MWH Barcol-Air

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A21 Gypsum Cooling Ceilings

The Radiant Cooling Ceiling with a Gypsum Surface: “Seamless” Thermal Comfort

Introduction

Visually the A21 Gypsum Cooling Ceiling is no different to a normal gypsum ceiling. As well as its function as a high-performance radiant cooling ceiling it features a high aesthetic appeal. The plastered underside gives that seamless ceiling look.

The A21 Gypsum Cooling Ceiling can be used everywhere where a high degree of upgrading is required and where a combination of aesthetics and thermal comfort is needed.

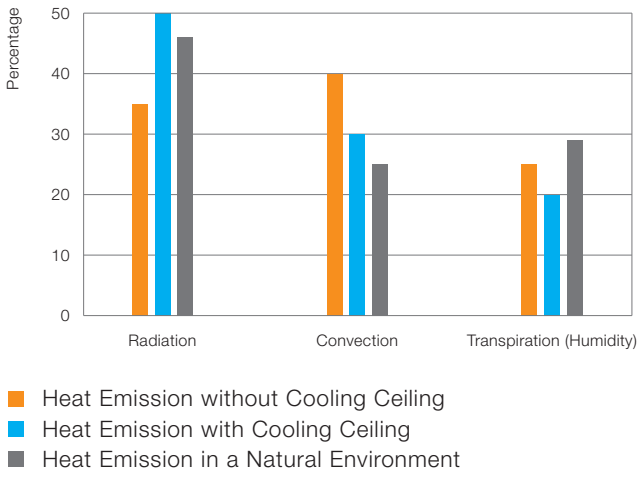
Principle of Heat Absorption

By using radiant cooling ceilings, high thermal comfort and draught freedom are also ensured in rooms with large thermal loads.

Radiation-induced heat exchange reduces the convective air flow considerably and ensures a positive environment in line with human comfort requirements.

The following diagram shows the difference in terms of human heat emission with and without the use of a radiant cooling ceiling.

Human Heat Emission



No-Restriction Design of the Reflected Ceiling Panel

Pipework in the Ceiling Cavity

One important advantage of the A21 Gypsum Cooling Ceiling is having the register unit installed completely independently of the panelling element.

The maintenance-free connections between the register units are undertaken with copper elbow fittings and strong soldered joints. The tightness test is carried out in each case in front of the panelling which means that access to the ceiling cavity is not necessary.

Ceiling Design

The choice of panelling elements depends on the capacity to be transmitted and architectural aspects.

Perforated or unperforated gypsum plasterboards as well as those with heat-conducting additions (e.g. Knauf Thermal Board or Rigips Climafit Board) can be used as the panelling elements.

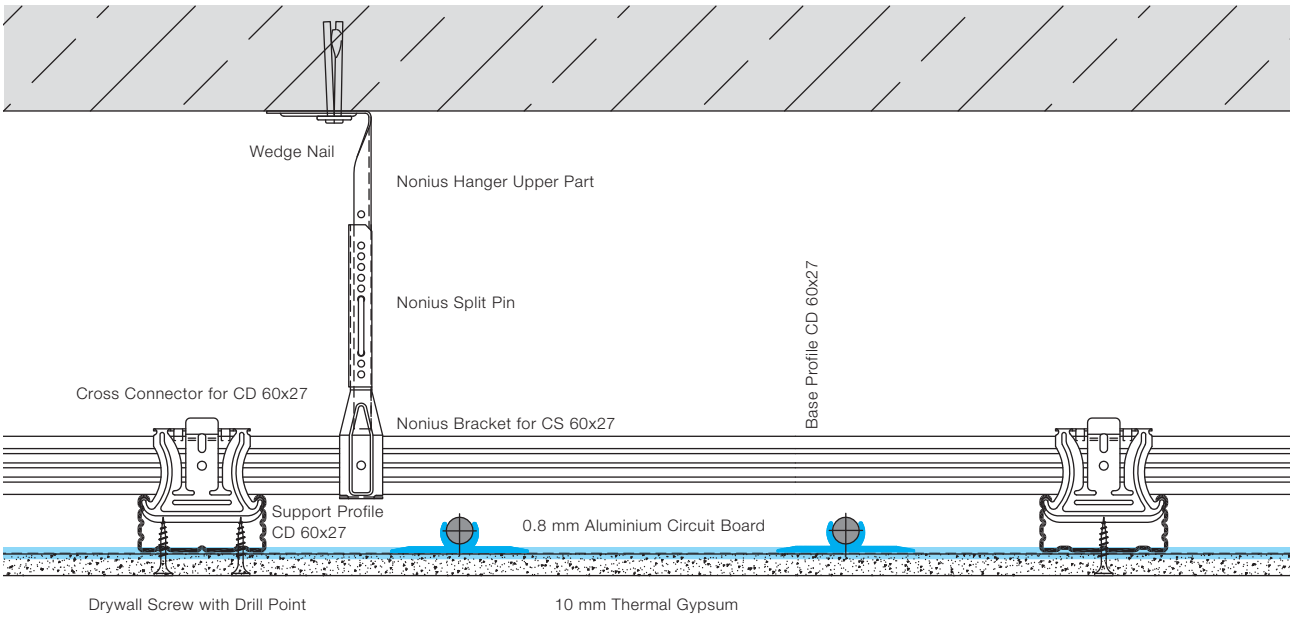
The register units are coordinated on the basis of the reflected ceiling panel and adapted to the fitted components.

Installation

The C-support profiles are suspended rigidly to the bare ceiling on Nonius hangers in line with the norms for ceiling lining.

Expansion joints of the shell must be taken up into the construction of the suspended ceilings.

The register units are attached to the C-support profiles. Here it is vital that the surface is flat and plane. The panelling of the gypsum plasterboards produces a full-surface and even cooling ceiling activation with a maximum cooling and heating capacity.



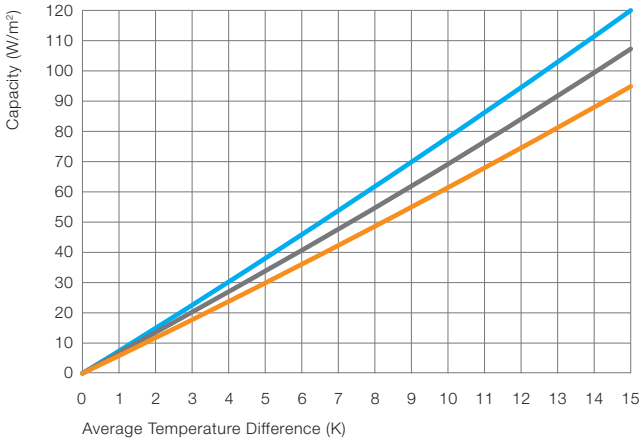
The Characteristics of the A21 Gypsum Cooling Ceiling

Cooling Ceiling Capacity

The diagram following shows the cooling ceiling capacity according to the EN14240 standard as depending on the average temperature difference (ambient temperature / average cooling water temperature).

The standard cooling capacities refer to the following basic conditions:

- C-profile span of 320 mm (perforated boards)
- 160 mm heat conducting rail spacing
- Acoustic backer made of mineral fibre



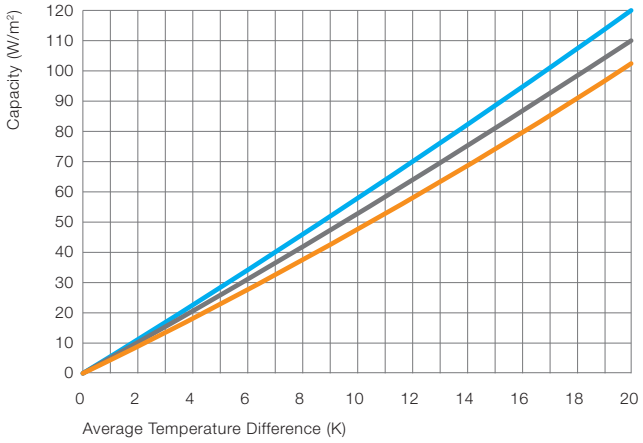
- Rigips Climafit
- Knauf Thermal Board
- 12.5 mm Gypsum Board

Heating Ceiling Capacity

The diagram following shows the heating ceiling capacity according to the EN14037 standard as depending on the average temperature difference (ambient temperature / average heating water temperature).

The standard heating capacities also refer to the basic conditions:

- C-profile span of 320 mm (perforated boards)
- 160 mm heat conducting rail spacing
- Acoustic backer made of mineral fibre



- Rigips Climafit
- Knauf Thermal Board
- 12.5 mm Gypsum Board

Hydraulics: Simplicity and Safety

Hydraulic Distribution System

The cooling water circulation through the cooling ceiling areas runs from the window front to the room interior. Thanks to the large cross-sections of the water-containing pipes of the gypsum cooling ceiling, large areas can be connected in series.

The water connections to the cooling water network are made according to the room or zone arrangement. The individual water circuits are provided with ball valves so each water circuit can be shut off separately.

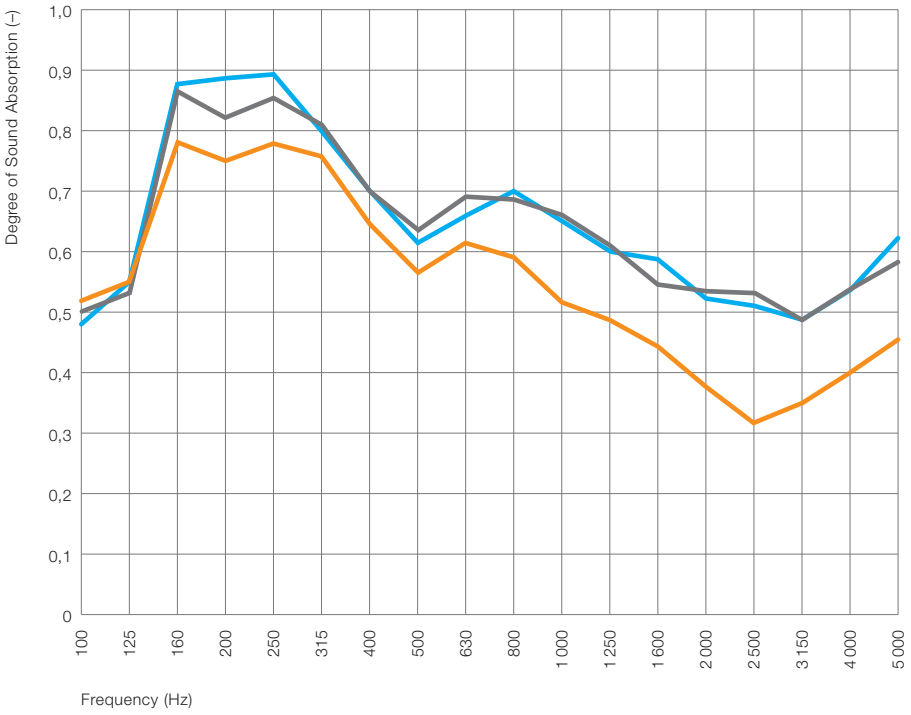
The advantages of this tried-and-tested type of installation are, on the one hand, the easy and efficient initial operation, and on the other, the possibility of shutting off a section on accessing the cooling ceiling system at a later date.

Acoustics: Sound Absorption at a High Level

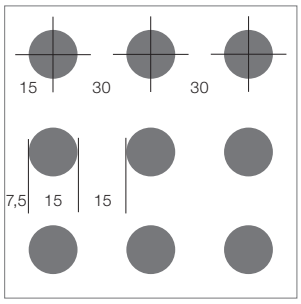
Degree of Sound Absorption

In workrooms sound-absorbing surfaces adjust the reverberation period to the corresponding requirements. The ceiling is the ideal place for locating the absorber surfaces.

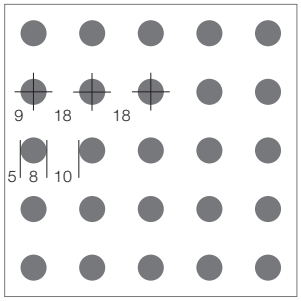
The following diagram shows the frequency-dependent degree of sound absorption with different types of hole patterns. The values apply to gypsum boards with fleece attached on the back.



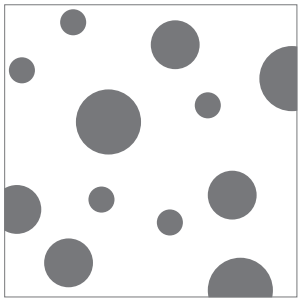
- Straight Round Hole 15/30 R
- Straight Round Hole 8/18 R
- Scattered Hole PLUS 8/15/20 R



Straight Round Hole
15/30 R



Straight Round Hole
8/18 R



Scattered Hole PLUS
8/15/20 R

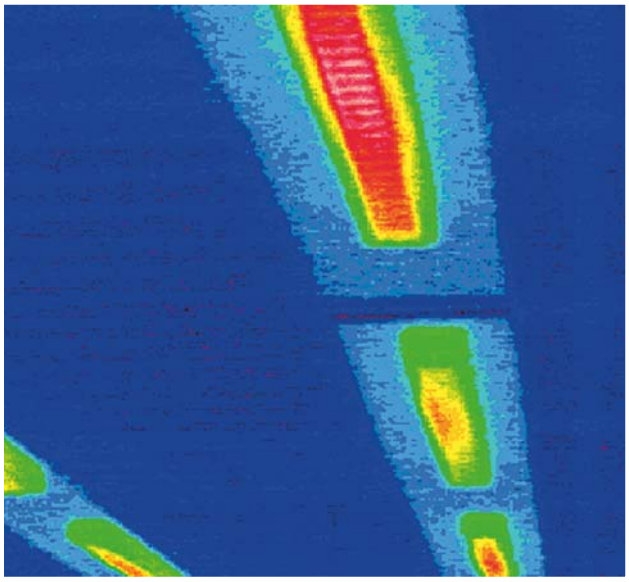
Putting into Operation

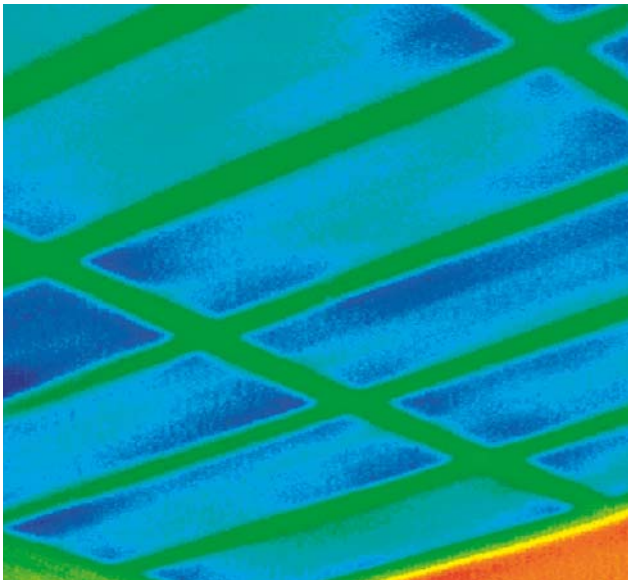
Pressure Test

Like every hydraulic network in domestic installations, a cooling ceiling system also has to be checked for tightness with a pressure test before initial operation. Here the completely filled and vented cooling ceiling system (including the fine distribution, connections between the register units and the flexible connections) undergoes a pressure test for at least 24 hours. The test results are kept in a log. The local regulations and requirements must be considered here.

Initial Operation

To ensure the cooling ceiling works perfectly, the cooling ceiling system has to be vented with all due care. Proof also has to be provided that all water circuits flow perfectly. This is done with the help of modern thermal imaging camera systems with pictures being recorded of the tested zones.





References

Example of Use of the A21 Gypsum Cooling Ceiling

The highest demands placed on functionality and aesthetics:

- High Standard Conference Room
- Shop
- Auditorium

- Representative Offices
- Foyer

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