Metawell
metal sandwich technology

Metawell® sports hall ceiling

Leidsche Rijn, Utrecht, Netherlands ©Jan Bitter

Shot resistant sports hall ceilings

RADIANT AND ACOUSTIC CEILINGS FOR SPORTS HALL

Ceiling constructions should not only meet the demand of sound protection, but also be tested upon ball impact resistance according to DIN 18032-3 and upon impingement resistance according to EN 13964-D. Because of the extremely rigid construction of the sandwich panel, a deforming of the panel by a ball shot is almost impossible. The Metawell® ceiling additionally undertakes the heating of the hall. The copper pipe meander mounted on the back side of the ceiling convert the acoustic ceiling into an acoustic–radiant ceiling heating.

The sports hall ceiling elements are delivered with perforation and rear fixed acoustic fleece, optionally also with copper pipe meander. The mounting is carried out with a narrow shadow gap onto standard CD rails. Because of the use of countersunk head screws with a 6 mm diameter the screw heads become invisible between the 6 mm perforation. The screwing on the visible side and the construction of a CD grid is useful.

SUSTAINABLE AND ENERGY EFFICIENT

Sports hall ceiling elements consist out of an aluminium carrier panel with copper pipe meanders. Both materials are excellent heat conductors. Therefore the Metawell® sports hall ceilings respond extremely fast and achieve high performance values. When the ceilings are not used anymore they can be recycled without additional preparation.

Furthermore EPDs (Environmental Product Declarations) according to DIN EN ISO 14025 Type III and EN 15804 are offered. The ecological balance of the panels shows a low carbon footprint.

EASIER PLANNING

Our products are available for ArchiCAD and Revit as BIM objects, which enables an easier planning of your sports hall ceiling. For free download just visit our homepage www.metawell.com.

Sports hall Köln-Porz, Germany ©Stefan Schilling

ADVANTAGES

In comparison to conventional solutions the heating of sports halls with radiant ceilings has many advantages, such as:

- low supply temperature of the heating water
- environmentally friendly generation by means of regenerative sources and / or heat pumps
- minimum air supply requirement, which results in smaller air ducts and lower air movements
- closed hall ceilings are more hygienic
- no balls can clamp or remain behind the ceiling
- dirt cannot settle down
- entire hall ceiling serves as an acoustic absorption surface
- ceiling system can also be used for heating and cooling

LAYOUT

On basis of the building physics data of the sports hall, the heating load of the hall is calculated by the expert planner, whereby the room height has a high influence on the temperature distribution.
In order to ensure the desired temperature in the area in which the athletes are located, a correction factor should be included in the calculation.

Example:
For a sports hall with a height of 7 m, a heat load of 25,000 watts is determined. The correction factor according to the table is 0.7. The heat load to be applied to the ceiling is therefore 35,700 watts.

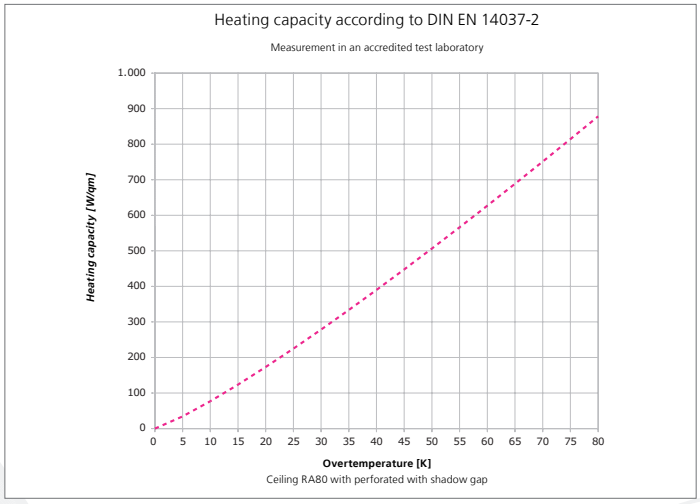


Diagram heating power

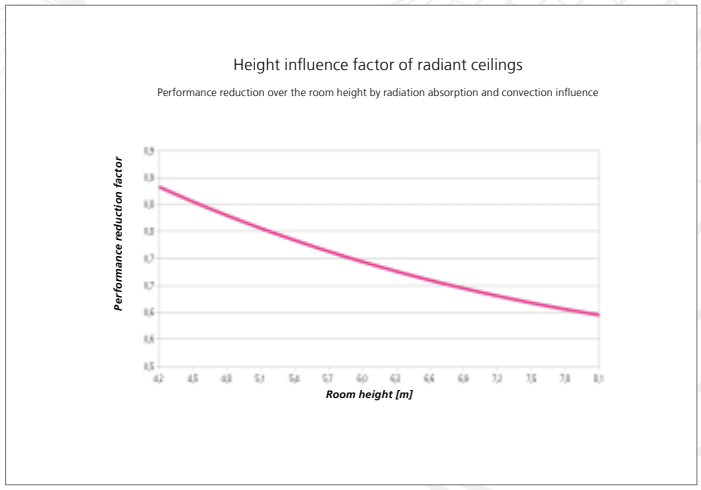


Diagram correction factor room height

Detail basket ball

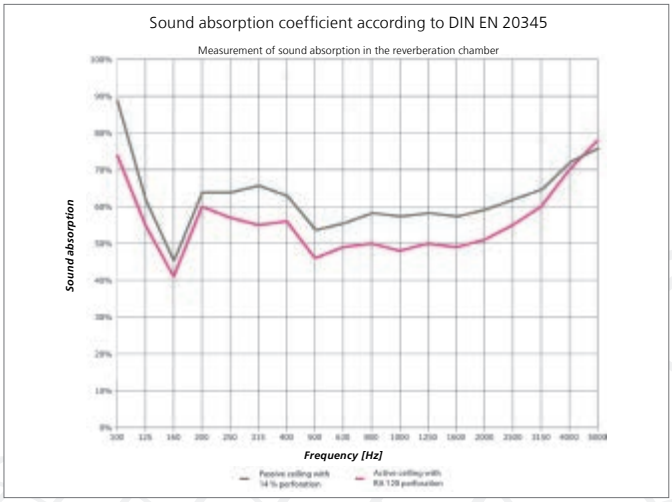
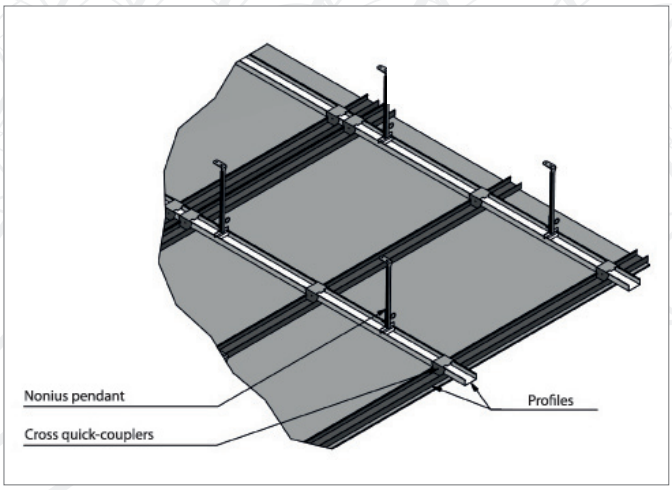


Diagram comparison of sound absorption of active and passive panels



Substructre in 3D

ACOUSTICS

In order to ensure the speech intelligibility during training lessons and to keep the noise disturbance for athletes, trainer and audience low, room acoustic measurements are undertaken. Subject to the kind of room use and the space volume the reverberation period in sports halls should amount to 1,4 to 2,5 sec. and in multi-purpose halls even to 1,1 to 4,4 sec. DIN EN 18032 explicitly requests the planning of room acoustics:

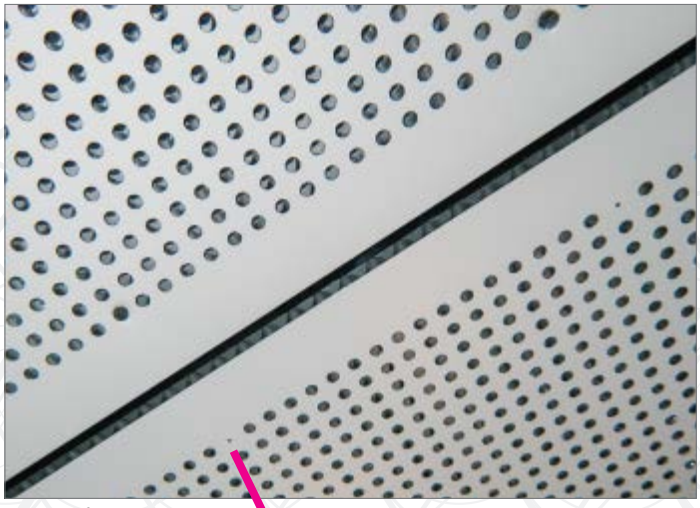
- speech intelligibility in the single and in particular multiple sporting activities
- speech communication possibilities of the athletes among themselves
- Speech intelligibility when using a PA system in sports halls with audience
- Noise and therefore stress-free sports

Therefore room acoustics is one of the fundamental planning tasks when designing a sports hall. A corresponding acoustic equipment has to be provided.

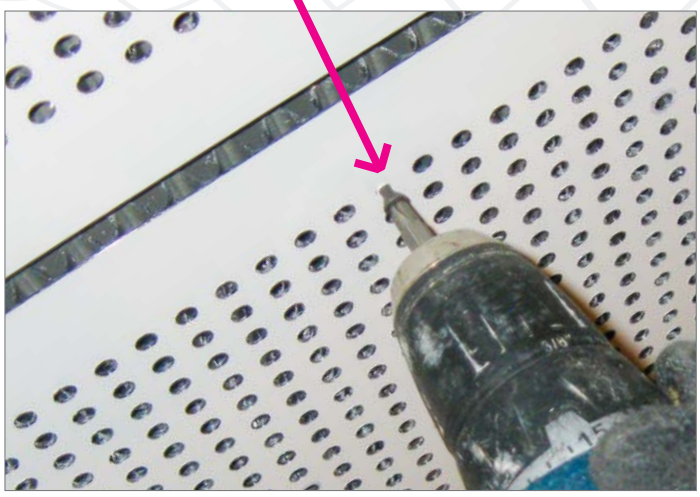
Campus Hoogvliet during installation

INSTALLATION

The installation of the ceiling is quite simple and is carried out using standard CD profiles and drywall screws - special and expensive substructures are not required.
A coarse and fine grid construction is mounted to the ceiling. The coarse grid has a spacing of 900 mm. The sacing of the fine grid depends on the width of the ceiling panels. If the width is 1480 mm, three fine grids must be provided per panel; in each case on the panel longitudinal edge and in the center of the panel. The spacing is 700 mm.
The perforated ceiling panels have a pre-drilled 2 mm hole instead of a 6 mm perforation hole at the point where a drywall screw has to be installed - which clearly determines the positioning of the screws.
The screw head diameter of 5.9 mm is very similar to a perforation hole, so the attachment is hardly noticeable from the floor. The 10 mm gap between the panels is shown in the picture.
All edge panels are supplied with a material addition. This material has to be removed by the customer during assembly. The room tolerances are taken into account creating a uniform shadow gap on the walls.



Detail perforation and shadow gap



Detail Befestigung

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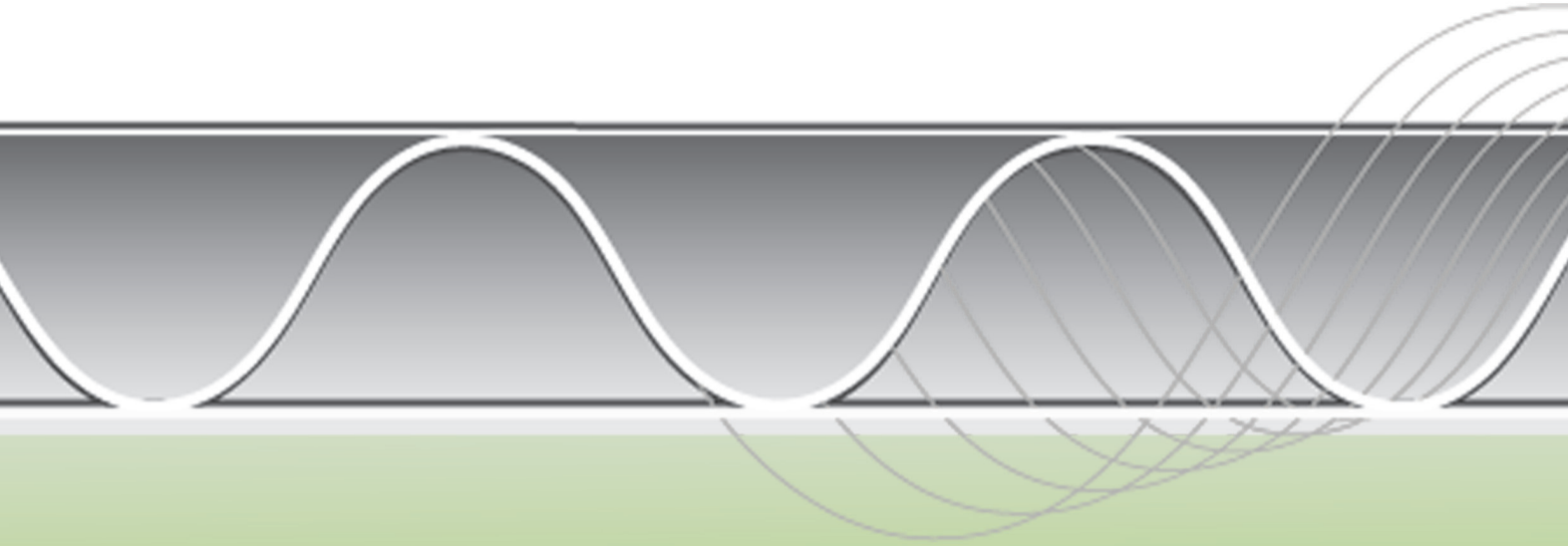

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