BUILDING
COMMON GROUND

MAX FRANK®

Sorp 10®

Room-acoustic sound absorber

Edition International

www.maxfrank.com

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Room-acoustic sound absorber

Contents

Room acoustics meet structural component activation

Improving the room acoustics in enclosed spaces makes for a more pleasant environment for people. Poor room acoustics can make people uneasy, increase stress levels and reduce performance – if a room is equipped with the correct acoustic measures, then the well-being, concentration levels and productivity of the occupants all increase.

The aim of good room acoustics is to provide the space with good audibility levels. Communication between people who are talking directly with each other should be able to take place without disturbing ambient noises and conversations in far-away areas should be dampened.

The wide range of requirements in buildings have steadily increased over recent years. Modern architectural planning must create concepts that are cost-effective, sustainable and energy efficient, and at the same time take into account and satisfy a host of different user requirements.

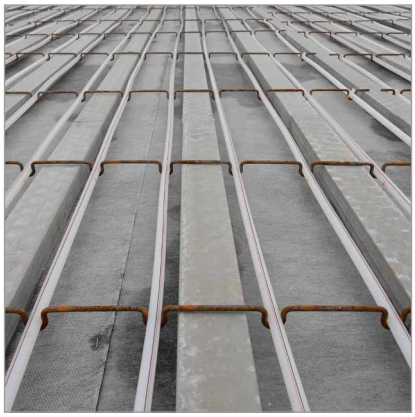
In this context, energy efficient heating and cooling systems in conjunction with structural component activation and concrete core temperature control are increasingly an integral part of an economical building concept.

Thermal and acoustic comfort in perfect harmony

This cooling and heating concept makes use of the storage capacity inherent in the building mass (e.g. concrete ceilings and walls). The solid structural components are therefore actively included in the heat exchange between the room and the heating and cooling medium over a large area. Good thermal comfort can thereby be ensured for the users.

Sound absorbing measures must be taken for the acoustic comfort of the users. So as not to reduce the thermal effectiveness of the structural component activation, the concrete ceilings should not be clad or covered on the underneath by suspended ceilings or ceiling sails. In order to ensure both the thermal and acoustic comfort for the users, suitable acoustic products must be considered. A room-acoustic concept tailored to the user requirements is necessary.

Room acoustics in the ceiling instead of underneath the ceiling



Acoustic strips in the ceiling

Surface appearance with acoustic plaster

By using the strip absorber from MAX FRANK, it was possible to ensure a jointless appearance for the ceilings at Roche Diagnostics.
The homogeneous, white surface is not disrupted by the acoustic sails, and the concrete core activation can really come into its own.

Andreas Hell, architect, Burckhardt+Partner AG, Basel

The psychology behind hearing

The latest findings from the field of occupational psychology were used in the development of the Sorp 10® strip absorber principle. After all, what we perceive as disturbing noise does not just depend on the sound level. Studies have shown that our performance – such as short-term memory – drops if we are subconsciously listening to intelligible voices. The primary objective of room-acoustic measures in an office environment must therefore be to reduce speech intelligibility – not necessarily to reduce the overall sound level!

We all perceive various noises in very different ways. The extent to which we find an acoustic noise unpleasant by no means depends solely on its sound pressure level – the volume. After all, our sense of hearing is most sensitive and differentiated within the frequency range of the human voice, between 250 Hz and 2,000 Hz. It is a useful specialisation of evolution – correspondingly, we find disruptions within this relevant range to be especially annoying, as they greatly impair our communication.

> "Noise," according to Kurt Tucholsky, "is always the sound of others."

When completed, we achieved good basic room damping with this ceiling, which was deliberately supplemented by way of the further interior design. In spite of the problematic room-acoustic material selection of many sound-reflecting surfaces, in our view we have achieved impressive room acoustics that fully satisfy our expectations.

Falko Hinz, structural engineer, Bauplanung Bautzen GmbH
Installation of Sorp 10® in a residential building

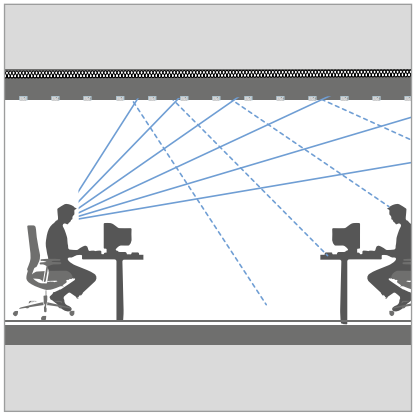
Explanations

Room acoustics

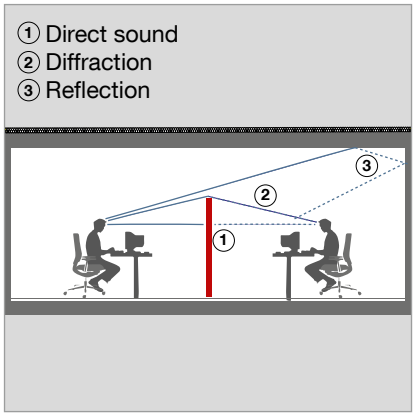
Room acoustics examine how the acoustic design of an interior space effects the planned use of the space (e.g. communication, speech or music). The room-acoustic quality of a space is essentially influenced by the following factors:

- Position of the space in the building
- Sound insulation of the surrounding structural components
- Noise development from technical building installations
- Room shape and room size (primary structure)
- Surface quality of the areas adjoining the room (secondary structure)
- Furnishings (secondary structure)
- Dimensioning and spatial distribution of sound absorbing and reflecting surfaces

In many rooms, sound reflecting surfaces made of concrete, glass, wood, plasterboards and the like are often predominantly used. These materials are not sufficiently able to absorb the sound occurring in the space, resulting in long reverberation times, which then often makes the users unable to adequately understand each other in the room, thus causing dissatisfaction.



Sound absorption in the room

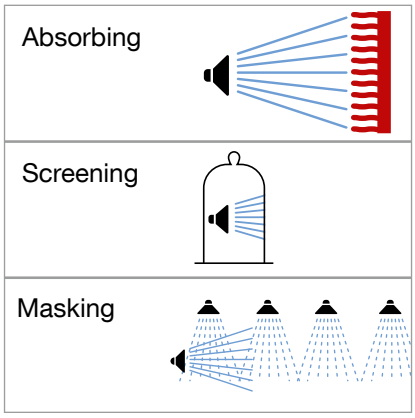


Sound propagation in the room

Measures in room acoustics

Specialist acoustic planners can use the measures specified below to make the room acoustics of a space meet the user's needs:

- **Absorbing sound:**
  By means of sound absorption, attempts are made to lower the emergence of sound in a space to a reasonable level for its use through suitable absorption measures. The acoustic products included in the space turn the sound energy into heat for this purpose.
- **Screening sound:**
  When it comes to screening sound, an obstacle is used (e.g. half-height room dividers, noise barrier), which is intended to influence and reduce the sound propagation.
- **Masking sound:**
  When it comes to masking sound, disruptive sound is countered with non-disruptive sound. This measure is used especially in open-plan offices. With the help of this method, the negative effects from speech containing information and interfering noises on people in the working environment can be reduced and their cognitive performance improved.



Measures in room acoustics

Specialist room acoustics planning & standards and guidelines

So that room acoustics that are appropriate to the respective use of the space can be ensured, an overall view and solution is required that is often even based on a combination of acoustic measures.

It is recommended to have room-acoustic plans carried out by experienced specialist acoustic planners. Depending on the task, these specialists also take the corresponding standards into account, such as

- DIN 18041 “Acoustic quality in rooms – Specifications and instructions for the room acoustic design” – March 2016 edition
- VDI 2569 “Sound protection and acoustic design in offices” – October 2019

The standards and guidelines provide the planners with the appropriate planning criteria depending on the type of room and how it is used. The best-known planning criteria in room acoustics is the so-called reverberation time T [s].

Specialist planners, standards and guidelines

Reverberation time

This specifies the time period during which the sound pressure level drops by 60 dB after the sound source has been stopped.

The reverberation time essentially depends on three factors:

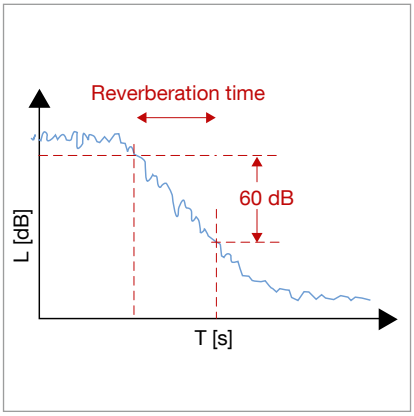
- Room volume
- Surface properties in the room (sound absorbing / sound reflecting)
- Furnishings / persons

As a matter of principle, the following applies:

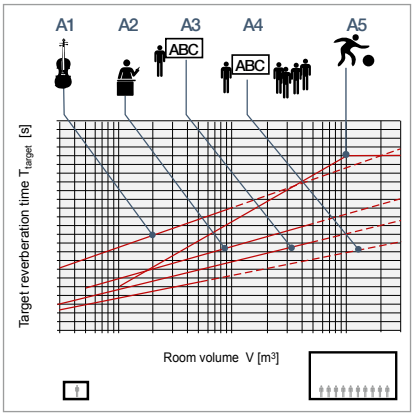
- The bigger a room, the longer the reverberation time
- The more sound absorption in the room, the shorter the reverberation time

$$T = 0.163 \times \frac{V}{A} [s]$$

V = Room volume in [m³]
A = Equivalent sound absorption area in [m²]
T = Reverberation time in seconds [s]



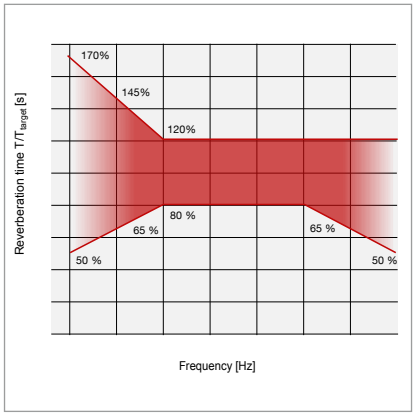
Measuring the reverberation time



Relationship between target reverberation time T_{target} [s] and the room volume V [m³] for the usage categories A1 to A5.

Tolerance range for the usage categories A1 to A4

In practice it is also permitted to deviate from the calculated target reverberation time requirement to a certain extent. This graph shows, in relation to the target reverberation time T_{target} [s], the tolerance range for the frequency-dependent reverberation time to be observed between 125 Hz and 4000 Hz. This tolerance range applies to the usage categories A1 to A4. For the frequencies outside the tolerance range of 125 Hz to 4000 Hz, only guide values are given.

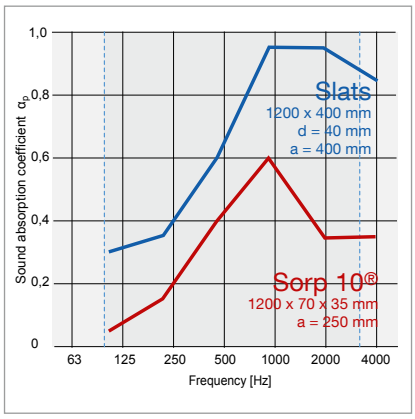


Tolerance range for the usage categories A1 to A4

Sound absorption influence on the reverberation time

Construction products have frequency-dependent sound absorption properties, i.e. they have a different effect in the individual frequencies. This property also subsequently has an effect on the room's reverberation time.

Product	acoustic comfort	thermal comfort
Sorp 10®	■ Good reverberation time basic damping ■ No overdamping at high frequencies ■ Complementary additional measures useful	■ Low effect on thermal efficiency ■ No effect on the radiation exchange
Slats	■ Good reverberation time basic damping ■ Risk of overdamping at high frequencies ■ Complementary additional measures useful	■ Greater effect on thermal efficiency ■ Greater effect on radiation exchange

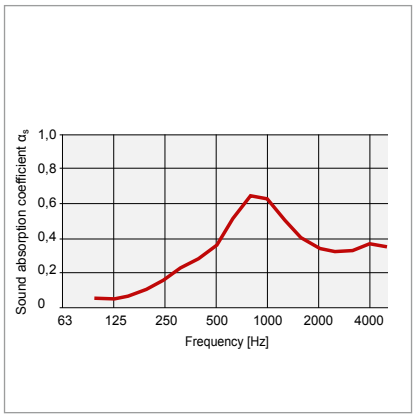


Sound absorption comparison between Sorp 10® and slat

Sound absorption

The sound absorption is the most important parameter when it comes to the acoustic design of rooms. In room acoustics, the reverberation time is usually designed to be in the frequency range of 100 Hz to 5000 Hz.

In order to be able to carry out room-acoustic planning, the frequency-dependent sound absorption properties of the construction materials used in the project first need to be known. This is because the sound absorption gives information as to how much the sound is reduced at the areas adjoining the room. Only once the sound absorbing and sound reflecting properties of the room's interior surfaces have been correctly dimensioned and positioned is it possible to ensure a reverberation time and hence also acoustic quality commensurate with the use of the space (speech / music).



Frequency-dependent sound absorption coefficients α_s of Sorp 10®, height 35 mm

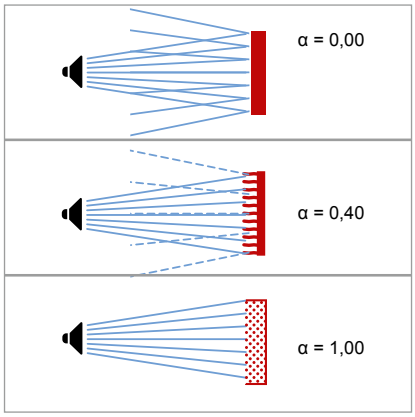
Table 1

	Frequencies [Hz]																		
	100	**125**	160	200	**250**	315	400	**500**	630	800	**1000**	1250	1600	**2000**	2500	3150	**4000**	5000
Sorp 10® (30 mm) α_s values	0.05	0.05	0.06	0.10	0.15	0.22	0.28	0.36	0.51	0.64	0.62	0.50	0.40	0.34	0.32	0.33	0.37	0.35
Sorp 10® (30 mm) α_p values		0.05			0.15			0.40			0.60			0.35			0.35	
Sorp 10® (30 mm) α_w value								0.40										

Sound absorption coefficient α (alpha)

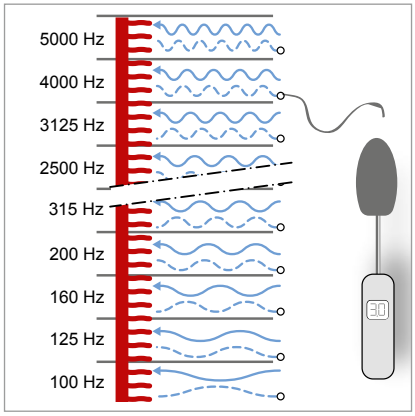
The sound absorption coefficient α describes the ratio of reflected to absorbed sound energy. Whilst a value of 0 corresponds to full reflection, a value of 1 stands for full absorption. If the sound absorption coefficient α is multiplied by 100, you get the sound absorption in per cent.

α = 0.40 means α = 0.40 × 100 % = 40 % sound absorption
(the remaining 60 % is sound reflection)



Sound absorption coefficient α_s (alpha-s)

The frequency-dependent sound absorption coefficient α_s of construction materials is determined in the so-called reverberation chamber by applying DIN EN ISO 354. The laboratory investigations provide a figure between 1 (full absorption) and 0 (full reflection) for 18 separate frequencies between 100 Hz and 5000 Hz. The α_s values are also needed to determine the practical sound absorption coefficient α_p.



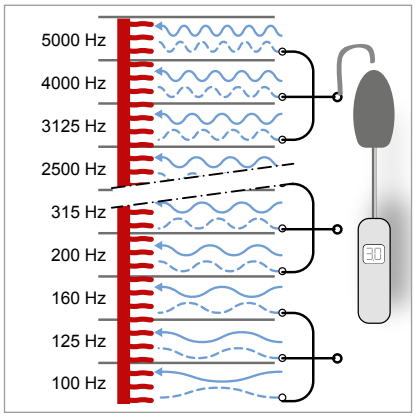
Practical sound absorption coefficient α_p (alpha-p)

The practical sound absorption coefficient α_p is a frequency-dependent average absorption value made up of three third-octave values each (e.g. of α_s values at 100 Hz, 125 Hz and 160 Hz), which are added up, arithmetically averaged and finally rounded up or down in increments of 0.05.

Example: $\alpha_{p,125\ Hz} = \frac{\alpha_{s,100\ Hz} + \alpha_{s,125\ Hz} + \alpha_{s,160\ Hz}}{3}$

(see Page 8 Table 1)

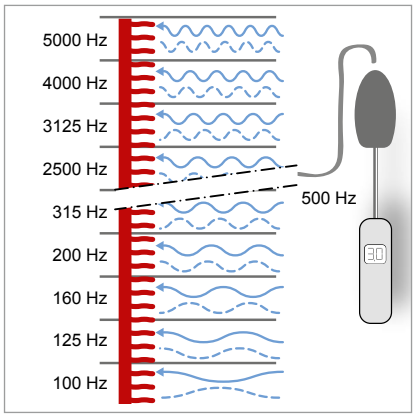
This method is used to convert the 18 frequency-dependent sound absorption coefficients α_s into six frequency-dependent practical sound absorption coefficients α_p.



Evaluated sound absorption coefficient α_w (alpha-w)

To determine the frequency-dependent evaluated sound absorption coefficient α_w as a single value, the standard DIN EN ISO 11654 and the assessment procedure contained therein is applied. According to this, the reference curve prescribed in the standard must be shifted in 0.05 increments towards the curve from the 6 determined α_p values until the sum of the values below the reference curve is less or equal to 0.10. In this case the evaluated sound absorption coefficient α_w equates to the value of the shifted reference curve at 500 Hz.

Single figure data does not describe the frequency-dependent absorption behaviour of a product, however, and is therefore not suitable for a differentiated design of the room acoustics.



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Sorp 10®

Room-acoustic sound absorber

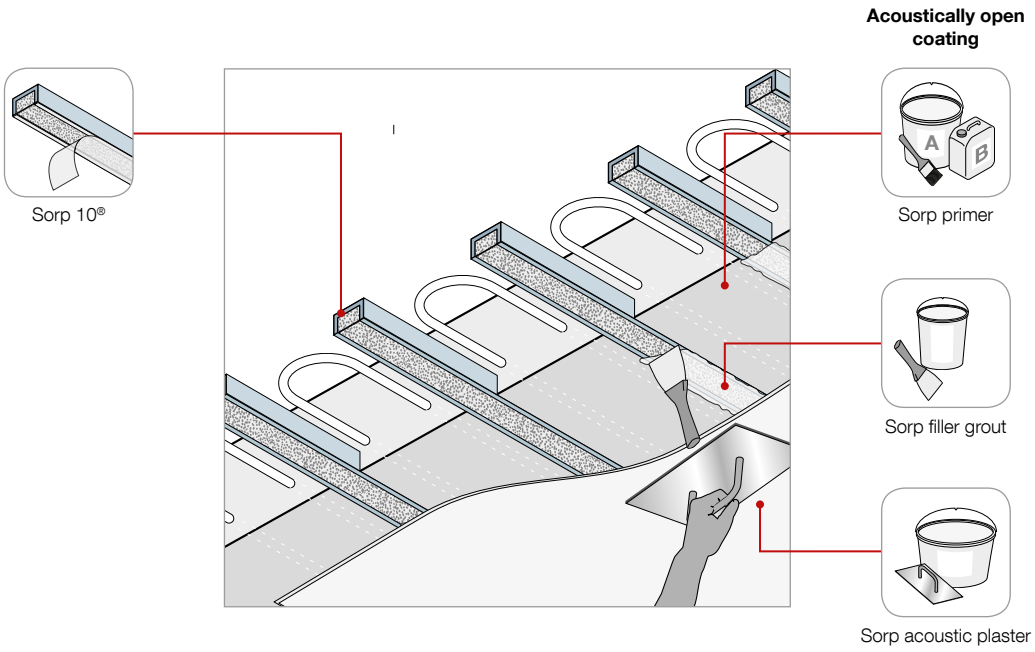
Sorp 10® room-acoustic sound absorber

for regulation of the reverberation time, including with thermally activated structural components

The requirements regarding sustainable buildings and rising energy costs are increasingly leading to the use of thermally activated concrete elements. These must not be covered with absorbent materials or concealed with suspended ceiling systems. The Sorp 10® sound absorber combines room acoustics and structural component activation into one function. Reverberation time can be reduced with a stripe arrangement of Sorp 10® in the bare ceiling. At the same time the influence on the thermal efficiency of the activated ceiling is minimized. Sorp 10® allows the room acoustics to be specifically included in the project planning and implemented in the shell construction phase.

Advantages

- Room acoustics for thermally activated structural components
- Diversity of optical design option: open or filled
- Installation already in the shell
- Acoustics immediately effective after demoulding
- Very high sound absorption coefficient with low surface coverage
- Recyclable, non-combustible
- No loss of usable room height



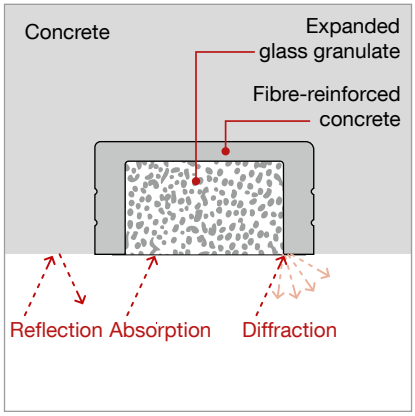
Technical Information

Structure and function of Sorp 10®

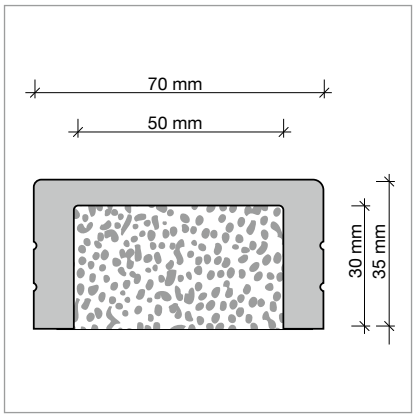
This innovative product from MAX FRANK is a combination of a fibre-reinforced concrete U-rail and an embedded absorber strip. This mineral-based material is moisture insensitive, non-combustible and recyclable.

The Sorp 10® sound absorber works like a classic porous absorber with additional diffraction effects, which are produced by the strip absorber principle. With the porous absorber, the occurring sound energy is absorbed by the air molecules trapped in the absorber strip's pores being agitated to make them vibrate. The resulting friction causes sound energy to be converted into heat energy and no longer reflected back into the room. Due to the periodically arranged strip absorbers, a stray field on the surface of the concrete elements is made use of. In this way and with little use of absorbers, a much higher sound absorption can be achieved than one might guess from the area between the absorber and concrete surface. In the 35 mm thick version, the Sorp 10® sound absorber has an evaluated sound absorption coefficient of α_w = 0.40.

Test certificates can be found at www.maxfrank.com



Structure and function of Sorp 10®

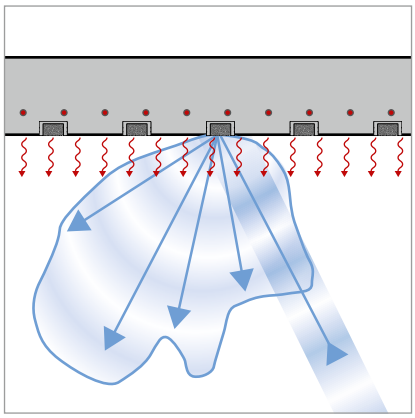


Dimensions of Sorp 10®

Reflection, absorption and diffraction

Thanks to its special combination of absorption, reflection and diffraction, Sorp 10® works in a particularly efficient manner. If 20% of the ceiling area is covered with 5 cm wide strips, basic damping of the room is achieved – particularly in the frequency range relevant to the human voice. What is more, the reverberation time is considerably reduced.

A convincing performance, which is delivered with very minimal effects on the structural component activation. The Sorp 10® sound absorber only has an insignificantly low influence of between 3% and 8% on the thermal efficiency of the component activated ceiling.

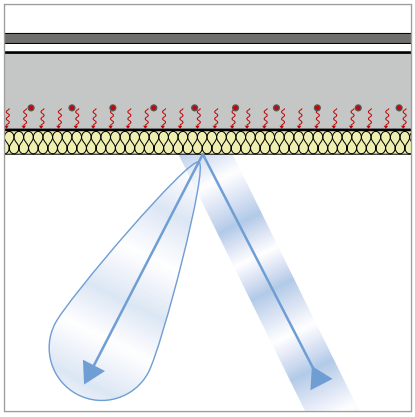


Strip absorber principle (Sorp 10®)

Preventing disturbing noises

In conventional buildings, suspended ceilings, partial ceiling sails or sound absorbers fitted directly to the ceiling are used to improve the room acoustics.

Yet in buildings with structural component activation, in particular solutions over a large area, which absorb sound and often also have a heat insulation effect, must not be applied. Although these measures are good for the room acoustics, they have a negative effect on the thermal efficiency of the structural component activated ceiling.



Disadvantageous for structural component activation

Technical specifications

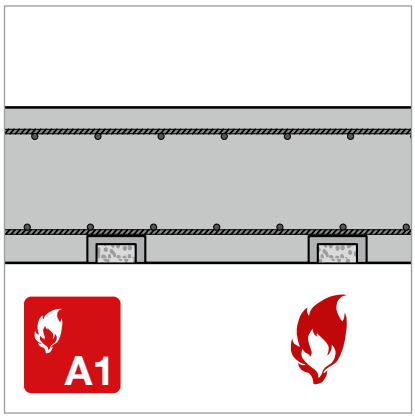
Sorp 10®	Extruded fibre-reinforced concrete shell with Reapor core filling (sintered expanded glass granulate)
Reapor core dimensions	1200 × 50 × 30 mm (length × width × height)
Weight (standard length: 1,200 mm)	3.18 kg
Load capacity	> 5000 N
Installation distance	250 mm centre distance
Installation temperature	+5 °C to +40 °C (down to −8 °C with reduced adhesion, to be tested case by case)
Sound absorption	α_w = 0.40 (core height 30 mm)
Fire protection	Building material class A1 / fire resistance rating R90/F90

Fire protection

The Sorp 10® sound absorbing spacer is rated in building material class A1 (not combustible).

Tests performed at the Federal Institute for Materials Research and Testing (BAM) showed that, with a flame period of 90 minutes, the reinforcement lying on top in the area of the Sorp 10® heats up less than with the normal concrete cover.

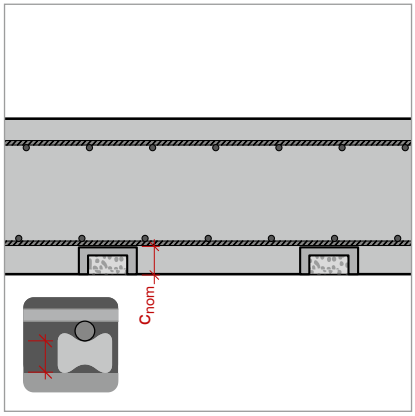
For a flame exposure period of up to 90 minutes according to the unit/temperature curve, there is therefore no negative influence on the temperature development and the load-bearing capacity of the reinforcement.



Concrete cover

The Sorp 10® sound absorber is a spacer and sound absorber in one product. Besides its sound absorbing effect for improved room acoustics, it also acts as a spacer for the first reinforcement layer.

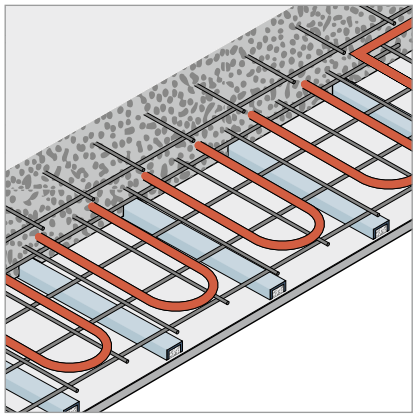
The version made of fibre-reinforced concrete offers increased protection due to its high chemical resistance, as well as because of the homogeneous bond between the fibre-reinforced concrete and the surrounding fresh concrete.



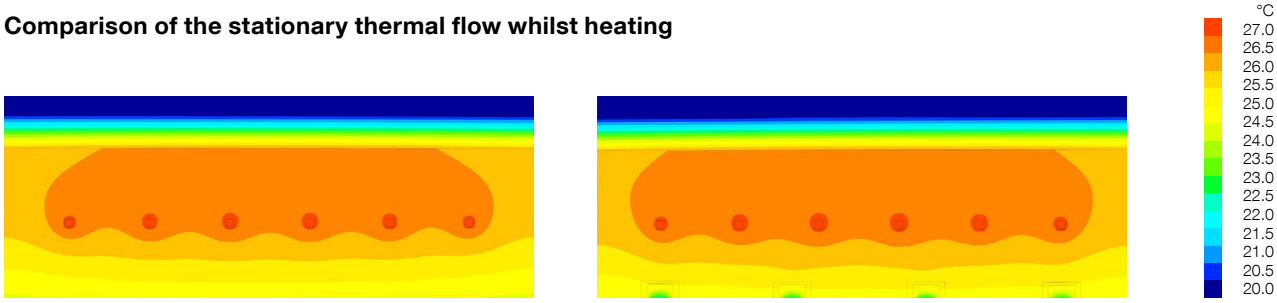
Thermal properties

So that the cooling and heating pipes integrated in the concrete ceiling can have an optimal effect, the radiation exchange between the concrete ceiling and the heads of the users should not be hindered as much as possible. Suspended ceilings or other horizontally or vertically arranged elements covering a large area should therefore be avoided if at all possible.

Sorp 10® sound absorbers are integrated in the concrete ceiling in strips with an area of 15 % to 25 %. The effect on the thermal efficiency is only very slight in practice at 3 % to 5 %. Nevertheless, under these installation conditions, approximately 60 – 70 % of the basic room-acoustic damping can be achieved.



Comparison of the stationary thermal flow whilst heating

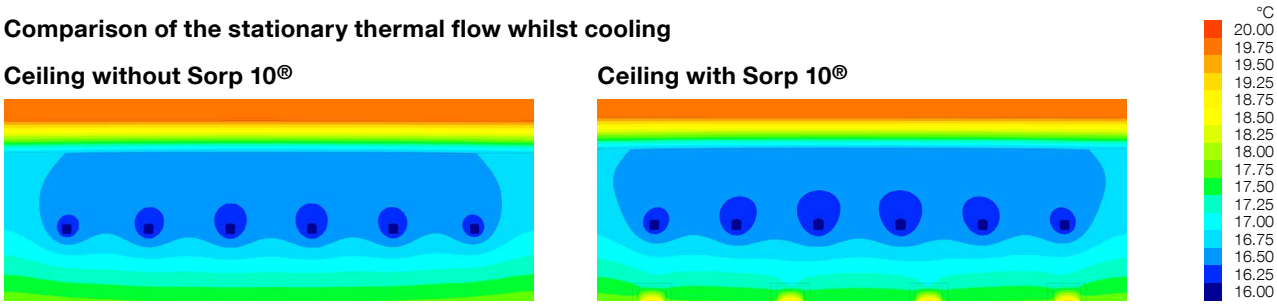


Influence the stationary thermal flow whilst heating: 7.48 %

Comparison of the stationary thermal flow whilst cooling

Ceiling without Sorp 10®

Ceiling with Sorp 10®



Influence the stationary thermal flow whilst cooling: 8.26 %

Inlet temperatures for the simulation:

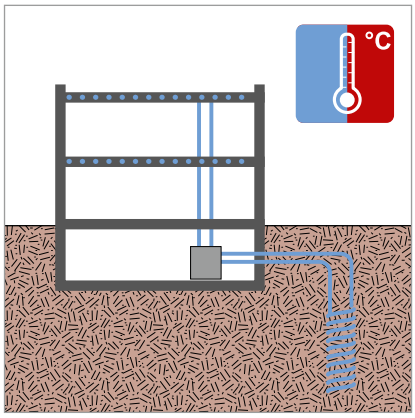
- Room temperature 20 °C
- Inlet temperature when heating 27 °C
- Inlet temperature when cooling 16 °C

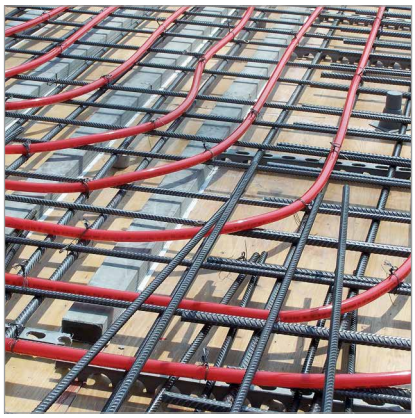
Thermal structural component activation

The cooling and heating of buildings plays an important role when it comes to consuming fossil fuels. Sustainable energy concepts can help to make an important contribution to reducing CO_2 emissions.

Concrete elements have a high heat storage capacity and are therefore ideally suitable as a storage, buffer and transport medium for heat. In the case of thermal structural component activation, the solid elements in the building, particularly the ceilings between floors, are used for temperature regulation purposes. The heat is transported via liquids that flow through the pipe registers in the concrete. Water flows through the pipes as a cooling or heating medium. The solid concrete elements are thus able to absorb or give off the heat across their entire area, depending on whether in cooling or heating mode.

The structural component activation is principally used to cool the space, but can also be used to provide basic heating. Heat or cold is usually charged into or discharged from the structural components during the night hours. During the day the structural components discharge themselves when thermal loads are incurred. Due to the phase shift that arises between energy production and energy release, the peak loads towards times when rooms are not in use are reduced and delayed.

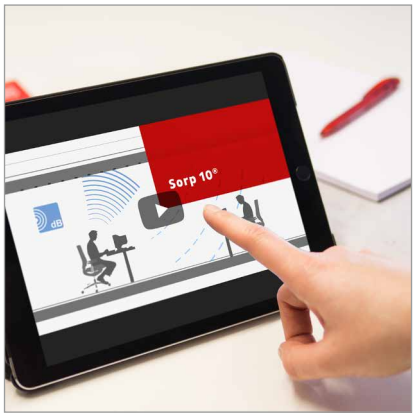




Understand Sorp 10® in less than a minute ...

An animated clip shows how simple it is to install the Sorp 10® sound absorber and spacer. In doing so, the thermal efficiency is only very slightly impaired, the concrete cover is secured and at the same time basic damping of the room is ensured for the room acoustics. A quick introduction to the Sorp 10® room-acoustic sound absorber ...

Scan QR code and watch the clip!



Product variants

Sorp 10® room-acoustic sound absorber

designed for all formwork variants in exposed concrete finish and acoustically open coating.

Sorp 10® does not affect the usable room height or the architectural design. The application of an acoustically open coating creates an aesthetic, seamless ceiling appearance.

Alternatively, a technical appearance can be achieved with an uncoated exposed concrete ceiling with visible functional stripe pattern.

Would you like to see an original of the Sorp 10® product?
Request product samples by sending an email to customer.service@maxfrank.com

Accessories

Sorp filler grout

Sorp filler grout is a grouting material, transparent to sound, for application directly on the Sorp 10® sound absorber for evening out height differences between the lower edge of the concrete ceiling and the sound absorbers.

- Basic: Expanded glass granulate
- Colour: Grey
- Supply form: Plastic bucket
- Contents: 8 kg

Sorp primer

Sorp primer is applied to the intermediate concrete areas as a primer and bonding agent. Sorp primer dries white glazed making it easy to identify areas that are already primed. The quartz grains (0.5 mm) contained in the primer results in a grippy surface on a smooth area for the Sorp acoustic plaster to be subsequently applied.

- Basic: Alkali silicate, polymer dispersion
- Colour: White
- Component A: Supply form: Bucket, contents: 10 kg
  Component B: Supply form: Canister, contents: 5 kg

Sorp acoustic plaster

If, for optical reasons, a construction project does not call for an exposed concrete surface, but instead a homogeneous and hence seamless surface, we offer a special Sorp 10® acoustic plaster system. The acoustic plaster is configured with a marble grain, meaning that it is acoustically open and does not hinder the sound absorption properties of Sorp 10®.

- Basic: Polymer dispersion, marble graining
- Colour: White (similar to RAL 9003)
- Supply form: Plastic bucket
- Contents: 15 kg

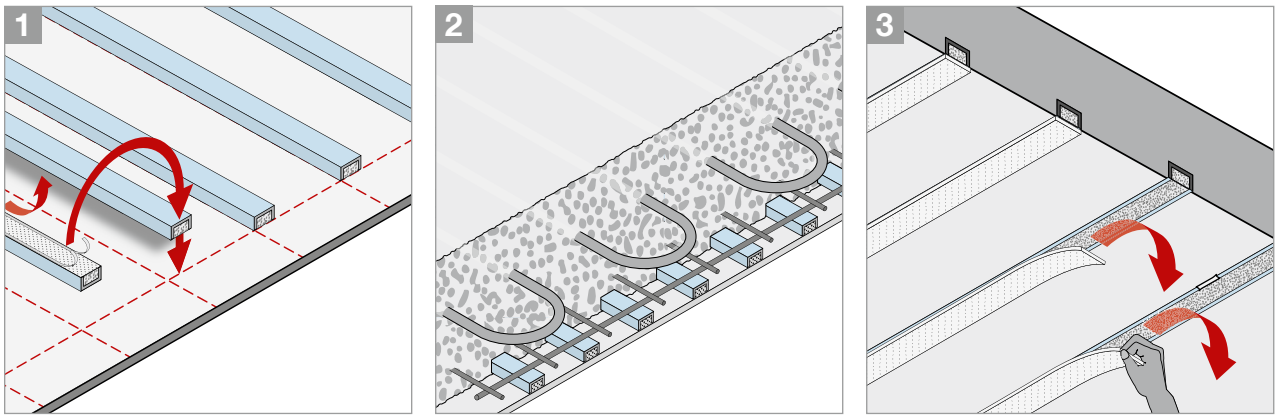
How it's done:

Sound absorption for thermally activated structural components

To avoid impeding the function of core-activated slabs, the room acoustics cannot be improved by using the normal sound-absorbing materials and ceiling suspensions.

So that the room acoustics can still be optimised, however, an acoustically active spacer is used. The absorber strip integrated in it is made of an expanded glass granulate and improves the acoustics, while the U-profile serves at the same time as a spacer for the first reinforcement layer.

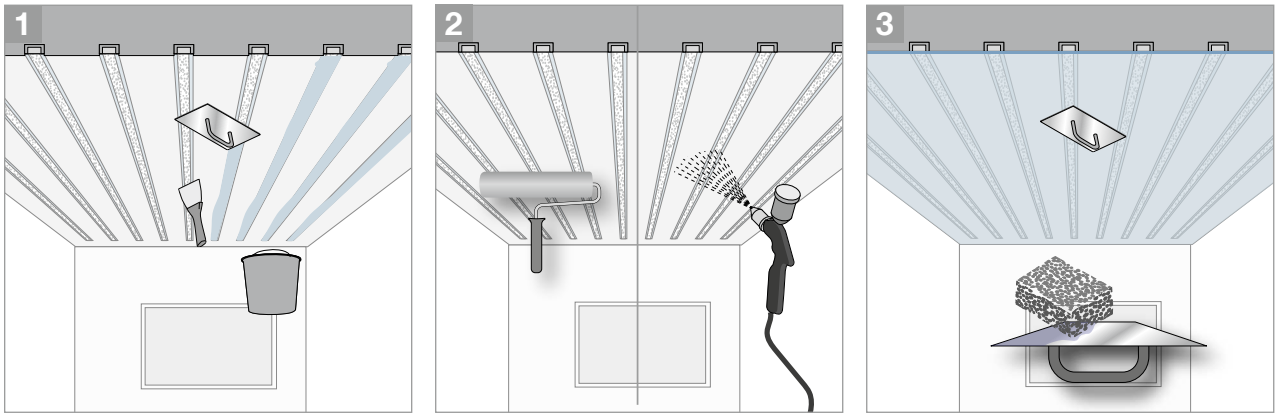
How it's done:



Good room acoustics combined with seamless and homogeneous ceiling appearance

Sorp 10® sound absorbers already integrated in the concrete ceiling ensure good room acoustics and reduce the reverberation time. Combined with Sorp acoustic plaster, this creates a jointless, homogeneous ceiling design. After demoulding the underside of the ceiling covered with Sorp 10®, the Sorp filler grout (1), the Sorp primer (2) on the concrete surfaces and the Sorp acoustic plaster (3) is applied.

How it's done:



Details about working with Sorp 10® as exposed concrete as well as an acoustically open coating can be found in our assembly instructions.

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© Photo outdoor shot: Dieter Blum

Südwestmetall

Esslingen, Germany

Two sites belonging to the Südwestmetall employer's association (Esslingen and Göppingen) had to be merged into one central office. In Esslingen there was an opportunity to create a contemporary and efficiently designed building.

The location of the building posed a major challenge for the architects. The structure, in its pointed shape, is adapted to the gusset-shaped piece of land, which is bordered by the river Neckar, railway tracks, road and vineyards. The geometry of the vineyards is also reflected in the building's architecture. What is more, many openings in the façade and windows provide a view of the vineyard.

Inside, a large, flowing air space stretches across all the floors, which is used for air conditioning and symbolises the communicative purpose of the building. It therefore acts as a foyer, reception, event area, meeting point and transition to the meeting rooms off it.

> **"The combination of Sorp 10® room-acoustic sound absorber and Sorp acoustic plaster meets the acoustic and optical requirement."**

The surfaces inside the building reveal a deliberate simplicity, with the colour white dominating.

The reinforced concrete skeleton structure draws its heating and cooling energy from a groundwater well by means of a heat pump. The component activated concrete ceilings are responsible for regulating the room temperature and were already laid during the shell construction phase with the Sorp 10® room-acoustic sound absorber.

The aim was both to implement the planned energy concept and to keep the surfaces inside the building simple. With the combination of Sorp 10® and the Sorp acoustic plaster, an acoustically open coating, the energy, room-acoustic and optical requirements were met.

Project data

Client	Südwestmetall regional group Neckar Fils
Architect	[fritzen 28]
Completion	2016
Quantity delivered	5300 m
Ceiling size	1,500 sqm
Execution	Acoustically open coating

> When it came to designing the interior of the new Südwestmetall building in Esslingen, it was important for us to create a smooth, seamless and white surface on the ceilings between floors to emphasise the styling. By using the acoustic absorber from MAX FRANK, it was possible to implement this specification perfectly. The room acoustics achieved in the office areas meets expectations.

Dipl. Ing. Katrin Kussinna, [fritzen28] architekten Esslingen

Roto Development Centre

Bad Mergentheim, Germany

Client's requirements

For the development of prototypes, the management at the company Roto wanted a building in the form of a multifunctional space. This space for about 80 people is intended to foster the employees' creativity on the one hand, and to attract creative people due to its outer appearance on the other.

Air conditioning technology

Concrete core temperature control is used for the cooling and heating technology and is integrated in the building shell. In addition, underfloor convector heaters were installed in the cavity floors in order to also ensure the temperature of the rooms can be controlled in a short space of time.

The integration of cooling and heating pipes together with the visible Sorp 10® room-acoustic sound absorber in the shell construction posed a particular challenge in terms of structural engineering. Furthermore, the concrete had to meet the aesthetic requirements of exposed concrete.

> "Design and office workplaces for creative working in an open workshop ambience."

By using renewable energies, a sustainable energy supply system with concrete core temperature control and highly technical materials, the operating costs are reduced to a considerable extent.

The different ways of using the space and the diverse spatial experiences in the new development centre show that not only do people work at Roto – people live at Roto and this fosters creativity!

Project data

Client	Roto Frank Bauelemente GmbH
Architect	Kalis Innovation GmbH
Completion	2017
Quantity delivered	3360 m
Ceiling size	900 sqm
Execution	Exposed concrete

"As part of the material implementation of this open space design, particularly attention was paid to the integration of acoustic measures. Consequently, panels made of glass granulate (Sorp 10®) were integrated in the exposed concrete ceilings as early as the shell construction stage. Not only do these open glass granulate strips make a critical contribution to the pleasant acoustics in the building, but at the same time they act as a design element in the building dominated by exposed concrete."

Dr.-Ing. Sigrid Hintersteininger, architect

Max Frank administration building

Leiblfing, Germany

The construction task for the new administration building planned to rearrange the access situation and create new office space on the existing company premises. The administration building itself is divided into three floors. Adjacent to the existing office building, a new inner courtyard will be created. The interior area gives the employees and visitors a high quality of stay.

In order to ensure a maximum degree of flexibility, the new building was based on an axial dimension of 5.25 m. Cast-in-place concrete pillars form the basic skeleton for the structure. Both cast-in-place concrete ceilings and precast elements are used for the ceilings between floors. The collaboration between a filigree concrete ceiling manufacturer and the manufacturer of the pipe systems for concrete core activation, it was possible to implement a system close to the surface combined with the Sorp 10® acoustic sound absorber. This offers the benefits of a combination of room acoustics and building temperature control. The capacity of the ceilings in the building is therefore used to store thermal energy for heating or cooling spaces.

> The new MAX FRANK headquarters overcomes barriers and unites people.

The architecture in the administration building is characterised by contrasts between hard construction areas and homely materials.

The bronze-coloured windows together with the grey of the façade create a calm, pleasant effect. For the interior design, alongside white, plastered walls, natural oak was used, which reflects the sleek and simple overall demeanour inside.

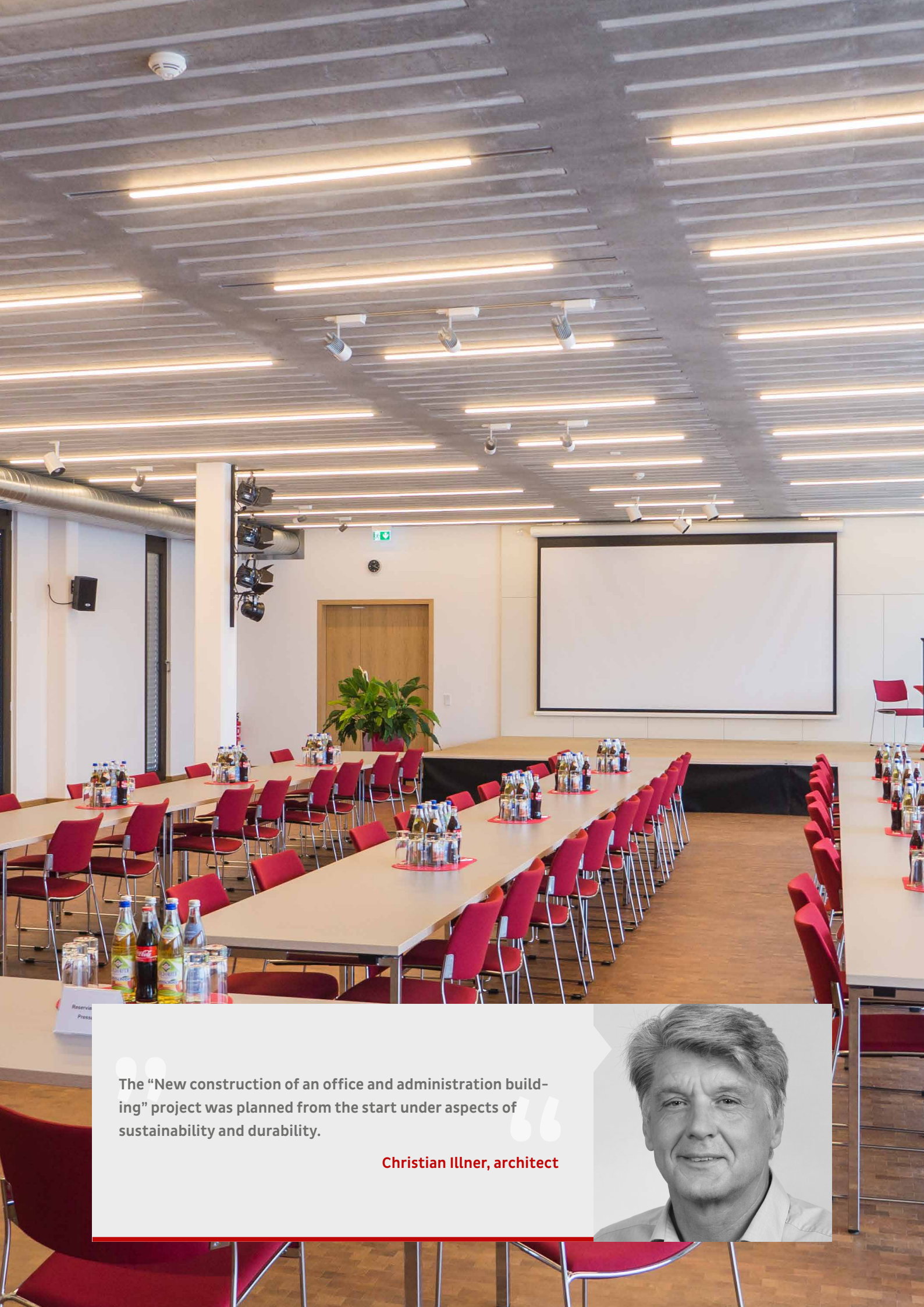
Aspects of sustainability and durability were planning objectives from the start. In order to verify this approach and make it visible, the building was certified according to DGNB and LEED criteria.

Project data

Client	Max Frank GmbH & Co. KG
Architect	HIW Architekten mbH
Completion	2015
Quantity delivered	3400 m
Ceiling size	1275 sqm
Execution	Exposed concrete

LEED GOLD 2015

DGNB Nachhaltiges Gebäude
DGNB Zertifikat in Gold



> The “New construction of an office and administration building” project was planned from the start under aspects of sustainability and durability.
>
> **Christian Illner, architect**

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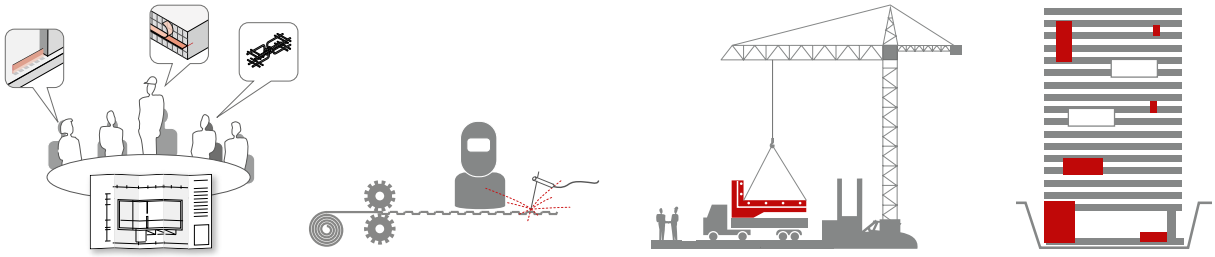
Products from MAX FRANK are technically sophisticated, requiring intensive explanation and advice – but above all they are versatile in use. Our service is versatile and precisely for that reason very personal.

The large number of proven products and the technological bandwidth of the business units enable us to develop customer-specific solutions together with planners, construction companies or building owners and to plan structures that are sustainable, safe, tight and quiet.

With our services we provide support from the planning phase through to and beyond the completion and, together with our partners, we create individual, comprehensive and cost-effective project solutions.



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Note down questions about Sorp 10® ...

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