# emco **Radiant Ceiling Systems**

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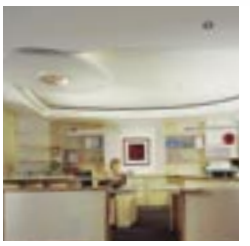
EMCO

## Radiant Ceiling Systems

Approximately half of the energy consumed in Europe serves to operate buildings. In order to provide this energy, large quantities of fossil fuels are needed, resources that one day will no longer be available for future generations. The alarming effects of global warming are forcing consistent energy-saving policies in all sectors of society. Indeed, careful examination of energy consumption must be made to an increasing degree, starting with the energy demand for materials manufacturing to efficiency during system operation to the expense of waste management.

The ambient climate in a room has a large influence on well-being and thus performance, productivity, accident and illness rates. Modern architecture, a greater number of office machines and computers in the workplace as well as increasing requirements for well-being all place high functional demands on the technology used to maintain the room climate.



emco **Radiant Ceiling System QL-tec GK CU WT**

emco **Radiant Ceiling System QL-tec GK 50 WT**

emco **Radiant Ceiling System QL-tec GKA 50 WT**

emco **Radiant Ceiling System QL-tec GKT integral**

emco **Radiant Ceiling System QL-tec GKT akustik**

emco **Radiant Ceiling System QL-tec MD CU WT**

emco **Radiant Ceiling System QL-tec MD 50 WT**

emco **Radiant Ceiling System QL-tec NE 50**

emco **Radiant Ceiling System QL-tec NE 3000**

emco **Radiant Ceiling System QL-tec Putz-PP**

emco **Radiant Ceiling System QL-tec Putz-Schiene**

emco **Radiant Ceiling System QL-tec RA 50**

# Overview: Contact Radiant Ceiling Systems

## Contact Radiant Ceiling Systems for Plasterboard Ceilings

The systems described in the following chart are designed for use in combination with standard perforated and unperforated plasterboard panels of various makes to produce radiant chilled and heating ceilings.

| QL-tec-Model | System Components / Features / Benefits | Performance | Floating Ceiling | Renovation |
|---|---|---|---|---|
| **GK CU WT**<br>**GKA CU WT** | – pre-engineered elements of copper meanders pressed into aluminium heat conducting membranes<br>– spacer tees of galvanized sheet steel<br>– easy and safe installation<br>– available as floating ceiling<br>– Fire class 1 | cooling: 80 W/m²<br>heating: 96 W/m² | suitable | suitable |
| **GK 50 WT**<br>**GKA 50 WT** | – Oxygen diffusion proof plastic pipe<br>– aluminium heat conducting membranes for mounting the plastic pipe<br>– high system flexibility<br>– no pre-engineered components<br>– available as floating ceiling | cooling: 62 W/m²<br>heating: 76 W/m² | suitable | suitable |
| **GKT integral** | – pre-engineered heat conducting panel with oxygen diffusion proof plastic pipe<br>– Suspended ceiling and radiant ceiling as one component saves valuable installation time<br>– available as floating ceiling | cooling: 70 W/m²<br>heating: 85 W/m² | suitable | especially suitable |
| **GKT akustik** | – pre-engineered heat conducting panel functioning as a highly effective acoustic ceiling, with oxygen diffusion proof plastic pipe<br>– Suspended ceiling and radiant ceiling as one component saves valuable installation time<br>– available as floating ceiling<br>– standard perforation 15/30<br>– additional perforations upon request | cooling: 60 W/m²<br>heating: 73 W/m² | suitable | especially suitable |

## Contact Radiant Ceiling Systems for Metal Ceilings

The systens described in the following chart are designed for use in combination with standard flat-shaped metal ceilings of various makes to manufacture produce radiant chilled and heating ceilings.

| | | | | |
|---|---|---|---|---|
| **MD CU WT** | – pre-engineered elements of copper mean ders pressed into aluminium heat conducting membranes<br>– high level of adaptability due to variable prefabrication of components<br>– easy and safe installation<br>– available as floating ceiling<br>– Fire class A1 | cooling: 93 W/m²<br>heating: 110 W/m² | suitable | suitable |
| **MD 50 WT** | – pre-engineered elements of copper meanders pressed into aluminium heat conducting membranes<br>– high level of adaptability due to variable prefabrication of components<br>– easy and safe installation<br>– available as floating ceiling | cooling: 78 W/m²<br>heating: 93 W/m² | suitable | suitable |

## Contact Radiant Ceiling Systems for Aluminium Ceilings

The systens described in the following chart are designed for use in combination with standard aluminum panels to manufacture radiant chilled and heating ceilings.

| QL-tec-Typ | System Components / Features / Benefits | Performance | Floating Ceiling | Renovation |
|---|---|---|---|---|
| **NE 50** | – oxygen diffusion proof plastic pipe<br>– high system flexibility<br>– no pre-engineered components<br>– easy and safe installation<br>– special carrier rails for integrating the strip ceilings<br>– available as smooth and thus highly effective perforated acoustic ceiling | Cooling: 79 W/m²<br>Heating: 92 W/m² | | suitable |
| **NE 3000** | –– pre-engineered elements of copper meanders (plastic pipe) pressed into aluminium heat conducting membranes<br>– high level of adaptability due to variable prefabrication of components<br>– easy and safe installation due to installation as linear grid process<br>– ceiling element width: 200-300-400 mm; maximum ceiling element width 2000 mm<br>– available as floating ceiling<br>– available as smooth and thus highly effective perforated acoustic ceiling<br>– Fire class A2 | Cooling: 96 W/m²<br>Heating: 110 W/m² | suitable | suitable |

## Contact Radiant Ceiling Systems for Plaster Ceilings

The systens described in the following chart are designed for use in combination with standard plaster ceilings to manufacture radiant chilled and heating ceilings.

| | | | | |
|---|---|---|---|---|
| **Putz-PP** | – PP plastic capillary tube mats for mounting on unfinished concrete<br>– available for installation in dry-wet or wet in wet process<br>– prefabricated capillary tube mats with length of up to 6 m<br>– easy and safe installation<br>– extremely low installation height of 15 mm | Cooling: 80 W/m²<br>Heating: 94 W/m² | | |
| **Putz-Schiene** | – oxygen diffusion proof plastic pipe<br>– special carrier rail for fixing onto unfinished concrete<br>– high system flexibility<br>– no pre-engineered components<br>– extremely low installation height of 20 mm | Cooling: 67 W/m²<br>Heating: 78 W/m² | | |

## Convective Radiant Ceiling Systems for Open Modular and Clamp Cassette Ceilings

The systems described in the following chart are designed for use in combination with open modular and clamp cassette ceilings to produce convective chilled radiant ceilings.

| | | | | |
|---|---|---|---|---|
| **RA 50** | – pre-engineered elements of copper meanders or plastic pipes<br>– copper tubes available in black<br>– prefabricated elements can be pressed into aluminium heat conducting membranes to enhance performance<br>–– high level of adaptability due to variable prefabrication of components<br>– easy and safe installation<br>–– well suited for renovation of existing ceilings<br>– available as an acoustically highly effective ceiling | Depending on the free area of the ceiling cooling capacities up to 200 W/ m² are possible | | especially suitable |

# contents

# the company

## das Unternehmen

Since its founding in 1945, the Erwin Müller Group in Lingen has distinguished itself through solid growth, competence and innovation. A wealth of ideas, entrepreneurial skill and a social partnership with its employees have contributed to the company's steady upward development. The commitment to excellence, combined with distinct practical advantages and outstanding design, have made all products marketed under the emco and NOVUS names so unmistakeably unique. The outstanding technical and functional product quality will help sustain the company's presence in a global market in the new millennium.

Die Erwin Müller Gruppe Lingen ist ein Unternehmen, das sich seit der Gründung im Jahre 1945 durch solides Wachstum, Kompetenz und Innovation auszeichnet. Ideenreichtum,unternehmerisches Geschick und die soziale Partnerschaft zu Arbeitnehmern begründen die stetige positive Entwicklung des Unternehmens. Unverwechselbare Eigenart aller unter den Marken emco und NOVUS hergestellten Produkte ist die Synthese ausgesprochener Gebrauchsvorteile und vorbildlichen Designs. In diesem Sinne wird durch die formale und funktionale Produktqualität eine nachhaltige Präsenz auf den globalen Märkten des neuen Jahrtausends angestrebt.

.

**Erwin Müller** **Gruppe Lingen**

emco**bad** | emco**bau** | emco**klima**

# radiant ceiling systems


Architects and building owners desire to achieve highest thermal comfort with full architectural freedom of design. However, using only existing conventional systems makes it difficult to achieve this goal. Active, water-conducting radiant ceiling systems require not only less conveyance energy and energetic supply temperatures, they can also be completely integrated into a building's interior, making them invisible.

The various models available for plaster, plasterboard and metal ceilings allow the highest degree of design freedom. The result is always a high-tech radiant ceiling system that satisfies every energetic requirement placed upon it. emco's QL-tec radiant ceiling systems span not only a range of all established ceiling systems but offers the most suitable technology for each individual ceiling principle. Plasterboard panels with integrated cooling technology, capillary tube mats for plaster ceilings and copper tubes for metal ceilings can be delivered. All systems were developed with the aim of achieving the highest possible heating / cooling performance and at the same time allowing for uncomplicated and cost-efficient installation techniques. Full planning and design services as well as installation by specially trained technicians complete the emco QL-tec Systems package.

Especially demanding building projects can be complemented with emco's Convector and Ventilation Systems as a guarantee for ideal air and heating conditions.

In addition to being perfectly suited for demanding new building projects, the convenient assembly size makes the QL-tec system the ideal solution for uncomplicated and cost-effective integration into exisiting building (i.e. renovation or restoration).

Talk to us. Together, we can bring your buildings up to the cutting edge in air conditioning technology.


Verleihungsurkunde

Die Gütegemeinschaft Flächenheizungen und Flächenkühlungen e.V. verleiht hiermit

EMCO Klima GmbH & Co. KG, Lingen

das vom RAL Deutsches Institut für Gütesicherung und Kennzeichnung e.V. anerkannte und durch Eintragung beim Deutschen Patentamt als Kollektivmarke geschützte

„Gütezeichen Systemzusammenstellung von Flächenheizungen und Flächenkühlungen" mit der Inschrift „RAL-GZ 952/5" für den Bereich „Wand- und Deckenkühlungen"

gemäß nachfolgender Zeichenerklärung

RAL

RAL-GZ 952/5
Wand- und Deckenkühlungen

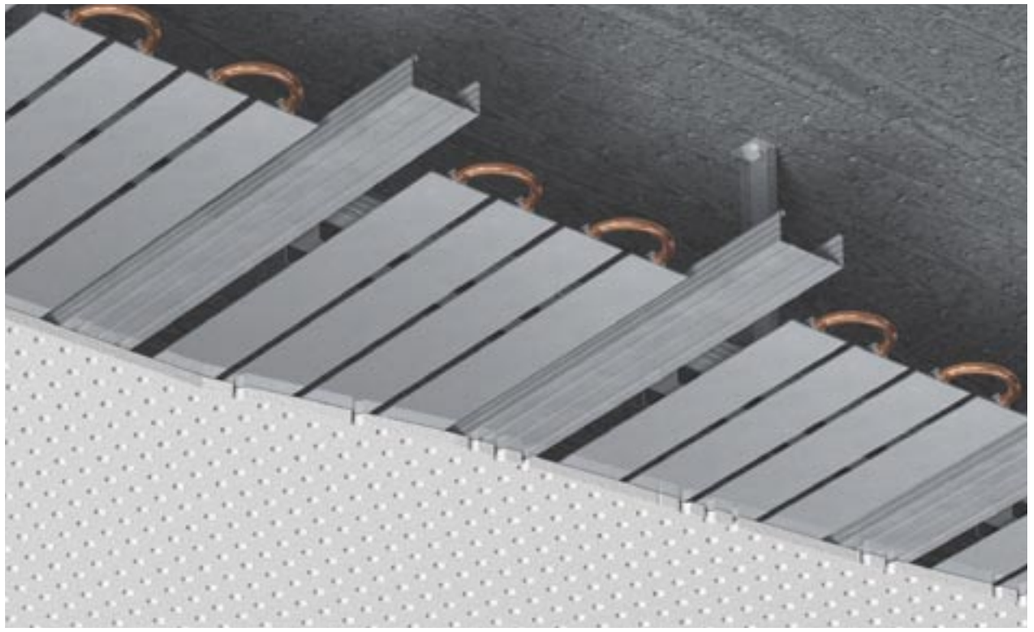
für die Systeme

QL-tec NE 60 P
QL-tec GKL Akustik-Klimadecke
QL-tec GKT Integral
QL-tec GK 60 WT
QL-tec ML/MK WT

Hagen, den 24.08.2001

Gütegemeinschaft Flächenheizungen und Flächenkühlungen e.V.

Die Vorsitzende | Der Geschäftsführer



**System concept**
The radiant cooling and heating system GK CU WT is a water-conducting ceiling system with a jointless surface that functions primarily according to the radiation principle. It distinguishes itself through its various application and design options.

It is designed for use in combination with perforated or unperforated plasterboard panels of various makes. The extensive and continuous contact between cooling and heating ceiling elements and the plasterboard panel is achieved through bolting, which is typical for dry construction.

A conventional frame of ceiling c-profiles (following DIN 18168-1) builds the base of this cooling and heating ceiling design. The cooling and heating ceiling elements are integrated into the frame together with aluminium heat-conducting membranes, so that after layering the GK-panels the modules are prestressed, providing optimal thermal conduction.

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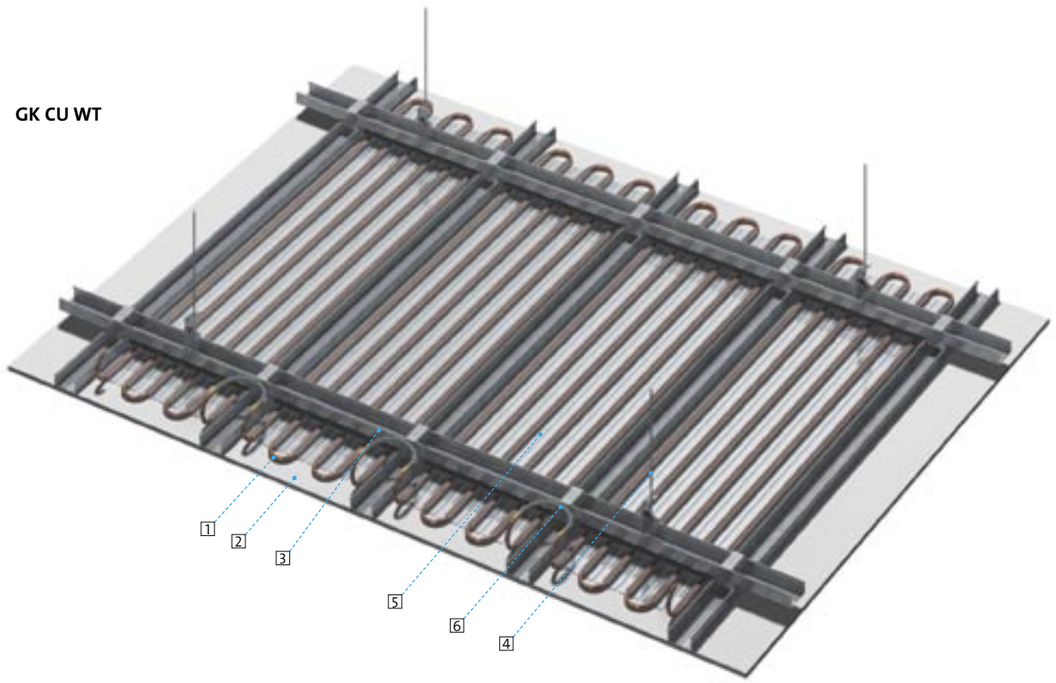
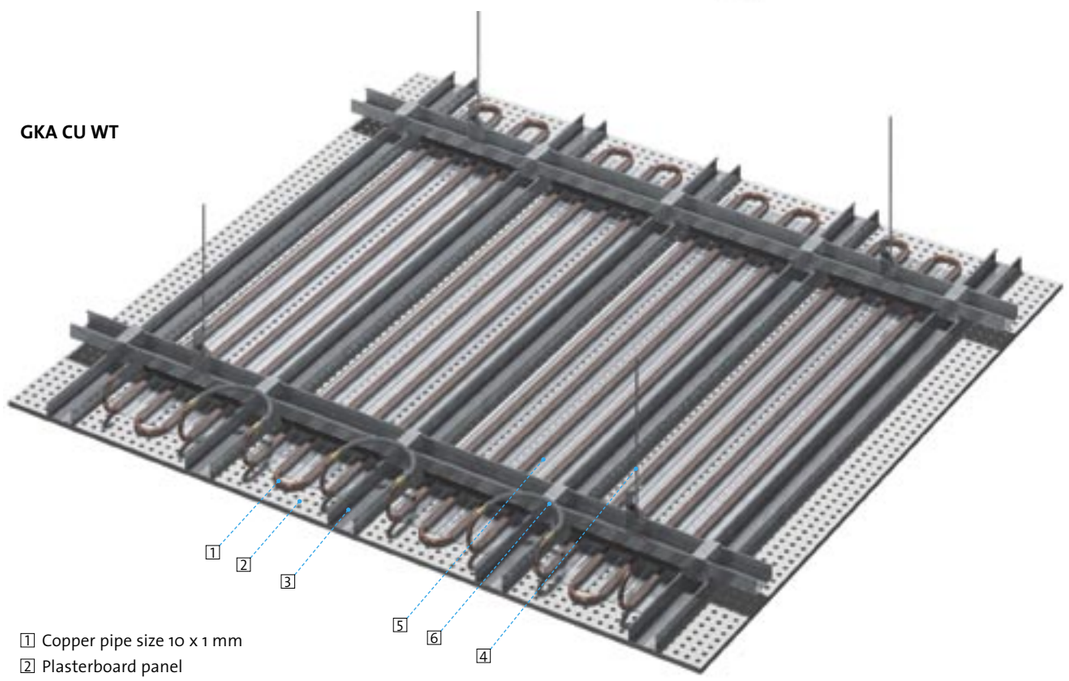
**Options**
Plasterboard cooling and heating ceilings using the GK CU WT system can be implemented in a multitude of options, ranging from flat or curved, painted or coated, perforated or unperforated, sound-absorbing or sound-reflecting, and many more. Even cooling and heating floating ceilings are available in various options. Active spaces should always include insulation in the rear side. Integrating light fixtures, vents, loudspeakers and other similar items is no problem at all, however, they fit best in between the cooling and heating ceiling elements in passive spaces. Integrating light fixtures, vents, loudspeakers and other similar items is no problem at all, but preferably should be done in passive spaces between the ceiling elements. When installing the radiant ceiling, no obstruction arises between the components. Moreover, both components, the cooling and heating technology as well as the ceiling work can be carried out independently of each other.

*Volksbank, Lingen*

**GK CU WT**




**GKA CU WT**




1 Copper pipe size 10 x 1 mm
2 Plasterboard panel
3 CD-profile 60 x 27
4 Suspension hangar
5 Aluminum heat-conducting membranes
6 Flexible connecting pipe



**Advantages**

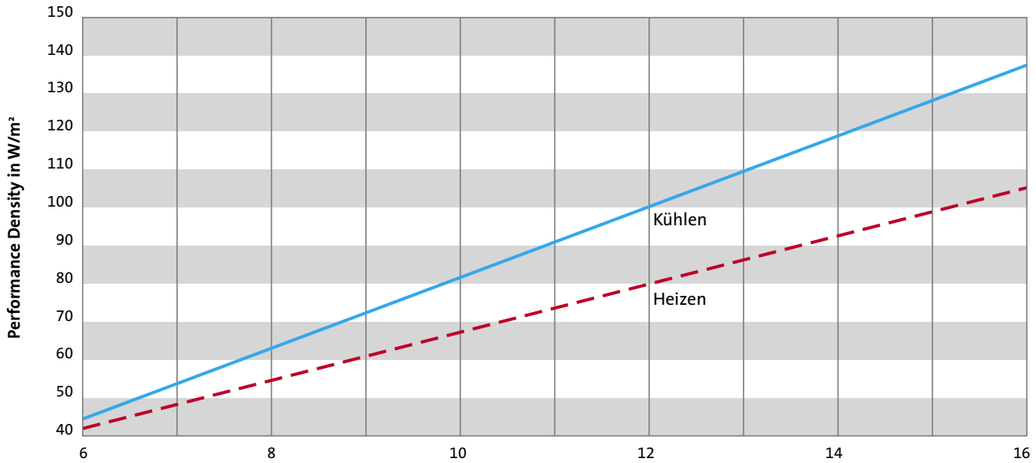
- jointless cooling or heating ceiling system
- suitable for office and open areas that have low to average cooling and heating load
- perforated ceilings provide a highly effective acoustic surface
- high level of design freedom for the architect
- minor temperature differences in common areas
- low overall height makes it well suited for restoration projects
- manufactured in high-quality, grade-inspected copper
- available also as plasterboard radiant sail, performance increase of 20%
- no combustible components

**System components**

- copper pipes (from coil) with connectors for the cooling and heating water intake / outlet
- aluminium heat conducting membranes with molded beading to mount the copper pipes
- spacer tees of galvanized sheet steel, firmly connected to the heat conducting membranes to reinforce the cooling / heating ceiling elements and simplify insertion into the drywall ceiling frame.
- flexible radiant tubes including plug fittings to interconnect the cooling and heating elements or to integrate them into the subsystem.

The cooling and heating elements are integrated parts of the frame and are subject to the relevant standards of DIN, professional associations and manufacturers. The frame should be installed rigid and level. It is possible to layer the frame with plasterboard panels made by various manufacturers, the panels may be of any combination of materials, thickness and design.

**Performance Diagramme GK CU WT**




**Cooling performance**

According to DIN 4715, the system's cooling performance has been separated into two options:

1. Plasterboard cooling ceiling with plasterboard thermal panel, 10 mm thick, unperforated, unfin ished surface, insulated on the back with a 20 mm thick mineral fibre pads, standard cooling per formance 80 W / m²
2. Plasterboard cooling ceiling with a wallboard as typically used in drywalling, 12.5 mm thick, insulat ed on the back with a 20 mm thick mineral fibre pads, standard cooling performance 76 w / m²

The reference area corresponds to the area of the aluminium heat conducting membranes (the QUERLEITUNG within the dry plaster panel is insignificant).

Comparable measurments with a sound-absorbing, perforated plasterboard panel, 12.5 mm thick, unfinished surface and insulated on the back with a 20 mm thick mineral fibre pads resulted in a standard cooling performance of 69 W / m².

**Heating performance**

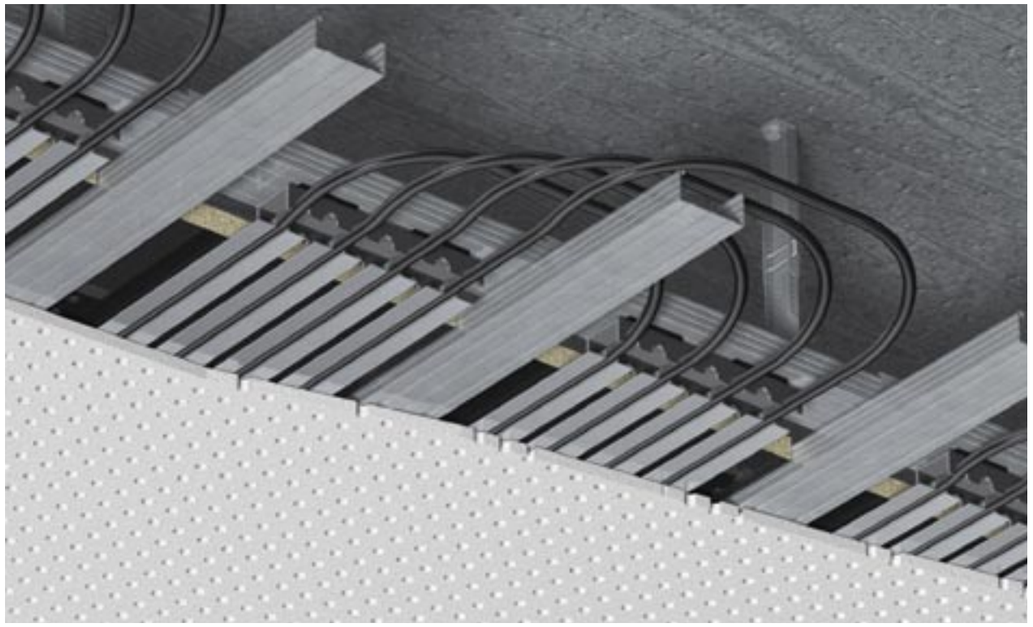
The system's heating performance was determined according to DIN 4715 as follows:

- Plasterboard cooling ceiling with a plasterboard-thermal panel, 10 mm thick, unperforated, unfin ished surface and insulated on the back with a 20 mm thick mineral fibre pads has a standard heating performance of 96 W/ m².

In real situations, several conditions that influence performance deviate from those achieved in testing under DIN 4715, for example:

- ➔ the convective heat transfer to the surface of the radiant ceiling increases when turbulent blended air is created by ceiling vents.
- ➔ radiant heat exchange with a room walls (e.g. outside walls) that exhibit higher surface temperatures
- ➔ rear back ventilation via an open shadow gap
- ➔ when designed as a floating ceiling

In most cases, these deviations lead to an increase in performance in practical applications. For true reliability and exact performance values, we recommend that emco technicians carry out the design using our special programmes.



**System components**

The GK 50 WT system is designed for use in combination with perforated or unperforated plasterboard panels of various makes for manufacturing radiant cooling and heating ceilings and walls. Due to its high level of flexibility, the system opens up a whole new range of options for cooling and heating ceiling designs with economical features.

A conventional frame of ceiling c-profiles (following DIN 18168-1) builds the base of this radiant ceiling design. The cooling and heating ceiling elements are integrated into the frame together with aluminium heat-conducting profiles, so that after layering the GK-panels the modules are pre-stressed, providing optimal thermal conduction. The result is a closed, recessed unit, which ensures optimum heat conducting contact between the plasterboard ceiling and the radiant ceiling.

**Options**

Plasterboard cooling and heating ceilings using the GK 50 WT system can be implemented in a multitude of options, ranging from flat or curved, painted or coated, perforated or unperforated, sound-absorbing or sound-reflecting, and many more. Floating cooling and heating ceilings are also available in various designs.

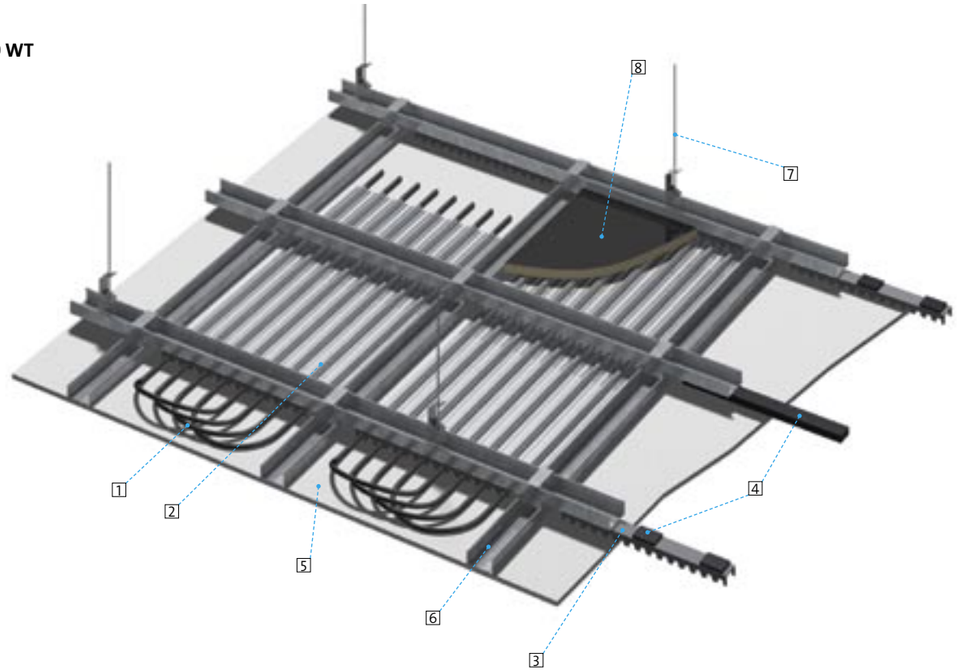
Integrating light fixtures, vents, loudspeakers and other similar items is no problem at all. The system's high level of flexibility allows even short-notice changes to be made during on-site installation. When installing the radiant ceiling, no obstruction arises between the components. Moreover, both components, the cooling and heating technology as well as the ceiling work can be carried out independently of each other.

**Advantages**

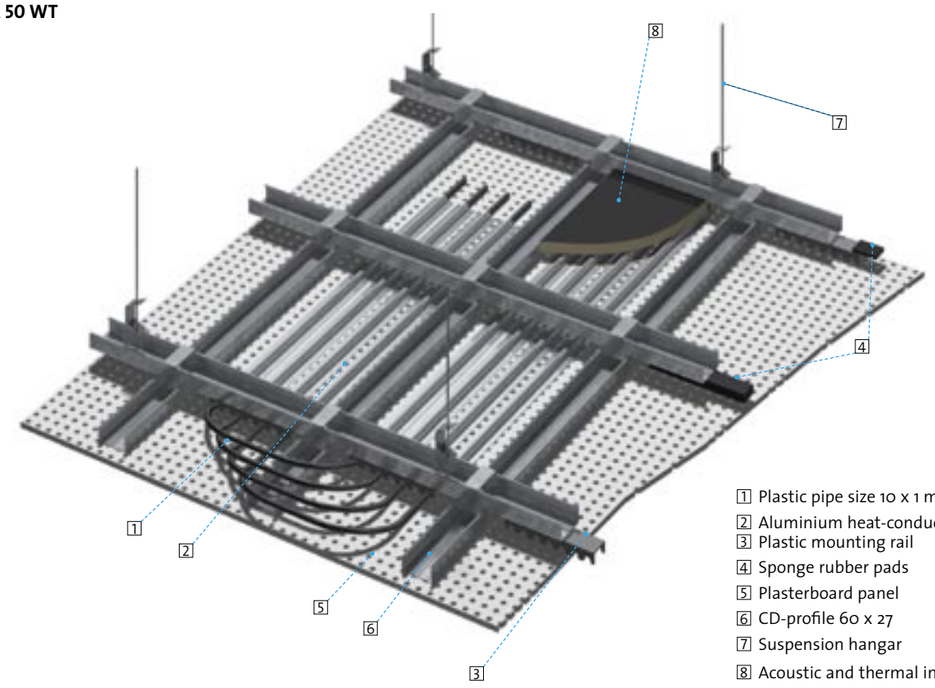
- jointless cooling or heating ceiling system
- perforated ceilings provide a highly effective acoustic surface
- low overall height makes it ideal, even for projects with unfavourable conditions
- high level of design freedom for the architect
- all types of components, such as light fixtures, vents, sprinkler devices, loudspeakers, etc can be integrated easily
- changes in the plan can be implemented during the construction phase with minimal added effort
- high system flexibility
- optimal adaptation to the space
- available also as plasterboard floating ceiling, performance increase of 20%

*Company Kupfer, Heilsbronn*

**GK 50 WT**




**GKA 50 WT**




1 Plastic pipe size 10 x 1 mm
2 Aluminium heat-conducting profile
3 Plastic mounting rail
4 Sponge rubber pads
5 Plasterboard panel
6 CD-profile 60 x 27
7 Suspension hangar
8 Acoustic and thermal insulation



**System components**

- highly flexible, oxygen diffusion proof plastic pipes (following DIN4726) with the dimensions 10 x1,0 mm (according to relevant DIN norms)
- large aluminium heat conducting membranes with molded beading for mounting the plastic pipes
- plastic profile rail to mount the aluminium heat conducting membranes
- rubber coating to create surface pressure on the plasterboard panel
- radiant ceiling manifold for mounting the flow pipes and return flow pipes of the ceiling's individual SUBREGISTERS (TEILREGISTER)
- control components consisting of regulating valve, control drive (Stellantrieb), room thermostat, dew point sensor and shut-off valve

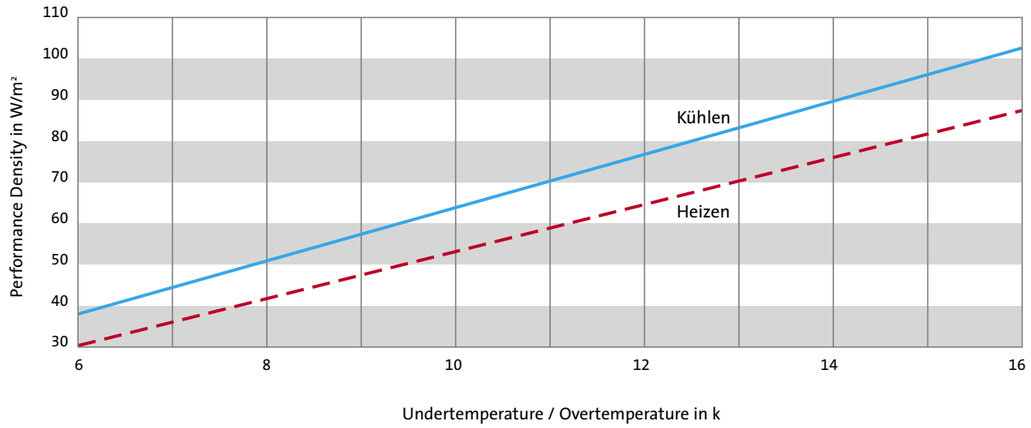
**Design notes**

- The GK 50 WT system is designed for on-site installation of the com ponents into the plasterboard ceiling frame
- The layout of the cooling registers is determined according to the on-site structural conditions and the results of the cooling load calculation
- An installation plan will be created by the planning firm in cooperation with emco's specialised staff
- The installation plan will indicate factors such as installation spacing, connection points and location of the cooling registers
- A calculation sheet will be created, containing all necessary hydraulic data (quantity of water, pressure loss, Reynolds numbers, cooling and heating performance etc.)

**Installation notes**

- Refer and strictly adhere to the installation instructions for the cooling and heating ceiling frame
- Install the cooling registers according to the instructions or where applicable, as given by the contracted firm
- Install manifolds (Verteiler) in the corridor
- Connect manifolds (Verteiler) to the supply pipe
- Connect individual registers to the manifold
- Pressure test the registers including the manifolds according to the pressure test results; have the results logged by the installation firm and return them to the building owner or planning firm
- Mount the plasterboard suspended ceiling

## Performance Diagramme GK 50 WT




**Cooling Performance**
The system's cooling performance has been determined according to DIN 4715.

- Plasterboard cooling ceiling with plasterboard thermal panel, 10mm thick, unperforated, unfined surface, insulated on the back with a 20 mm thick mineral fibre pads, standard cooling performance 62 W / m²

Comparable measurments with a sound-absorbing, perforated plasterboard panel, 12.5 mm thick resulted in a standard cooling performance of 55 W / m².

**Note:** The reference area corresponds to the area of the radiant ceiling system including the area of the frame.

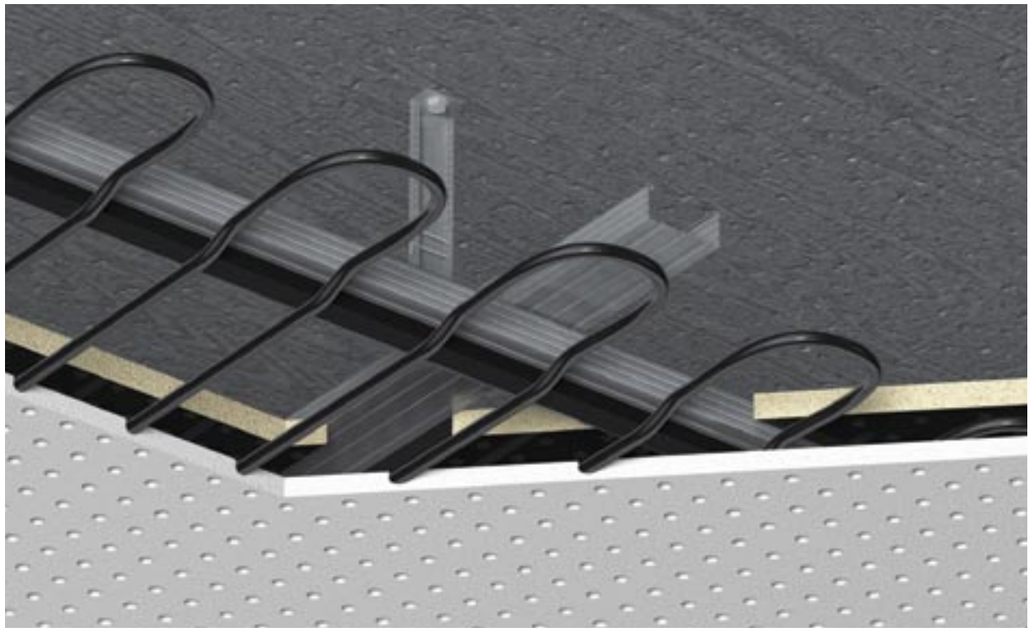
**Heating Performance**
The system's heating performance was determined according to DIN 4715 as follows:

- Plasterboard cooling ceiling with a plasterboard heat-conducting panel, 10 mm thick, unperforated, unfinished surface and insulated on the back with a 20 mm thick mineral fibre pads has a standard heating performance of 80 W/ m².

In real situations, several conditions that influence performance deviate from those achieved in testing under DIN 4715, for example:

- ➔ The convective heat transfer to the surface of the radiant ceiling increases when turbulent blended air is created by ceiling vents
- ➔ radiant heat exchange with a room walls (e.g. outside walls) that exhibit higher surface temperatures
- ➔ rear back ventilation via an open shadow gap
- ➔ when designed as a floating ceiling

In most cases, these deviations lead to an increase in performance in practical applications. For true reliability and exact performance values, we recommend that emco technicians carry out the design using our special programmes.

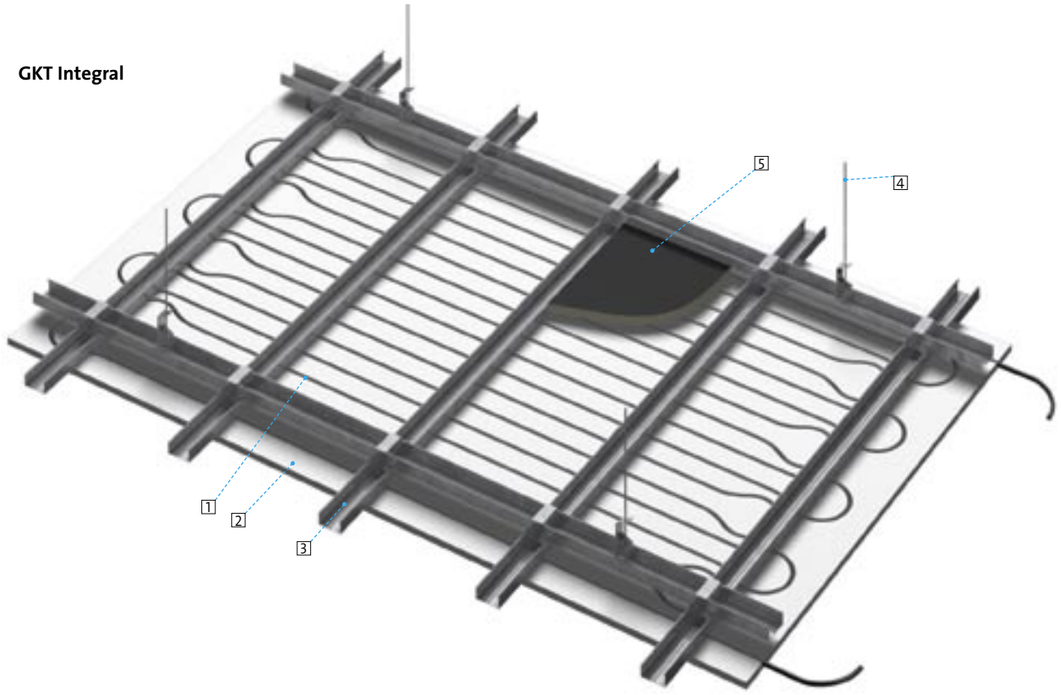


**System components**
The prefabricated cooling and heating system GKT Integral / Akustik is a water-conducting ceiling system with a jointless surface that functions primarily according to the radiation principle. It fulfills all the standards that otherwise could only be achieved through an exact separation of components (system and ceiling producers).
The main component in the GKT Integral / Akustik system is a heat-conducting panel with cooling and heating pipes integrated at the factory. The heat-conducting panel is characterised by a high level of thermal conductivity as well as a high rigidity. The result is excellent cooling and heating performance, whereby there is no impact on the function and properties of the heat-conducting panel.

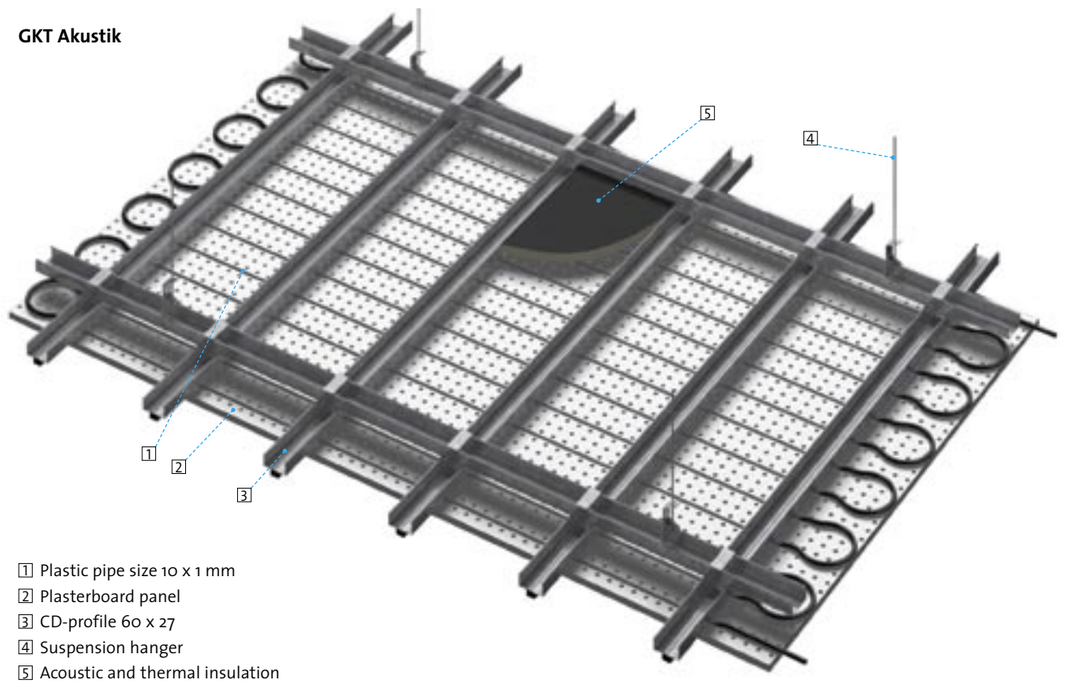
This guarantees optimal heat transfer over the entire ceiling area and the possibility of a faulty installation can be avoided.
The heat-conducting panel is 15 mm thick and available smooth or perforated. The perforated model is an acoustic ceiling whose standard hole pattern is 15/30. Other hole patterns are available upon request.
The heat-conducting panels have a continuous perforation, which results in a jointless and evenly perforated surface.
The heat-conducting panels are mounted on a conventional frame of DIN 18168-1 ceiling c-rails, mounting is done at the marked points only. Inactive areas are created by using conventional 15mm thick plasterboard panels.
The edges of the panel should be glued together. This offers a high degree of guarantee against cracks forming later in time.

*Stadtsparkasse, Herne*

**GKT Integral**




**GKT Akustik**




1 Plastic pipe size 10 x 1 mm
2 Plasterboard panel
3 CD-profile 60 x 27
4 Suspension hanger
5 Acoustic and thermal insulation



**Options / Advantages**

- Available as a smooth or perforated plasterboard ceiling with integrated cooling and heating pipes
- The perforated plasterboard ceiling is available with a coating of acoustical plaster on the visible side
- Available with visible perforation
- The cooling and heating pipes are integrated into the space between the holes in the plaster-board panels, meaning that the panel's acoustic properties are in no way affected
- The air conditioning system is automatically installed with the ceiling, saving additional cost and effort of separate installation
- The patented installation of linking points, e.g. in corridor areas, excludes the possibility of leakage

**System components**

- Highly flexible, oxygen diffusion proof plastic pipes (following DIN 4726) with the dimensions 10 x 1,0 mm (according to relevant DIN norms)
- Highly compressed plasterboard heat-conducting panel
- Flexible plastic connection tubes including fittings to interconnect the cooling and heating elements or to connect them to the subsystem

**Design Notes**

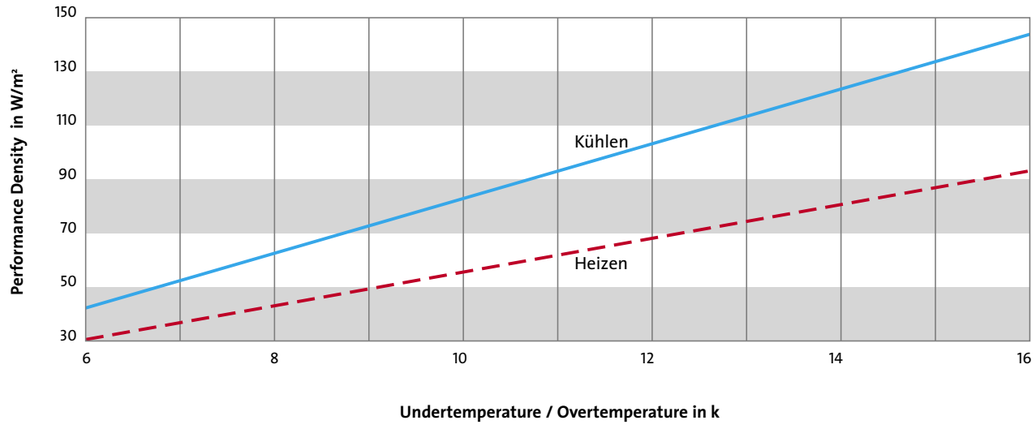
- The GKT-Integral / Akustik system is designed for on-site installation of the heat-conducting panel onto the plasterboard ceiling frame.
- The GKT-Integral / Akustik system is designed for on-site installation of the heat-conducting panel onto the plasterboard ceiling frame.
- The layout of the cooling registers is determined according to the on-site structural conditions and the results of the cooling load calculation
- An installation plan will be created by the planning firm in cooperation with emco's specialised staff
- The installation plan will indicate factors such as installation spacing, connection points and location of the cooling registers
- A calculation sheet will be created, containing all necessary hydraulic data (quantity of water, pressure loss, Reynolds numbers, cooling and heating performance etc.)

**Installation Notes**

- Install the wallboard panels with the integrated cooling and heating pipes diagonal to the tees (spacing 420 mm on unperforated panel / 320 mm on perforated panel) and arrange the edge joints on a tee.
- Install manifolds (Verteiler) in the corridor
- Connect manifolds (Verteiler) to the supply pipe
- Connect individual registers to the manifold
- Pressure test the registers including the manifolds according to the pressure test results; have the results logged by the installation firm and return them to the building owner or planning firm



**Performance Diagramme GK 50 WT**




**Cooling Performance**
The system's cooling performance has been determined according to DIN 4715.

- Plasterboard cooling ceiling with plasterboard thermal panel, 15 mm thick, unperforated, unfinished surface, cooling performance 79 W / m²

Comparable measurments with a sound-absorbing, perforated plasterboard panel, 12.5 mm thick resulted in a standard cooling performance of 70 W / m².

**Note:** The reference area corresponds to the area of the radiant ceiling system less the area of the cooling and heating pipe.

**Heating Performance**
The system's heating performance was determined according to DIN 4715 as follows:

- Plasterboard cooling ceiling with a heat-conducting panel, 15 mm thick, unperforated, unfinished surface, heating performance of 88 W/ m².

In real situations, several conditions that influence performance deviate from those achieved in testing under DIN 4715, for example

- ➔ he convective heat transfer to the surface of the radiant ceiling increases when turbulent blended air is created by ceiling vents
- ➔ radiant heat exchange with a room walls (e.g. outside walls) that exhibit higher surface temperatures
- ➔ rear back ventilation via an open shadow gap
- ➔ when designed as a floating ceiling.

In most cases, these deviations lead to an increase in performance in practical applications. For true reliability and exact performance values, we recommend that emco technicians carry out the design using our special programmes.

**System concept**
The radiant cooling and heating system MD 50 WT / MD CU WT is a water-conducting ceiling system that functions primarily according to the radiation principle. It distinguishes itself through its various application and design options. It is primarily used in office and administrative buildings, shops, conference rooms and treatment rooms in hospitals.

**Options**
This system is designed for use in combination with metal panels, which are available in various options:

- perforated or unperforated and thus either sound absorbing or sound reflecting
- part of linear grid system or concealed frame
- available as rectangular panels or tiles
- hingeable or removable / clip in or lay on

Extensive and permanent contact between radiant ceiling elements is primarily achieved by glueing or form fitting. The radiant ceiling element is available in three types of material:

- copper pipe meanders
- plastic pipe of oxygen diffusion proof plastic
- plastic pipe as a polypropylene capillary tube mat

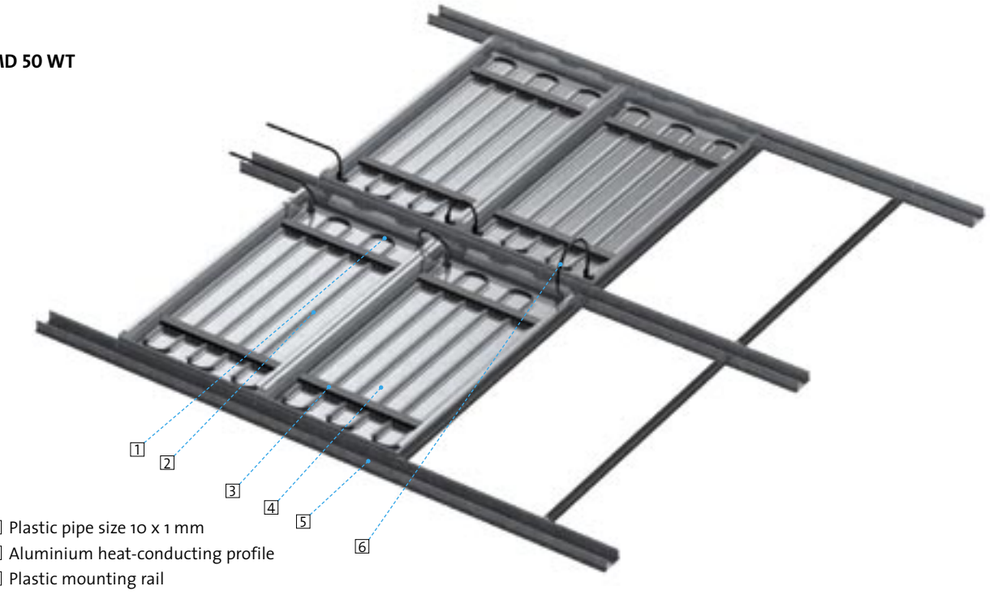
The 50 WT / MD CU WT radiant ceiling system thus offers many options for application in extensive closed suspended ceilings. Floating ceilings are also available in various designs.

**Advantages**

- hingeable or swing-off metal tiles allow easy access to the ceiling
- high degree of design variety and combination freedom for the architect
- low variations in temperature in occupied areas
- oxygen diffusion proof system according to DIN 4726 (copper and plastic pipes)
- flexible connecting of the radiant elements with removable connectors
- manufactured in the emco factory
- easy to install in existing ceilings
- sound absorption, fire protection and sound insulation possible
- high cooling and heating performance

*Sparkasse, Paderborn*

**MD 50 WT**




1 Plastic pipe size 10 x 1 mm
2 Aluminium heat-conducting profile
3 Plastic mounting rail
4 Metal plate
5 Linear grid profile
6 Flexible connector hose

**MD CU WT**


1 Plastic pipe (DIN 8905)
2 Aluminium heat-conducting profile
3 Metal plate
4 Flexible connector hose
5 Linear grid profile



**System components**

- Heat exchange element consisting of aluminium extruded profiles and a form-fit copper pipe meander (following DIN 4726) or an oxygen diffusion proof (DIN4726) plastic pipe sized 10 x 1,0 mm
- Heat exchange element as a plastic pipe-mat module made of type 3 PP copolymer (DIN 80787), quality standard following DIN ISO 9001/SKZ-1000 testing
- Flexible connector hose made of plastic, stainless steel braided plastic or stainless steel corrugated hoses including plug fittings to interconnect the cooling and heating elements or to connect these to the subsystem
- Radiant ceiling manifold for mounting the flow pipes and return flow pipes of the ceiling's individual subregisters
- Control components consisting of regulating valve, control drive (Stellantrieb), room thermostat, dew point sensor and shut-off valve

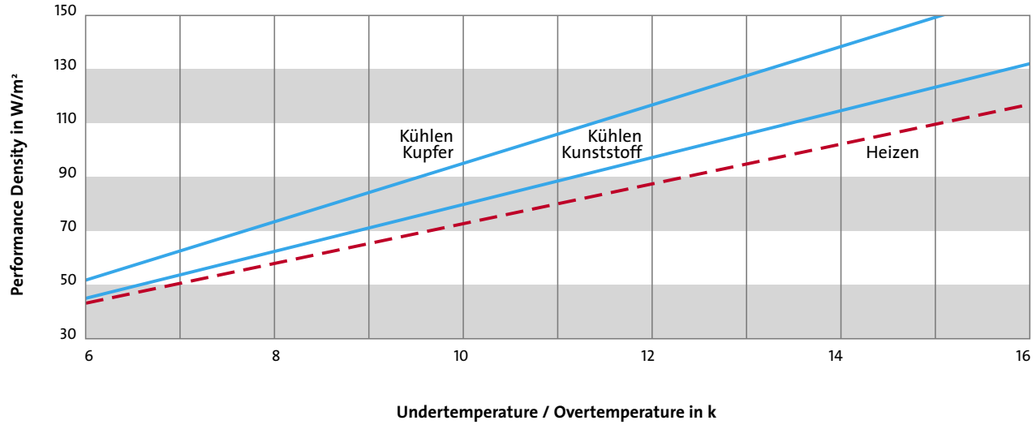
**Design notes**

- The heat exchange elements can be glued into the ceiling panels either on site, at the manufacturing factory or by the drywall contractor
- The layout of the cooling registers is determined according to the on-site structural conditions and the results of the cooling load calculation
- An installation plan will be created by the planning firm in cooperation with emco's specialised staff
- The installation plan will indicate factors such as installation spacing, connection points and location of the cooling registers
- A calculation sheet will be created, containing all necessary hydraulic data (quantity of water, pressure loss, Reynolds numbers, cooling and heating performance etc.

**Installation notes**

- Determine the number of ceiling panels that should have heat exchange elements mounted on them
- Install the cooling registers according to the instructions or where applicable, as given by the contracted firm
- Install manifolds in the corridor
- Connect manifolds to the supply pipe
- Connect individual registers to the manifold
- Pressure test the registers including the manifolds according to the pressure test results; have the results logged by the installation firm and return them to the building owner or planning firm

**Performance Diagramme MD 50 WT / MD CU WT**




**Cooling performance**
The system's cooling performance has been determined according to DIN 4715

- rectangular panels of perforated sheet steel with acoustic fleece, insulated on the back with 20 mm thick mineral fibre pads, standard cooling performance of 93 W / m² with copper pipes, standard cooling performance of 80 W / m² with plastic pipes and 83 W / m² with capillary tube mats.

**Note:** The reference area corresponds here to the area of the ceiling panels.

**Heating performance**
The system's heating performance was determined according to DIN 4715 as follow

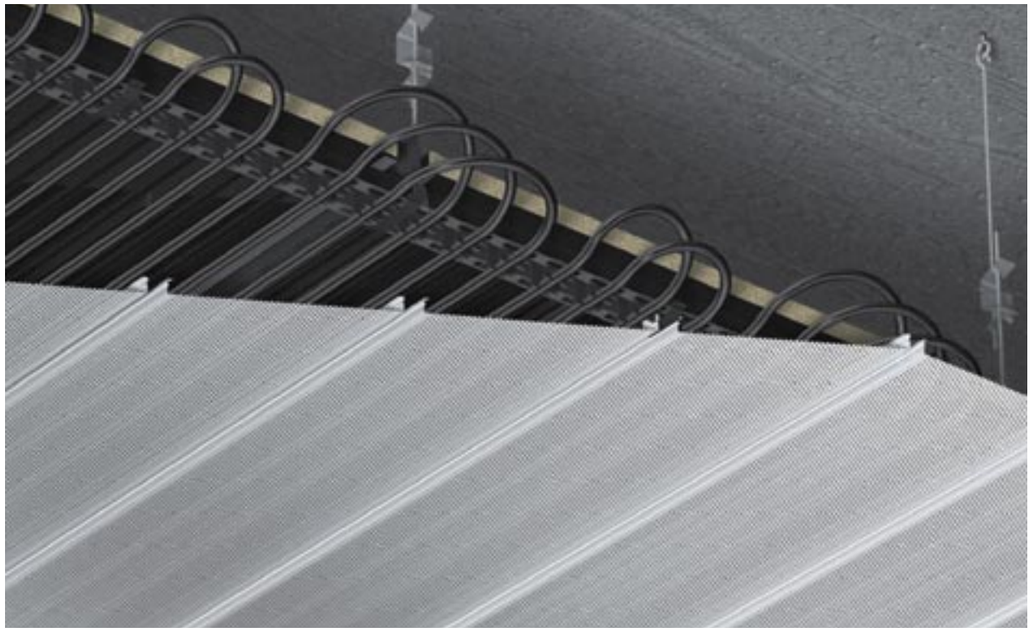
- rectangular panels of perforated sheet steel with acoustic fleece, insulated on the back with 20 mm thick mineral fibre pads have a standard heating performance of 110 W / m²

In real situations, several conditions that influence performance deviate from those achieved in testing under DIN 4715, for example:

- ➔ the convective heat transfer to the surface of the radiant ceiling increases when turbulent blended air is created by ceiling vents
- ➔ radiant heat exchange with a room walls (e.g. outside walls) that exhibit higher surface temperatures
- ➔ rear back ventilation via an open shadow gap
- ➔ when designed as a floating ceiling

In most cases, these deviations lead to an increase in performance in practical applications. For true reliability and exact performance values, we recommend that emco technicians carry out the design using our special programmes.

*Sparkasse, Paderborn*



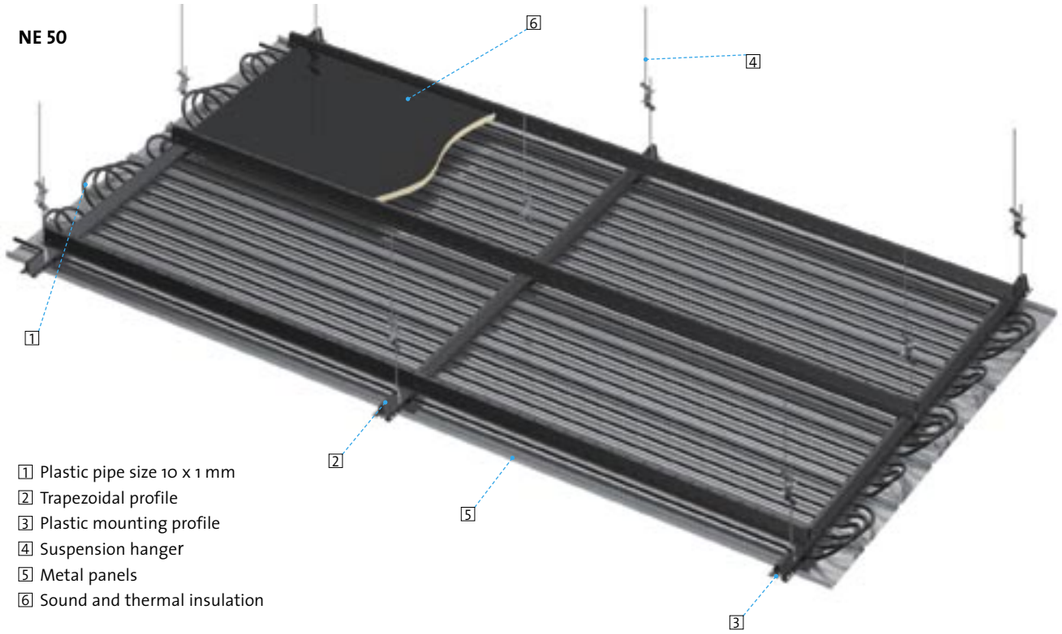
**System concept**
The NE 50 / NE 3000 system is designed for use in combination with smooth and perforated aluminium panels for manufacturing radiant cooling and heating ceilings. Aluminium panels are highly favoured by architects and building owners due to their high level of flexibility and a nearly unlimited range of design options. Flexible concepts for partitioning and the possibility of modifiying the room's geometrical layout or its use can be realised with minimal time and cost. The construction process is realised in a standard manner (panel ceiling by the ceiling manufacturer, heating/cooling technology by the systems engineers) that in no way affects the harmony of the implementation. Radiant panel ceilings can be used in almost any area in which suspended ceilings are found, ranging from small shops, offices, supermarkets, automobile showrooms, large halls to major airports. The system is available in a variety of options:

- smooth or perforated and thus sound absorbing or sound reflecting
- as part of linear grid system or with concealed frame
- linear or diagonal arrangement in the room
- sloping or radial installation
- panel widths of 30 mm to 400 mm available

The cooling and heating elements are available as either copper pipe meanders or oxygen diffusion proof plastic pipes

*Company Alanod, Ennepetal*

**NE 50**




1 Plastic pipe size 10 x 1 mm
2 Trapezoidal profile
3 Plastic mounting profile
4 Suspension hanger
5 Metal panels
6 Sound and thermal insulation

**NE 3000**


1 Plastic pipe (DIN 8905)
2 Aluminium heat-conducting profile
3 Aluminium panel
4 Flexible connector hose
5 Linear grid profile

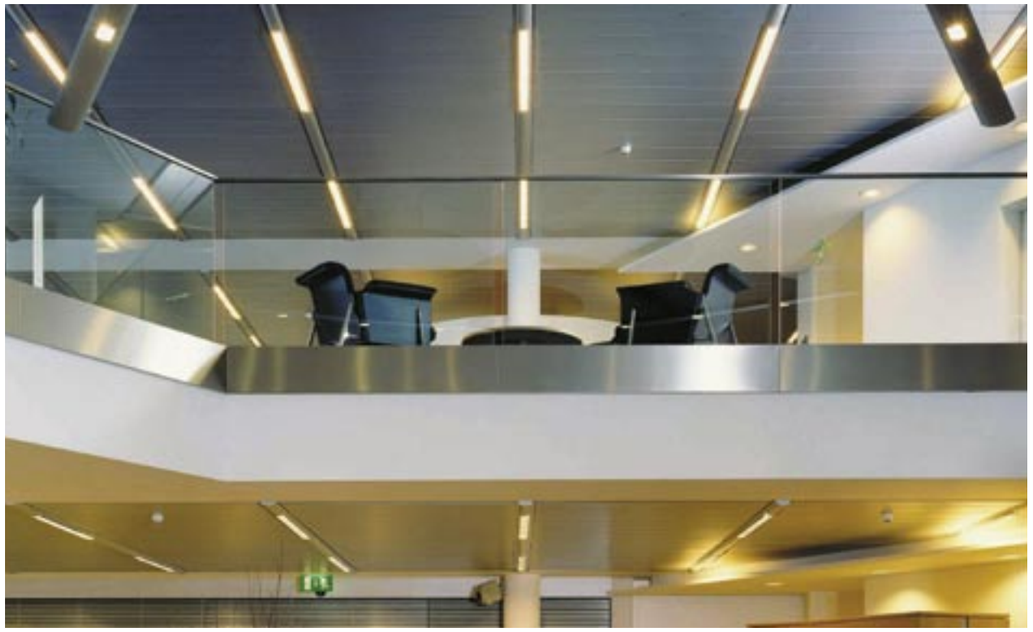


**Advantages**

- removable aluminium panels allow easy access to the ceiling
- high degree of design variety and combination freedom for the architect
- low variations in temperature in occupied areas
- oxygen diffusion proof system according to DIN 4726
- flexible connecting of the radiant elements with removable connectors
- easy to install, existing ceilings can be retrofitted
- sound absorption and sound insulation possible
- high cooling and heating performance
- excellent price-performance-ratio
- painted or anodised surfaces possible
- energy efficient
- quick installation

**System components**

- highly flexible, oxygen diffusion roof plastic pipes (following DIN 4726) with the dimensions 10 x 1,0 mm (according to relevant DIN norms)
- plastic profile rail to mount the cooling and heating pipes
- heat exchange element consisting of aluminium extruded profiles and a form-fit copper pipe meander (DIN 8905) or an oxygen diffusion proof (DIN 4726) plastic pipe sized 10 x 1,0 mm
- radiant ceiling manifold for mounting the flow pipes and return flow pipes of the ceiling's individual subregisters
- Control components consisting of regulating valve, control drive, room thermostat, dew point sensor and shut-off valve



**Design notes**

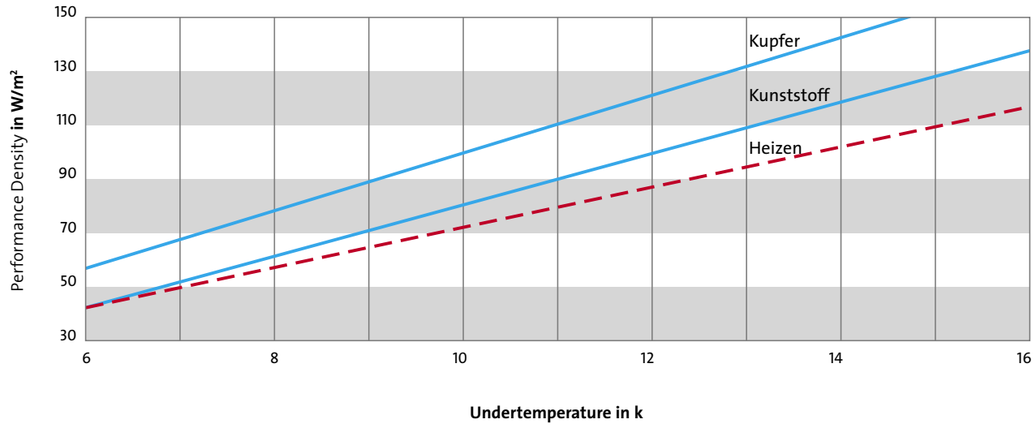
- The NE 50 / NE 3000 system is designed for on-site installation of the components onto the frame of the aluminium panel ceiling
- The layout of the cooling registers is determined according to the on-site structural conditions and the results of the cooling load calculation
- An installation plan will be created by the planning firm in cooperation with emco's specialised staff
- The installation plan will indicate factors such as installation spacing, connection points and location of the cooling registers
- A calculation sheet will be created, containing all necessary hydraulic data (quantity of water, pressure loss, Reynolds numbers, cooling and heating performance etc)

**Installation notes**

- Install the cooling registers according to the instructions or where applicable, as given by the contracted firm
- Install manifolds in the corridor
- Connect manifolds to the supply pipe
- Connect individual registers to the manifold
- Pressure test the registers including the manifolds according to the pressure test results; have the results logged by the installation firm and return them to the building owner or planning firm



**Performance Diagramme NE 50 / NE 3000**




**Cooling performance**

The system's cooling performance has been determined according to DIN 4715

- aluminium panel ceiling NE 50, perforated; aluminium panel system 185/15 insulated on the back with 20 mm thick mineral fibre pads, standard cooling performance of 79 W / m²
- aluminium panel ceiling NE 3000 as perforated, rectangular panels, with acoustic fleece, insulated on the back with 20 mm thick mineral fibre pads, standard cooling performance of 96 W / m² with copper pipes; standard cooling performance of 83 W / m² with plastic pipes and 85 W / m² with capillary tube mats.

**Note**

The reference area corresponds here to the area of the radiant ceiling system or the area of the ceiling panel

**eating performance**

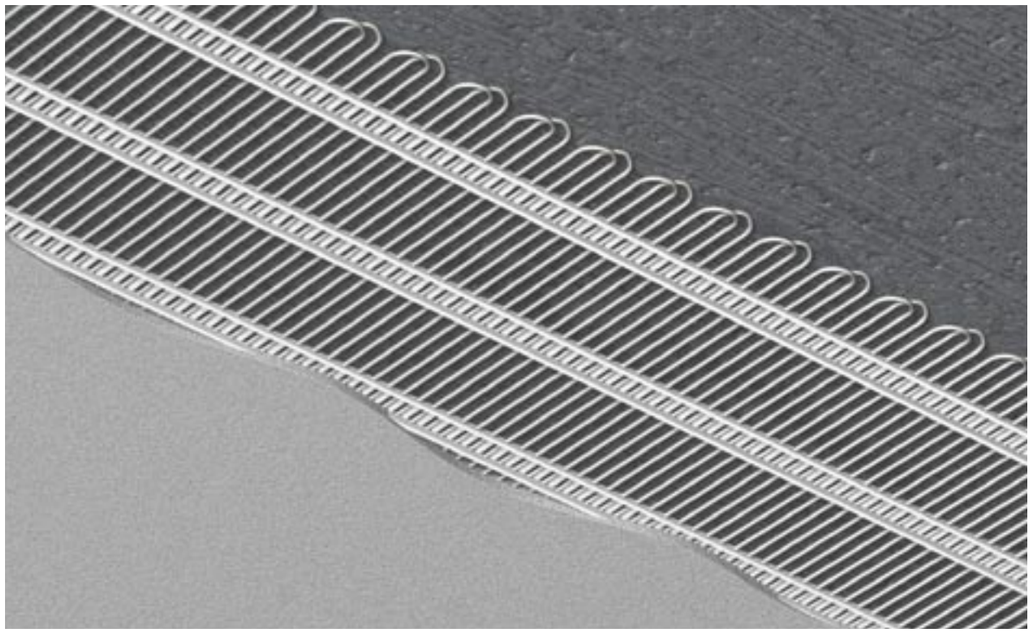
The system's heating performance was determined according to DIN 4715 as follows:

- aluminium panel ceiling NE 3000 as perforated rectangular panels with acoustic fleece, insulated on the back with 20 mm thick mineral fibre pads has a standard heating performance of 110 W / m²

In real situations, several conditions that influence performance deviate from those achieved in testing under DIN 4715, for example:

- ➔ the convective heat transfer to the surface of the radiant ceiling increases when turbulent blended air is created by ceiling vents
- ➔ radiant heat exchange with a room walls (e.g. outside walls) that exhibit higher surface temperatures
- ➔ rear back ventilation via an open shadow gap or when designed as a floating ceiling

In most cases, these deviations lead to an increase in performance in practical applications. For true reliability and exact performance values, we recommend that emco technicians carry out the design using our special programmes.



**System concept**
Conventional cooling systems require appropriate space in order to produce a pleasant ambient atmosphere in office and work space, meaning that in most cases, valuable space is lost when a cooling system is installed.

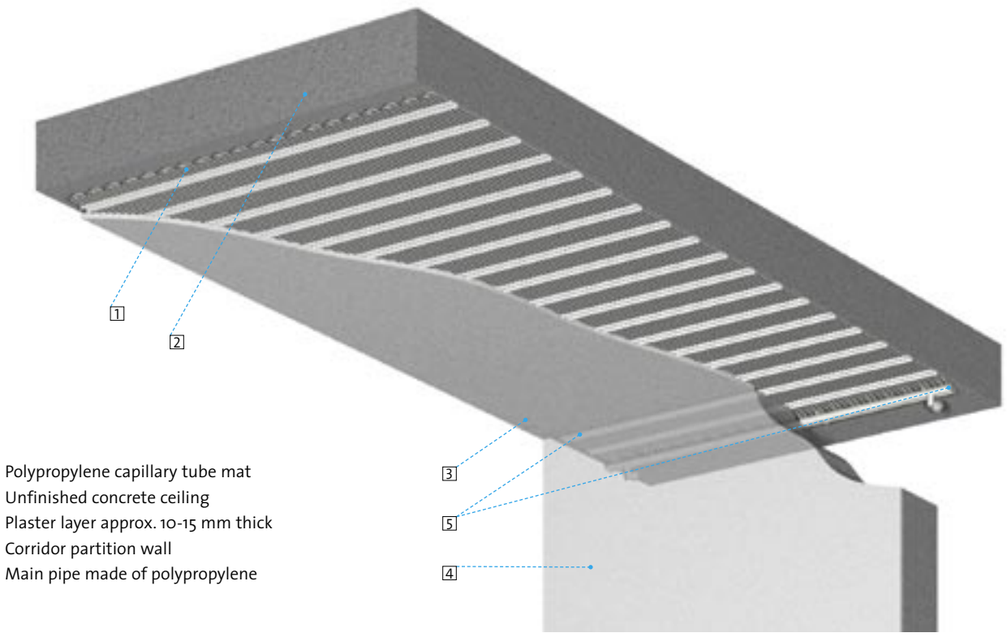
Buildings using conventional air conditioning systems in false ceilings usually have less stories than buildings using space-saving systems. Lower operating costs, absolute silence and the highest level of thermal comfort are three excellent reasons to make the emco PP-Chilled Ceiling your number one choice.

The capillary tube system distinguishes itself through extremely small dimensions and its ability to integrate perfectly into the ceiling plaster. It is fitted with only a very short distance to the upper layer of plaster making the active ceiling extremely responsive and consistently controllable. The PP-System functions primarily by way of radiation and thus contributes to a comfortable and pleasant atmosphere, ultimately increasing productivity.

**Options**
The capillary mat is embedded into an approximately 10-15 mm thick layer of plaster. Both concrete and drywall ceilings can be fitted with this system. The main and connector tubes are brought out of the plaster in the corridor areas or when integrated into a drywall ceilings they are led into the false ceiling, where they are connected to the primary cold/hot water supply pipe. This simple method of installation allows a great level of freedom in choosing the desired ceiling design. In addition to curved ceilings, all conventional designs are available.

**Advantages**
- jointless chilled or heated ceiling system
- extremely low height (approx. 10-15 mm) makes this system well suited for retrofitting
- self-deventilating system
- defective capillary tubes easily repaired through welding
- great degree of design variety for the architect
- system has a high level of flexibility and thus adapts well to the surrounding architecture

*DePfa-Bank, Wiesbaden*




1 Polypropylene capillary tube mat
2 Unfinished concrete ceiling
3 Plaster layer approx. 10-15 mm thick
4 Corridor partition wall
5 Main pipe made of polypropylene

**System components**

- Capillary pipe system consisting of highly flexible polypropylene capillaries in connection with main pipes for feed and return-flow.
- Main pipe of polypropylene to be welded directly onto the distribution pipe or with plug-in connectors for quick installation
- Additional mounting fixtures to position the capillary tube mats to the unfinished concrete or fibreboard ceiling
- Polypropylene distribution pipes
- Control components consisting of regulating valve, control drive, room thermostat, dew point sen sor and shut-off valve
- Transmission unit to separate primary and secondary circuits as well as oxygen diffusion proof and leaking components

**Design notes**

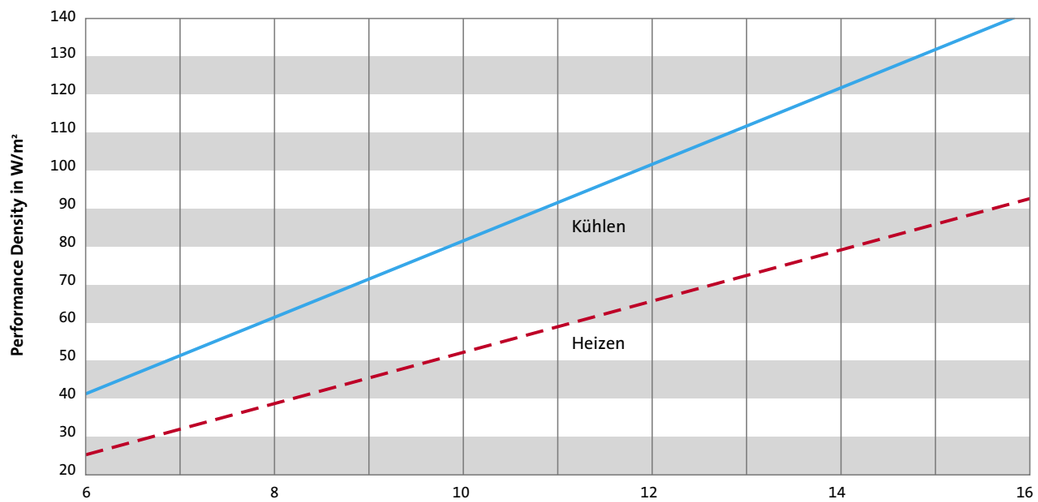
- The PP system is designed for flush-mounting in concrete or fiberboard ceilings.
- The layout of the individual control systems and capillary tube mats is done on-site and appropriate to the building conditions and in accordance with the calculated heat requirement and cooling load
- An installation plan will be created by the planning firm in cooperation with emco's specialised staff. The installation plan will indicate factors such as installation spacing, connection points and location of the cooling registers
- A calculation sheet will be created, containing all necessary hydraulic data (quantity of water, pressure loss, Reynolds numbers, cooling and heating performance etc)

**Installation notes**

- Installation instructions for the emco PP system are included and must be strictly adhered to
- hydraulically connect the capillary tube mats, suspend coiled up from the unfinished ceiling and check for seal tightness
- check the subsurface and then coat the unfinished concrete ceiling with a bonding compound (e.g. 'Betonkontakt' from Knauf)
- Option 1: Mount capillary tube mat onto the concrete ceiling and then apply a 10-15 mm thick layer of plaster
- Option 2: Apply machine plaster (e.g. MP75 G/F) to the concrete ceiling according to the number of mats to be installed
- Apply plaster according to the manufacturer's instructions
- Uncoil capillary tube mats and press into the plaster
- Carefully seal the plastered mats, taking care not to use any sharp materials or tools
- Apply a cover layer of plaster until a overall thickness of approx. 10 mm has been reached



**Performance Graph for Installation Spacing of 75 mm**




**Cooling performance**

The system's cooling performance has been determined according to DIN 4715:

- Chilled ceiling PP with a plaster thickness of 10-15 mm, plaster MP 75, standard cooling performance 83 W / m²

**Heating performance**

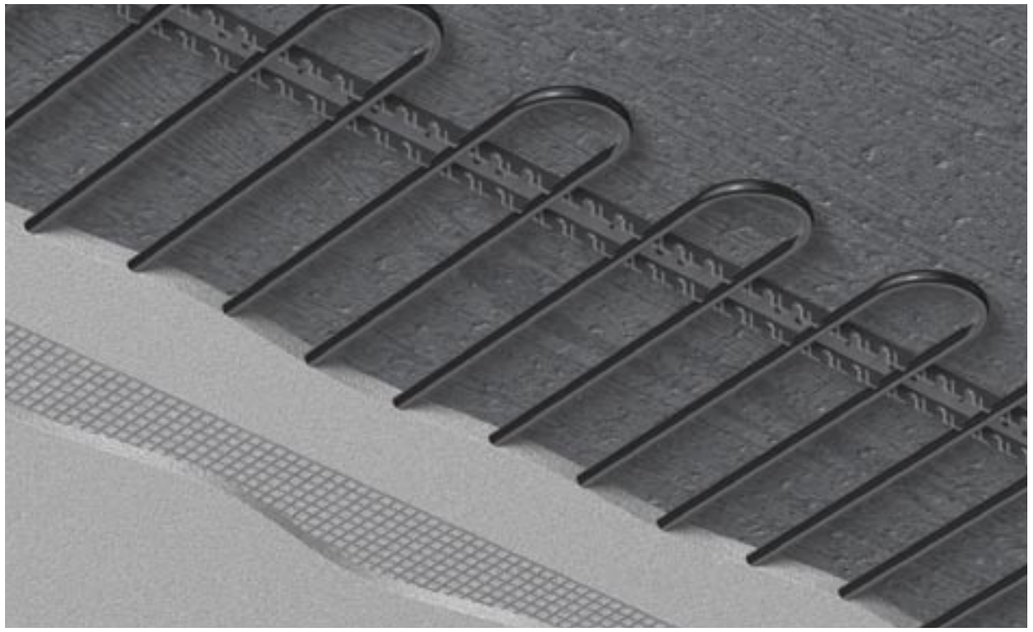
The system's heating performance was determined according to DIN 4715 as follows:

- Heated ceiling PP with a plaster thickness of 10-15 mm, plaster MP 75, unfinished surface, standard cooling performance 85 W / m²

In real situations, several conditions that influence performance deviate from those achieved in testing under DIN 4715, for example:

- ➔ the convective heat transfer to the surface of the radiant ceiling increases when turbulent blended air is created by ceiling vents
- ➔ radiant heat exchange with room walls (e.g. outside walls) that exhibit higher surface temperatures

In most cases, these deviations lead to an increase in performance in practical applications. Our extensive experience in installing such systems enables us to make these assess-ments. For true reliability and exact performance values, we recommend that emco technicians carry out the design using our special pro-grammes.



**System Concept**

This system is designed for use in commercial and office space as well as single-family or multiple-family homes. It is also suitable for use in restored old buildings. Its relatively small size of 20-25 mm and its high level of flexibility open up a multitude of new possibilities in designing an economical radiant cooling and heating system. Mat modules form the basis for this system, which are arranged together with other system components and then mounted onto the concrete ceiling. The cooling registers are then plastered according to general specifications.

**Options**

Plastered radiant cooling and heating ceilings with the *Putz-Schiene* are available in several different variations, which distinguish themselves by the spacing and resulting cooling and heating performance. Spacing is determined according to the project specifications and the needs of the building's users; standard spacing choices are 50, 75 and 100. The distribution of the cooling and heating medium in relation to the individual cooling and heating circuits is carried out according to a reliable cooling and heating manifolds. These can be equipped with dual subsystems to minimize the number of cooling and heating circuits – with the same pressure drop and mass flow rate.

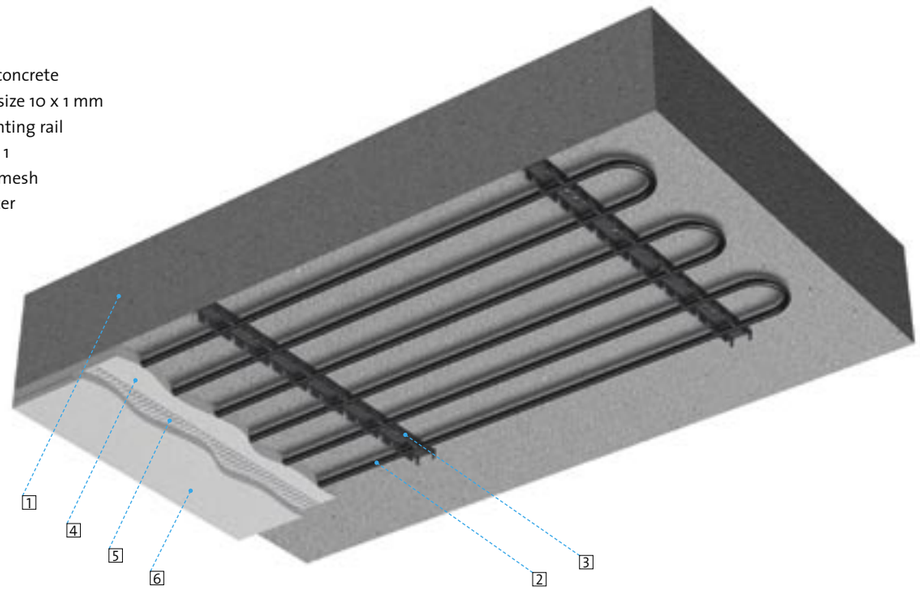
Room temperature can be controlled using a dew point sensor as a limiter, which automatically shuts off the cool water circulation when the dew point temperature is reached. The system uses a room temperature control device, which switches the heating and cooling functions in sequence.

**Advantages**

- jointless chilled or heated ceiling system
- low overall height makes it ideal, even for projects with unfavourable conditions
- cost-effective system
- all types of components, such as light fixtures, vents, sprinkler devices, loudspeakers, etc can be integrated easily
- changes in the plan can be implemented during the construction phase with minimal added effort
- high system flexibility
- good price-performance ratio
- optimal adaptation to the space
- thermal storage capacity is utilized by embedding the system into the ceiling plaster

*Sparkasse Neumarkt, Nürnberg*

1 Unfinished concrete
2 Plastic pipe size 10 x 1 mm
3 Plastic mounting rail
4 Plaster layer 1
5 Reinforcing mesh
6 Ceiling plaster




**System components**

- highly flexible, oxygen diffusion proof plastic pipes (following DIN 4726) with the dimensions 10 x 1,0 mm (according to relevant DIN norms)
- plastic profile rail to mount the cooling and heating pipes
- heat exchange element consisting of aluminium extruded profiles and a form-fit copper pipe meaner (DIN 8905) or an oxygen diffusion proof (DIN 4726) plastic pipe sized 10 x 1,0 mm
- radiant ceiling manifold for mounting the flow pipes and return flow pipes of the ceiling's individual subregisters
- Control components consisting of regulating valve, control drive (Stellantrieb), room thermostat, dew point sensor and shut-off valve

**Design notes**

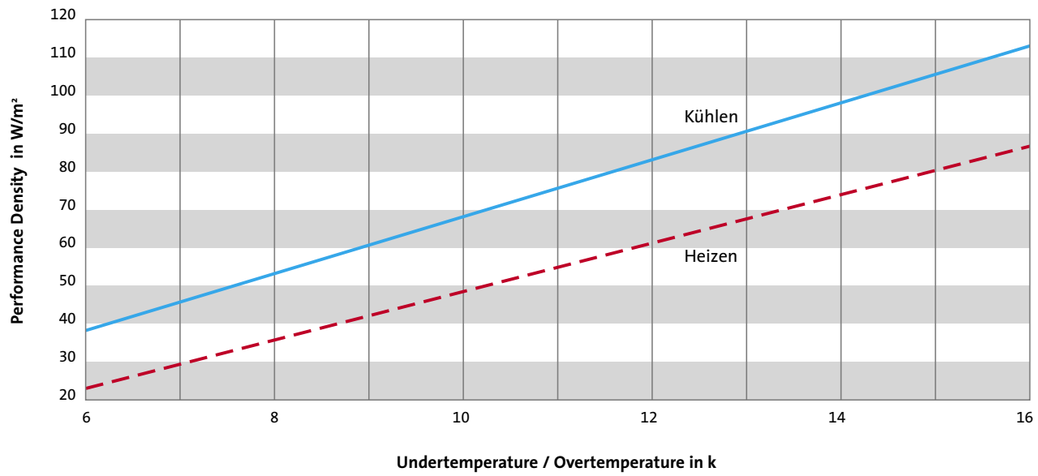
- The system is designed for on-site installation of the cooling and heating pipes to the plastic profile rails in the ceiling
- The layout of the cooling registers is determined according to the on-site structural conditions and the results of the cooling load calculation
- An installation plan will be created by the planning firm in cooperation with emco's specialised staff
- The installation plan will indicate factors such as installation spacing, connection points and location of the cooling registers
- A calculation sheet will be created, containing all necessary hydraulic data (quantity of water, pressure loss, Reynolds numbers, cooling and heating performance etc)

**Installation notes**

- Install the plastic mounting rails and the cooling/heating pipes according to the plan
- Install manifolds in the corridor
- Connect manifolds to the supply pipe
- Connect individual registers to the manifold
- Pressure test the registers including the manifolds according to the pressure test results; have the results logged by the installation firm and return them to the building owner or planning firm
- apply ceiling plaster according to general recommendations



**Performance Diagramme with spacing of 75 mm**




**Cooling performance**

The system's cooling performance has been determined according to DIN 4715

- cooling ceiling *Putz-Schiene* with a plaster thickness of 25 mm, unfinished surface, spacing of cooling pipes 75 mm, standard cooling performance of 66 W / m²

**Heating performance**

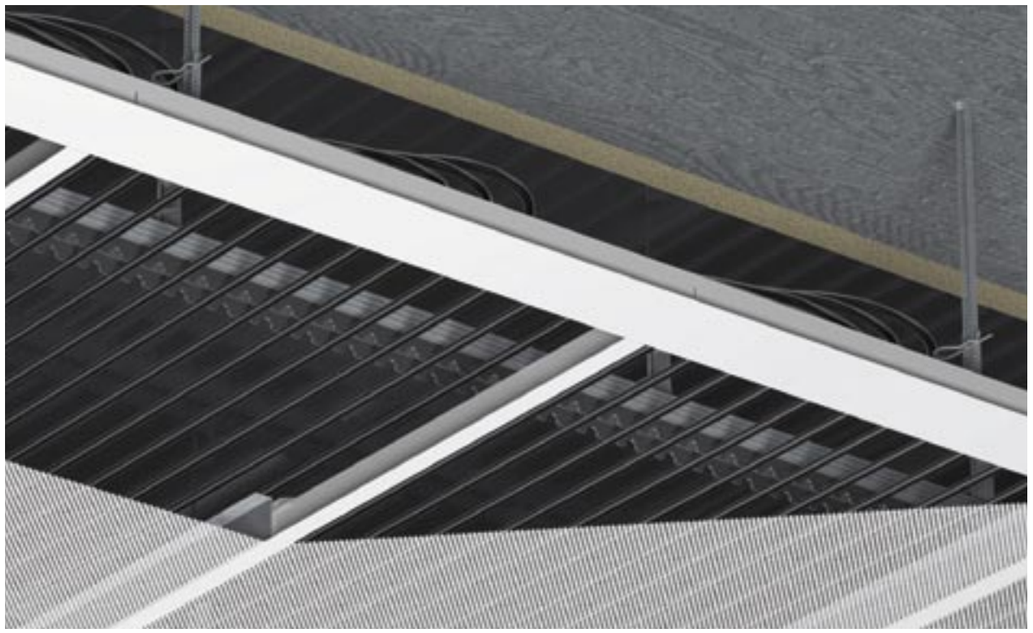
The system's heating performance was determined according to DIN 4715 as follows

- heated ceiling *Putz-Schiene* with a plaster thickness of 25 mm, unfinished surface, spacing of heating pipes 75 mm, standard cooling performance 78 W / m²

In real situations, several conditions that influence performance deviate from those achieved in testing under DIN 4715, for example

- ➔ the convective heat transfer to the surface of the radiant ceiling increases when turbulent blended air is created by ceiling vents
- ➔ radiant heat exchange with a room walls (e.g. outside walls) that exhibit higher surface temperatures

In most cases, these deviations lead to an increase in performance in practical applications. Our extensive experience in installing such systems enables us to make these assessments. For true reliability and exact performance values, we recommend that emco technicians carry out the design using our special programmes



**System concept**
The convection cooling ceiling system RA 50 is designed for use in combination with suspended ceilings of various makes for manufacturing convective radiant ceilings. The main difference to closed radiant ceilings is that an suspended ceiling has the highest level of free area.

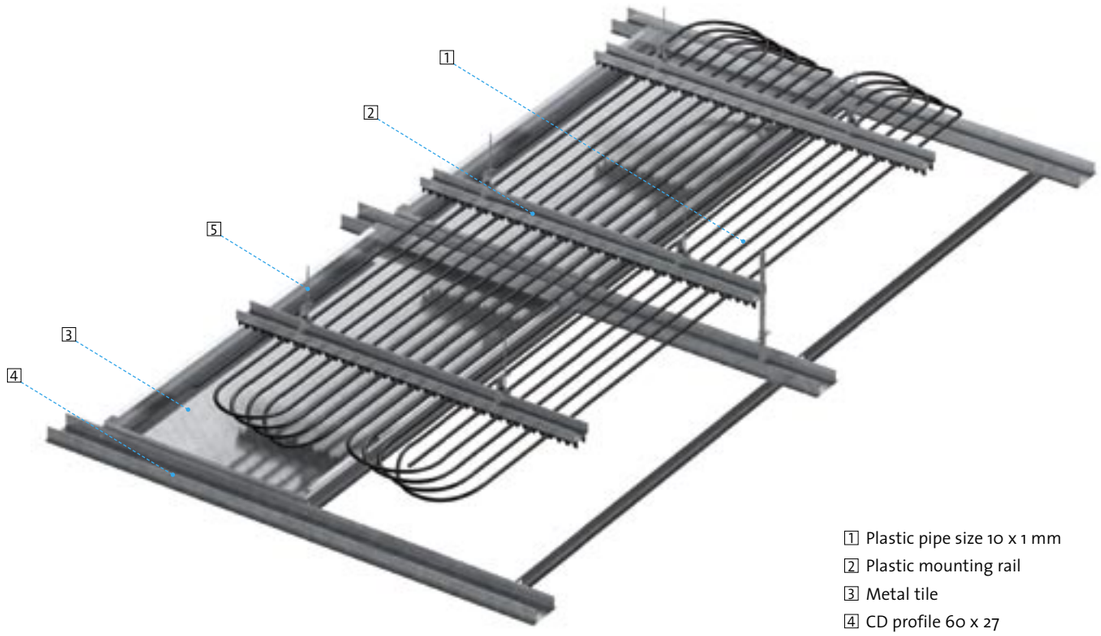
This allows the air in the room to flow unhindered through the ceiling cavity and cool down via the cooling conducting pipes. These pipes are located in a pre-defined spacing from the concrete ceiling and the suspended ceilings.

**Options**
The system's high level of flexibility and its quick and easy installation make it ideal for entry and display areas, airport terminals as well as office-administration buildings. As an suspended ceilings many different design options are available, all with a high level of free area:
- expanded metal ceilings
- aluminium grid ceilings
- perforated metal tiles
- perforated aluminium tiles
- perforated plasterboard ceilings

The system is available with the following materials, making it ideal for use in various types of ceilings:
- copper pipe meanders
- plastic pipe meanders or oxygen diffusion proof plastic

**Advantages**
- extremely high performance: with a free area of 80% under the suspended ceilings, a cooling performance of approx. 130 w/m²; using aluminium heat conducting membranes the performance increases to approx. 200 w/m²
- low overall height allows for integration, even under unfavourable conditions
- high degree of design variety and combination freedom for the architect
- all types of components, such as light fixtures, vents, sprinkler devices, loudspeakers, etc can be integrated easily
- system is clearly separated form the ceiling, resulting in many design advantages
- excellent for use in restoration and retrofitting work
- changes in the plan can be implemented during the construction phase with minimal added effort
- high system flexibility
- optimal adaptation to the space


*Company Catem, Herxheim*




1 Plastic pipe size 10 x 1 mm
2 Plastic mounting rail
3 Metal tile
4 CD profile 60 x 27
5 Suspension hanger

**System components**

- Heat exchange element consisting of aluminium extruded profiles and a form-fit copper pipe (following DIN 4726) or an oxygen diffusion proof (DIN 4726) plastic pipe sized 10 x 1,0 mm
- Flexible connector hose made of plastic, stainless steel braided plastic or stainless steel corrugated hoses including plug fittings to interconnect the cooling and heating elements or to connect these to the subsystem
- Radiant ceiling manifold for mounting the flow pipes and return flow pipes of the ceiling's individual subregisters
- Control components consisting of regulating valve, control drive, room thermostat, dew point sensor and shut-off valve

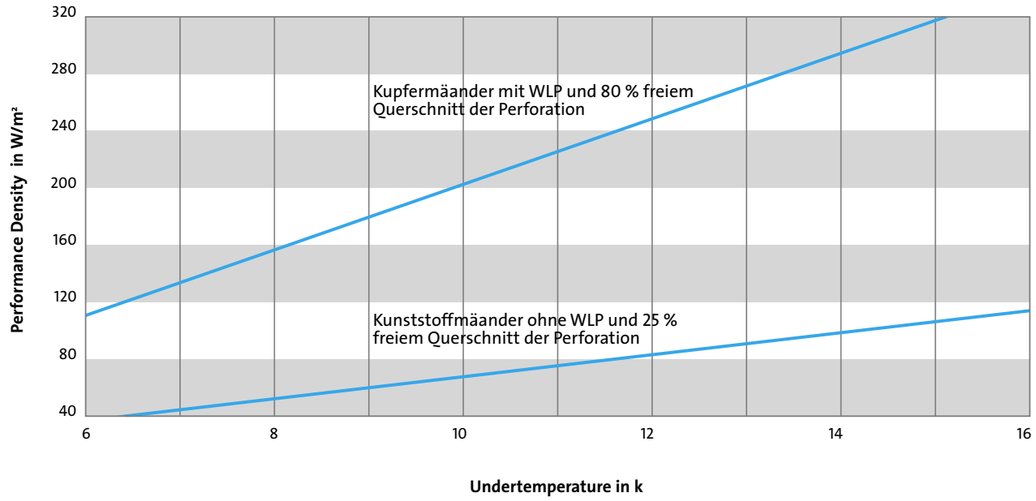
**Design notes**

- The convection cooling ceiling system RA 50 is designed to have the components be installed on-site in the frame of the suspended ceiling
- The layout of the cooling registers is determined according to the on-site structural conditions and the results of the cooling load calculation.
- An installation plan will be created by the planning firm in cooperation with emco's specialised staff
- The installation plan will indicate factors such as installation spacing, connection points and location of the cooling registers
- A calculation sheet will be created, containing all necessary hydraulic data (quantity of water, pressure loss, Reynolds numbers, cooling and heating performance etc)

**Installation notes**

- Install the cooling coils according to the instructions or by the contracted firm, depending on the suspended ceiling and the choice of material
- install manifolds
- Connect manifolds to the supply pipes
- Connect cooling registers to the manifold
- Pressure test the registers including the manifolds according to the pressure test results; have the results logged by the installation firm and return them to the building owner or planning firm
- Install the suspended ceiling

## Performance Diagramme RA 50




**Cooling performance**
The system's cooling performance has been determined according to DIN 4715.

- metal tiles of perforated sheet steel [s = 0.7 mm], without acoustic fleece, unfinished surface, free space in perforation of 25%, standard cooling performance of 65 W/m²
- expanded metal ceiling, unfinished surface, free space in perforation of 80%, cooling performance of 130 W/m²

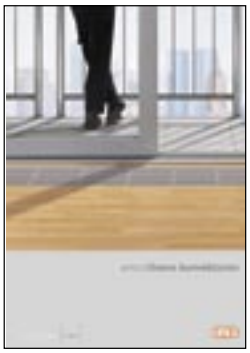
Comparable measurements with heat exchange elements made of copper pipes pressed into aluminium membranes resulted in a cooling performance of approx. 200 W/m²
In real situations, several conditions that influence performance deviate from those achieved in testing under DIN 4715, for example:

- ➔ The convective heat transfer to the surface of the radiant ceiling increases when fan-generated turbulent blended air is blown into the ceiling cavity
- ➔ the spacing of the heat exchange elements: when spaced 10 mm from the concrete ceiling, performance was decreased approx. 12% in comparison to a spacing of 60 mm
- ➔ changes in performance occurred when the opening of the suspended ceiling changes

In most cases, these deviations lead to an increase in performance in practical applications. Our extensive experience in installing such systems enables us to make these assessments. For true reliability and exact performance values, we recommend that emco technicians carry out the design using our special programmes.

*Company Catem, Herxheim*

## emco **therm convectors**



- all emco convectors for floor, call and ceiling in one catalogue
- clear classification of the convector to the product features heating, cooling and ventilating
- Quick Reference to the products' most important features
- heating and cooling performance graphs, illustrations featuring functions and installations
- introduction to emco control technology, system advantages and special solutions

## emco **roll-grates**

- all emco roll grates, industrial roll grates, linear grates and clean grates in one catalogue
- Graph with functionality, colours and exact dimensions for each model
- Quick Reference to the products' most important features
- Sectional drawings, special designs, recommendations for applications and load table

## emco **diffusers**

- all emco swirl, ceiling, slot, pipe, displacement flow, industrial, special and floor air diffusers as well as grilles, valves and controllers in one catalogue
- Graphs illustrating the various airstream patterns and functionality
- Illustrations of construction design
- Charts illustrating dimensions and aerodynamic data

## emco **airconditioning technology price list**

- Detailed price list for all emco air conditioning products
- Concise listing of all models and options using sectional drawings and exact measurements for installation situations

## emco **Air Conditioning Technology Information CD**


- Provides quick access to all relevant information on emco air conditioning technology and all other emco products
- User-friendly interface via your internet browser
- Contains all selection and design programmes
- Comprehensive description of all of emco's business divisions and services
- Contains all emco air conditioning product catalogues in PDF format
- Detailed list of references

Have we awakened your interest? **Let us provide you with more information!**

**Fax-No. +49 (0591) 9140-851** **e-mail: klima@emco.de**

Company: _____ Contact: _____

Street: _____ Telephone: _____

City/Postcode: _____ Fax: _____

E-mail: _____

emco **bad**

- ☐ Bath Accessoires & Interiors
- ☐ Price List emco bath

# faxformular

emco **bau**

- ☐ Entrance Mats
- ☐ Clean Walk Systems
- ☐ Swimming Pool Gratings
- ☐ Carpet Mats
- ☐ Price List Mat Systems
- ☐ Price List Swimming Pool Gratings
- ☐ Price List Carpet Mats

emco **klima**

- ☐ Convectors
- ☐ Roll Grates
- ☐ Air Diffusers
- ☐ Chilled Ceiling Systems
- ☐ CD Air Conditioning Technology, CAP Programmes and Detailed Product Information
- ☐ Price List Air Conditioning Technology

Place/Date: _____ Signature: _____

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emcoBau-undKlimatechnikGmbH&Co.KG·PF1860·D-49803 Lingen(Ems)·Telefon+49 (0) 591 9140-0·Telefax+49 (0) 591 9140-851·e-mail:klima@emco.de·www.emco-klima.de