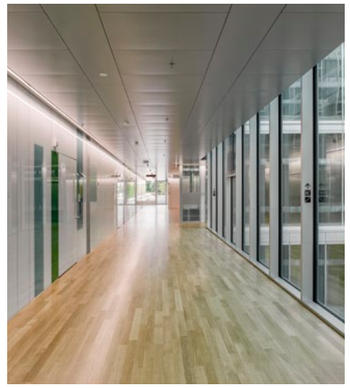
UP MAGAZINE

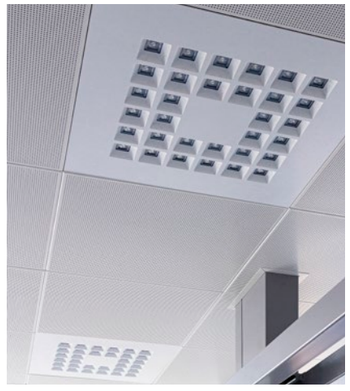
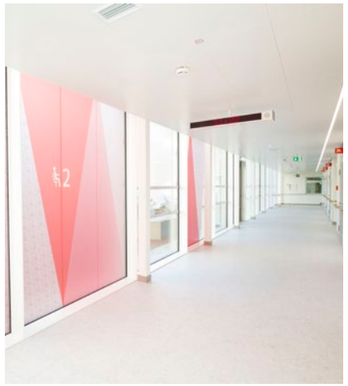
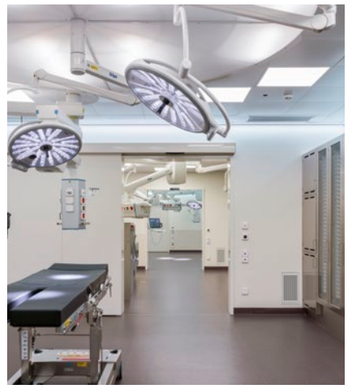
HEALTH 02

FURAL

METALIT

DIPLING



UP! Fibre-free from above

»

Health is an important sector in construction and is facing major changes. We all need to become better and more efficient every day. The possibilities are far from exhausted. The project » The Patient Room of the Future «, which we successfully helped to design, demonstrates the potential, as do the many international hospital buildings in which we are involved.

Our metal ceiling systems are suitable for:
- patient rooms
- treatment rooms
- operating rooms
- recreation areas and
- traffic areas

Our metal ceilings are characterized by:
- hygiene and cleanability
- heating and cooling
- revisability
- maintainability, convertibility and
- sustainability

I would be delighted if we could deepen our discussions and turn them into successful, forward-looking projects!

Christian Demmelhuber
CEO Fural Metalit Dipling
Perfect metal ceilings

«

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

UP

We think in terms of feeling good and getting well faster.

The patient room at Merian Iselin Hospital (CH) as a comfort room

A new »Premium Gold« clinic area has been opened at the private health center for orthopaedics, surgery and urology in Basel.

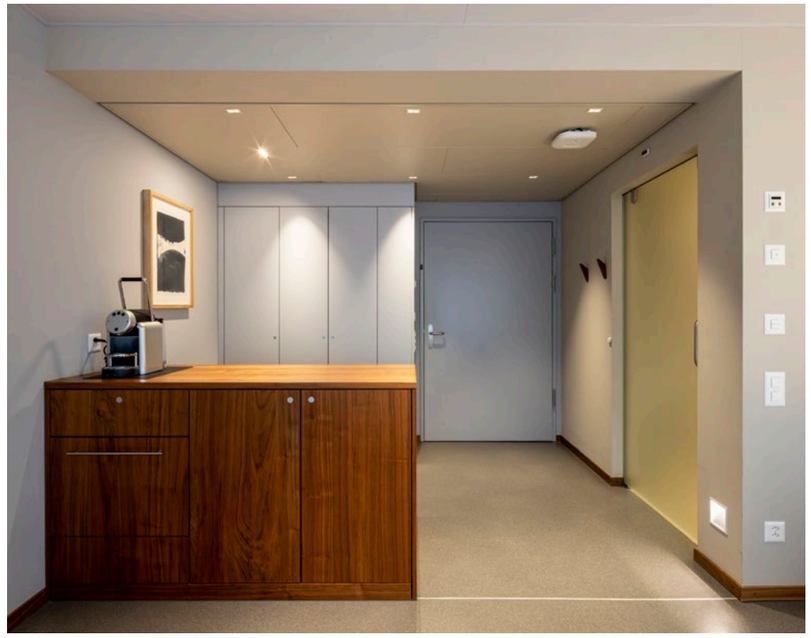
The 28 new rooms are equipped to the highest standard and meet the needs of privately insured patients. The top floor has a beautiful panoramic terrace and a spacious lounge with an additional kitchen. In such an ambience, you can wait for examinations or treatments in peace and then go through the recovery process in a pleasant atmosphere.

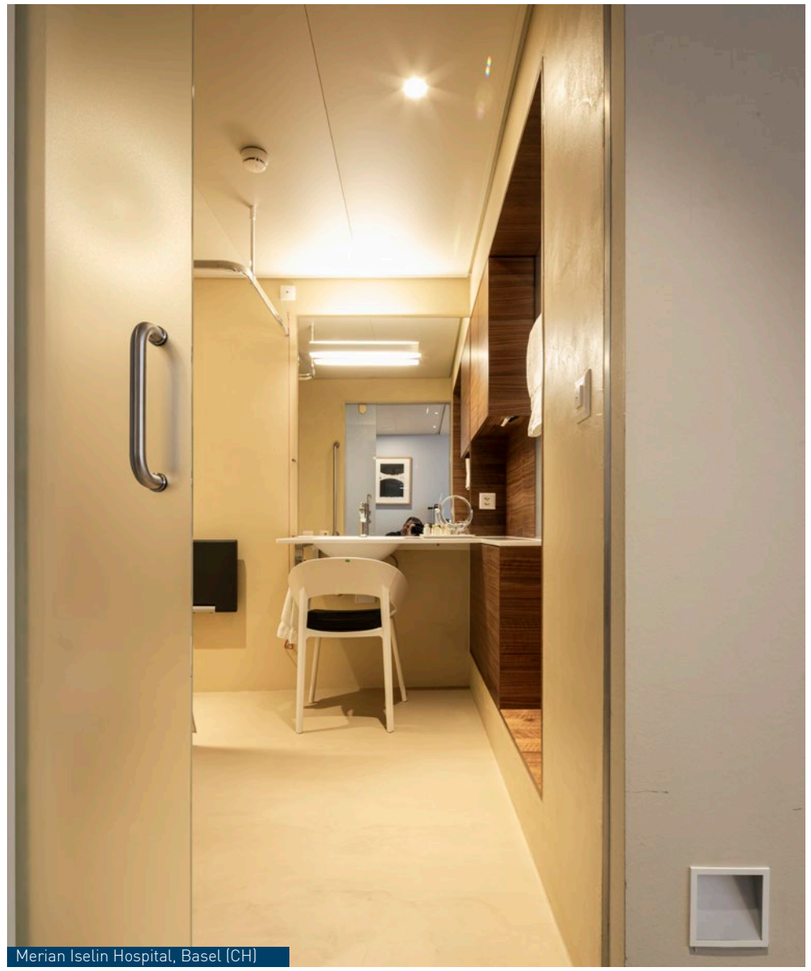
Photovoltaic panels are also planned for the façade of the building, in line with smart ecological and technical solutions. Metalit metal ceilings were used in almost all areas in order to meet the high standards of functionality and hygiene on the interior ceilings as well. The perfect appearance and functionality complement the entirety of this hospital of the future.

UP

Merian Iselin Hospital Basel

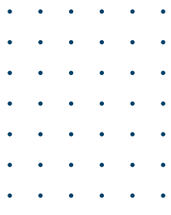
Architecture	Vischer Architekten
Gross floor area	1.000 m²
Ceiling system	hang-in, clip-in system
Material	galvanized sheet steel
Surface	powder-coated: RAL 9010, RAL 9016, NCS S 5020-R20B N, NCS S 1515-R80B



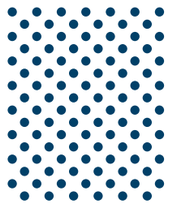


Merian Iselin Hospital, Basel (CH)

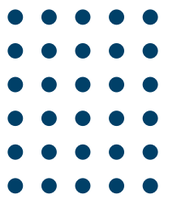
Perforation	Fural
	Rg 0,7 - 1,5 %
Perforation Ø	0,7 mm
Percentage of holes	1,5 %
Perforation width max	1.400 mm
Ref. according to DIN 24041	Rg 0,70 - 5,00
Distance horizontal	5,00 mm →
Distance vertical	5,00 mm ↓
Distance diagonal	7,07 mm ↘
Perforation direction	→

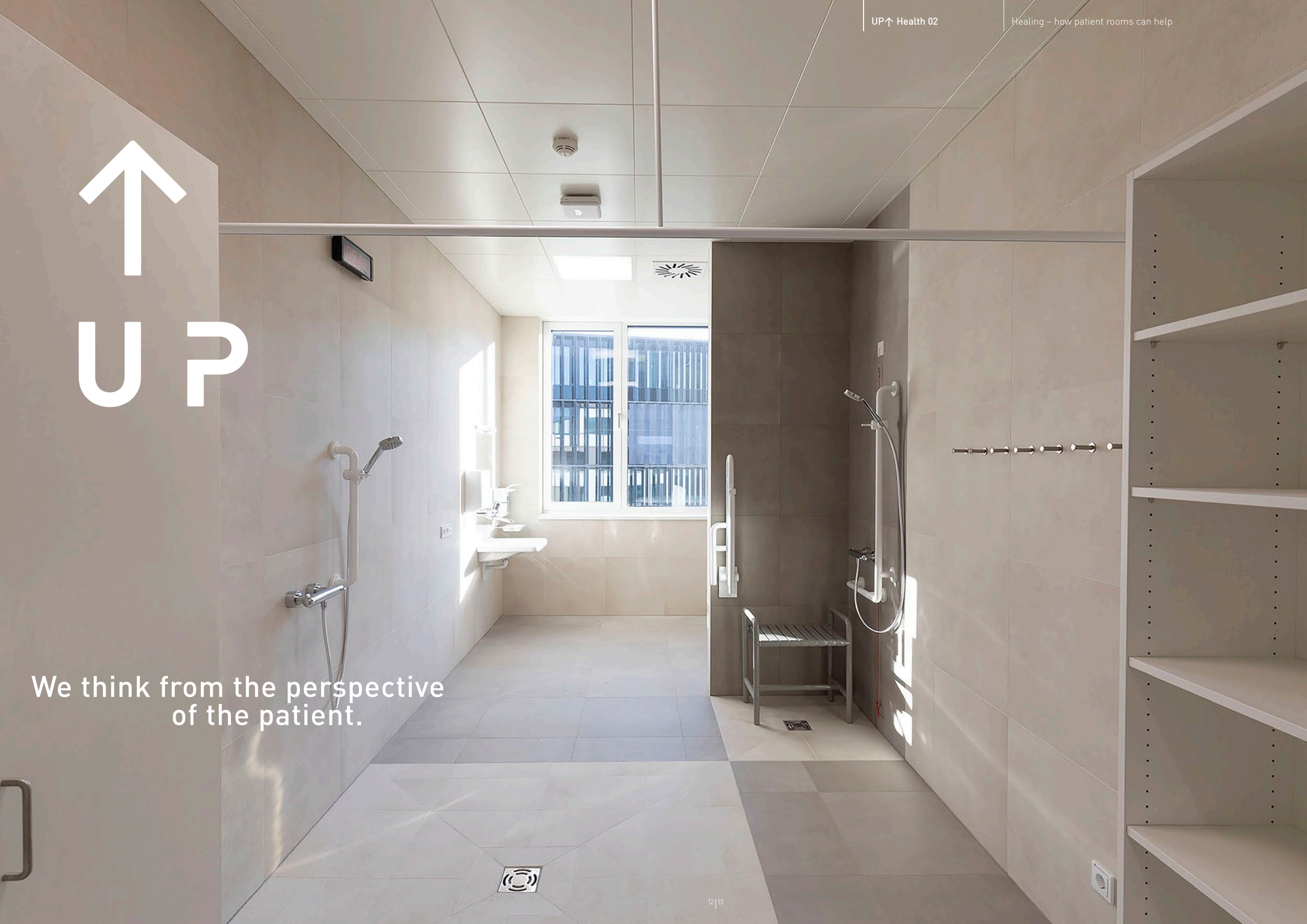


Perforation	Fural
	Rd 1,5 - 22 %
Perforation Ø	1,5 mm
Percentage of holes	22 %
Perforation width max	1.488 mm
Ref. according to DIN 24041	Rd 1,50 - 2,83
Distance horizontal	4,00 mm →
Distance vertical	2,00 mm ↓
Distance diagonal	2,83 mm ↘
Perforation direction	→



Perforation	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	→





We think from the perspective of the patient.

We think in terms of comfort of patients and staff:

Climate and room air quality, acoustic, room-optical and hygienic comfort.

The well-being of the patient in the hospital environment, as well as his or her ability to recover, is influenced by a variety of factors.
In addition to medical and social factors, this also includes the comfort factors of room climate, room air quality, visual and acoustic comfort, accessibility, and the area of electro-magnetic fields.

When planning patient rooms, the needs of the patients should be taken into account first and only after that the technical and constructional desired requirements as well as possible problem areas of the hospital staff should be considered.

Hospital Solothurn (CH)

Room air quality

Room air quality is significantly influenced by the building products used.

Construction projects are monitored from a construction ecology perspective during the planning and construction phase in order to select the construction materials and construction chemicals used according to ecological criteria and to avoid the introduction of materials that are hazardous to health.

Particular attention is paid to solvents and allergenic building materials.

Building products as possible sources of pollutants are fibers, radon (granite), and VOCs (solvents in paints, glue, and varnishes, biocides in wood preservatives and carpets, PAHs in parquet adhesives, and formaldehyde-containing adhesives in wood-based materials).

Our metal ceilings and walls take the hygiene aspect into account. Our fire protection ceilings additionally ensure safety, because they achieve the required fire resistance - and without inserts made of artificial mineral fibers.

Colors and room optical comfort

The fact that colors have an unconscious influence on people is no secret and it is well-established in psychological research. Each nuance has a different effect and can be calming or stimulating, invigorating or relaxing, concentration enhancing or distracting. Color accents in hospital construction also serve orientation and at the same time provide a feel-good atmosphere.

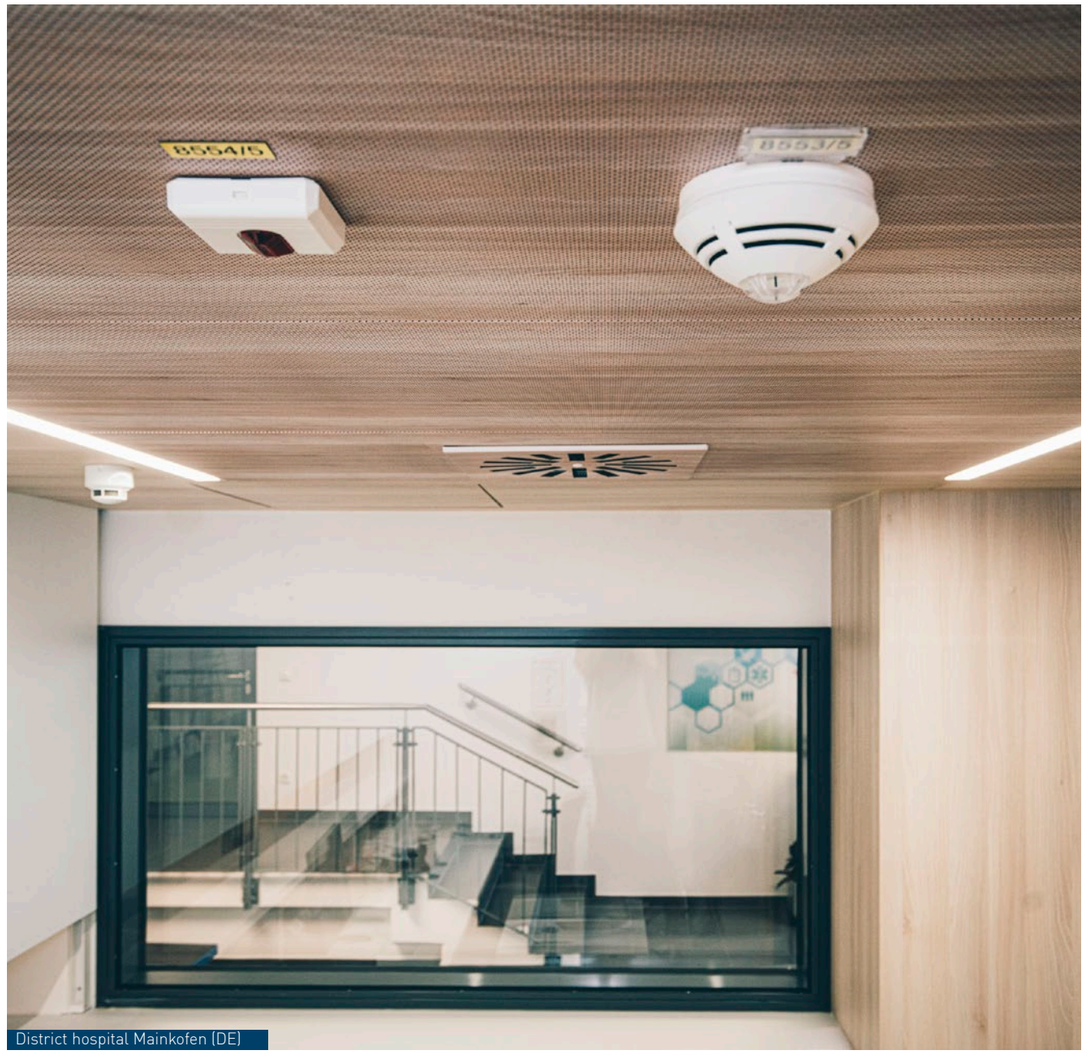
It is therefore perfect that metal ceilings from Fural can be manufactured in all RAL colors and thus adapt completely to the architectural ideas. In this way, a clinic becomes a place where people like to spend time - in rooms that are perfectly equipped in form and color for the respective purpose.

The visual comfort in the patient's room is also influenced by the choice of furniture in the room, type of windows, floor coverings, walls and ceilings. The surfaces, objects, fixtures and attachments may be perceived as pleasant or even uncomfortable in terms of their color, format and arrangement.

Some of the most interesting research on the way hospitals are built looks at nature's role in promoting recovery. The more nature we have around us, the better we can recover from an illness.

School Sandgruben (CH)

District hospital Mainkofen (DE)



District hospital Mainkofen (DE)

Med Campus Modul 2, Graz (AT)

We are acoustic ceilings. We are acoustic walls.

Acoustic comfort

Hospitalization requires both mental concentration and communication from patients.

The recovery process can be significantly affected by acoustic annoyance. These impairments can be: noise penetrating from outside and generated by work equipment, personal or telephone conversations of fellow patients, noise and sounds of any kind penetrating from the corridor, technical background noise, which is mainly generated by EDP and air-conditioning devices or room air-conditioning systems.

Sound triggers physiological and psychological reactions: some sounds are perceived as pleasant, others cause tension or feelings of annoyance.

From the ceiling to the wall

Acoustic walls from Fural not only control the room acoustics, they also optimize the design of the entire room. Thanks to their specific structure, the wall elements act as broadband absorbers and are thus ideally suited for regulating reverberation time and speech intelligibility. The wall cladding is suitable for both targeted and subsequent optimization of the room acoustics.

The benefits of metal ceilings as acoustic ceilings

Our systems combine outstanding acoustic properties and a high-quality appearance with functionality and durability. This combination creates a pleasant room atmosphere that impresses developers and users alike. Architects and installers hold us in high regard for our easily installed, perfected acoustic metal ceiling systems and our service-oriented project handling.

Our acoustic ceilings can also be fitted with additional functions, such as air conditioning (cooling, heating, ventilation) or lighting. Likewise, the product properties can be enhanced in terms of fire protection, hygiene (hospitals and laboratories) or resistance to ball impact (kindergartens, schools and sports halls). Ceiling components are manufactured on state-of-the-art production systems, which can produce everything from individual pieces to high volumes with maximum precision.

The metal ceilings are delivered with finished surfaces to the construction site, thereby ensuring quick and simple processing and short construction processes.

Our products are sustainable, because they consist of easily processed materials that can either be reused or straightforwardly recycled.

See from page 50 Special Acoustics.

Bürgerspital Solothurn (CH)

Sustainability and daylight: Hospital with an award

With the new building of the Bürgerspital Solothurn (Building 1), the hospital has gained a new 56.300 m² space where patients can feel comfortable and receive the best medical care.

The L-shaped new building was designed to allow plenty of daylight into the interior, not only reflecting the modern style, but above all supporting recovery through light.

The new building is designed with the environment in mind. It incorporates various renewable energy sources and prioritizes sustainability also in its interior design. Activated metal ceilings, which cover approximately 19,000 m², have been selected for cooling and heating. These ceilings are installed in a precise strip grid system and are known for their durability, eco-friendliness, and recyclability.

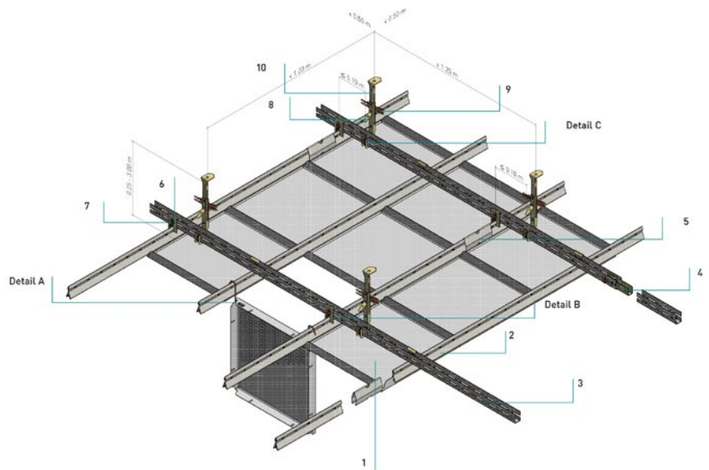
In the course of an international competition for hospital projects, the architectural firm Silvia Gmür Reto Gmür Architekten GmbH succeeded in creating a unity of aesthetics, functionality and maximum sustainability. Aesthetics, functionality and maximum flexibility of use.

Planning with experts

The University Hospital Zurich (USZ) offers basic medical care at the highest level and is open to everyone at all times.

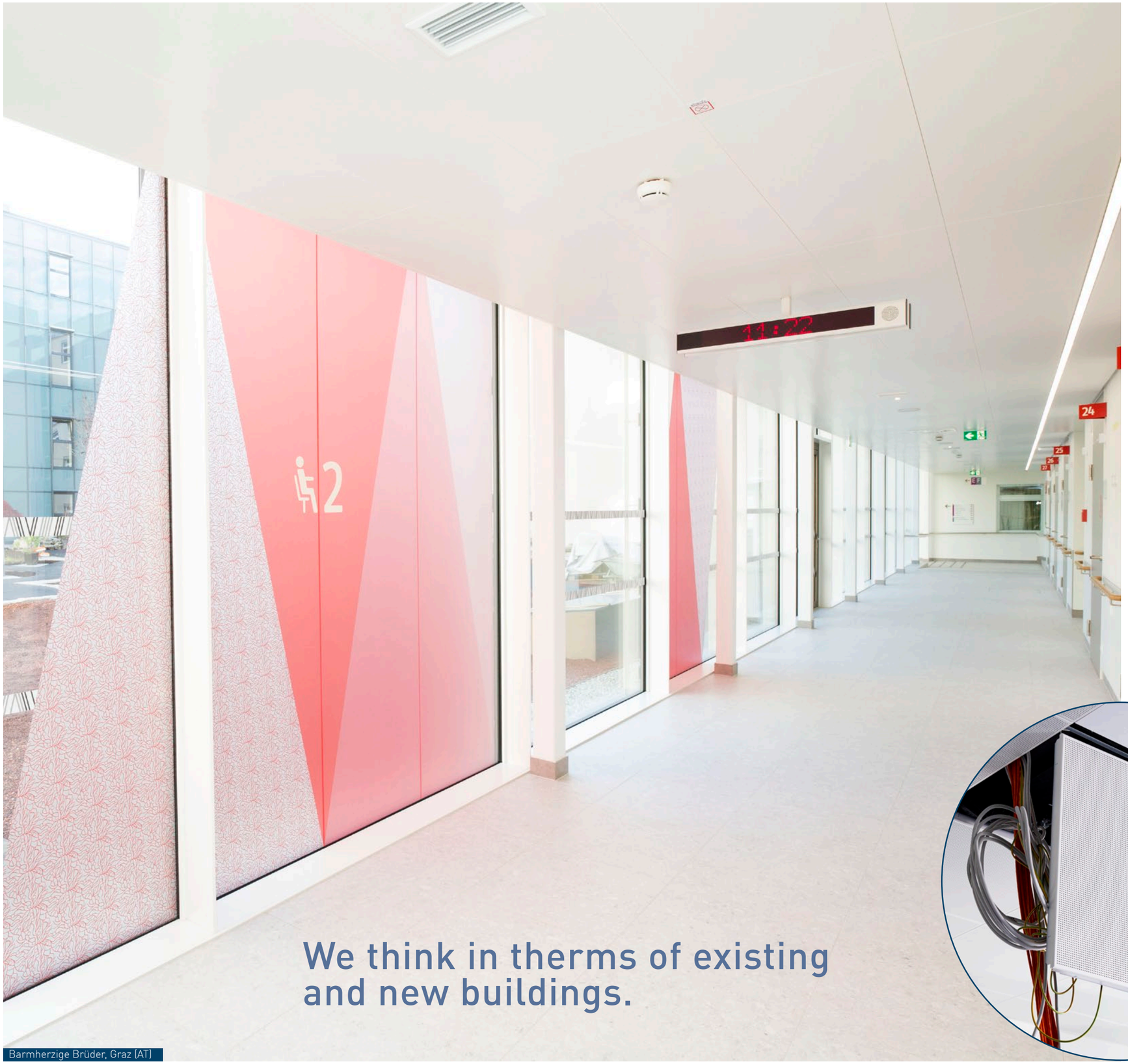
The USZ site is currently undergoing structural development, which made a temporary solution unavoidable. The SUED2 modular building is being used as a temporary solution and, in addition to providing top-class medical care, is also impressive in terms of its aesthetics and feel-good factor. Patients can therefore receive the best possible care and recover in an environment in which they feel comfortable.

Hemmi Fayet Architekten, Zurich, planned the project to the highest standards. Fural Metalit Dipling was also involved in the realization itself with the metal ceilings: Clip-in metal ceilings and fire protection ceilings with an acoustic function were installed over an area of 6.900 m². These systems guarantee maximum safety (standard EI 30), maximum comfort, an outstanding appearance and quick installation.



KQK 1.1.4.2 Square tile – clip-in system
Standard ceiling

University Hospital Zurich Modulbau SUED 2 (CH)



Barmherzige Brüder, Graz (AT)

We think in therms of existing and new buildings.

Multifunctional metal ceilings

The Hospital der Barmherzigen Brüder Graz first opened its doors in 1615 and is one of the order's largest hospitals.

For over 400 years, the hospital has been striving to offer and ensure the best possible healthcare for all patients.

The so-called Ordenskrankenhaus Graz-Mitte, a hospital cooperation between the Elisabethinnen Hospital and the Hospital of the Brothers of Mercy, is also to be built on the Marschallgasse site by 2025 at the latest.

The major new construction, extension and conversion project, to which Fural Metalit Dipling also contributed, has been underway since October 2018:

Fural Metalit Dipling metal ceilings with their individual functions such as fire protection, cooling and acoustics were installed over an area of more than 4.300 m². Various systems were also used: from SWING F0 to expanded metal, the optimum system solution was found for every area.

The project was planned by architects DI Tinchon and DI Wissounig and continues to be implemented at the highest level.

Hospital with mountain view

The state hospital in Hall in Tirol is the second largest hospital in Tyrol and offers a wide range of modern medical, nursing and therapeutic care.

The Fural Metalit Dipling metal ceilings were installed on an area of over 6.700 m² and in addition to their aesthetics, impress with excellent solutions for fire protection and hygiene. Especially in hygiene-sensitive buildings such as hospitals, it is important to choose systems that meet all requirements.

The clip-in system used has a special hospital wall connection, which is ideal for healthcare facilities. The ceiling system is acoustically effective thanks to the perforation and offers uncomplicated access to the ceiling void in the event of an inspection. The project was carefully planned by the Hinterwirth architectural office in Gmunden and completed in 2021.

Hospital Hall (AT)

UP

We think in terms of maintenance and service.


Detail F30 tile


Hospital Siegen (DE)

Fire protection and hygiene

In hygiene-sensitive buildings in particular, hospitals for example, cleanliness and sterility take top priority. The fire protection ceilings from Fural offer the necessary conditions for it.

Thanks to their special design, metal ceilings from »Fural Metalit Dipling« not only prevent the accumulation of dust particles but also ensure easy cleaning of the surfaces. The plasterboard of our fire protection tiles behind the ceiling remains completely closed, so dust has no possibility to accumulate. The metal ceiling also enables ideal disinfection.

Fural metal fire protection ceilings combine practicality and safety with today's building requirements and boast of numerous advantages:
In addition to being 100% free of dust, ceilings from Fural Metalit Dipling are easy to clean and fibre-free. The panels do not contain any rock wool; as ceilings, they guarantee fire protection for up to 90 minutes.

Thanks to the minimum height, emergency and warning lights can be easily integrated into the ceiling panels.

In addition to the fire protection function, a cooling system can be integrated as well.

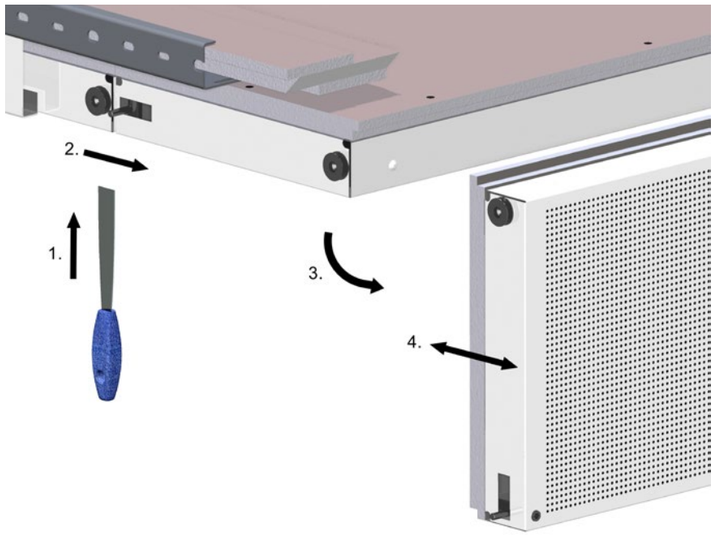
Fire Protection Ceiling Manual in AT/CH/DE according to the corresponding country standard
EI 30 a ←→ b
EI 60 a → b + EI 30 a ← b
EI 90 a → b + EI 30 a ← b
F30 from above and from below
F90 from above and F30 from below
– Intro
  – Swinging down system and lay-in system
  – Design of the fire protection tiles
  – Direct wall connections
  – Centre suspensions
  – Hall crossings
  – Niche connections
  – Frieze connections
  – Centre friezes
– Installation guide
– User guide

For more information, see our "Fire Protection Ceilings" Manuals, available for Germany, Austria and Switzerland, as well as on our website at: www.fural.com/en/metal_ceilings/fire_protection/11


Kantonspital Graubünden (CH)

Open and close

Hinge-down process of the
Fural-Fire protection ceiling
- The ceiling is easy to open without special tools.
- With a spatula or Hex key the F30/EI 30, EI 60 and F90/EI 90 or F90/EI 90 ceilings can be easily opened.
- The twist lock is galvanized and prevents signs of use due to the opening.
- The swivel castors guarantee through their perfect shape an auto-centering of the tiles between



1 Insert ceiling opener or Hex key
2 Open twist lock
3 Fold down tile
4 Move tile

Technical fixtures

Generally tested is the installation or connection of:
- Lights, e.g. LED-light 410 and more types, LED Luminaire series 481
- Speaker
- Escape route pictograms
- Disc valves
- Fire dampers/Swirl diffusers

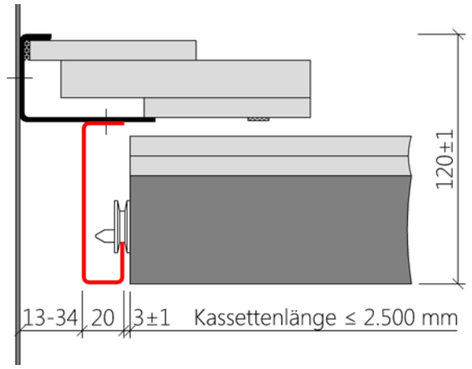
Various fixtures can be supplied as system parts integrated at the factory.. These include a selection of LED lights, escape route pictograms and speakers.

Further information on this as well as photometric data can be found on our website www.fural.com or on request. Cut-outs for built-in fixtures are manufactured at the factory.

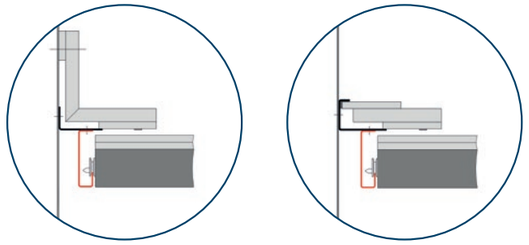
Security

The Graubünden Cantonal Hospital has relocated its pediatric and adolescent medicine department to the new Children's Clinic M. This is a place with a cosy atmosphere and makes the stay more pleasant for patients and their relatives. It offers more space than before, as the patient rooms, examination rooms and material storage areas are ideally planned.

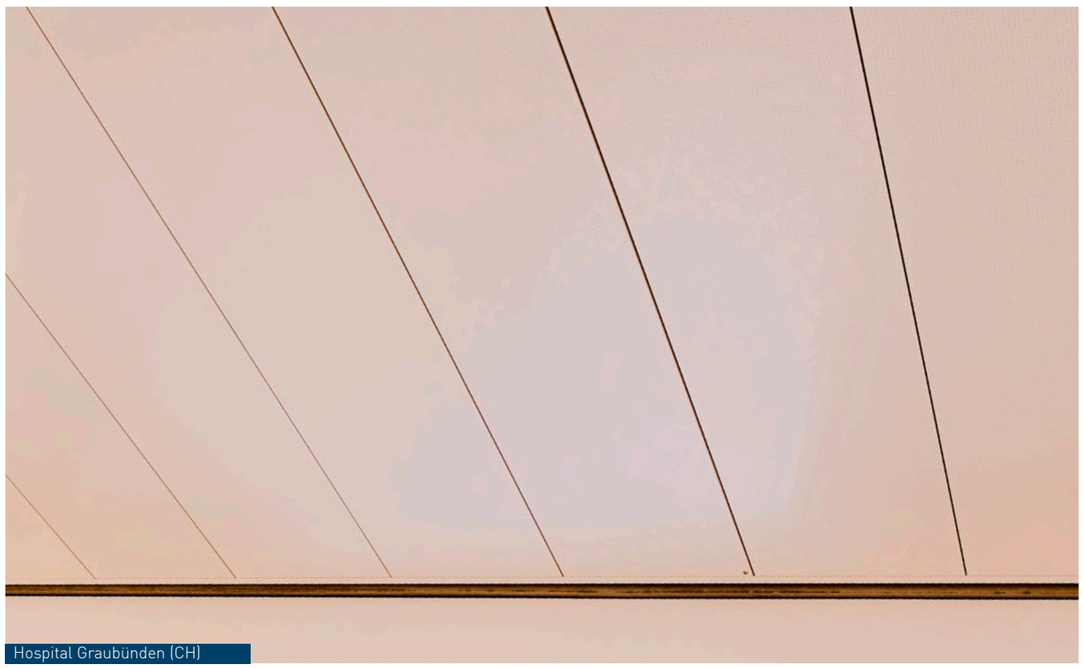
Fural Metalit Dipling fire protection ceilings EI 60 and SWING ceilings EI 0 were installed in the corridors. Both ceiling systems are acoustically effective and the color of the metal ceilings ideally matches the color concept of the Children's Hospital M, which contributes to a harmonious environment. In the event of maintenance work, individual cassettes in both ceiling systems can be flexibly folded down. This allows quick and easy access to the ceiling void and minimizes disruption to ongoing hospital operations.



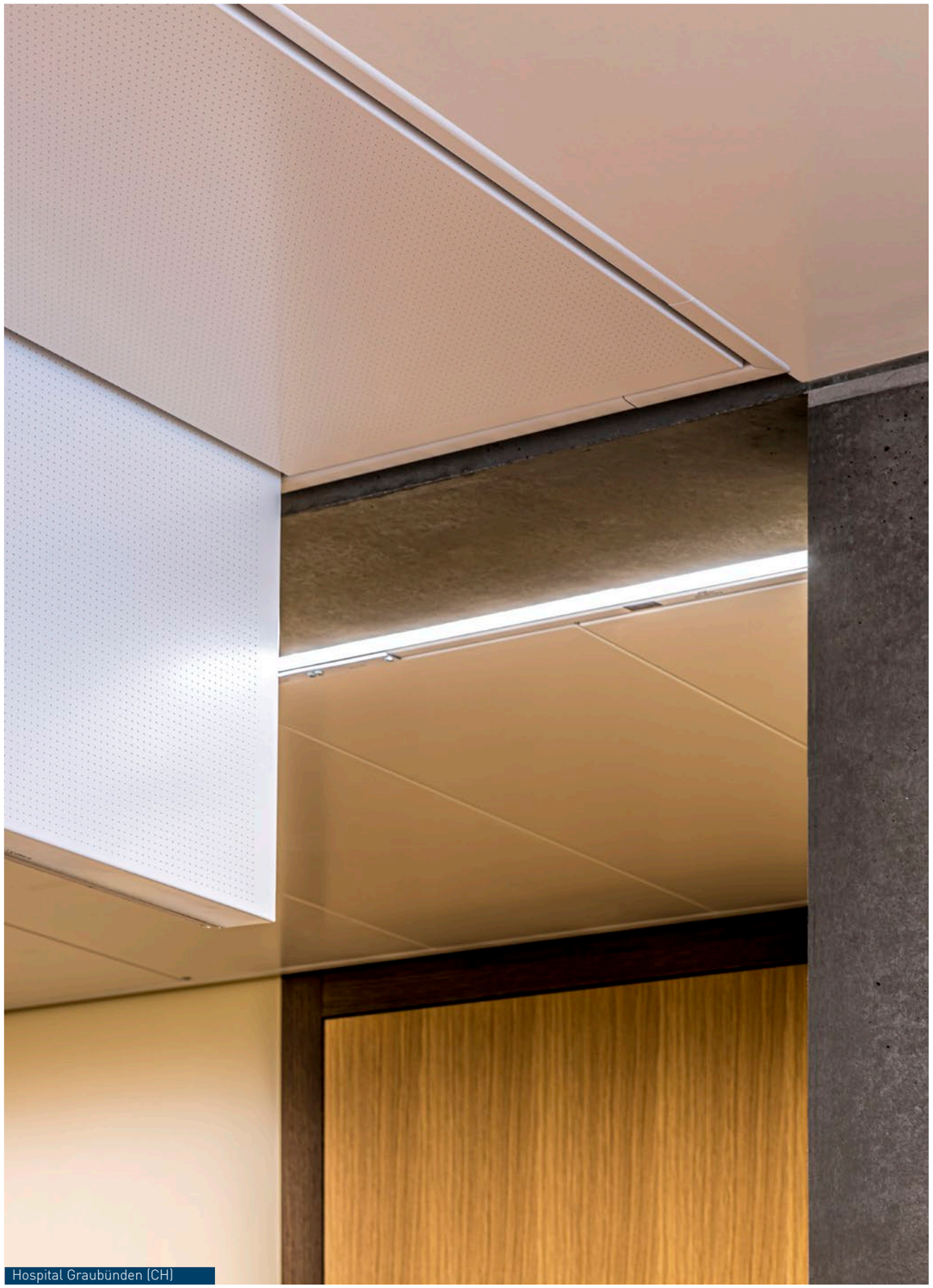
A.W.50
Longitudinal corridor connection



Connection old → Connection new



Hospital Graubünden (CH)



Hospital Graubünden (CH)

Multifunctionality

Metal ceilings from Fural can be equipped with functions in many ways. Our products combine the following features:

- Fire protection
- Acoustics
- Heating, cooling and ventilation
- Integration possibility of fixtures
- Each tile can be hinged-down
- Simple maintenance
- easy replacement of ceiling components
- easy revision of the ceiling void
- 100 % separable by type
- Recyclability

State Hospital Hall (AT)


Merian Iselin Hospital, Basel (CH)

Integration of technology

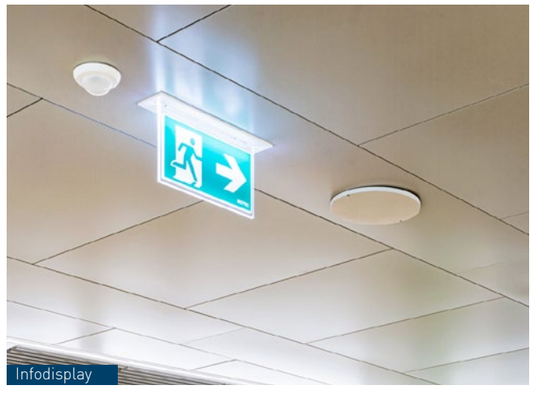
It is important to control not only the technical aspects of the building, but also the comfort of patients and staff. For example, the control of temperature and humidity, thermal regulation and lighting appropriate to health conditions, and combine all this with the intended use of the structure (clinical paths and relative coherence of the rooms, flexibility of the parameters of each room).


Linear luminaire


Downlight

Ceiling hanger for orientation


Speaker


Infodisplay

Why metal as a cooling ceiling?

Metal ceilings are ideal for cooling and heating rooms. Temperature control is largely based on the radiation principle. In cooling mode, the cold water flow absorbs the heat radiation from people and objects in the room and dissipates it. The cooling effect is immediately noticeable. In heating mode, the heat radiates extremely gently via the metal ceiling directly into the room.

In addition, our cooling ceilings work completely without air circulation - dust turbulence is thus prevented and draughts are avoided.

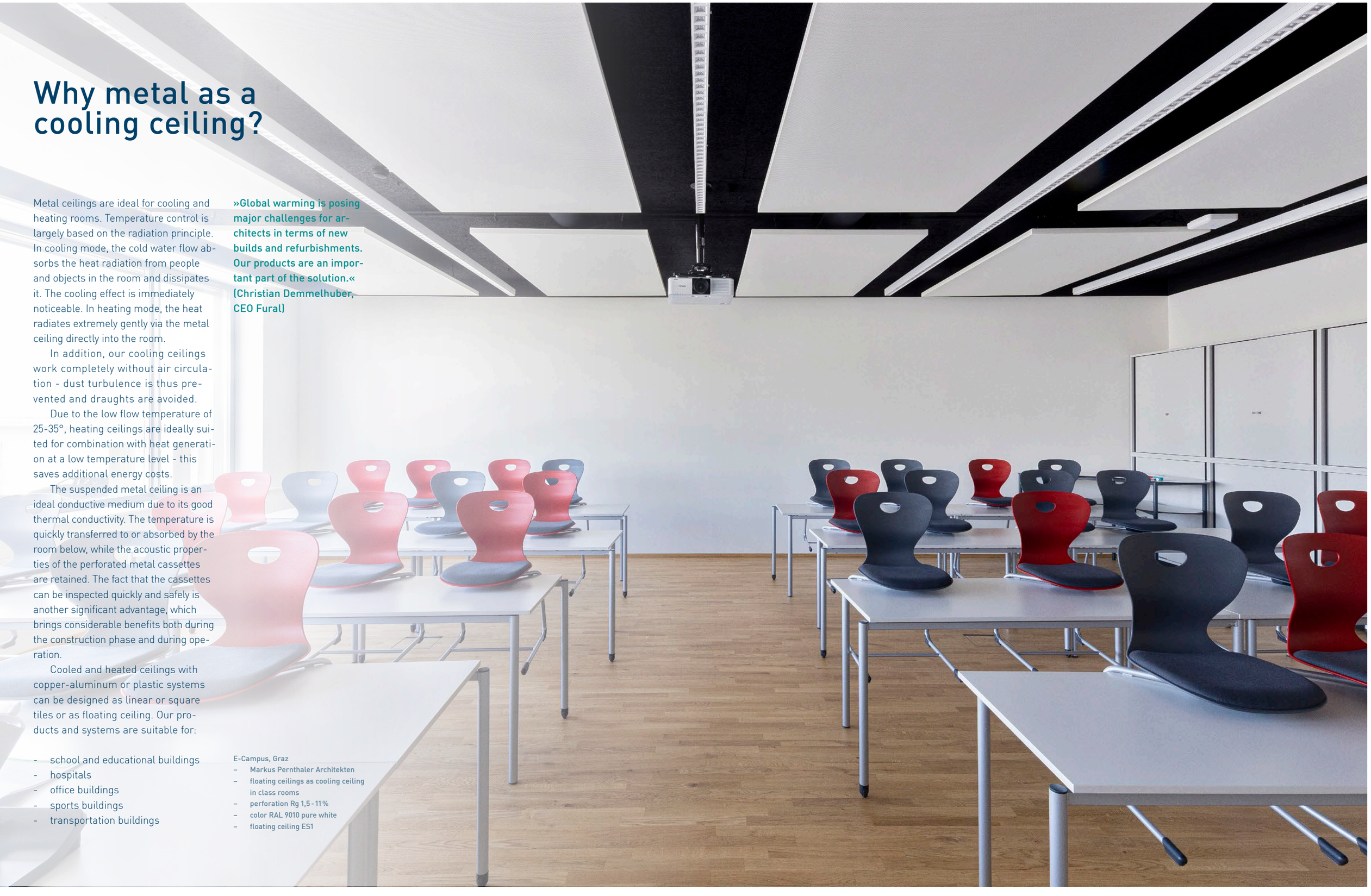
Due to the low flow temperature of 25-35°, heating ceilings are ideally suited for combination with heat generation at a low temperature level - this saves additional energy costs.

The suspended metal ceiling is an ideal conductive medium due to its good thermal conductivity. The temperature is quickly transferred to or absorbed by the room below, while the acoustic properties of the perforated metal cassettes are retained. The fact that the cassettes can be inspected quickly and safely is another significant advantage, which brings considerable benefits both during the construction phase and during operation.

Cooled and heated ceilings with copper-aluminum or plastic systems can be designed as linear or square tiles or as floating ceiling. Our products and systems are suitable for:

- school and educational buildings
- hospitals
- office buildings
- sports buildings
- transportation buildings

»Global warming is posing major challenges for architects in terms of new builds and refurbishments. Our products are an important part of the solution.« (Christian Demmelhuber, CEO Fural)



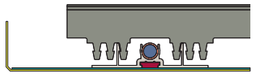
E-Campus, Graz
- Markus Pernthaler Architekten
- floating ceilings as cooling ceiling in class rooms
- perforation Rg 1,5 - 11 %
- color RAL 9010 pure white
- floating ceiling ES1

Heating and cooling

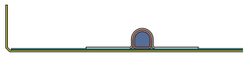
Climate elements

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

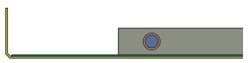


- Copper/aluminium systems with adhesive fixation



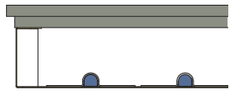
- Plastic/aluminium systems with magnetic fixation

- Copper/graphite systems with adhesive fixation

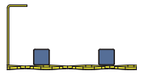


Fire protection ceiling and cooling

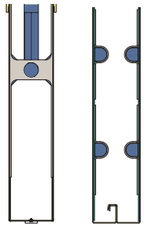
Cooling ceiling systems in the case of fire protection ceilings always require an expert opinion.



Expanded metal ceiling and cooling

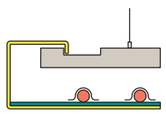


Baffle ceiling and cooling

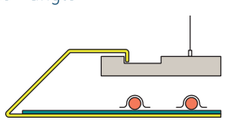


Floating ceiling and cooling

90°-angle



45°-angle



(60°- angle also available)

We are a cool company!

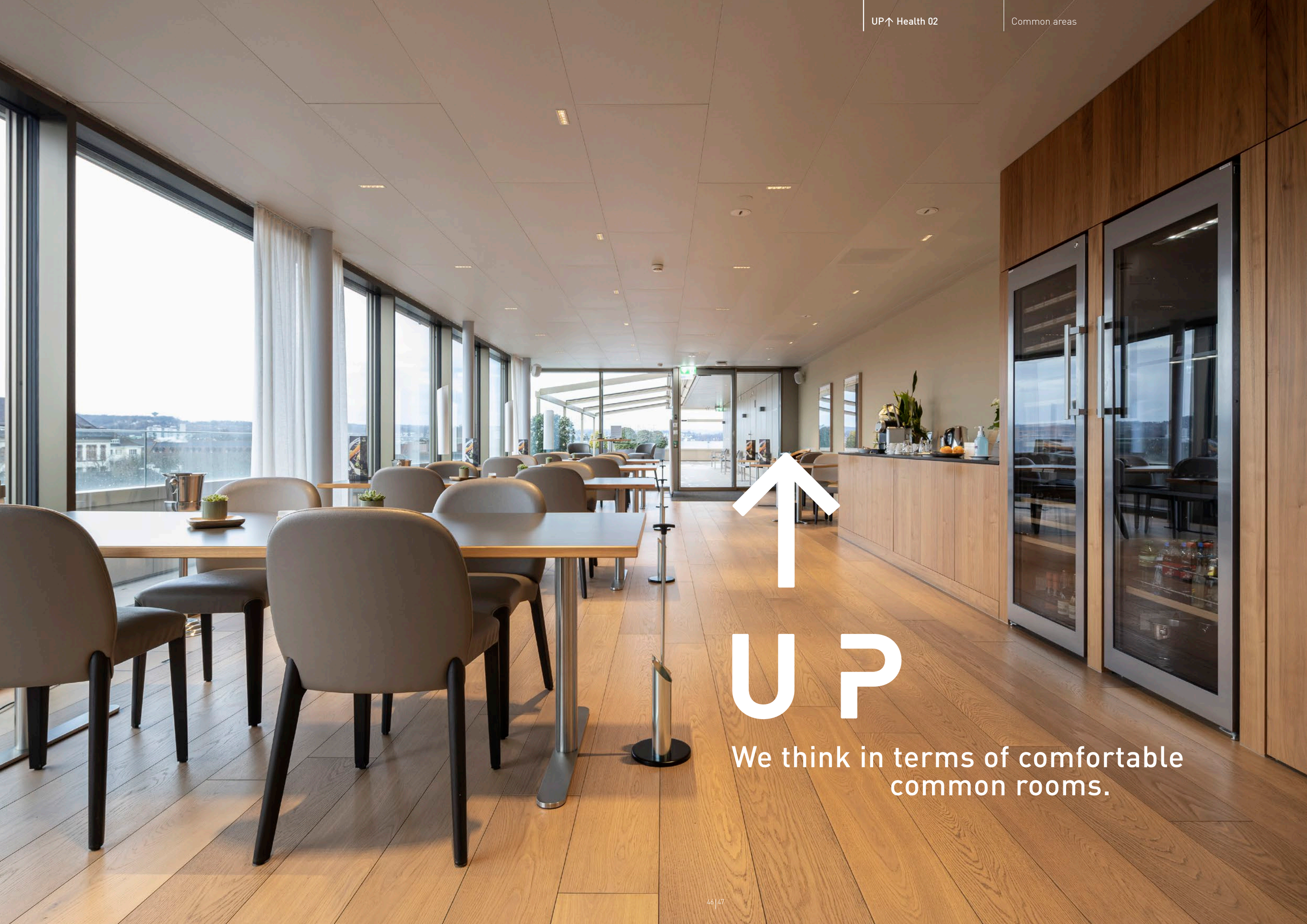
One thing in particular is cool for us: our metal ceilings. Because they make it possible to heat and cool rooms in a very simple way. Climate functions can be added and integrated into our metal ceilings according to the modular principle and be combined with other ceiling variants, e.g. acoustic ceilings.

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 topmost quality.

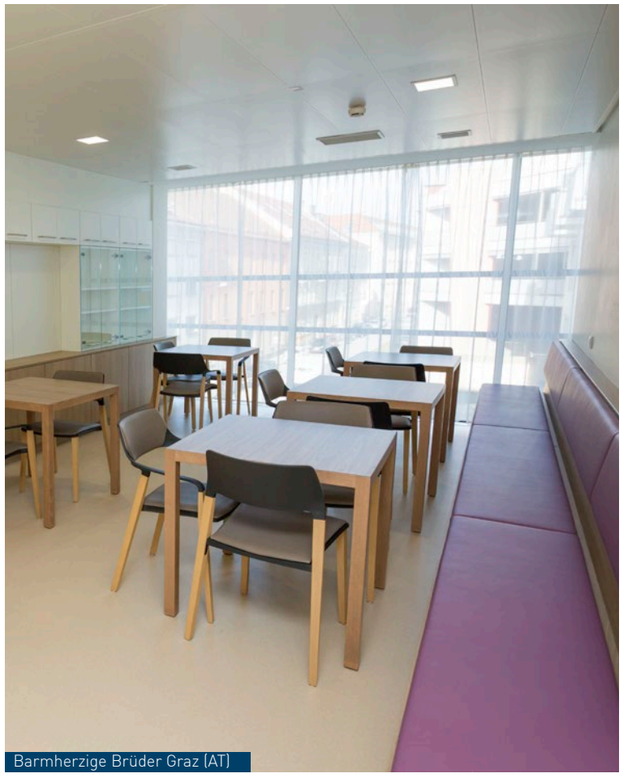
ALP – Acoustic guide profile

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 acoustic guiding profile, ALP. 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.



UP

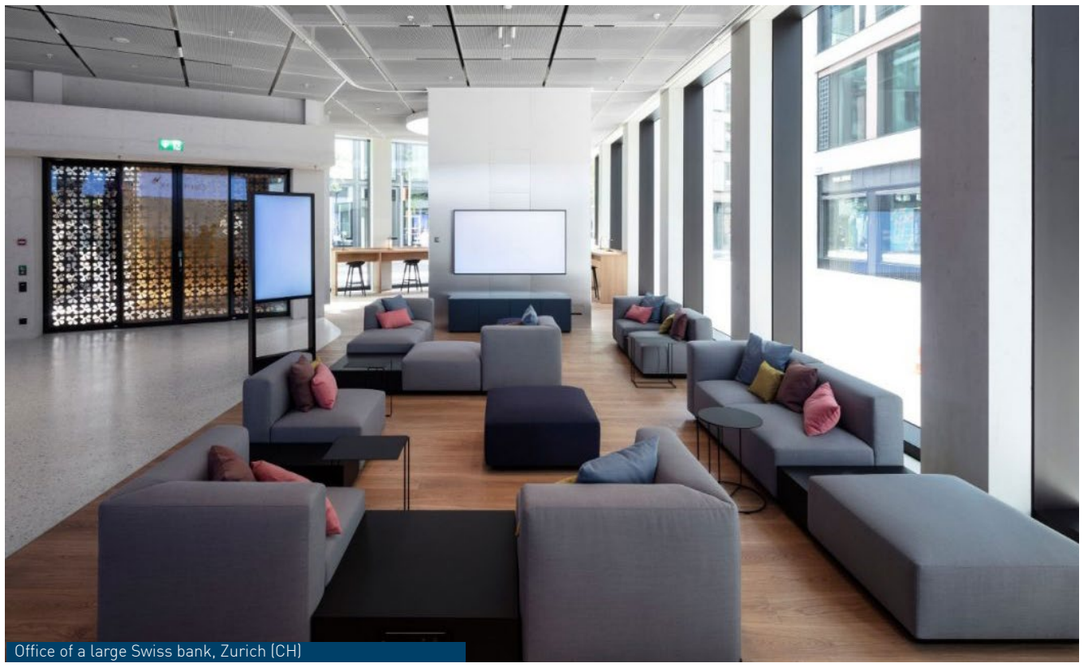
We think in terms of comfortable common rooms.


Barmherzige Brüder Graz (AT)

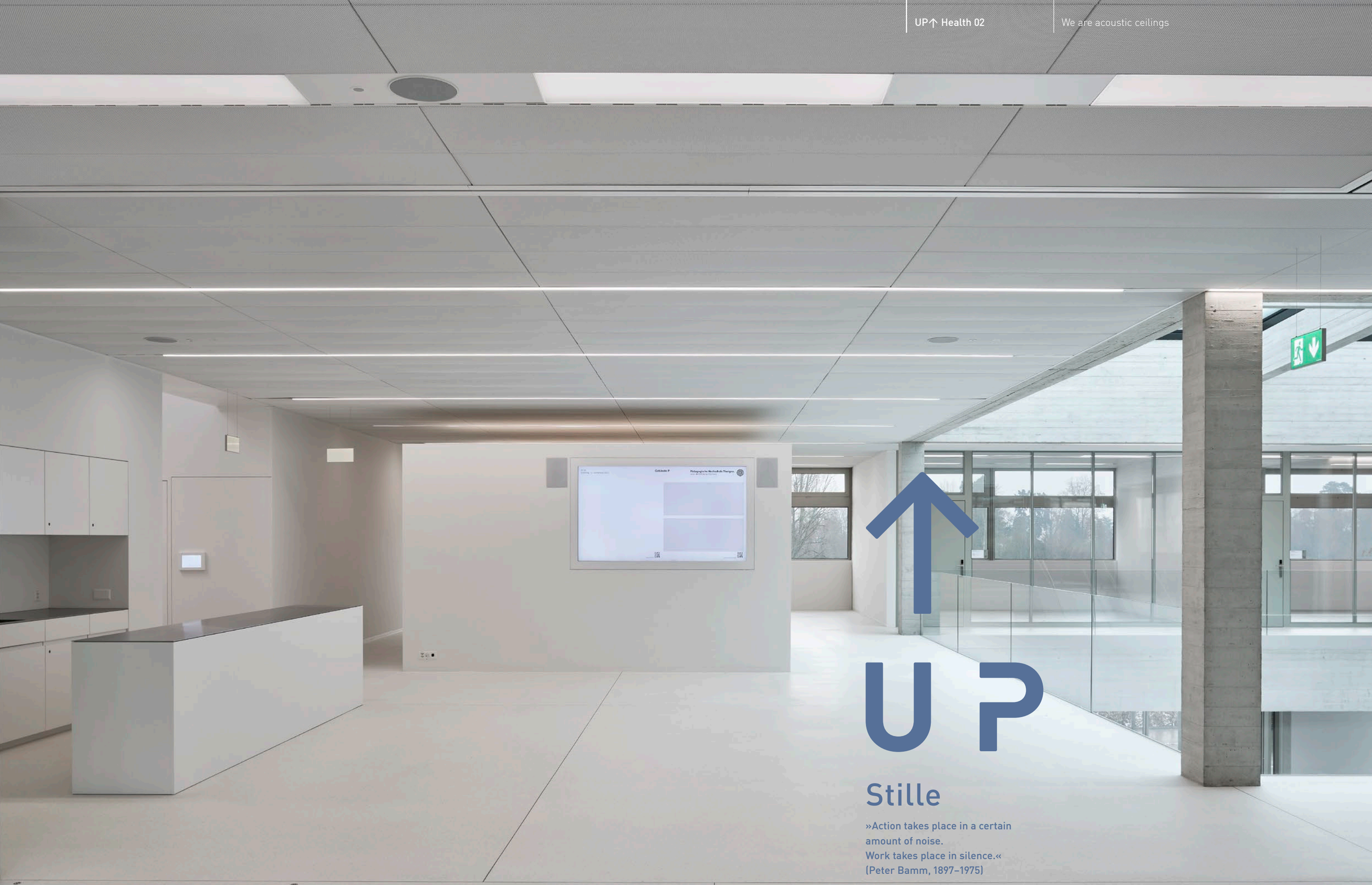
Stay in a feel-good atmosphere

In addition to excellent, all-inclusive care, the environment and atmosphere in hospitals is an important factor in feeling comfortable.

The metal ceilings from Fural Metalit Dipling create an area with one hundred percent feel-good character in the lounge, eating and drinking areas. Whether for eating, drinking, chatting or relaxing and switching off - for patients and all employees.


Office of a large Swiss bank, Zurich (CH)


Trostberg State school (DE)



UP

Stille

»Action takes place in a certain
amount of noise.
Work takes place in silence.«
(Peter Bamm, 1897–1975)

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:

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

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.

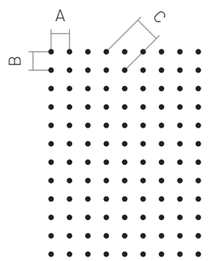
The cavity that this creates between raw ceiling and suspended ceiling acts as a sound transmission path which must be compensated for with longitudinal sound insulation.

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

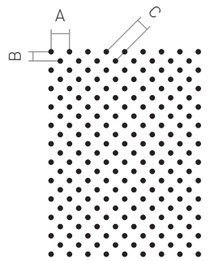
The longitudinal sound insulation is determined according to EN ISO 717-1 and specified as a weighted normalised flanking sound level difference **$D_{n,f,w}$** in **dB** units.

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.

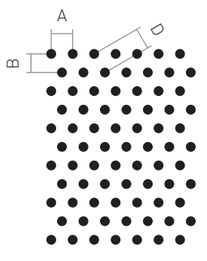
The reference curve is not shown in the test report diagrams.



Rg



Rd



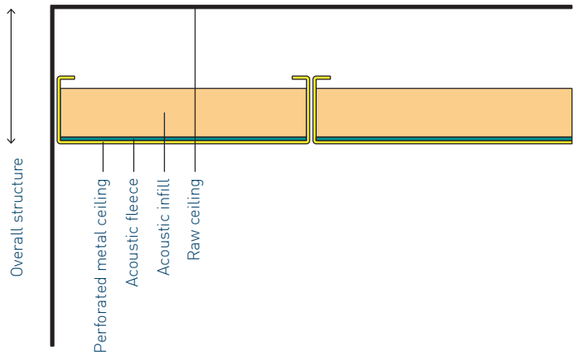
Rv

Perforation sizing

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

Effect of acoustic infills

Barmherzige Brüder, Graz (AT)

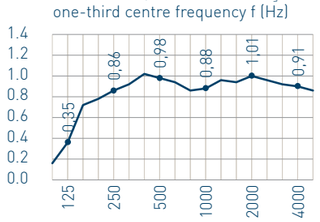


Different acoustic infills (absorber types)

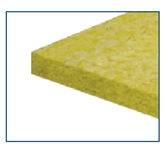
The sound absorption coefficient is greatly affected by the acoustic infills used, which can consist of mineral wool, mineral wool sealed in PE film, foam or polyester wool.

These acoustic infills are also available in different volumetric weights (kg/m³).

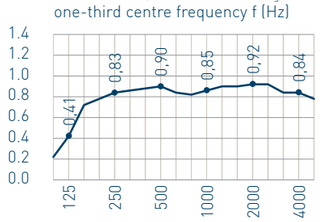
	Fural
	Rg 2.5 - 16 %
Perforation Ø	2.5 mm
Hole content	16 %
Max. perforation width	1,460 mm
Des. acc. to DIN 24041	Rg 2.50 - 5.50
Horizontal spacing	5.50 mm →
Vertical spacing	5.50 mm ↓
Diagonal spacing	7.78 mm ↘
Perforation direction	→
Sound absorption	Sound absorption coefficient α_s at one-third centre frequency f (Hz)



Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 279/2006 Figure 14
NRC	0.95
α_w	0.95
Absorber class	A (DIN EN 11654)
Acoustic infill	**30 mm mineral wool 45 kg/m³**

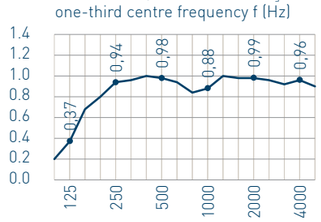


	Fural
	Rg 2.5 - 16 %
Perforation Ø	2.5 mm
Hole content	16 %
Max. perforation width	1,460 mm
Des. acc. to DIN 24041	Rg 2.5 - 5.50
Horizontal spacing	5.50 mm →
Vertical spacing	5.50 mm ↓
Diagonal spacing	7.78 mm ↘
Perforation direction	→
Sound absorption	Sound absorption coefficient α_s at one-third centre frequency f (Hz)



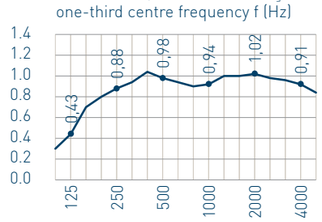
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 279/2006 Figure 17
NRC	0.85
α_w	0.90
Absorber class	A (DIN EN 11654)
Acoustic infill	**30 mm mineral wool 45 kg/m³ in PE film**

	Fural
	Rg 2.5 - 16 %
Perforation Ø	2.5 mm
Hole content	16 %
Max. perforation width	1,460 mm
Des. acc. to DIN 24041	Rg 2.50 - 5.50
Horizontal spacing	5.50 mm →
Vertical spacing	5.50 mm ↓
Diagonal spacing	7.78 mm ↘
Perforation direction	→
Sound absorption	Sound absorption coefficient α_s at one-third centre frequency f (Hz)

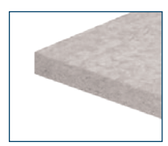


Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 279/2006 Figure 18
NRC	0.95
α_w	0.95
Absorber class	A (DIN EN 11654)
Acoustic infill	**30 mm foam 9 kg/m³**

	Fural
	Rg 2.5 – 16 %
Perforation Ø	2.5 mm
Hole content	16 %
Max. perforation width	1,460 mm
Des. acc. to DIN 24041	Rg 2.50 – 5.50
Horizontal spacing	5.50 mm →
Vertical spacing	5.50 mm ↓
Diagonal spacing	7.78 mm ↘
Perforation direction	→
Sound absorption	Sound absorption coefficient α_s at one-third centre frequency f (Hz)



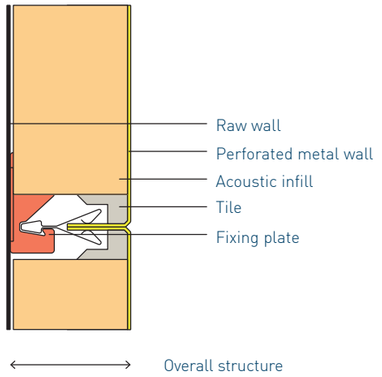
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 279/2006 Figure 19
NRC	0.95
α_w	0.95
Absorber class	A (DIN EN 11654)
Acoustic infill	**30 mm polyester wool 48 g/m³**



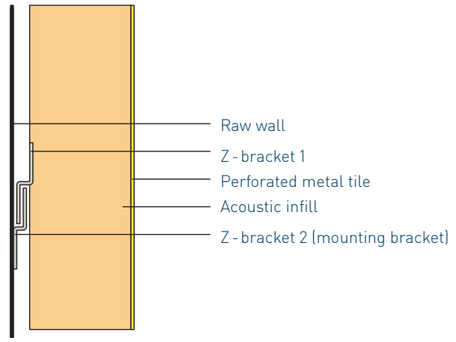
Acoustic walls

School Munich Moosach (DE)

Clip-in system



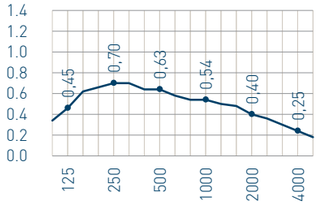
Hang-in system



	Fural
	Rg 0.7 - 1 %
Perforation Ø	0.7 mm
Hole content	1 %
Max. perforation width	1,140 mm
Des. acc. to DIN 24041	Rg 0.70 - 6.00
Horizontal spacing	6.00 mm →
Vertical spacing	6.00 mm ↓
Diagonal spacing	8.48 mm ↘
Perforation direction	→

Sound absorption

Sound absorption coefficient α_s at one-third centre frequency f (Hz)

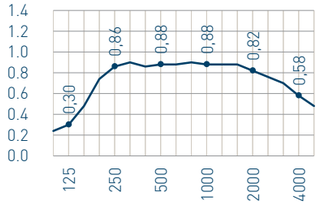


Overall structure	50 mm
Fleece	Bonded acoustic fleece
Test certificate	07.12.2010 M 61840/27
NRC	0.55
α_w	0.40 (L)
Absorber class	D (DIN EN 11654)
Acoustic infill	**50 mm mineral wool 100 kg/m³ in PE film**

	Fural
	Rg 0.7 - 4 %
Perforation Ø	0.7 mm
Hole content	4 %
Max. perforation width	1,140 mm
Des. acc. to DIN 24041	Rg 0.70 - 3.00
Horizontal spacing	3.00 mm →
Vertical spacing	3.00 mm ↓
Diagonal spacing	4.24 mm ↘
Perforation direction	→

Sound absorption

Sound absorption coefficient α_s at one-third centre frequency f (Hz)

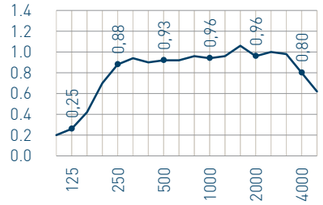


Overall structure	50 mm
Fleece	Bonded acoustic fleece
Test certificate	07.12.2010 M 61840/26
NRC	0.85
α_w	0.80 (L)
Absorber class	B (DIN EN 11654)
Acoustic infill	**50 mm mineral wool 100 kg/m³ in PE film**

	Fural
	Rv 1.6 - 20 %
Perforation Ø	1.6 mm
Hole content	20 %
Max. perforation width	1,450 mm
Des. acc. to DIN 24041	Rv 1.60 - 3.50
Horizontal spacing	3.50 mm →
Vertical spacing	3.03 mm ↓
Offset spacing 60°	3.50 mm ↘
Perforation direction	→

Sound absorption

Sound absorption coefficient α_s at one-third centre frequency f (Hz)

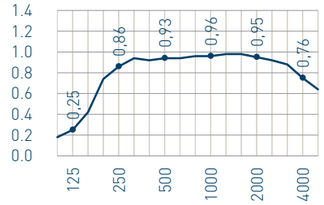


Overall structure	50 mm
Fleece	Bonded acoustic fleece
Test certificate	07.12.2010 M 61840/22
NRC	0.95
α_w	0.95
Absorber class	A (DIN EN 11654)
Acoustic infill	**50 mm mineral wool 100 kg/m³ in PE film**

	Fural
	Rd 1.8 - 21 %
Perforation Ø	1.8 mm
Hole content	21 %
Max. perforation width	1,400 mm
Des. acc. to DIN 24041	Rd 1.80 - 3.50
Horizontal spacing	4.96 mm →
Vertical spacing	2.48 mm ↓
Diagonal spacing	3.50 mm ↘
Perforation direction	→

Sound absorption

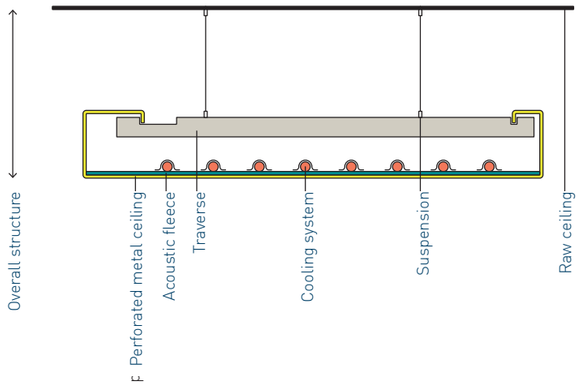
Sound absorption coefficient α_s at one-third centre frequency f (Hz)



Overall structure	50 mm
Fleece	Bonded acoustic fleece
Test certificate	07.12.2010 M 61840/25
NRC	0.95
α_w	0.95
Absorber class	A (DIN EN 11654)
Acoustic infill	**50 mm mineral wool 100 kg/m³ in PE film**

Cooling floating ceilings

Post Finance Bern (CH)



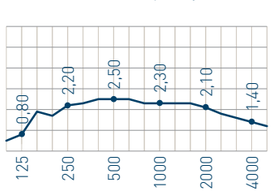
Room temperature control by floating ceiling

Floating ceilings are particularly suitable for combination with water-bearing heat exchangers for room temperature control. Fitting with cooling systems changes the acoustic properties of the floating ceilings, because the previously continuous holes of profiles are covered. Therefore the "acoustic occupancy level" is specified in the tables. This means the proportion of the area covered by the heat-conducting profile.

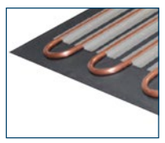
	Fural
	Rg 2.5 - 16 %
Perforation Ø	2.5 mm
Hole content	16 %
Max. perforation width	1,460 mm
Des. acc. to DIN 24041	Rg 2.50 - 5.50
Horizontal spacing	5.50 mm →
Vertical spacing	5.50 mm ↓
Diagonal spacing	7.78 mm ↘
Perforation direction	→

Sound absorption

Absorption area A_{Obj}/m^2 at one-third centre frequency f (Hz)



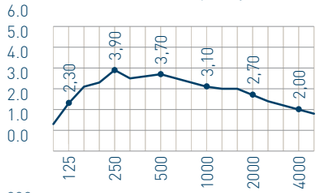
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	28.06.2019 M 105629/37
Equiv. sound absorp.	(500 Hz) 2.50 m^2
Visible surface area	3.45 m^2
Acoustic infill	**Cooling system**
Acoustic occ. level	73 % (cooling system with 12 heat conducting profiles)



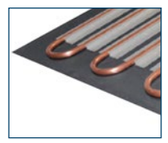
	Fural
	Rg 2.5 - 16 %
Perforation Ø	2.5 mm
Hole content	16 %
Max. perforation width	1,460 mm
Des. acc. to DIN 24041	Rg 2.50 - 5.50
Horizontal spacing	5.50 mm →
Vertical spacing	5.50 mm ↓
Diagonal spacing	7.78 mm ↘
Perforation direction	→

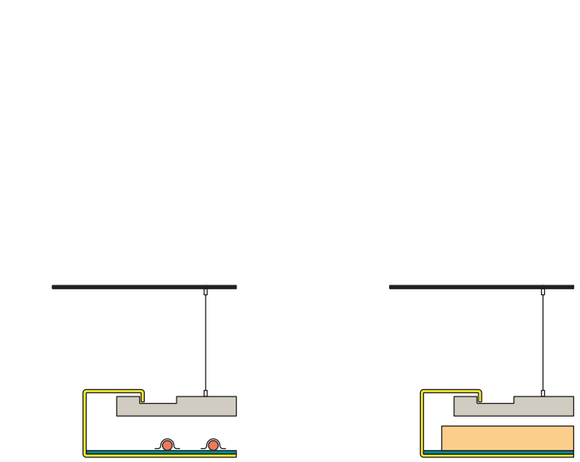
Sound absorption

Absorption area A_{Obj}/m^2 at one-third centre frequency f (Hz)



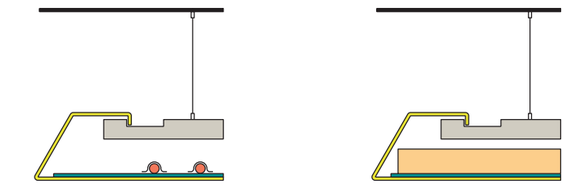
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	28.06.2019 M 105629/38
Equiv. sound absorp.	(500 Hz) 3.70 m^2
Visible surface area	3.45 m^2
Acoustic infill	**50 mm mineral wool 100 kg/m^3 in PE film + cooling system**
Acoustic occ. level	73 % (cooling system with 12 heat conducting profiles)

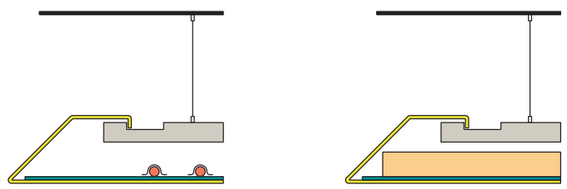




Edge formation of floating ceilings

The edge formation of floating ceilings can be implemented with internal angles of 90°, 60°, or 45°. While internal angles of 90° create a voluminous impression, the versions with internal angles of 60° and 45° have a more two- dimensional effect.



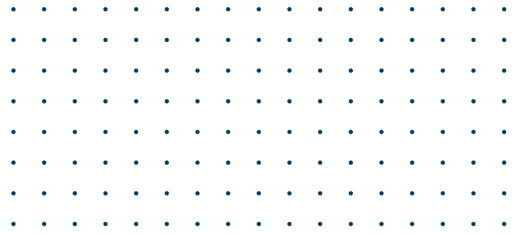


UP

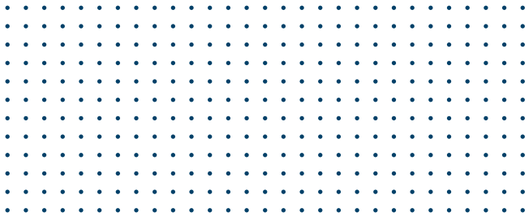
Acoustics, fire protection and aesthetics. We think in terms of patient rooms.

Tested perforations 1

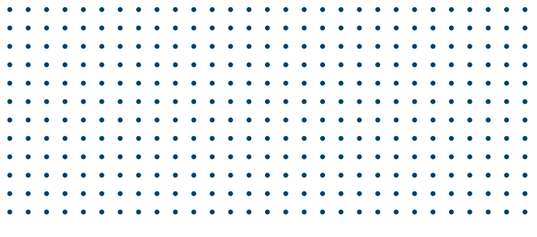
	Fural
	Rg 0.7 - 1 %
Perforation Ø	0.7 mm
Hole content	1 %
Max. perforation width	1,197 mm
Des. acc. to DIN 24041	Rg 0.70 - 6.00
Horizontal spacing	6.00 mm →
Vertical spacing	6.00 mm ↓
Diagonal spacing	8.48 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	31/08/2007 P-BA 231/2007
NRC	0.65
α_w	0.50 (LM)
Absorber class	D (DIN EN 11654)
Acoustic infill	w/o



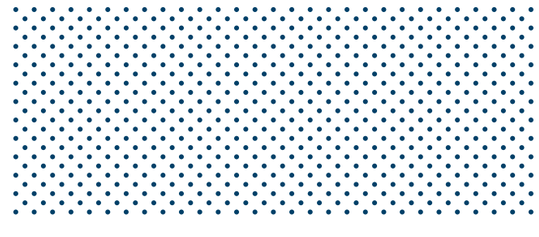
	Fural
	Rg 0.7 - 1.5 %
Perforation Ø	0.7 mm
Hole content	1.5 %
Max. perforation width	1,400 mm
Des. acc. to DIN 24041	Rg 0.70 - 5.00
Horizontal spacing	5.00 mm →
Vertical spacing	5.00 mm ↓
Diagonal spacing	7.07 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	04/12/2019 M 105629
NRC	0.60
α_w	0.50 (L)
Absorber class	D (DIN EN 11654)
Acoustic infill	w/o



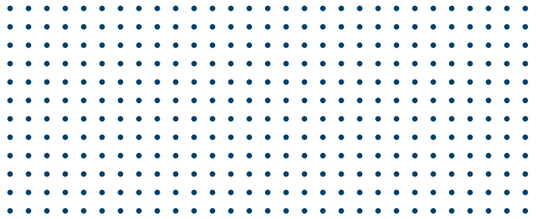
	Fural
	Rg 0.7 - 4 %
Perforation Ø	0.7 mm
Hole content	4 %
Max. perforation width	1,197 mm
Des. acc. to DIN 24041	Rg 0.70 - 3.00
Horizontal spacing	3.00 mm →
Vertical spacing	3.00 mm ↓
Diagonal spacing	4.24 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	31/08/2007 P-BA 219/2007
NRC	0.80
α_w	0.75 (LM)
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o



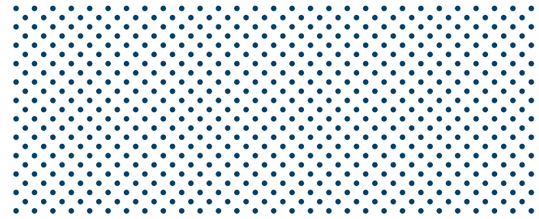
	Fural
	Rg 0.8 - 6 %
Perforation Ø	0.8 mm
Hole content	6 %
Max. perforation width	1,400 mm
Des. acc. to DIN 24041	Rg 0.80 - 3.00
Horizontal spacing	3.00 mm →
Vertical spacing	3.00 mm ↓
Diagonal spacing	4.24 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	09/06/2017 M 105629/17
NRC	0.75
α_w	0.75
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o



	Fural
	Rd 0.8 - 11 %
Perforation Ø	0.8 mm
Hole content	11 %
Max. perforation width	1,400 mm
Des. acc. to DIN 24041	Rd 0.80 - 2.12
Horizontal spacing	3.00 mm →
Vertical spacing	1.50 mm ↓
Diagonal spacing	2.12 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	09/06/2017 M 105629/18
NRC	0.75
α_w	0.70
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

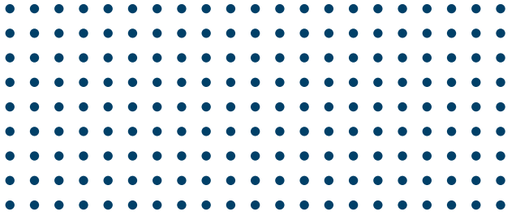


	Fural
	Rg 0.9 - 7 %
Perforation Ø	0.9 mm
Hole content	7 %
Max. perforation width	1,022 mm
Des. acc. to DIN 24041	Rg 0.90 - 3.00
Horizontal spacing	3.00 mm →
Vertical spacing	3.00 mm ↓
Diagonal spacing	4.24 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	30/09/2019 M 105629/44
NRC	0.75
α_w	0.70
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

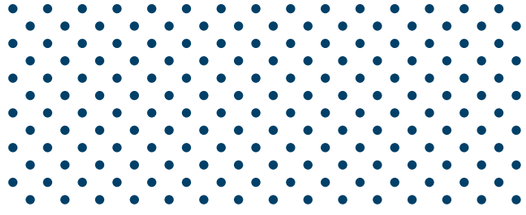


	Fural
	Rd 0.9 - 14 %
Perforation Ø	0.9 mm
Hole content	14 %
Max. perforation width	1,022 mm
Des. acc. to DIN 24041	Rd 0.90 - 2.12
Horizontal spacing	3.00 mm →
Vertical spacing	1.50 mm ↓
Diagonal spacing	2.12 mm ↘
Perforation direction	→
Overall structure	400 mm
Fleece	Bonded acoustic fleece
Test certificate	17/11/2012 7178-12-2
NRC	0.55
α_w	0.55 (LH)
Absorber class	D (DIN EN 11654)
Acoustic infill	w/o

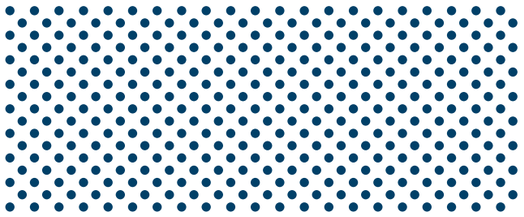
Tested perforations 2



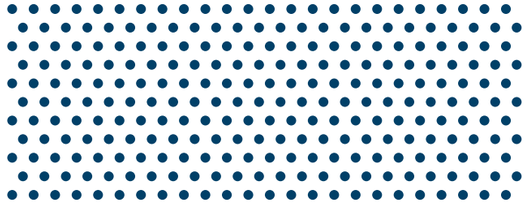
	Fural
	Rg 1.5 - 11 %
Perforation Ø	1.5 mm
Hole content	11 %
Max. perforation width	1,488 mm
Des. acc. to DIN 24041	Rg 1.50 - 4.00
Horizontal spacing	4.00 mm →
Vertical spacing	4.00 mm ↓
Diagonal spacing	5.65 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	07/12/2010 M 61840/6
NRC	0.80
α_w	0.75
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o



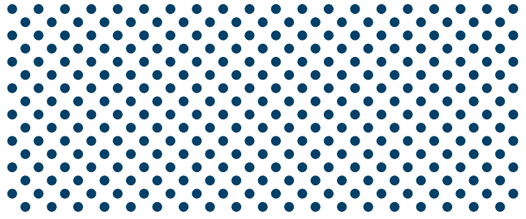
	Fural
	Rd 1.5 - 11 %
Perforation Ø	1.5 mm
Hole content	11 %
Max. perforation width	1,470 mm
Des. acc. to DIN 24041	Rd 1.50 - 4.00
Horizontal spacing	5.66 mm →
Vertical spacing	2.83 mm ↓
Diagonal spacing	4.00 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	07/12/2010 M 61840/6
NRC	0.80
α_w	0.75
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o



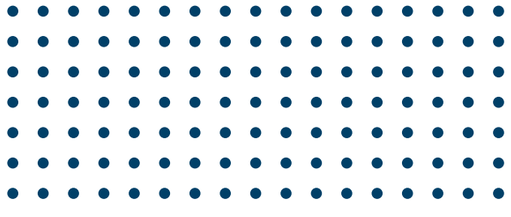
	Fural
	Rd 1.5 - 22 %
Perforation Ø	1.5 mm
Hole content	22 %
Max. perforation width	1,488 mm
Des. acc. to DIN 24041	Rd 1.50 - 2.83
Horizontal spacing	4.00 mm →
Vertical spacing	2.00 mm ↓
Diagonal spacing	2.83 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	07/12/2010 M 61840/5
NRC	0.70
α_w	0.70
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o



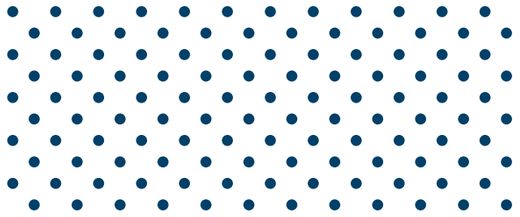
	Fural
	Rv 1.6 - 20 %
Perforation Ø	1.6 mm
Hole content	20 %
Max. perforation width	1,450 mm
Des. acc. to DIN 24041	Rv 1.60 - 3.50
Horizontal spacing	3.50 mm →
Vertical spacing	3.03 mm ↓
Offset spacing 60°	3.50 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	14/12/2006 P-BA 279/2006
NRC	0.74
α_w	0.80
Absorber class	B (DIN EN 11654)
Acoustic infill	w/o



	Fural
	Rd 1.6 - 22 %
Perforation Ø	1.6 mm
Hole content	22 %
Max. perforation width	636.4 mm
Des. acc. to DIN 24041	Rd 1.60 - 3.00
Horizontal spacing	4.30 mm →
Vertical spacing	2.15 mm ↓
Diagonal spacing	3.00 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	09/06/2017 M 105629/19
NRC	0.70
α_w	0.70
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

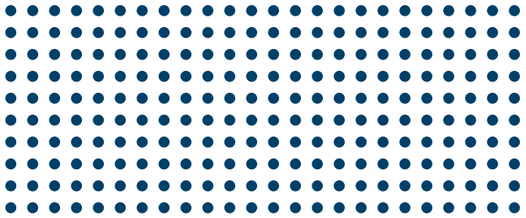


	Fural
	Rg 1.8 - 10 %
Perforation Ø	1.8 mm
Hole content	10 %
Max. perforation width	1,400 mm
Des. acc. to DIN 24041	Rg 1.80 - 4.95
Horizontal spacing	4.95 mm →
Vertical spacing	4.95 mm ↓
Diagonal spacing	7.00 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	07/12/2010 M 61840/4
NRC	0.80
α_w	0.75
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

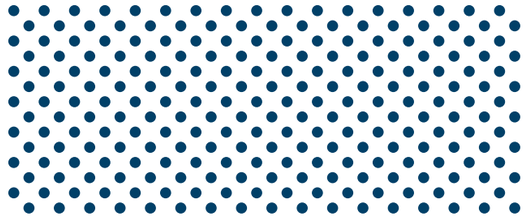


	Fural
	Rd 1.8 - 10 %
Perforation Ø	1.8 mm
Hole content	10 %
Max. perforation width	1.460 mm
Des. acc. to DIN 24041	Rd 1.80 - 4.95
Horizontal spacing	7.00 mm →
Vertical spacing	3.50 mm ↓
Diagonal spacing	4.95 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	07/12/2010 M 61840/4
NRC	0.80
α_w	0.75
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

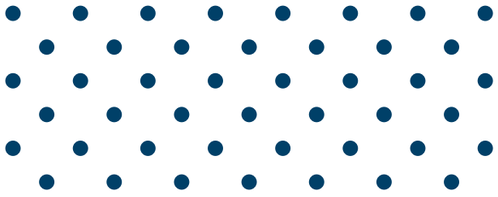
Tested perforations 3



	Fural
	Rg 1.8 - 20 %
Perforation Ø	1.8 mm
Hole content	20 %
Max. perforation width	1.460 mm
Des. acc. to DIN 24041	Rg 1.80 - 3.50
Horizontal spacing	3.50 mm →
Vertical spacing	3.50 mm ↓
Diagonal spacing	4.95 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 220/2007 Figure 2
NRC	0.75
α_w	0.75
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

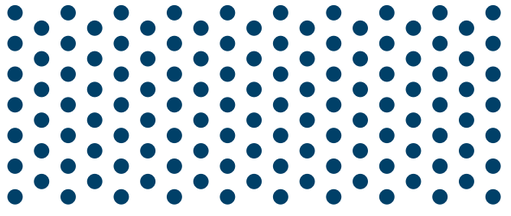


	Fural
	Rd 1.8 - 21 %
Perforation Ø	1.8 mm
Hole content	21 %
Max. perforation width	1,400 mm
Des. acc. to DIN 24041	Rd 1.80 - 3.50
Horizontal spacing	4.96 mm →
Vertical spacing	2.48 mm ↓
Diagonal spacing	3.50 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	31/08/2007 P-BA 220/2007 Figure 2
NRC	0.75
α_w	0.75
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

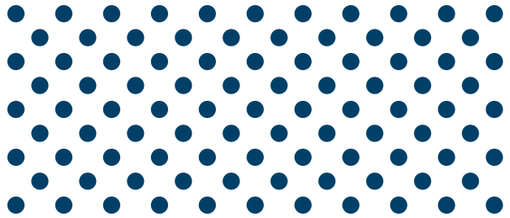


	Fural
	Rd 2.5 - 8 %
Perforation Ø	2.5 mm
Hole content	8 %
Max. perforation width	1,460 mm
Des. acc. to DIN 24041	Rd 2.50 - 7.80
Horizontal spacing	11.0 mm →
Vertical spacing	5.50 mm ↓
Diagonal spacing	7.78 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	14/12/2006 P-BA 279/2006 Figure 5
NRC	0.80
α_w	0.75
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

	Fural
	Rg 2.5 - 16 %
Perforation Ø	2.5 mm
Hole content	16 %
Max. perforation width	1,460 mm
Des. acc. to DIN 24041	Rg 2.50 - 5.50
Horizontal spacing	5.50 mm →
Vertical spacing	5.50 mm ↓
Diagonal spacing	7.78 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	14/12/2006 P-BA 279/2006 Figure 1
NRC	0.80
α_w	0.80
Absorber class	B (DIN EN 11654)
Acoustic infill	w/o

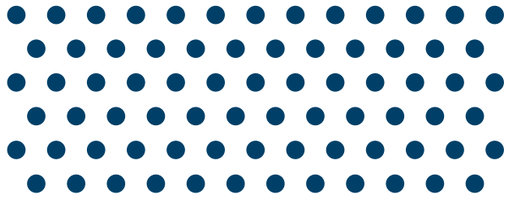


	Fural
	Rv 2.5 - 23 %
Perforation Ø	2.5 mm
Hole content	23 %
Max. perforation width	1,467 mm
Des. acc. to DIN 24041	Rv 2.50 - 5.00
Horizontal spacing	8.66 mm →
Vertical spacing	2.50 mm ↓
Offset spacing 60°	5.00 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	07/12/2010 M 61 840/7
NRC	0.75
α_w	0.75 (L)
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o



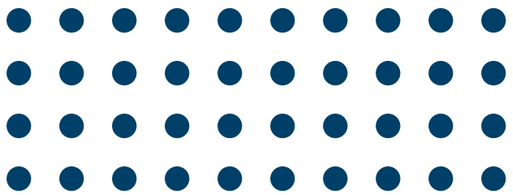
	Fural
	Rd 2.8 - 20 %
Perforation Ø	2.8 mm
Hole content	20 %
Max. perforation width	627.9 mm
Des. acc. to DIN 24041	Rd 2.80 - 5.50
Horizontal spacing	7.80 mm →
Vertical spacing	3.90 mm ↓
Diagonal spacing	5.50 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	09/06/2017 M 105629/20
NRC	0.75
α_w	0.75
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

	Fural
	Rg 3.0 - 20 %
Perforation Ø	3.0 mm
Hole content	20 %
Max. perforation width	1,434 mm
Des. acc. to DIN 24041	Rg 3.00 - 6.00
Horizontal spacing	6.0 mm →
Vertical spacing	6.0 mm ↓
Diagonal spacing	8.48 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 221/2007 Figure 2
NRC	0.80
α_w	0.75 (L)
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

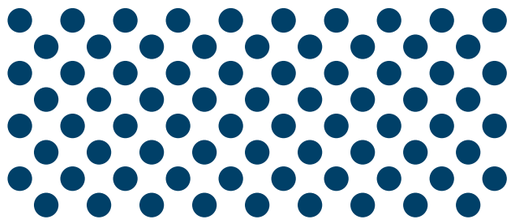


	Fural
	Rv 3.0 - 20 %
Perforation Ø	3.0 mm
Hole content	20 %
Max. perforation width	1,402 mm
Des. acc. to DIN 24041	Rv 3.00 – 6.35
Horizontal spacing	6.50 mm →
Vertical spacing	5.50 mm ↓
Offset spacing 60°	6.39 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 221/2007 Figure 2
NRC	0.80
α_w	0.75 (L)
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

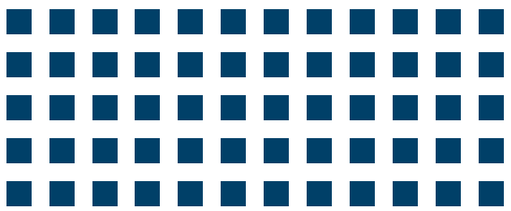
Tested perforations 4



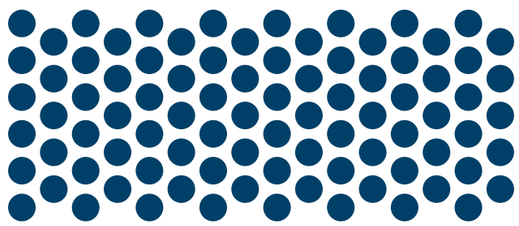
	Fural
	Rg 4.0 - 17 %
Perforation Ø	4.0 mm
Hole content	17 %
Max. perforation width	1,453 mm
Des. acc. to DIN 24041	Rg 4.00 - 8.60
Horizontal spacing	8.60 mm →
Vertical spacing	8.60 mm ↓
Diagonal spacing	12.1 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 279/2006 Figure 7
NRC	0.80
α_w	0.80
Absorber class	B (DIN EN 11654)
Acoustic infill	w/o



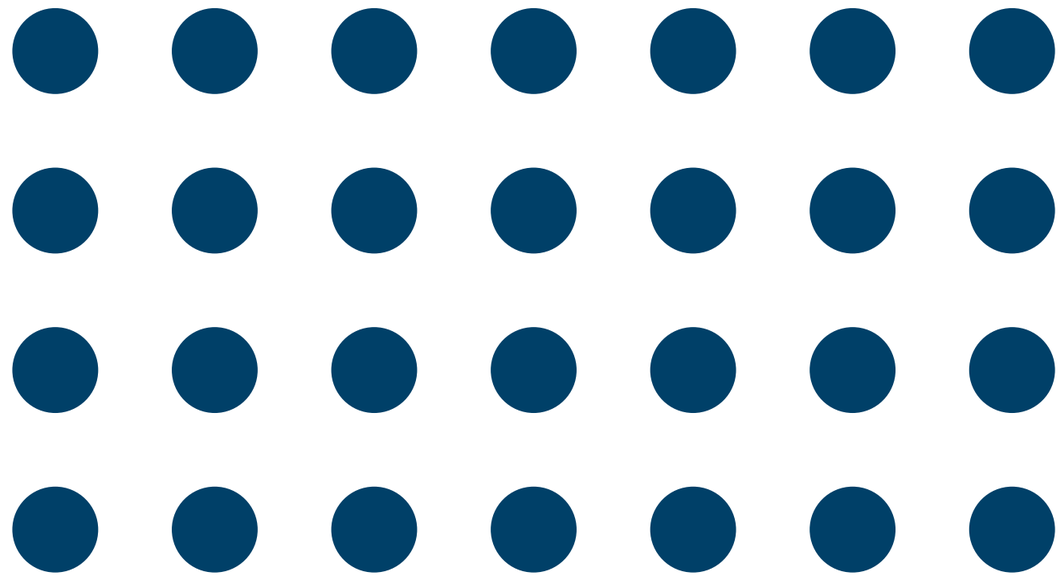
	Fural
	Rd 4.0 - 33 %
Perforation Ø	4.0 mm
Hole content	33 %
Max. perforation width	1,450 mm
Des. acc. to DIN 24041	Rd 4.00 - 6.10
Horizontal spacing	8.60 mm →
Vertical spacing	4.30 mm ↓
Diagonal spacing	6.10 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 279/2006 Figure 3
NRC	0.80
α_w	0.80
Absorber class	B (DIN EN 11654)
Acoustic infill	w/o



	Fural
	Qg 4.0 - 33 %
Perforation	4.0 mm
Hole content	33 %
Max. perforation width	630 mm
Des. acc. to DIN 24041	Qg 4.00 - 7.00
Horizontal spacing	7.00 mm →
Vertical spacing	7.00 mm ↓
Diagonal spacing	9.89 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 279/2006 Figure 4
NRC	0.80
α_w	0.80
Absorber class	B (DIN EN 11654)
Acoustic infill	w/o



	Fural
	Rv 4.5 - 51 %
Perforation Ø	4.5 mm
Hole content	51 %
Max. perforation width	627 mm
Des. acc. to DIN 24041	Rv 4.50 - 6.00
Horizontal spacing	10.4 mm →
Vertical spacing	3.00 mm ↓
Offset spacing 60°	6.00 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	09/06/2017 M 105629/21
NRC	0.65
α_w	0.65 (L)
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o



	Fural
	Rg 14.0 - 23 %
Perforation Ø	14.0 mm
Hole content	23 %
Max. perforation width	598 mm
Des. acc. to DIN 24041	Rg 14.00 - 26.00
Horizontal spacing	26.00 mm →
Vertical spacing	26.00 mm ↓
Diagonal spacing	36.76 mm ↘
Perforation direction	→
Overall structure	200 mm
Fleece	Bonded acoustic fleece
Test certificate	P-BA 279/2006 Figure 8
NRC	0.75
α_w	0.75 (L)
Absorber class	C (DIN EN 11654)
Acoustic infill	w/o

We are 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 respiratory tract. 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.

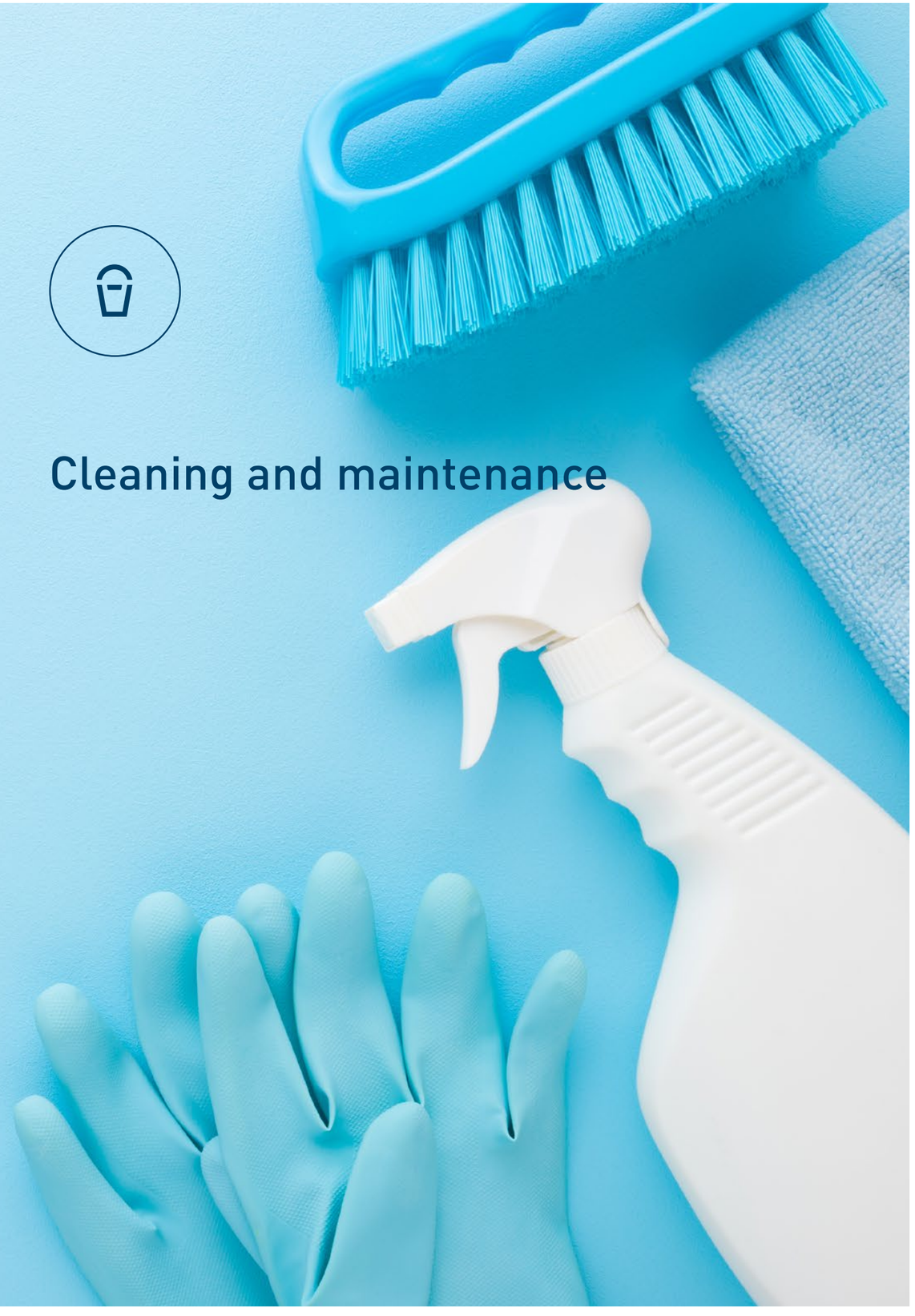
Wet cleaning

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, which is also possible with metal ceiling systems.

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.

Cleaning and maintenance



Cleaning and care instructions

Metal ceilings from Fural Metalit Dipling have a powder coating or Parzifal®. The smooth surface is therefore particularly easy to clean and disinfect.

Cleaning methods

The ceiling tiles can be mounted on the ceiling and, depending on the system, can be cleaned when folded down or removed.

Dry cleaning (powder coating)

Powder-coated surfaces can be wiped with a dry, soft cleaning cloth. A vacuum cleaner with a soft brush attachment can also be used.

Wet cleaning (powder coating)

Powder-coated surfaces can also be wet-cleaned if necessary. Commercially available, non-abrasive cleaning agents (diluted with pure water) should be used. The mixing ratio depends on the degree of soiling of the components.

In the case of heavy, greasy soiling, special cleaning agents (on a self-volatilizing basis - e.g. diluted spirit) can also be used.

Consultation

In the event of heavy soiling, it is essential to consult a specialist company for advice and to carry out the cleaning work before starting the work.

Dry cleaning (Parzifal®)

Light soiling can simply be wiped off with a moistened microfiber cloth. For more persistent stains, we recommend cleaning with water with the addition of a mild, commercially available neutral cleaner.

Wet cleaning (Parzifal®)

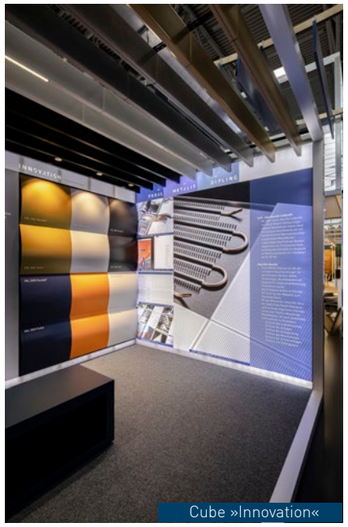
Abrasive cleaning agents or solvents (nitro thinner or similar) should not be used.

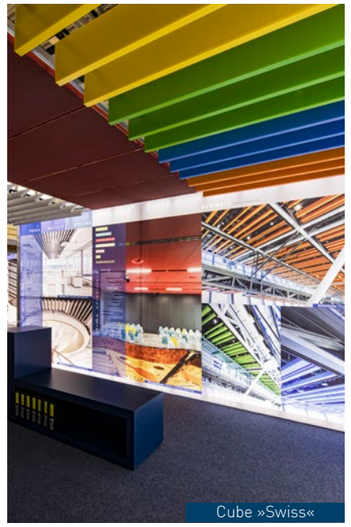
Clear rinsing

It is important for all wet cleaning to rinse the cleaned surfaces with clean water afterwards, as microorganisms find excellent breeding grounds in dried surfactant residues.

UP

Cube »Health« at the»Bau 2023« trade fair in Munich


Cube »Innovation«


Cube »Swiss«


Cube »Sustainability«

Trade fair »Bau 2023« in Munich

The Fural Metalit Dipling companies presented itself at the "Bau 2023" trade fair with an almost 400 square meter stand and showed itself to be one of the leading, innovative companies in the metal ceiling sector. Products and best-practice examples from the following business areas were presented in 8 cubes measuring 6 - 3 - 3 meters. The response from trade visitors and the discussions held were great. We have products for the future of construction.

- Education
- Health
- Office
- Mobility
- Justice

Cube »Special projects«

- Acoustics
- Heating and cooling
- Design
- Fire protection
- Expanded metal
- Parzifal®
- Sustainability
- Baffle
- Hygiene

Forum »Sustainability«

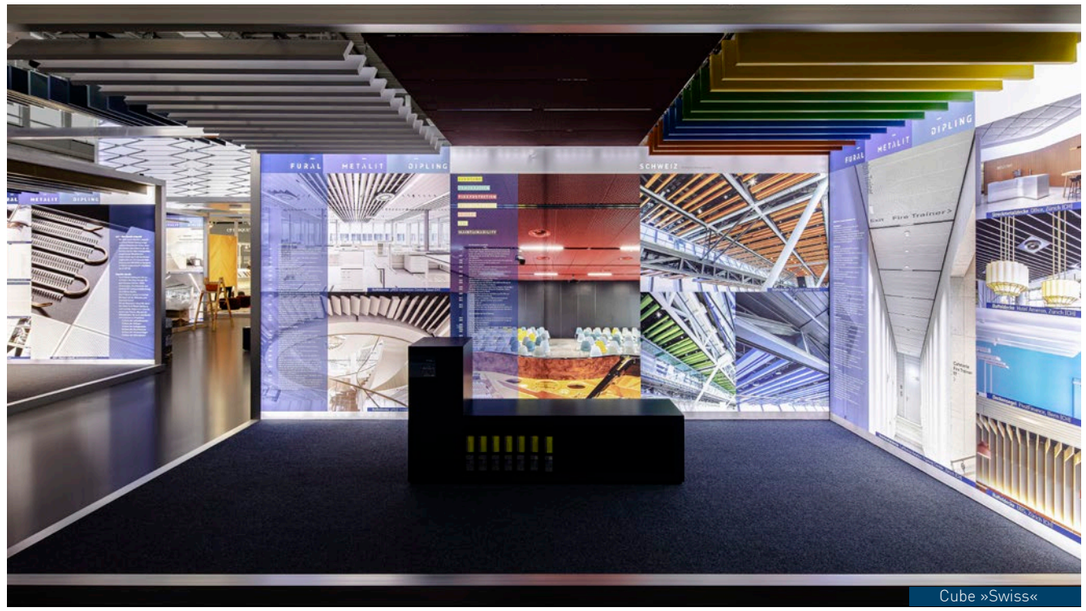
»Metal ceiling systems« world of experience at »Bau 2023« in Munich

Metal ceilings are high-precision and recyclable materials that offer many advantages over mineral fiber and plasterboard ceilings. At our trade fair stand during "Bau 2023" in Munich, you could feel our quality, experience our diversity and see our successful collaboration with internationally renowned architecture and planning offices. We plan and produce for a good present as well as for a better future.


Large-scale photos


Portal North


Café und Restaurant »Bau 2023«

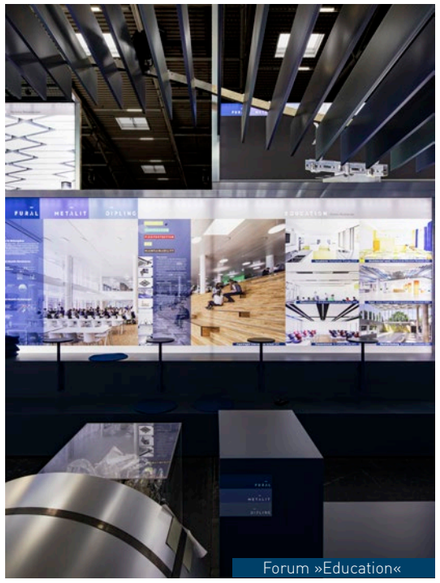

Cube »Swiss«

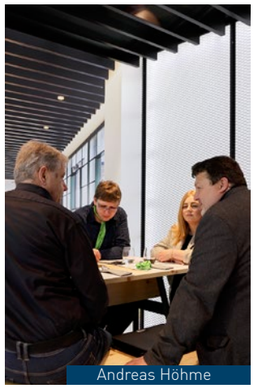
Internationality at »Bau 2023« in Munich

Fural Metalit Dipling is an international group of companies with production sites in Gmunden am Traunsee (AT), Büron (CH), Hungen (DE) and Prachatice (CZ). Development work is carried out at the aforementioned locations as well as in Wommelgem (BE) and Mikotów (PL). There are also various sales locations in Central Europe.

Our customers and planners are also international. We work with renowned architectural offices from the UK, France, Italy, Spain, Austria, Switzerland and Germany, including several Pritzker Prize winners.

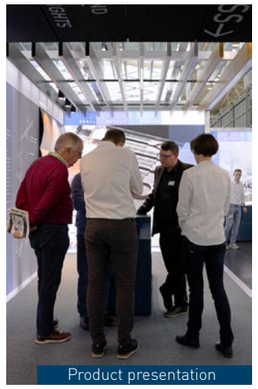
Our metal ceiling systems have proven themselves in large international transportation and office buildings as well as in hospitals and cultural buildings.


Forum »Education«


Andreas Höhme


Florian Heininger


Max Huemer
Viktor Kutscher


Product presentation

Bernhard Niessen


Andrzej Wereszczak and Tobias Franke


Martin Richter


Herbert Brunnmaier

Dirk Freytag

People at the »Bau 2023« in Munich

The results of our actions depend very much on the people who work with us and for us. The company benefits from their knowledge and skills, their experience and motivation, their willingness to learn and develop. We would like to thank everyone who made the »Bau 2023« trade fair so successful!!


Robert Markowski

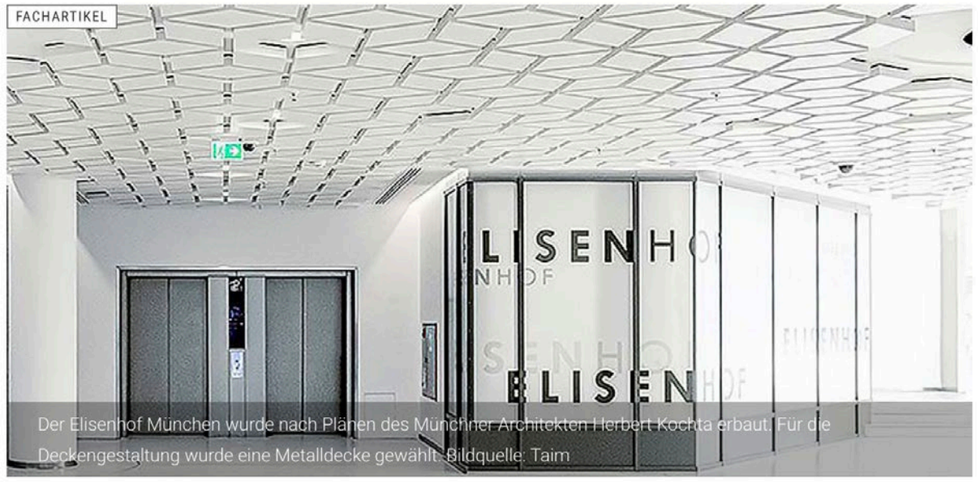

Lenka Boutineau

ARCHITEKTUR ZEITUNG
DEUTSCHLAND ÖSTERREICH SCHWEIZ

Metalldecken: Rohstoff für den generationenübergreifenden Wiedereinsatz

ROM / 23. NOVEMBER 2021

FACHARTIKEL



Der Elisenhof München wurde nach Plänen des Münchner Architekten Herbert Kochta erbaut. Für die Deckengestaltung wurde eine Metalldecke gewählt. Bildquelle: Taim

Der Begriff der Nachhaltigkeit ist in der Baubranche sehr präsent. Experten aus Bauindustrie, Handwerk und Planung übersetzen „Nachhaltigkeit" als Zusammenfassung der Eigenschaften dauerhaft, umweltverträglich und langlebig. Für die Umsetzung nachhaltiger, energieeffizienter und ressourcenschonender Gebäude ist die Materialauswahl für den Innenausbau von größter Bedeutung.

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Die Forderung nach der Nachhaltigkeit eines Baumaterials ist eine Herausforderung für zukünftige Generationen. Alle in einem nachhaltigen Wirtschaftskreislauf beteiligten Systeme können ein bestimmtes Maß an Ressourcennutzung dauerhaft aushalten, ohne Schaden zu nehmen. Baumaterialien und zuverlässige Bausysteme sind dazu ein wichtiger Produktionsfaktor im Bauprozess. Die Baubranche braucht langfristig wirkende Konzepte für einen verantwortlichen Umgang mit unseren endlichen Ressourcen. Dazu kommt die Erkenntnis: Ökologisch sinnvoll – und von der Fachwelt propagiert – ist ausschließlich die Bilanzierung eines Gebäudes über den gesamten Lebenszyklus.

Ein Sportartikelhersteller in Herzogenaurach entschied sich mit den Metallbaffeln für eine ganz besondere Deckenkonstruktion. Bildquelle: Rasmus Hjortshøj – COAST

Unsere Bausysteme sind der Rohstoff von Morgen

In der deutschen Baubranche herrscht derzeit ein eklatanter Materialmangel. Stahl, Aluminium und weitere Baumaterialien fehlen auf dem Bau. Der Baustoffmangel gefährdet sowohl Neubauprojekte als auch Sanierungsarbeiten, daher gilt es für die Zukunft vorzusorgen. Wir müssen folglich unseren gebauten Bestand als Rohstoffquelle für morgen verstehen. In Gebäuden eingesetzte Stahloder Aluminiumprodukte zum Beispiel werden grundsätzlich nie zu Abfall, denn baulich verwendete Metalle wie Stahl und Aluminium werden nicht „verbraucht", sondern immer wieder neu genutzt. Bauexperten bescheinigen den Baustoffen Stahl und Aluminium daher eine hohe Recyclingfähigkeit.

Man kann die Prognose wagen, dass Abbrucharbeiten in Zukunft nicht mehr Kosten verursachen, sondern als „Abbau von Rohstoffen" für Gewinne sorgen. Beim so genannten „Urban Mining" werden rückgebaute Systeme aus Metall für die Rohstoffversorgung und im Sinne der Ressourcenschonung in Zukunft essentiell sein.

Upcycling von Stahl ist ein Zukunftstrend

Stahl lässt sich verlustfrei recyceln. Wird der Baustoff nach seiner Verwendungszeit in einem Bauwerk zu einem neuen Produkt gleicher oder besserer Qualität aufgewertet, findet ein so genanntes Upcycling statt. Ein bemerkenswertes Beispiel für das Upcycling ist der Bau des höchsten Gebäudes der Welt: Das Hochhaus Burj Khalifa in Dubai besteht in den oberen Stockwerken überwiegend aus Stahl, der ursprünglich aus dem ehemaligen „Palast der Republik" in Berlin stammt.

Stahl ist folglich ein langlebiger und zeitloser sowie einer der weltweit am meisten recycelten Rohstoffe. Jedes Jahr werden weltweilt rund 570 Mio. Tonnen recycelt. Weil während des Recyclingprozesses keine Qualitätsverluste auftreten, gilt Stahl als einer der nachhaltigsten Werkund Baustoffe. Dabei ist der Baustoff Stahl noch nicht ausgereizt, weitere Potenziale des Baumaterials liegen beispielsweise in der ingenieurtechnischen Materialoptimierung für den jeweiligen Einsatz.

Mit Heiz- und Kühldecken kann die Raumtemperatur zuverlässig geregelt werden. Bildquelle: Taim

Das Leichtgewicht Aluminium hat eine gute Umweltbilanz

Aluminium ist ein – weit über die Baubranche hinaus – weltweit eingesetztes Metall. Aluminium hat das Potential für einen Rohstoff mit guter Ökobilanz. Im Gegensatz zu anderen Werkstoffen kann reines Aluminium ohne Qualitätseinbuße immer wieder aufs Neue für hochwertige Produkte eingeschmolzen werden. Ein qualitativer Unterschied zum Primärmetall, das aus dem Erz Bauxit gewonnen wird, besteht nicht.
Aluminiumrecycling ist besonders energieeffizient: beim Umschmelzaluminium wird nur 5 % der Energie benötigt, die man sonst beim Primäraluminium brauchen würde.

Die Baubranche setzt Aluminium auch als Metalldecken ein. In dieser Form ist das Baumaterial leicht rückbaubar und kann ohne Qualitätsverlust wieder in den Rohstoffkreislauf eingeführt werden. In Deutschland wird mehr recyceltes Aluminium produziert, als neues Aluminium hergestellt. Die Recyclingraten für den Metallwerkstoff sind hierzulande sehr hoch. Im Baubereich oder im Verkehrsbau werden etwa 95 Prozent des Aluminiums wiederverwendet.

Metalldecken im Einkaufszentrum Herti, Schweiz. Bildquelle: Plafondnova

3R-Baustoffe stehen für die Zukunft des Bauens

Der Begriff „3R" (Reduce, Reuse, Recycling) steht für die drei Themen Reduzieren, Reaktivieren und Recyceln. Damit sind die Grundvoraussetzungen für ein von Fachleuten anerkanntes, ressourcenschonendes, nachhaltiges Bauen vorgegeben.

Reduzieren: Baumaterialien sind Wertstoffe und folglich möglichst effektiv einzusetzen.
Reaktivieren: Unsere bebaute Umwelt ist das Rohstofflager der Zukunft. Moderne Baustoffe müssen in einer Art und Weise verbaut werden, die dafür Sorge trägt, dass diese wieder leicht lösbar und trennbar sind.
Recycling: Bereits verwendeter Stahl oder Aluminium ist kein Bauschutt. Metall ist ein dauerhaft wertvolles Baumaterial – jetzt und in Zukunft.

Auch wenn wir hier ausschließlich die Baustoffe Stahl und Aluminium in Bezug auf Metalldecken erwähnen, gelten die vorbeschriebenen Grundsätze natürlich auch für andere am Bau verwendeten Metalle. Von der Stahl- oder Aluminiumfassade über die Metalldecke bis zum Stahlträger oder Aluminiumrohr, können nach der Nutzungsdauer von i.d.R. einigen Jahrzehnten recycelt werden und stehen dem industriellen Kreislauf weitgehend uneingeschränkt wieder zur Verfügung. Dieser Recyclingprozess besteht seinerseits schon seit Jahrzehnten und hat sich bewährt. Nachdem das Material als Rohstoff für das Recycling dient, erfolgt bei der Rückgabe seit jeher eine monetäre Vergütung

Stahl und Aluminium in der Anwendung als Metalldecken

Als Baustoff für hochwertige Raumgestaltung haben sich Metalldeckensysteme seit Jahrzehnten bewährt. Die hochpräzise herstellbaren Metalldecken lassen sich in allen Größen werkseitig vorfertigen und für die bauseitige Montage vorbereiten.

Praktisch jede planerisch darstellbare kreative Idee lässt sich mit Metalldecken verwirklichen. Zudem können technische Einbauten, also Leuchten, Brandmelder, Lautsprecher, bereits systembedingt leicht integriert werden. Akustische oder gestalterische Anforderungen sind mit Metalldecken sicher und zuverlässig machbar.

Vorteile von Metalldecken

Gemäß der Nutzungsdauer von Bauteilen nach dem Bewertungssystem Nachhaltiges Bauen /BBSR Tabelle 2017/ liegt diese bei über 50 Jahren. Danach ist eine Metalldecke nicht etwa wertlos, sondern kann als hochwertiger Rohstoff zurück in den Produktionskreislauf der Metallherstellung gegeben werden. Innerhalb der zu erwartenden Einsatzdauer von einigen Jahrzehnten wird es in privaten wie auch in gewerblich genutzten Bauten immer wieder gebäudetechnische Ergänzungen oder Reparaturen geben.

Ein großer Vorteil von Metalldeckensystemen ist, dass diese ohne Beschädigung abgenommen und wiederverwendet werden können. Bei Sanierungsund Wartungsarbeiten ist dies von großem Vorteil. Generell bieten Metalldecken aufgrund ihrer Robustheit eine dauerhafte und leichte Zugänglichkeit zum Deckenhohlraum.

Metalldecken als Heiz- und Kühldecken

Bild links: Das Hochhaus Burj Khalifa in Dubai wurde mit Stahlschrott gebaut, der ursprünglich aus dem ehemaligen „Palast der Republik" in Berlin stammt. Bildquelle: Taim

Zuverlässiges Heizen und Kühlen sind für die Nutzer eines Gebäudes elementare Komfortmerkmale. Metalldecken tragen als Heizund Kühldecken zu einem angenehmen Raumklima bei. Von unschätzbarem Vorteil ist dabei die Tatsache, dass ein Deckensystem sowohl zum Beheizen, wie auch zum Kühlen eines Raumes verwendet werden kann.

Akustische Anforderungen an Deckensysteme werden dabei erfüllt. Für das Empfinden einer subjektiv gefühlten Behaglichkeit sind drei Faktoren entscheidend. Neben der Luftfeuchte spielen auch die Luftund Oberflächentemperaturen eine Rolle.

In Bürogebäuden kommt dem Raumklima eine große Bedeutung zu, denn es verhilft zu einer als angenehm empfundenen Aufenthaltsqualität und steigert somit die Konzentrationsund Leistungsfähigkeit der Nutzer. Heiz- und Kühldecken – im Allgemeinen werden sie auch als Flächentemperierungen bezeichnet – haben eine positive Kostenbilanz. Mit nur einem hydraulischen Kreislauf können Gebäude zuverlässig und aufgrund der wirtschaftlich erzeugbaren Vorlauftemperaturen mit geringen Betriebskosten auf der gewünschten Temperatur gehalten werden. Die Heizund Kühldecke bleibt zudem im Wartungsfall zuverlässig leicht erreichbar.

Fazit

Metalldecken erfüllen alle Anforderungen an moderne, nachhaltige Baustoffe. Sie sind langlebig und zählen auch nach über fünfzigjähriger Einsatzdauer noch nicht zum „Alteisen", stattdessen sind sie Rohstoff für den generationenübergreifenden Wiedereinsatz.

taim.info

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