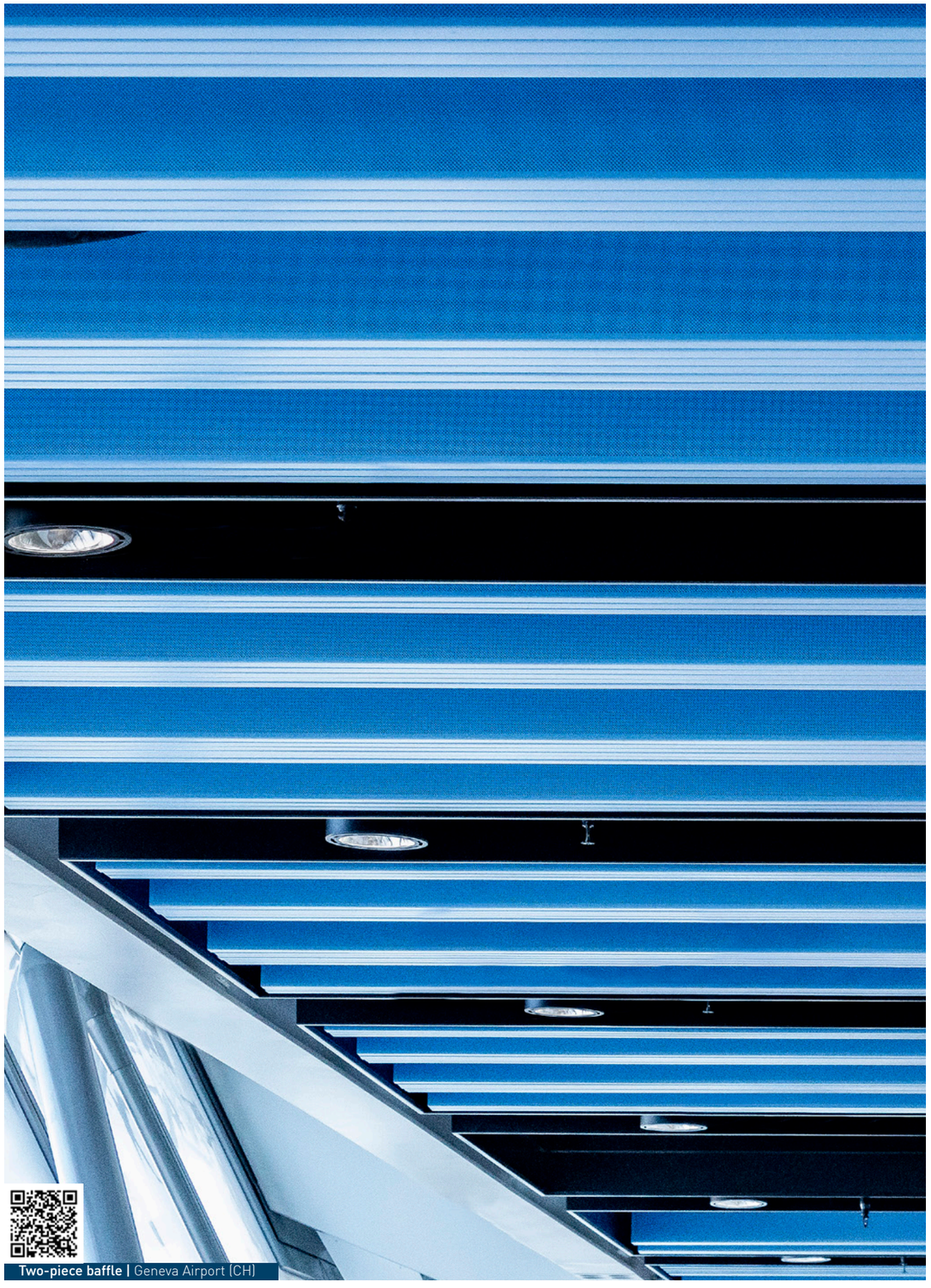
Perforation sizing

- A Horizontal spacing
- B Vertical spacing
- C Diagonal spacing 45°
- D Offset spacing 60°

HIGH TECH

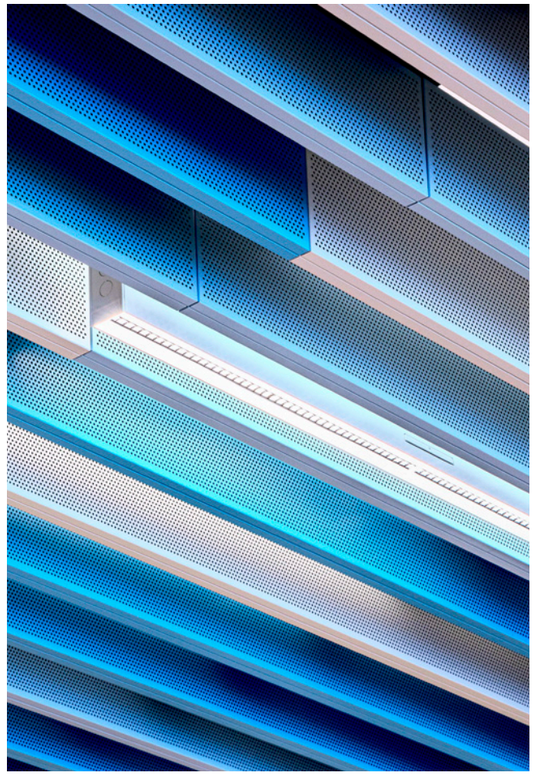
The advantages of baffle ceilings are most evident for ceilings with a high degree of technology integration. Outlets for sprinkler systems as well as lighting and ventilation elements can be positioned between the baffles. In addition, the baffles that are installed in rails can be easily pushed aside to inspect the ceiling cavity.

One-piece baffle | Hotel AMERON Zürich Bellerive au Lac, Zürich (CH)



Two-piece baffle | Geneva Airport (CH)

On a powder coating line with suspended transportation of the components through the coating and annealing chamber, the baffles receive their final surface in the desired colour, layer thickness and degree of matt or glossiness.



COLOUR

MIXED LIGHT

Baffle ceilings offer excellent opportunities for mixing daylight and artificial light. Depending on the reflectance of the surface, the light is softly brought into the room.

One-piece baffle | Sporting Goods Manufacturer, Herzogenaurach (DE)

SPORTS

At a sports equipment manufacturer in Herzogenaurach in Central Franconia, everything revolves around performance and the aesthetics of their own products. In the "Halftime" building, the Danish architectural firm COBE has developed a ribbed concrete ceiling with sky light strips in between. Our baffles integrate the parallel long-span lighting and ensure good acoustics. Products, as fit for high-performance as excellent sports gear.

One-piece baffle | Sporting Goods Manufacturer, Herzogenaurach (DE)

Innovation: Acoustic Guide Profile (ALP) with 100 W/m² Output Instead of 84 W/m² and 20% Higher Sound Absorption

Less acoustically treated and activated surface area required, possible elimination of additional absorbers
Sustainability:
–20% material usage for the same output,
–30% copper due to reduced thickness (0.35 mm instead of 0.5 mm)

Winner of the BVF Award 2023; BVF – 400 member companies for surface heating and cooling

ALP | Acoustic Guide Profile

HEATING AND COOLING

We are a cool company!

One thing in particular is cool for us: our metal ceilings. Because they make it possible to heat and cool rooms in a very simple way. Climate functions can be added and integrated into our metal ceilings according to the modular principle and be combined with other ceiling variants, e.g. acoustic ceilings.

Why use metal for a cooling ceiling?

Metal is ideally suited as a conductive medium for heat and cold. Optimal temperature control is achieved on the basis of the radiation principle.

Since our cooling ceilings work completely without air circulation, dust swirling is prevented and the draft is avoided. During the pollen season, it is particularly important to ensure an agreeable cooling of the room – without being exposed to pollen.

This is particularly relevant to school buildings, since more and more children suffer from allergies due to pollen in the air.

Cooling and heating ceilings with copper/ aluminium or plastic systems can be implemented in various designs. Sustainability is also taken into account: Energy is saved, and costs are reduced.

We test cooling ceilings

The efficiency of our cooling ceilings and walls is no accident. We test your individual projects in our own test laboratory and guarantee custom-tailored solutions for your projects in top quality.

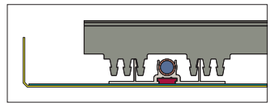
ALP - Acoustic guide profile

In joint tests, Schmöle (Menden), wg plan (Simmerath) and Fural (Gmunden) have developed a solution that ideally combines cooling performance and sound absorption. The result is the ALP acoustic guiding profile. The patented profile opens up large parts of the perforation surface thanks to its raised slats. This allows the perforation, the acoustic fleece and the ceiling cavity to work in the same way as metal ceilings. Tests by independent testing institutes confirm a 20 % higher sound absorption and 20 % higher cooling and heating performance of the ALP compared to conventional WLB (heat conducting sheet). For this increase in performance and the sustainability of the product, the BVF Award 2023 was presented to the ALP by the Bundesverband Flächenheizungen und Flächenkühlungen e.V. (Federal Association for Surface Heating and Cooling).

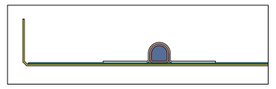
Climate elements

In Austria, the following climate elements are manufactured by long-term and well-experienced partner companies and integrated into our products.

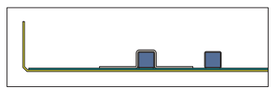
- Copper/aluminium systems with magnetic fixation



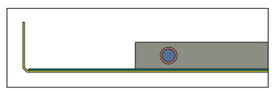
- Copper/aluminium systems with adhesive fixation



- Plastic/aluminium systems with magnetic fixation

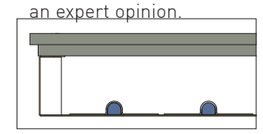


- Copper/graphite systems with adhesive fixation

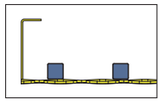


Fire protection ceiling and cooling

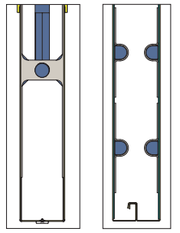
Cooling ceiling systems in the case of fire protection ceilings always require an expert opinion.



Expanded metal ceiling and cooling

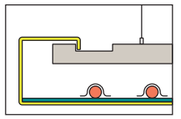


Baffle ceiling and cooling

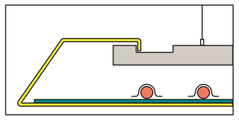


Floated ceiling and cooling

90° angle



55°-angle



Further information can be found in the »Cooling ceilings« brochure.

Further information can be found in the brochure » ALP – Acoustic guide profile «

INTEGRATION

In the "Karlstraße" building in Munich, the ceiling is a prime example of integrating technical functions into a single construction unit. Lighting, sprinkler systems, and acoustic optimization are combined within a cuboid geometry. In addition, the lighting helps make the cubic unit appear sleek and transparent.

Built-in Elements | Karlstraße, Munich (DE)

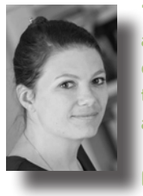
The smartest building in the world: The Edge, Amsterdam (NL)

Exemplarity

The Edge, a globally recognized smart building that stands out for its performance, environmental friendliness and beauty. This building uses a system of technological innovations to maximize comfort and energy efficiency. It improves the health, comfort and productivity of Deloitte employees and other building occupants while reducing energy consumption and environmental impact. The Edge is a net-zero energy building, producing 102% of the energy it consumes.

STYLE

Today, contemporary interior designs of hotels take you into a new world ruled by a style mix of retro and modern, East and West, sophisticated and improvised. Guests want to experience to the full a world that is quite different from their everyday lives. Our metal ceiling products allow for creative design options to highlight the desired ideas.



"The ceiling resolves a paradox: It looks quite calm and disappears, although a lot of things are openly visible there.

(Vanessa Thulliez, Monoplan AG)

One-piece baffle | Hotel AMERON Zürich Bellerive au Lac, Zürich (CH)

Reduce, reuse, recycle
100% circular economy

Sustainable building with sustainable metal ceilings

Sustainability - a topic that is increasingly becoming the focus of social discussions – and justifiably so!

In the fight against climate change, the conscientious use of resources and measures to promote the ecosystem are urgently needed to protect the environment. The idea of sustainability should also find its way into the construction industry: Thus, at Fural Metalit Dipling we focus on this and process our steel and aluminum sheets directly in the factory and to measure, which avoids unnecessary work on the construction site. In addition, metal ceilings allow repairs and revisions at any time without much effort and can be reused. Last, but not least, our metal ceiling systems are long-lasting and easy to recycle, thus gentle on the environment.

Building materials

The use of building materials and constructions with substances that cause environmental damage has long been avoided or greatly reduced in sustainable construction.

In addition, we always keep an eye on the reusability of individual components in the event of modernization or reconstruction. Since around 79% of mineral waste in Germany comes from the building industry and a total of around 53% of the entire waste volume can be attributed to the building industry, possible deconstruction or conversion is increasingly being taken into account as early as the planning phase.

In addition, building components and products that require less energy to manufacture are now preferred - assessing the energy flows involved in manufacturing, transporting, and processing building materials involves calculating their primary share of non-renewable energy, their share of global warming, and their share of acidification.

Metal ceilings for more comfort in the room

Metal ceilings are ideal for cooling and heating rooms, because the temperature control is based on the radiation principle: The heat or cold radiates gently through the metal ceiling directly into the room. In addition, cooling ceilings work completely without air circulation and thus cause neither dust turbulence nor drafts.

»Nothing fits the building life cycle like a Fural metal ceiling«
(Dirk Freytag, CTO)

TECHNICAL ASPECTS

The technical properties of baffle ceilings and their aesthetics largely depend on the following factors:

Hollow body

Our baffle tiles are made of sheet metal and form a hollow body that can be technically used in many ways: e.g. for the integration of heating and cooling elements or lighting fixtures; or for fillings that further improve the acoustics.

	One-piece baffles	Two-piece baffles
A (internal dimensions)	25/30/35/40/50/60 mm	30–50 mm
B (external dimensions)	100–600 mm (with a length of up to 3,500 mm) 100–350 mm (with a length of up to 4,000 mm)	150–600 mm
C (external dimensions)	up to 4,000 mm	up to 3,000 mm
Materials	Sheet metal 0.6 mm (standard) Sheet metal 0.7 mm Aluminium 1.0 mm	Sheet metal 0.6 mm

Baffle width A

The A dimension describes the width of the visible bottom side of the baffle.

Baffle height B

A higher baffle has a larger surface than a lower one and is thus more efficient in terms of its acoustic effect and any integrated heating and cooling. At the same time, the visual overlap with adjacent baffles is better.

Baffle length C

This dimension describes at which lengths the individual tiles of the baffles can be manufactured.

Baffle space D

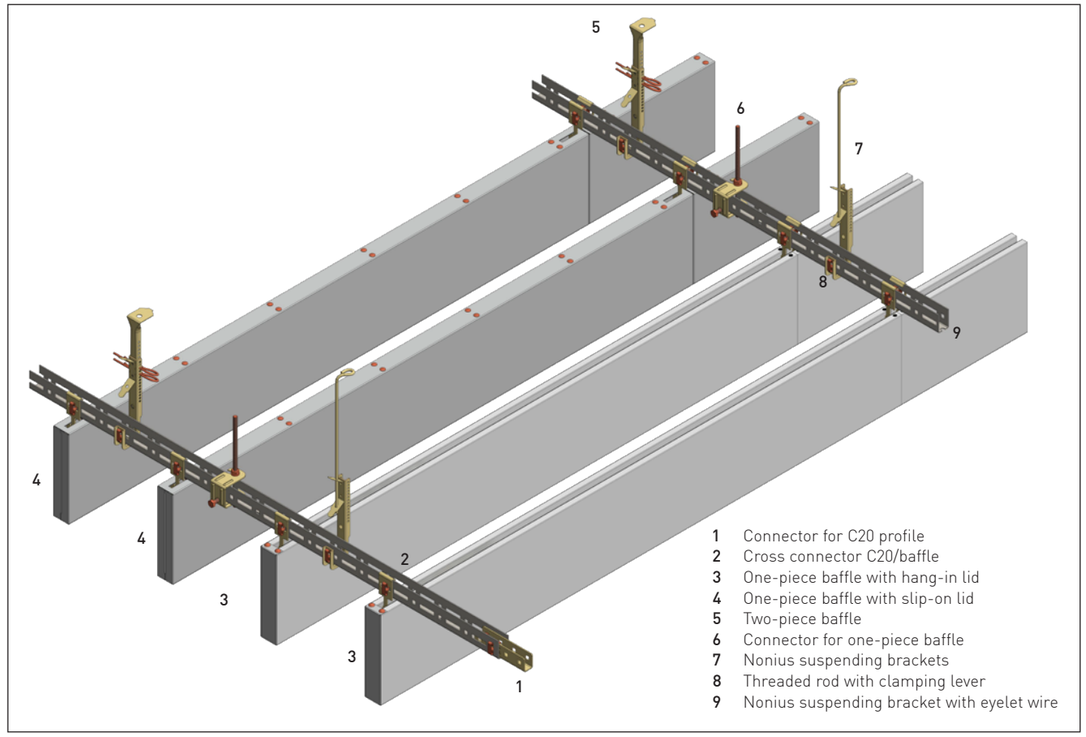
The smaller the space D, the more baffles can be deployed effectively. The surface of baffle ceilings clearly exceeds that of smooth ceilings.

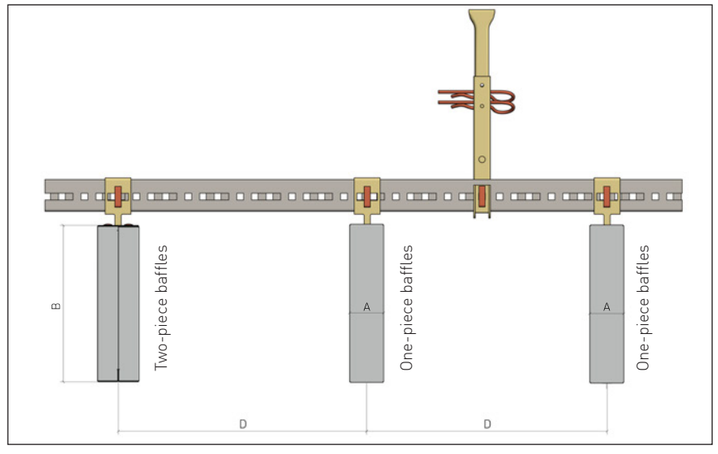
Perforation height E

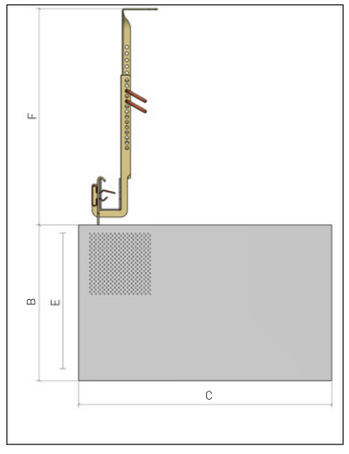
Not the height of the baffle but the actual height of the perforation is key to the acoustic effect of metal baffle ceilings.

Ceiling cavity/suspension height F

The clearance from the upper border of the baffles to the raw ceiling describes the height of the ceiling cavity. Dynamic fanning allow for creative ceiling plans and responding to special floor plan situations.







A Baffle width
B Baffle height
C Baffle length
D Centre to centre distance/module
E Perforation height
F Suspension height

THERMALLY ACTIVATED BAFFLES

Beyond the acoustic aspect, baffles are excellent for cooling or heating rooms. Temperature control is based on the radiation principle:
Heat radiation is a form of heat transfer in which the heat is transmitted by electromagnetic waves (infrared radiation and infrared light). The thermal energy always moves in the direction of the lower temperature, so no thermal energy is lost – according to the second main principle of thermodynamics and the law of conservation of energy.

The properties of heat radiation for the thermal activation of the baffles are generally of great import. Because when heat radiation hits a body, some of it is reflected, some of it is absorbed by the body. The rougher the surface and the darker a body, the more heat radiation is absorbed and the less is reflected by the body.

The radiation power of a black body with its surface and absolute temperature is specified here by the Stefan Boltzmann Law that describes an ideal black body depending on its temperature and its radiated thermal power.

$$P=\sigma \cdot A \cdot T^4$$

The radiation power of a black body is therefore proportional to the fourth power of its absolute temperature: Doubling the temperature causes the radiated power to increase by a factor of 16.

A black body completely absorbs all radiation that hits it (absorption = 1). According to Kirchhoff's Radiation Law, its emission level ε therefore also reaches the value of 1, which results in the fact that, given the relevant temperature, the black body radiates the maximum possible thermal power.

The value of the Stefan Boltzmann constants amounts to

$$\sigma=\frac{2\pi^5 k_B^4}{15h^3c^2}=5.670374419\ldots\cdot 10^{-8}\ \frac{W}{m^2K^4}$$

If the body is not black, the weighted average emission degree across all wavelengths and the weighting function of black body energy distribution are taken into account. Depending on the material and coating, ε(T) scatters between 0.01 and 0.98.

$$P=\varepsilon(T)\cdot\sigma\cdot A\cdot T^4$$

Due to these physical principles, it is possible to optimise the power of a cooling system through the cooling assignment and the colour.

RAL 9010 matt	0,93 ± 0,02
RAL 9005 matt	0,93 ± 0,02

In the cooling mode, the cold water flow absorbs the thermal radiation from people and objects in the room and dissipates it. An immediately noticeable cooling effect occurs. In the heating mode, the heat radiates softly via the baffles directly into the room.

Moreover, our cooling baffles work completely without air circulation – dust swirls are prevented, draft is avoided.

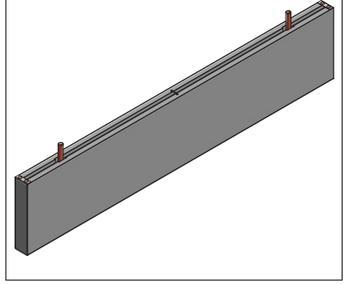
Due to the low inlet temperature of 25–35 °C, heating baffles are ideal for the combination with low-temperature heat generation – additional energy costs can be saved.

The suspended metal baffles are a perfect conductive medium owing to its good thermal conductivity. The temperature is quickly transferred to or absorbed from the space below; the acoustic properties of the perforated metal baffles are retained. Quick and safe servicing of the baffles is ensured and constitutes another major plus point that yields considerable advantages both in the construction phase and during operation.

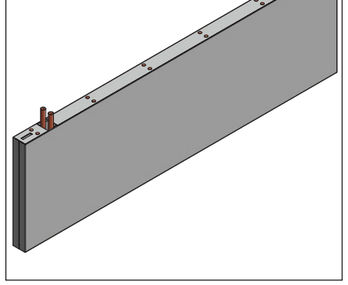
Cooling and heating baffles can be designed with copper/aluminium or plastic systems. Our products and systems are suitable for:

- School and educational buildings
- Hospitals
- Office buildings
- Sports facilities
- Transport buildings

One-piece baffles



Two-piece baffles



BAFFLES AND LIGHT PLANNING

Baffles and lighting systems are two elements that are not just closely connected – they also ideally complement one another.
In combination, they create the basis for excellent acoustics, perfect lighting, a pleasant perception of the space and a great appearance.

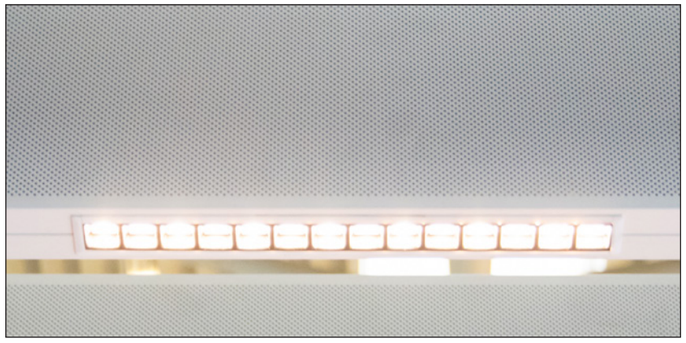
This symbiosis is created for ideal use in our baffles:
LED lighting integrated in the baffles not only improves the light situation in the room, the baffles additionally improve its acoustics. Optionally, the light elements can be supplied in a DALI-controllable version.

To guarantee a long service life, only renowned top-notch-quality brand products are used, corresponding to different room requirements.

So if you opt for baffles with LED lighting, you do not just produce wonderful highlights and facilitate active lighting, you can also choose from a wide range of colours: In addition to the standard profile colours white and black, the profiles can be powder-coated in RAL colours and adapted to the colour of the baffles. On request, covers can be made in transparent, opal or black.

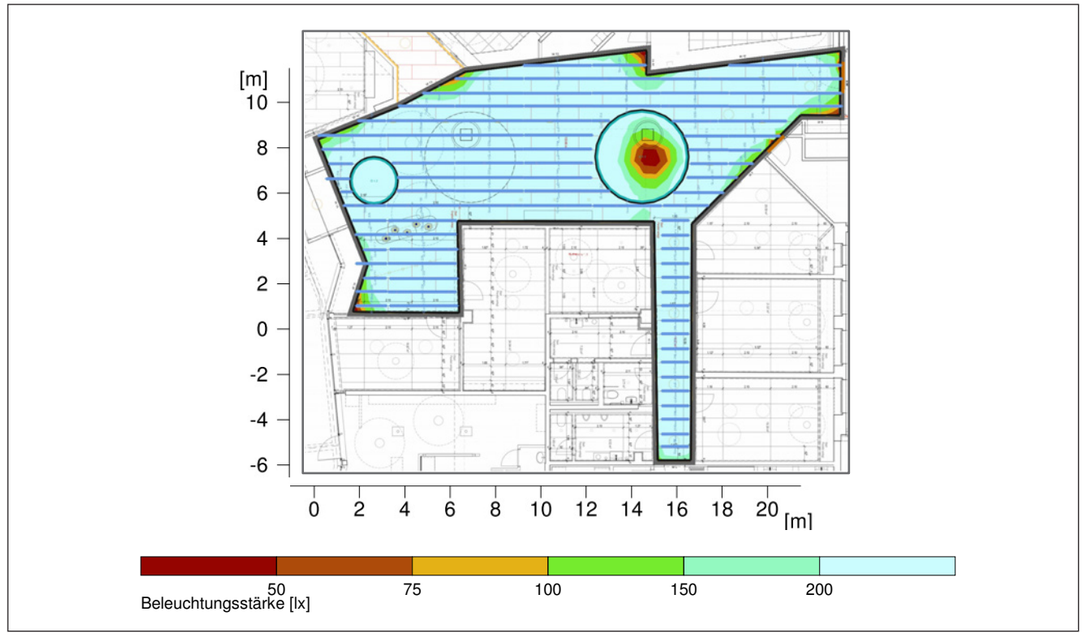
LED lighting can be integrated into baffles, can be configured in various colours and colour temperatures (2400–6000 K) and is prefabricated for 230 V ready for connection.

In summary, alongside a brilliant aesthetic effect, our baffles with integrated LED-lighting improve the auditory and visual aspects of a room, and there are no limits to creative ideas.



Lighting data

Height of light fixture level:	2.70 m		
Maintenance factor:	0.80		
Total luminous flux of all light fixtures	93,240 lumen.	Evaluation area 1	Utilisation level 1.1
Overall power:	1,368.0 W		
Overall power per space (159.90 m²):	8.56 W/m² (2.63 W/m²/100 lx)	EM:	326 lx
		Emin:	167 lx
		Emin/Em (Uo):	0.51
		Emin/Emax (Ud):	0.34
		Position:	0.00 m
		Cover:	Frost
			horizontal



HYGIENE

Dust-free
Dust is a so-called »dry« carrier of infections, in which viruses and bacteria spread. Dust can also be deposited in mucous membranes and the respiratorytract. This is why it is vital to avoid dust.

Fibre-free
Fibres are also “dry” carriers of infection. Since fibres can enter the body through the respiratory tract and skin, it is essential to avoid fibres – and not only those of a risky type.

Mould-free
Mould fungi evolve in a humid and warm environment. They secrete substances that can be harmful to humans, either indirectly through the air or by direct contact. Mould must be avoided.

Disinfection
In sensitive environments such as hospitals, doctor’s offices, schools and public institutions, hazardous environments can be created through use and operation. It must be possible to disinfect surfaces in such buildings.

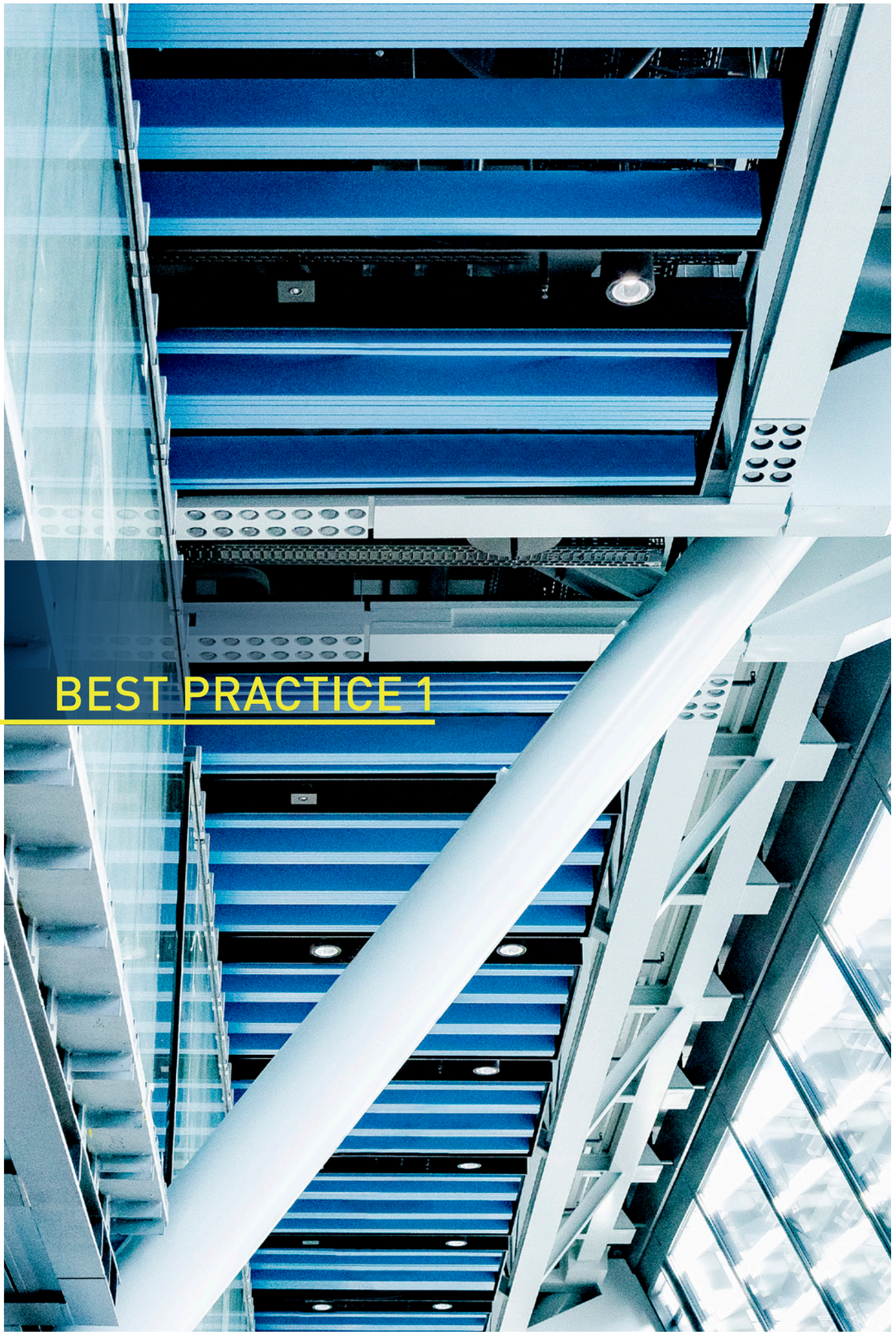
No moisture absorption
Components that can absorb moisture often turn into a breeding ground for microorganisms when heated. Subsequently, the surfaces are hard to disinfect and dry. Metal ceilings by contrast are especially easy to clean and do not absorb moisture.

Hygienic heating and cooling
Thanks to the high level of thermal conductivity of metal, our ceilings are excellently suited for heating and cooling. Since our systems work via radiation instead of air transport, they are also especially hygienic.

Serviceability
Our ceilings can be quickly and easily opened nearly everywhere. This guarantees easy and thorough servicing not only of the ceiling itself but of the ceiling cavity and the built-in components in it as well.

Wet cleaning
With water as a solvent and surfactants, dirt can be removed far easier than by dry cleaning. Important here is that the surfaces can be rinsed with clean water – metal ceiling systems allow for this, too.

Interior air quality
Our metal ceiling systems do not release any relevant quantities of VOCs, even taking into account the paints and adhesives (LCI values, evaluation according to AgBB evaluation scheme). Independent testing institutes have certified this.

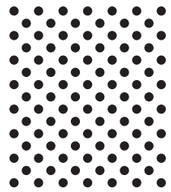


BEST PRACTICE 1

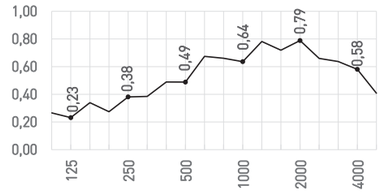
Geneva Airport

In the open high-tech architecture of the new "Aile Est" terminal with a length of 520 metres, the former long-distance terminal built in 1975, our baffle ceiling is a major player in both technical and aesthetic terms. With a total of 480 million euros, the building is a strategic investment Geneva Airport as the client made for the future. The baffle ceiling system used contributes significantly to the optimisation of the climate and the acoustics in this ultra-modern check-in building.

Architecture	Rogers Stirk Harbour + Partners
Ceiling system	Baffles, aprons
Area of metal ceilings	52,000 running metres
Material	Galvanized sheet steel
Surface	powder-coated: RAL 5005, 5012, 6018, 1023, 2003, 3001, 4006 (baffles); RAL 9005 (aprons)
Perforation	Fural
	Rd 1.5 - 22%
Perforation Ø	1.5 mm
Percentage of holes	22%
Perforation width max	1,488 mm
Ref. according to DIN 24041	Rd 1.50 - 2.83
Distance horizontal	4.00 mm →
Distance vertical	2.00 mm ↓
Distance diagonal	2.83 mm ↘
Perforation direction	→



Calculated sound absorption level*



Baffle height	220 mm
Baffle thickness	35 mm
Filling	Rock wool
Type of filling	in PE foil 40 kg/m³
Suspension height	300 mm
Centre to centre distance	110 mm
Cooling	80 mm heat conducting sheet metal
Baffle type	Two-piece
a_w	0.55
Absorber class	D
Shape indicator	M, H
NRC	0.55

* Absorptions were calculated using interpolations. Tested by external room engineering office.

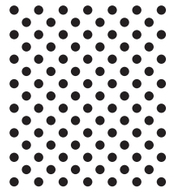
BEST PRACTICE 2

UBS Zurich

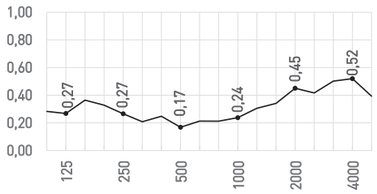
The ZFV Group is one of the largest Swiss companies in the field of hotels, restaurants and bakeries. It comprises around 200 establishments – one of them is the UBS Restaurant Flur in Zurich. It is one of staff restaurants of the Group and serves internal and external guests from Monday to Friday. The restaurant is equipped with baffles from Metalit. The 164 baffles ensure agreeable room acoustics in the open-plan restaurant and are a definite design element.

Ceiling system	Baffle
Area of metal ceilings	506 running metres
Material	Galvanized sheet steel
Surface	NCS S 2005-Y20R matt

Perforation	Fural
	Rd 1.5 - 22%
Perforation Ø	1.5 mm
Percentage of holes	22%
Perforation width max	1,488 mm
Ref. according to DIN 24041	Rd 1.50 - 2.83
Distance horizontal	4.00 mm →
Distance vertical	2.00 mm ↓
Distance diagonal	2.83 mm ↘
Perforation direction	→

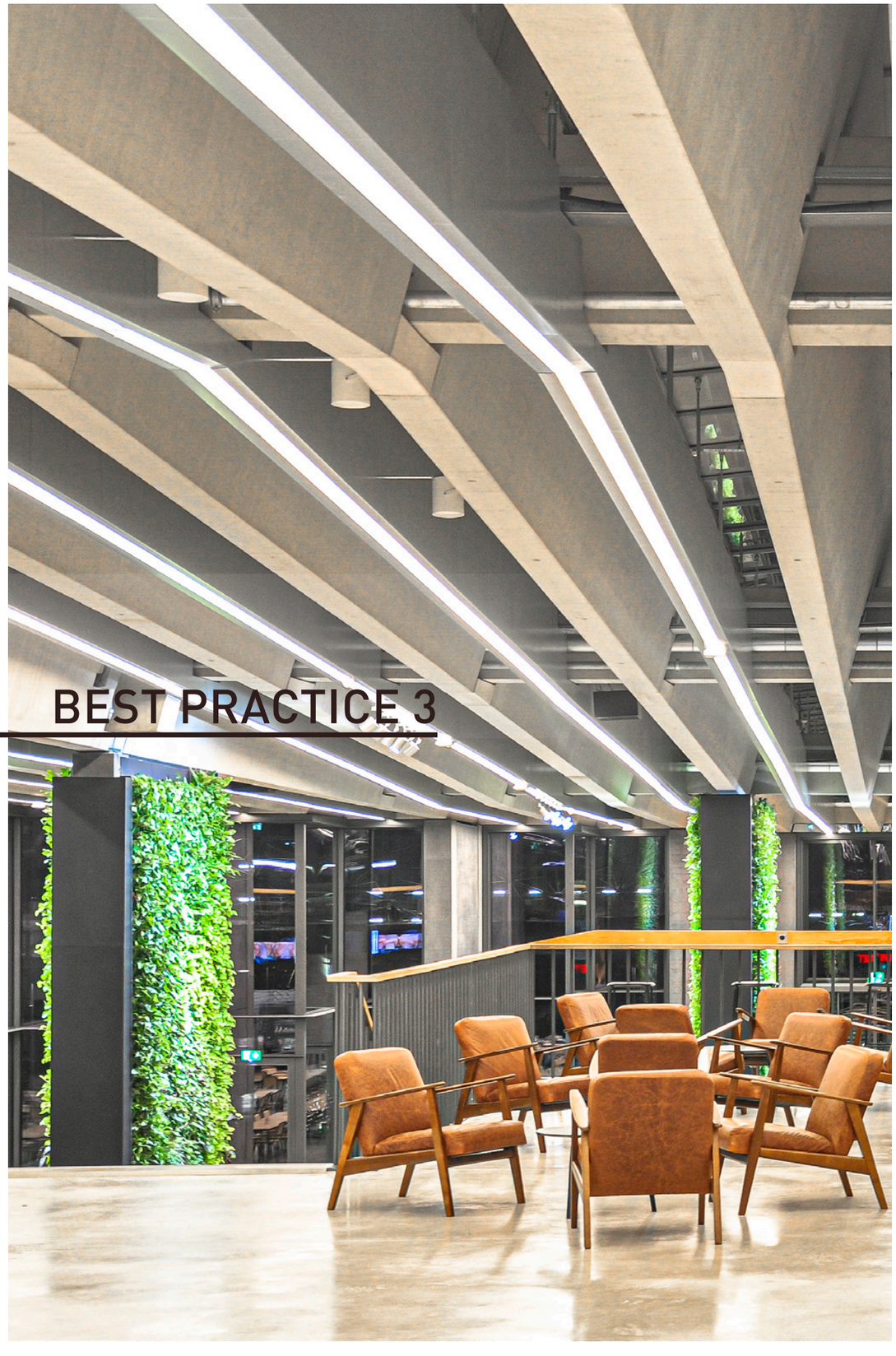


Calculated sound absorption level*



Baffle height	244 mm
Baffle thickness	30 mm
Filling	Acoustic fleece
Type of filling	in black 35 kg/m³
Suspension height	150 mm
Centre to centre distance	350 mm
Cooling	None
Baffle type	One-piece
α_w	0.25
Absorber class	E
Shape indicator	L, H
NRC	0.30

* Absorptions were calculated using interpolations. Tested by external room engineering office.



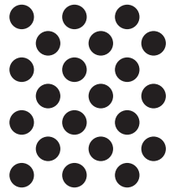
BEST PRACTICE 3

Sports equipment manufacturer, Herzogenaurach

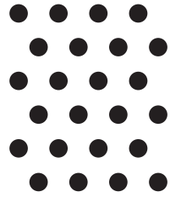
The "HalfTime" building belongs to the campus of a sports equipment manufacturer in Herzogenaurach. Covering an area of 15,500 m², the new building offers plenty of space for employees, brand ambassadors and visitors. In addition to a spacious cafeteria, "HalfTime" houses meeting rooms, conference centres and showrooms. Between the long concrete struts of the ceiling, the baffles give the impression of an elongated strip. The visual strip effect is amplified by the light channel between the baffle rows. In general, the baffles are essential to the room acoustics of the building, since the rooms are very much open-plan.

Architecture	COBE
Ceiling system	Baffle, clip-on system
Area of metal ceilings	5,000 running metres
Material	Galvanized sheet steel
Surface	Bare/galvanised; powder coated: RAL 9010; Parzifal®: RAL 9006

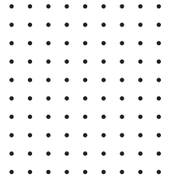
Perforation



	Fural
	Rd 4.0 - 33%
Perforation Ø	4.0 mm
Percentage of holes	33%
Perforation width max	1,450 mm
Ref. according to DIN 24041	Rd 4.00 - 6.10
Distance horizontal	8.60 mm →
Distance vertical	4.30 mm ↓
Distance diagonal	6.10 mm ↘
Perforation direction	→



	Rv 3.0 - 20%
Perforation Ø	3.0 mm
Percentage of holes	20%
Perforation width max	1,402 mm
Ref. according to DIN 24041	Rv 3.00 - 6.35
Distance horizontal	6.35 mm →
Distance vertical	5.50 mm ↓
Distance diagonal	6.35 mm ↘
Perforation direction	→



	Rg 0.7 - 4 %
Perforation Ø	0.7 mm
Percentage of holes	4%
Perforation width max	1,197 mm
Ref. according to DIN 24041	Rg 0.70 - 3.00
Distance horizontal	3.00 mm →
Distance vertical	3.00 mm ↓
Distance diagonal	4.24 mm ↘
Perforation direction	→

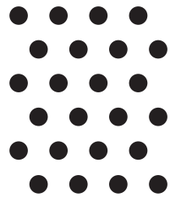
BEST PRACTICE 4

»Die Höhensprünge der Baffeln kommen von der verlängerten, gedachten Linie der Kreuzung der Süd- und Nordflügel der darüberliegenden Stockwerke.«
(Hans Niedermaier, FUN Architekten)

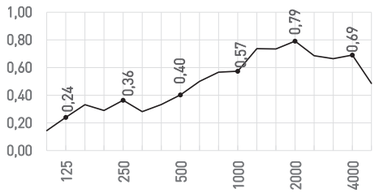
Anton Fingerle Education Centre, Munich

The Anton Fingerle Education Centre is operated by the Department of Education and Sport of the state capital of Munich and houses several municipal technical schools and academies. The Centre, which provides training in the field of occupational therapy, has given itself the following motto: "The human being takes centre stage". The new baffle ceilings in the lobby matches this philosophy, since they significantly improve the room acoustics and their colour scheme makes the large ceiling surfaces look far more friendlier.

Architecture	FUN Architekten
Ceiling system	Baffle
Area of metal ceilings	7,900 running metres
Material	Galvanized sheet steel
Surface	Powder-coated, RAL 9010, NCS S0520-B10G, NCS S0540-B10G
Perforation	Fural
	Rv 3.0 - 20%
Perforation Ø	3.0 mm
Percentage of holes	20%
Perforation width max	1,402 mm
Ref. according to DIN 24041	Rv 3.00 - 6.35
Distance horizontal	6.35 mm →
Distance vertical	5.50 mm ↓
Distance diagonal	6.35 mm ↘
Perforation direction	→

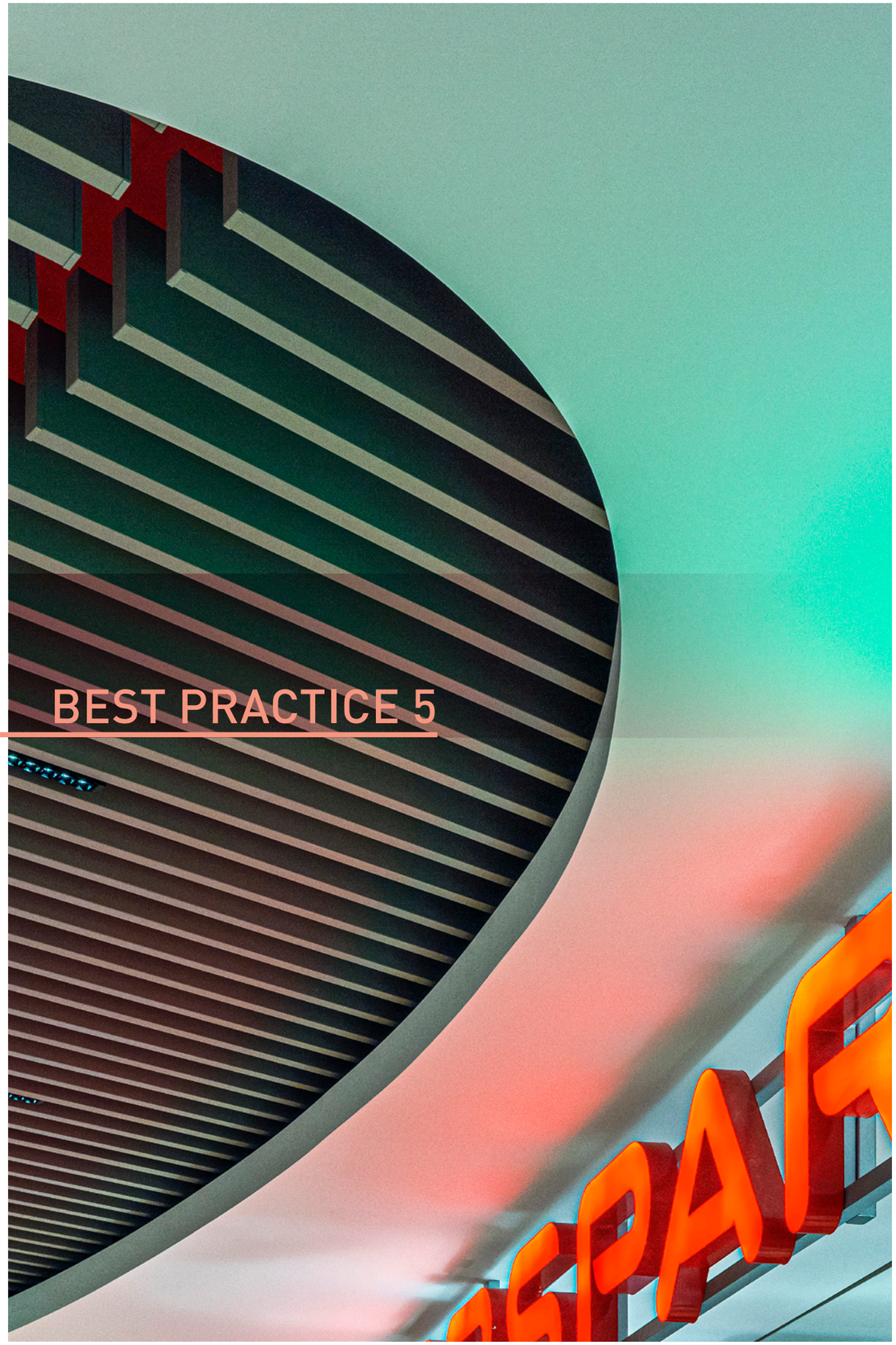


Calculated sound absorption level*



Baffle height	150 mm
Baffle thickness	32 mm
Filling	Rock wool
Type of filling	in PE foil 44 kg/m³
Suspension height	600 mm
Centre to centre distance	170 mm
Cooling	None
Baffle type	Two-piece
α_w	0.50
Absorber class	D
Shape indicator	M, H
NRC	0.55

* Absorptions were calculated using interpolations. Tested by external room engineering office.



BEST PRACTICE 5

Interspar hypermarket, Bregenz

"Interspar" is the largest subsidiary of "Spar Austria" and is also the market leader in the area of hypermarkets in Austria. Since 1970, this concept of large markets serves the end-to-end supply to consumers. "Interspar" is the largest wine trader in Austria, for instance. The focus today is on the shopping adventure and thus on the topics of atmosphere and quality of stay. Partial baffle ceilings from our company are an important team player here and improve both the acoustics and appearance.

Architecture

Kulmus Bügelmayer GmbH

Ceiling system

Area of metal ceilings	Baffle
Material	751 running metres
Surface	Galvanized sheet steel
	Powder-coated, RAL 4201

Perforation

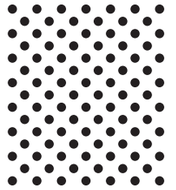
	Fural
	Smooth
Baffle height	150 mm
Baffle thickness	30 mm
Centre to centre distance	130 mm
Cooling	None
Baffle type	One-piece

BEST PRACTICE 6

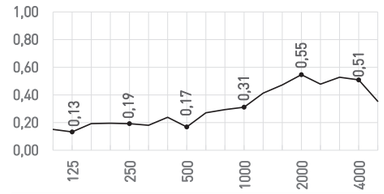
Restaurant Bellerive au Lac at Hotel Ameron, Zurich Bellerive au Lac

In high-quality catering operations like the hotel industry, the well-being of the guests, both mentally and physically, is the absolute benchmark. In terms of acoustics, interior climate and appearance. In busy areas such as restaurants and bars, in particular, a few stratagems are required in this respect. We are delighted that our baffle ceiling makes the stay pleasant and agreeable for the guests looking at the lakeside resort "Utoquai" on Lake Zurich. The ceiling system is highly effective in terms of acoustics and at the same time equipped with heating and cooling elements.

Architecture	Monoplan AG
Ceiling system	Baffle
Area of metal ceilings	384 running metres
Material	Galvanized sheet steel
Surface	Powder-coated, RAL 8022
Perforation	Fural Rd 1.5 - 22%
Perforation Ø	1.5 mm
Percentage of holes	22%
Perforation width max	1,488 mm
Ref. according to DIN 24041	Rd 1.50 - 2.83
Distance horizontal	4.00 mm →
Distance vertical	2.00 mm ↓
Distance diagonal	2.83 mm ↘
Perforation direction	→



Calculated sound absorption level*



Baffle height	200 mm
Baffle thickness	35 mm
Filling	Rock wool
Type of filling	in PE foil 40 kg/m³
Suspension height	1,500 mm
Centre to centre distance	300 mm
Cooling	70 mm heat conducting sheet
Baffle type	One-piece
α_w	0.50
Absorber class	D
Shape indicator	L, H
NRC	0.30

* Absorptions were calculated using interpolations. Tested by external room engineering office.

BEST PRACTICE 7

Trzesniewski

In the heart of Vienna, the "unspeakably good sandwiches" have been delighting locals for more than 120 years, ever since the first restaurant was founded by Kraków native Franciszek Trzesniewski.
Another branch was recently opened in the renovated Terminal 2 of Vienna International Airport in Schwechat.
The suspended deep-black baffle system gives the space perfect acoustics for relaxing before or after a journey. Round light points between the baffles add a pleasant character to the interior.

Architecture

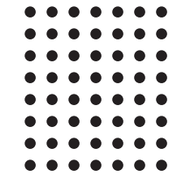
Architekturbüro Hauer

Ceiling system

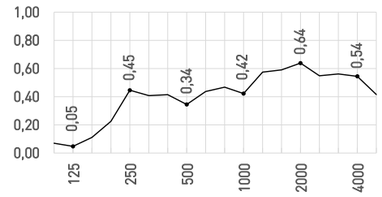
Metal Ceiling Area	Baffle
	178 running metres
Material	Galvanised steel scheet
Surface	Powder-coated, RAL 9005 matt

Perforation

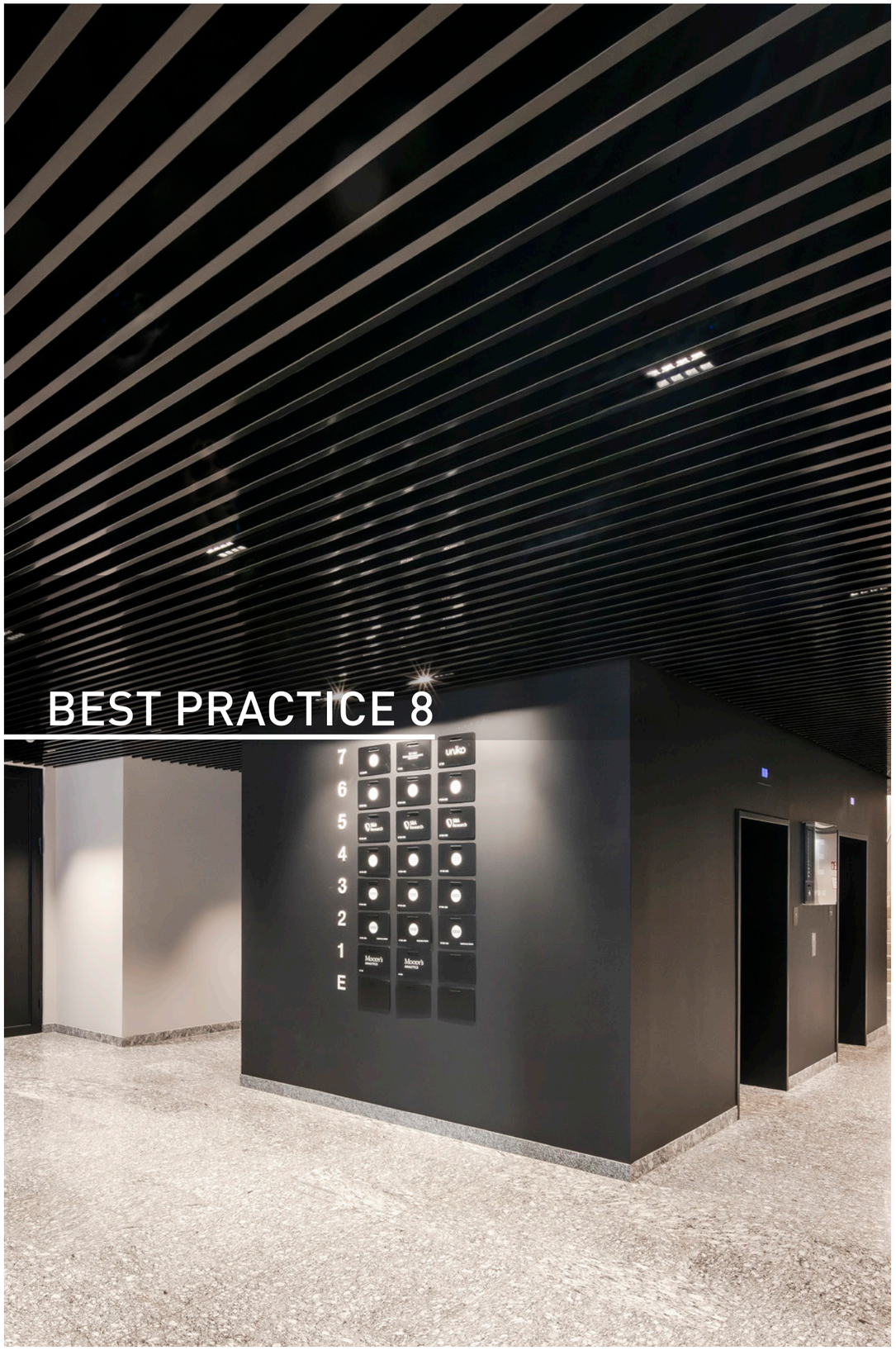
	Fural
	Rg 1,8 - 20 %
Perforation Ø	1,8 mm
Percentage of holes	20 %
Perforation width max	632 mm
Ref. according to DIN 24041	Rg 1,80 - 3,57
Distance horizontal	3,57 mm →
Distance vertical	3,57 mm ↓
Distance diagonal	5,04 mm ↘
Perforation direction	→



Calculated sound absorption coefficient*



Baffle height	150 mm
Baffle thickness	30 mm
Filling	Mineral wool
Filling type	in PE-Foil 40 kg/m³
Suspension height	1.000 mm
Axis spacing	200 mm
Baffle type	one-piece
α_w	0,50
Absorber Class	D
Shape Indicator	L, H
NRC	0,45

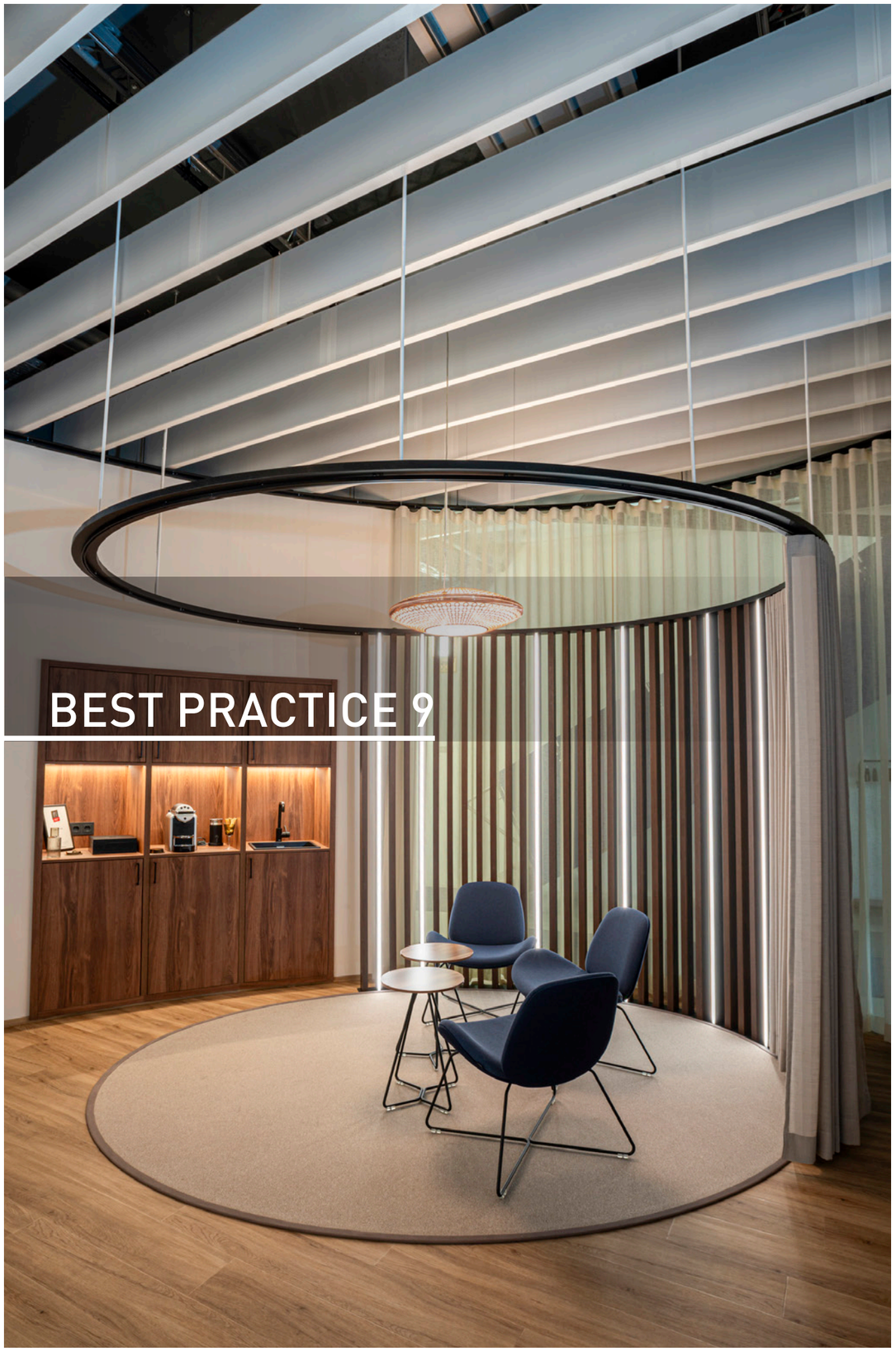


Flora 7

At Floragasse 7 in Vienna, the building was transformed into modern loft offices. Its attractive location in the heart of Vienna and the state-of-the-art facilities have drawn the interest of prominent companies.
The interior design aimed primarily to create a visually optimized environment that meets the needs of various tenants.

The glossy black baffles achieve this goal, giving the building a modern, timeless look and serving as an architectural highlight.

Architecture	A.C.C. ZT GmbH
Ceiling system	Baffle
Metal ceiling area	7.800 running metres
Material	Galvanised steel sheet
Surface	Powder-coated, RAL 9005 glossy
Perforation	Fural smooth
Baffle height	150 mm
Baffle thickness	30 mm
Axis spacing	130 mm
Cooling	none
Baffle type	One-piece



BEST PRACTICE 9

Lights of Vienna

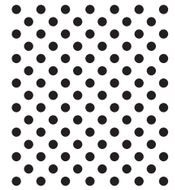
The global market leader "Lights of Vienna" develops unique lighting fixtures and lighting concepts for clients worldwide, ranging from luxury hotels to high-end real estate. All steps, from the design drawing to the finished product, are carried out in-house.

For the presentation room in Guntramsdorf, Fural manufactured custom ceiling baffles that combine modern design with functionality. They offer design versatility, flexibility, easy access to technical installations, excellent acoustics, and integration of lighting fixtures.

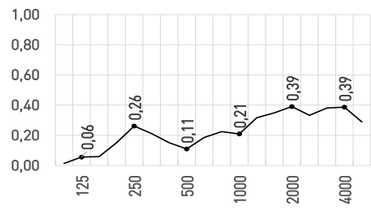
Architecture

Ceiling System	Baffle
Metal Ceiling Area	178 running metres
Material	Galvanised steel sheet
Surface	powder-coated, RAL 9001

Perforation	Fural
	Rd 1,5 - 22 %
Perforation Ø	1,5 mm
Percentage of holes	22 %
Perforation width max	1.488 mm
Ref. according to DIN 24041	Rd 1,50 - 2,83
Distance horizontal	4,00 mm →
Distance vertical	2,00 mm ↓
Distance diagonal	2,83 mm ↘
Perforation direction	→

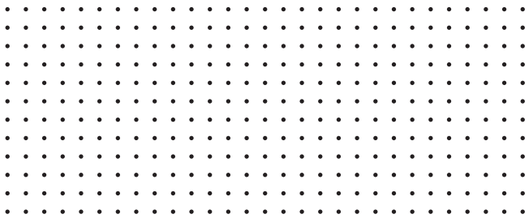


Berechneter Schallabsorptionsgrad*

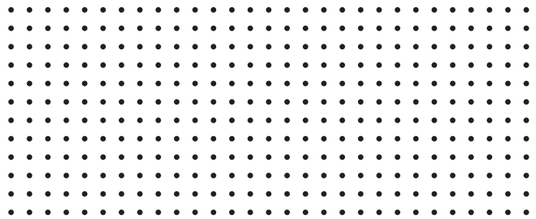


Baffle height	300 mm
Baffle thickness	40 mm
Filling	Mineral wool
Filling type	in PE-Foil 45 kg/m³
Suspension height	732 mm
Axis spacing	400 mm
Baffle type	one-piece
α_w	0,25
Absorber Class	E
Shape Indicator	L, H
NRC	0,25

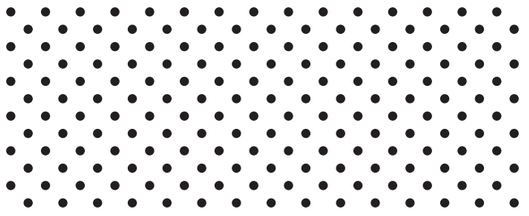
PERFORATIONS TESTED



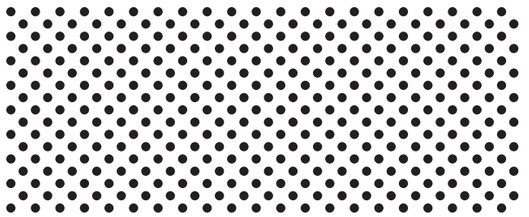
	Fural
	Rg 0,7 - 4 %
Perforation Ø	0,7 mm
Percentage of holes	4 %
Perforation width max	1.197 mm
Ref. according to DIN 24041	Rg 0,70 - 3,00
Distance horizontal	3,00 mm →
Distance vertical	3,00 mm ↓
Distance diagonal	4,24 mm ↘
Perforation direction	→



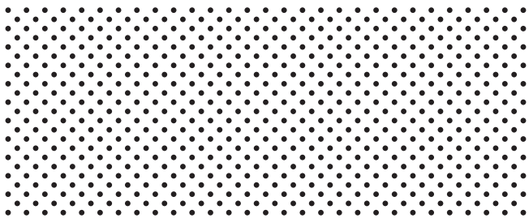
	Fural
	Rg 0,9 - 7 %
Perforation Ø	0,9 mm
Percentage of holes	7 %
Perforation width max	1.022 mm
Ref. according to DIN 24041	Rg 0,90 - 3,00
Distance horizontal	3,00 mm →
Distance vertical	3,00 mm ↓
Distance diagonal	4,24 mm ↘
Perforation direction	→



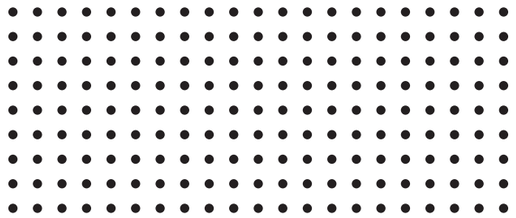
	Fural
	Rd 1,5 - 11 %
Perforation Ø	1,5 mm
Percentage of holes	11 %
Perforation width max	1.470 mm
Ref. according to DIN 24041	Rd 1,50 - 4,00
Distance horizontal	5,66 mm →
Distance vertical	2,83 mm ↓
Distance diagonal	4,00 mm ↘
Perforation direction	→



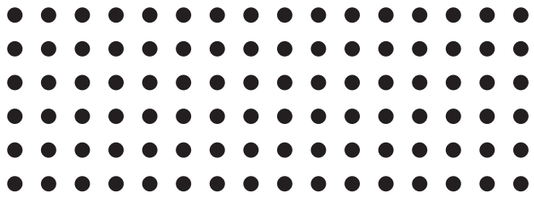
	Fural
	Rd 1,5 - 22 %
Perforation Ø	1,5 mm
Percentage of holes	22 %
Perforation width max	1.488 mm
Ref. according to DIN 24041	Rd 1,50 - 2,83
Distance horizontal	4,00 mm →
Distance vertical	2,00 mm ↓
Distance diagonal	2,83 mm ↘
Perforation direction	→



	Fural
	Rd 0,9 - 14 %
Perforation Ø	0,9 mm
Percentage of holes	14 %
Perforation width max	1.022 mm
Ref. according to DIN 24041	Rd 0,90 - 2,12
Distance horizontal	1,50 mm →
Distance vertical	1,50 mm ↓
Distance diagonal	2,12 mm ↘
Perforation direction	→



	Fural
	Rg 1,5 - 11 %
Perforation Ø	1,5 mm
Percentage of holes	11 %
Perforation width max	1.488 mm
Ref. according to DIN 24041	Rg 1,50 - 4,00
Distance horizontal	4,00 mm →
Distance vertical	4,00 mm ↓
Distance diagonal	5,65 mm ↘
Perforation direction	→

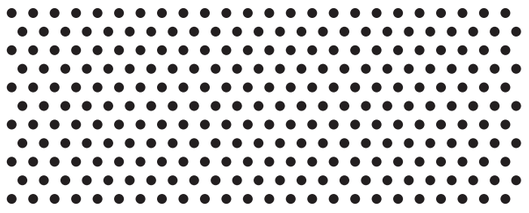


	Fural
	Rg 2,5 - 16 %
Perforation Ø	2,5 mm
Percentage of holes	16 %
Perforation width max	1.460 mm
Ref. according to DIN 24041	Rg 2,50 - 5,50
Distance horizontal	5,50 mm →
Distance vertical	5,50 mm ↓
Distance diagonal	7,78 mm ↘
Perforation direction	→

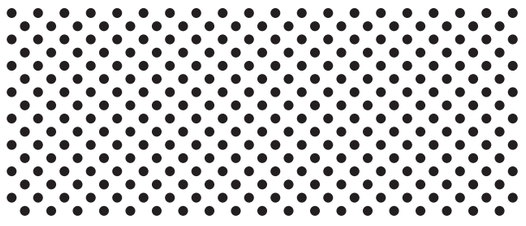
OTHER AVAILABLE PERFORATIONS*

	Fural
	Rg 0,7 - 1 %
Perforation Ø	0,7 mm
Percentage of holes	1 %
Perforation width max	1.197 mm
Ref. according to DIN 24041	Rg 0,70 - 6,00
Distance horizontal	6,00 mm →
Distance vertical	6,00 mm ↓
Distance diagonal	8,48 mm ↘
Perforation direction	→

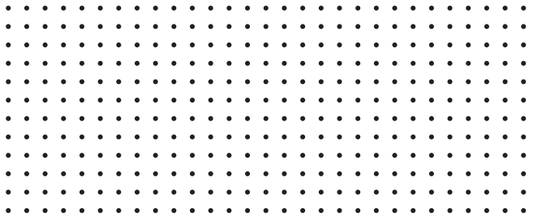
	Fural
	Rg 0,7 - 1,5 %
Perforation Ø	0,7 mm
Percentage of holes	1,5 %
Perforation width max	1.400 mm
Ref. according to DIN 24041	Rg 0,70 - 5,00
Distance horizontal	5,00 mm →
Distance vertical	5,00 mm ↓
Distance diagonal	7,07 mm ↘
Perforation direction	→



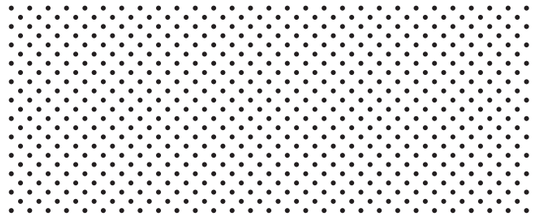
	Fural
	Rv 1,6 - 20 %
Perforation Ø	1,6 mm
Percentage of holes	20 %
Perforation width max	1.450 mm
Ref. according to DIN 24041	Rv 1,60 - 3,50
Distance horizontal	3,50 mm →
Distance vertical	3,03 mm ↓
Distance diagonal	3,50 mm ↘
Perforation direction	→



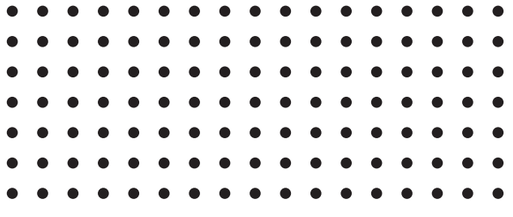
	Fural
	Rd 1,6 - 22 %
Perforation Ø	1,6 mm
Percentage of holes	22 %
Perforation width max	636,4 mm
Ref. according to DIN 24041	Rd 1,60 - 3,00
Distance horizontal	4,30 mm →
Distance vertical	2,15 mm ↓
Distance diagonal	3,00 mm ↘
Perforation direction	→



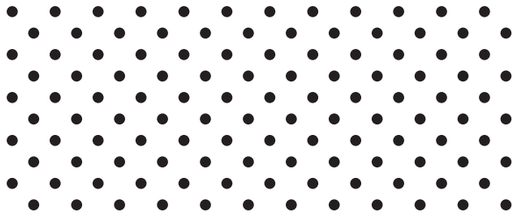
	Fural
	Rg 0,8 - 6 %
Perforation Ø	0,8 mm
Percentage of holes	6 %
Perforation width max	800 mm
Ref. according to DIN 24041	Rg 0,80 - 3,00
Distance horizontal	3,00 mm →
Distance vertical	3,00 mm ↓
Distance diagonal	4,24 mm ↘
Perforation direction	→



	Fural
	Rd 0,8 - 11 %
Perforation Ø	0,8 mm
Percentage of holes	11 %
Perforation width max	800 mm
Ref. according to DIN 24041	Rd 0,80 - 2,12
Distance horizontal	3,00 mm →
Distance vertical	1,50 mm ↓
Distance diagonal	2,12 mm ↘
Perforation direction	→



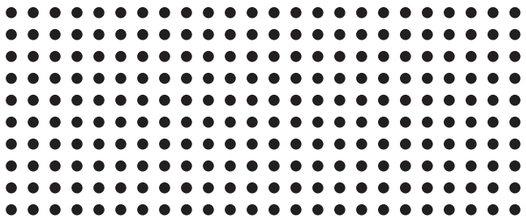
	Fural
	Rg 1,8 - 10 %
Perforation Ø	1,8 mm
Percentage of holes	10 %
Perforation width max	1.400 mm
Ref. according to DIN 24041	Rg 1,80 - 4,95
Distance horizontal	4,95 mm →
Distance vertical	4,95 mm ↓
Distance diagonal	7,00 mm ↘
Perforation direction	→



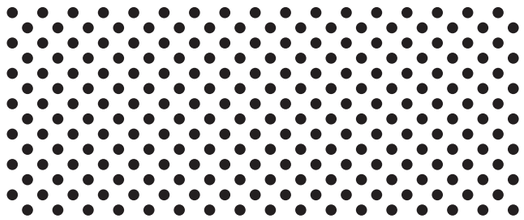
	Fural
	Rd 1,8 - 10 %
Perforation Ø	1,8 mm
Percentage of holes	10 %
Perforation width max	728 mm
Ref. according to DIN 24041	Rd 1,80 - 4,95
Distance horizontal	7,00 mm →
Distance vertical	3,50 mm ↓
Distance diagonal	4,95 mm ↘
Perforation direction	→

* Perforations are calculated using interpolations.

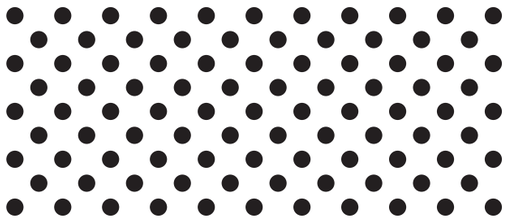
OTHER AVAILABLE PERFORATIONS*



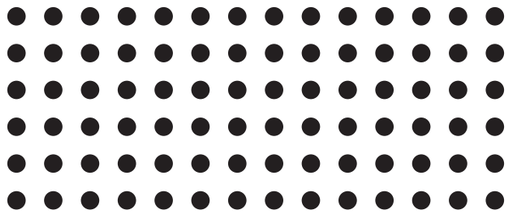
	Fural
	Rg 1,8 - 20 %
Perforation Ø	1,8 mm
Percentage of holes	20 %
Perforation width max	632 mm
Ref. according to DIN 24041	Rg 1,80 - 3,57
Distance horizontal	3,57 mm →
Distance vertical	3,57 mm ↓
Distance diagonal	5,04 mm ↘
Perforation direction	→



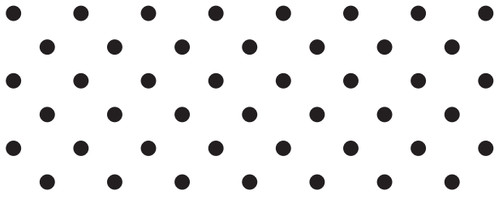
	Fural
	Rd 1,8 - 21 %
Perforation Ø	1,8 mm
Percentage of holes	21 %
Perforation width max	1.400 mm
Ref. according to DIN 24041	Rd 1,80 - 3,50
Distance horizontal	4,96 mm →
Distance vertical	2,48 mm ↓
Distance diagonal	3,50 mm ↘
Perforation direction	→



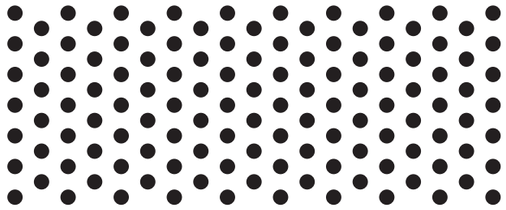
	Fural
	Rd 2,8 - 20 %
Perforation Ø	2,8 mm
Percentage of holes	20 %
Perforation width max	627,9 mm
Ref. according to DIN 24041	Rd 2,80 - 5,50
Distance horizontal	7,80 mm →
Distance vertical	3,90 mm ↓
Distance diagonal	5,50 mm ↘
Perforation direction	→



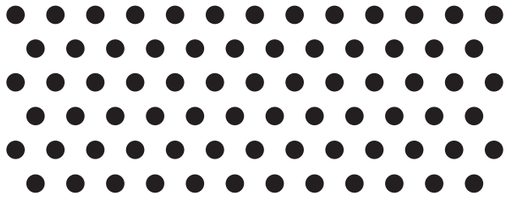
	Fural
	Rg 3,0 - 20 %
Perforation Ø	3,0 mm
Percentage of holes	20 %
Perforation width max	1.434 mm
Ref. according to DIN 24041	Rg 3,00 - 6,00
Distance horizontal	6,0 mm →
Distance vertical	6,0 mm ↓
Distance diagonal	8,48 mm ↘
Perforation direction	→



	Fural
	Rd 2,5 - 8 %
Perforation Ø	2,5 mm
Percentage of holes	8 %
Perforation width max	1.460 mm
Ref. according to DIN 24041	Rd 2,50 - 7,80
Distance horizontal	11,0 mm →
Distance vertical	5,50 mm ↓
Distance diagonal	7,78 mm ↘
Perforation direction	→



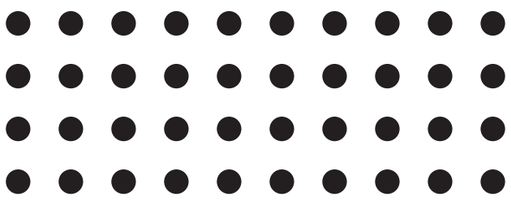
	Fural
	Rv 2,5 - 23 %
Perforation Ø	2,5 mm
Percentage of holes	23 %
Perforation width max	1.467 mm
Ref. according to DIN 24041	Rv 2,50 - 5,00
Distance horizontal	8,66 mm →
Distance vertical	2,50 mm ↓
Distance diagonal	5,00 mm ↘
Perforation direction	→



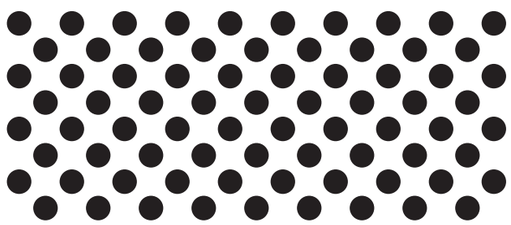
	Fural
	Rv 3,0 - 20 %
Perforation Ø	3,0 mm
Percentage of holes	20 %
Perforation width max	1.402 mm
Ref. according to DIN 24041	Rv 3,00 - 6,35
Distance horizontal	6,35 mm →
Distance vertical	5,50 mm ↓
Distance diagonal	6,35 mm ↘
Perforation direction	→

* Perforations are calculated using interpolations.

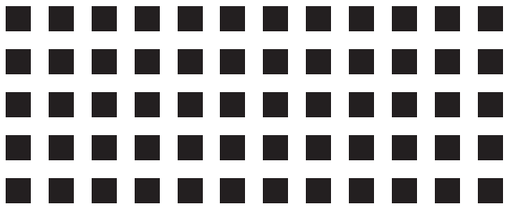
OTHER AVAILABLE PERFORATIONS*



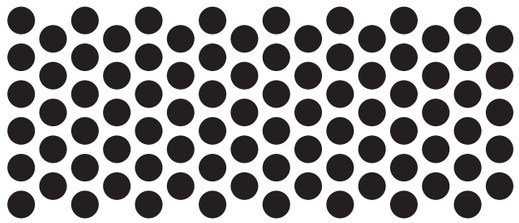
	Fural
	Rg 4,0 - 17 %
Perforation Ø	4,0 mm
Percentage of holes	17 %
Perforation width max	1.453 mm
Ref. according to DIN 24041	Rg 4,00 - 8,60
Distance horizontal	8,60 mm →
Distance vertical	8,60 mm ↓
Distance diagonal	12,1 mm ↘
Perforation direction	→



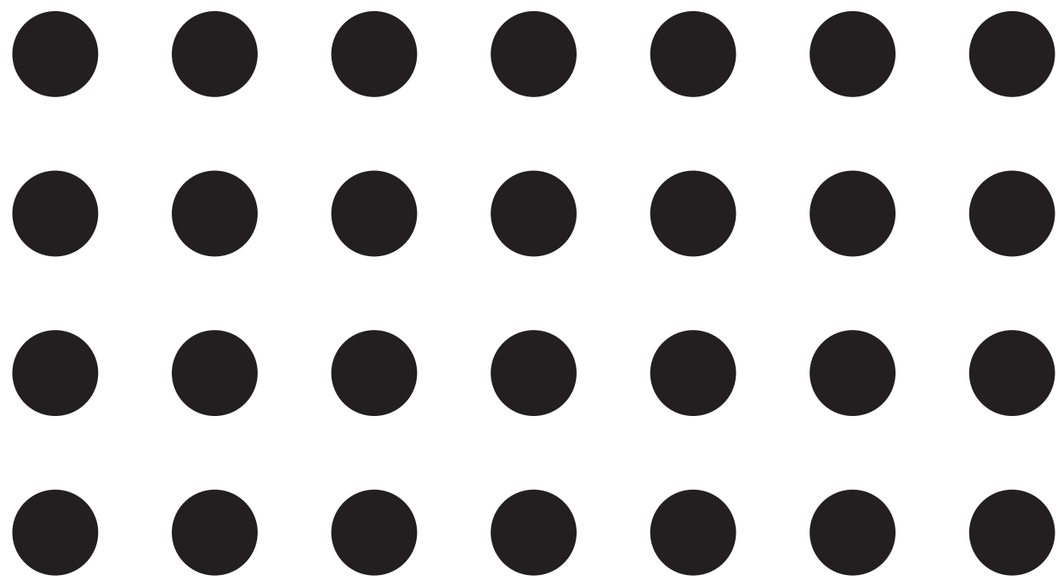
	Fural
	Rd 4,0 - 33 %
Perforation Ø	4,0 mm
Percentage of holes	33 %
Perforation width max	1.450 mm
Ref. according to DIN 24041	Rd 4,00 - 6,10
Distance horizontal	8,60 mm →
Distance vertical	4,30 mm ↓
Distance diagonal	6,10 mm ↘
Perforation direction	→



	Fural
	Qg 4,0 - 33 %
Perforation Ø	4,0 mm
Percentage of holes	33 %
Perforation width max	630 mm
Ref. according to DIN 24041	Qg 4,00 - 7,00
Distance horizontal	7,00 mm →
Distance vertical	7,00 mm ↓
Distance diagonal	9,89 mm ↘
Perforation direction	→



	Fural
	Rv 4,5 - 51 %
Perforation Ø	4,5 mm
Percentage of holes	51 %
Perforation width max	627 mm
Ref. according to DIN 24041	Rv 4,50–6,00
Distance horizontal	10,4 mm →
Distance vertical	3,00 mm ↓
Distance diagonal	6,00 mm ↘
Perforation direction	→



	Fural
	Rg 14,0 - 23 %
Perforation Ø	14,0 mm
Percentage of holes	23 %
Perforation width max	598 mm
Ref. according to DIN 24041	Rg 14,00 - 26,00
Distance horizontal	26,00 mm →
Distance vertical	26,00 mm ↓
Distance diagonal	36,76 mm ↘
Perforation direction	→

* Perforations are calculated using interpolations.

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FURAL METALIT DIPLING BRÜNSCH

Fural
Systeme in Metall GmbH
Cumberlandstraße 66
4810 Gmunden
Österreich
T +43 7612 74 851 0
E fural@fural.at
W **fural.com**

Metalit
AG
Murmattenstrasse 7
6233 Büron
Schweiz
T +41 41 925 60 22
E metalit@metalit.ch
W **metalit.ch**

Dipling
Werk GmbH
Königsberger Straße 21
35410 Frankfurt Hungen
Deutschland
T +49 6402 52 58 0
E dipling@dipling.de
W **dipling.de**

BST Brünsch
GmbH
Alter Fuhrweg 10
57223 Kreuztal
Deutschland
T +49 2732 55 89 90
E bruensch@bruensch.com
W **bruensch.com**

Fural
Bohemia s.r.o.
Průmyslová II/985
383 01 Prachatice
Tschechische Republik
T +420 732 578 739
E info@fural.cz
W **fural.com**

Fural
Systeme in Metall GmbH
Büro BeNeLux
Corluytstraat 5 GLV
2160 Wommelgem
Belgien
T +32 3 808 53 20
E benelux-france@fural.com
W **fural.com**

Fural
Systeme in Metall GmbH Sp. z o.o.
Oddział w Polsce
ul. Krakowska 25
43-190 Mikołów
Polen
T +48 32 797 70 64
E polska@fural.com
W **fural.com**