

**Zehnder Carboline
Ceiling Heating and Cooling System
The Quickest of its Type.**

zehnder





Speed, energy-efficiency and architectural freedom – with Zehnder Carboline

When designing a building, architects wish for ultimate design freedom whereas developers and planners have a much keener focus on costs and energy-efficiency.

With this in mind, the Zehnder Carboline combines both aesthetics and cost-conscious functionality into a heating and cooling panel that is systematic, efficient and saves energy. At the same time, the innovative radiant ceiling system offers diverse opportunities for designing attractive and functional spaces.

The high-performance ceiling-mounted heating and cooling system is based on superior Zehnder know-how and an innovative material that combines high thermal conductivity with minimal weight: expanded natural graphite, which is excellent at distributing heat quickly and evenly throughout the space.

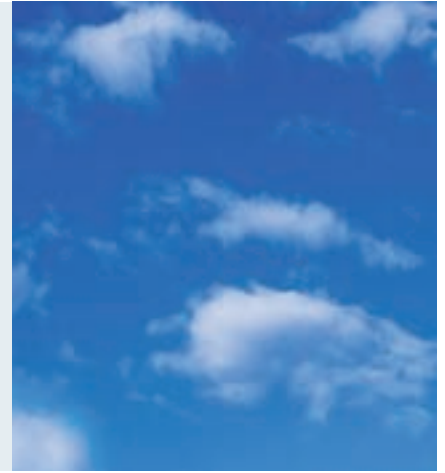
The result is a high-performance system which can be simply and practically integrated into existing and new grid and suspended ceilings.

This makes Zehnder Carboline perfectly suited to providing energy-efficient air conditioning in offices, schools, hospitals, meeting rooms and surgeries – in short, everywhere that a comfortable and healthy indoor climate plays a decisive role.

1

Energy-saving

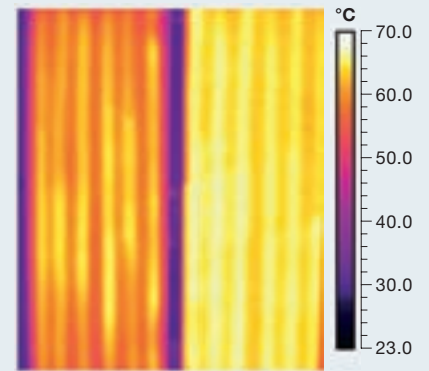
Energy consumption is an increasingly important consideration when choosing a heating and cooling system. The Zehnder Carboline adheres to this requirement by using lower temperatures when heating and higher temperatures when cooling. This creates a perceived pleasant indoor climate.



2

Quick and efficient

Just how quickly a comfortable room temperature is reached without wasting energy, depends on the controllability of the heating and cooling systems. This is where the innovative material of Zehnder Carboline comes into play: The excellent conductivity and low mass of the expanded natural graphite ensure that Zehnder Carboline reacts quicker and with greater energy efficiency than conventional systems.



3

Warmth

Anyone who has ever stood near a tiled stove will know the warm feeling produced by its radiant heat. Modern ceiling-mounted heating and cooling systems also employ this principle. The special material properties of Zehnder Carboline reinforce this effect, both when heating and when cooling.



4

Comfort

Zehnder Carboline increases indoor comfort. As well as the ceiling panels operate silently, they give off or absorb heat without creating a draught or dispersing dust. A huge advantage for everyone, including allergy sufferers.



5

Applications

Zehnder Carboline provides a pleasant indoor climate. Temperatures can be optimally controlled, silently and free of draughts, regardless of whether it's bitterly cold or extremely hot outside. This makes Zehnder Carboline the ideal choice wherever a pleasant and healthy indoor climate matters: In offices, schools, hospitals, meeting rooms and surgeries.



6

Highly efficient

Low overheads increase the value of offices and other buildings. Investing in Zehnder Carboline is worthwhile for the energy savings alone. The investment costs of the building can be reduced by using radiant ceiling panels, even when compared to a pure ventilation system.



7

Architectural freedom

Zehnder Carboline gives architects plenty of freedom to create their designs. The ceiling elements can be harmoniously integrated into any type of interior architecture and create whole new planning possibilities. This is supported by a wide range of colours and surfaces. Zehnder Carboline is also ideal for installation into existing grid ceilings.



8

Know-how and service

Zehnder Carboline encompasses more than half a century of experience in the manufacture of radiant ceiling systems for industrial and commercial use. Ceiling-mounted heating and cooling systems by Zehnder are used in over 2,500 projects every year. They are examples and proof of the high quality, know-how and comprehensive service regarding their planning and installation.



Principles and functionality

Radiation

Each body radiates heat, depending on the nature of its surface and temperature. The heat is transmitted from one body to another by means of electromagnetic waves (light). Example: Sensing the heat radiated by the sun on a snow-covered mountain.

Heating effect

As simple as it is effective: The radiant panels are heated by hot water and give off energy to the room. This energy only converts into heat when it comes into contact with the human body or other objects.



Cooling effect

The same principle can also be used for cooling: Cold water flows through the cooling ceiling. The people and objects in the room give off heat to the ceiling through radiation. At the same time the warm indoor air rises and transfers its heat to the cooling ceiling. The cooled air flows back into the room.



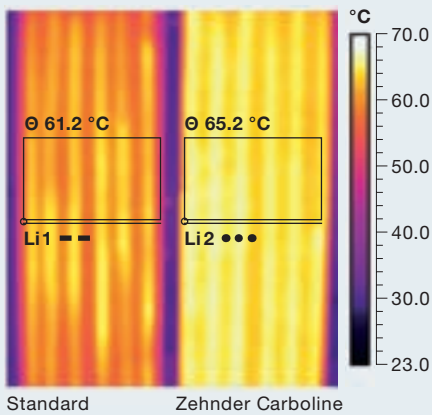
More cosiness

Cosiness is above all created by the type of heat transmission: Modern ceiling-mounted heating and cooling systems create a better sense of well-being for lower costs:

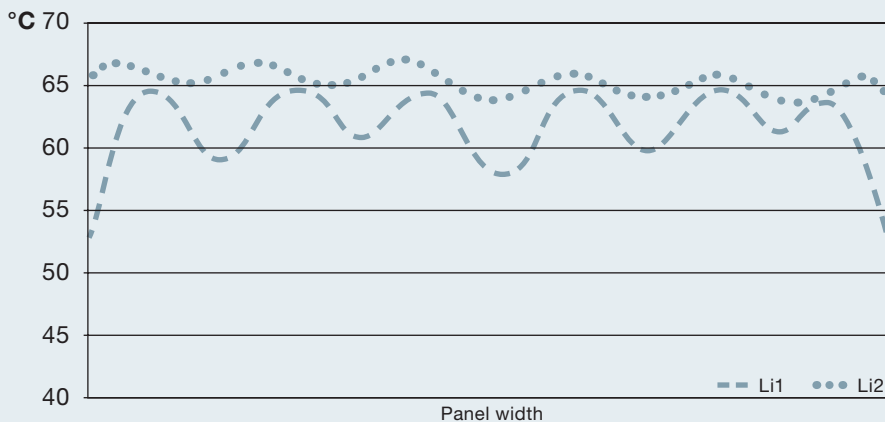
- Natural principle of radiant heat
- Even heat distribution throughout the room
- Heating and cooling effect is immediately noticeable
- Silent operation
- No dispersal of dust – benefit for allergy sufferers



Quick and efficient



Temperature gradient over panel

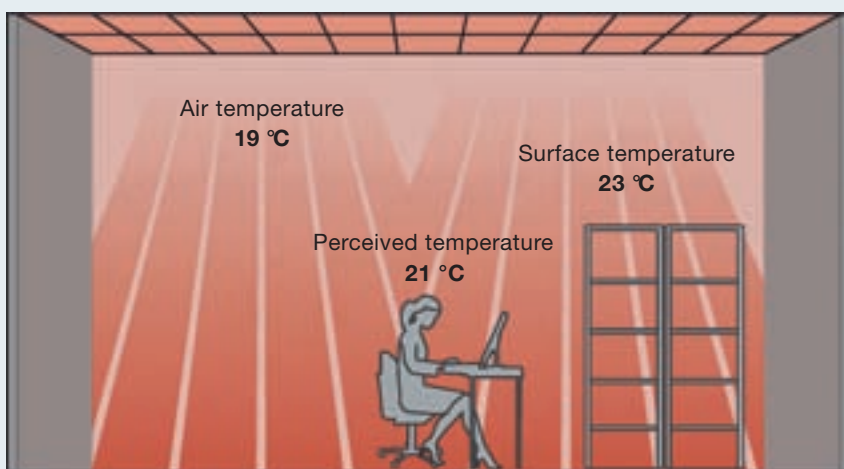


Zehnder Carboline sets new standards in terms of performance, temperature distribution and reaction time. The system reacts much more quickly than conventional ceiling-mounted heating and cooling systems.

The expanded natural graphite guarantees an extremely even distribution of temperature.

Due to the high and even surface temperature, the radiant component of Zehnder Carboline is much higher than in comparable ceiling-mounted heating and cooling systems. This additional radiant heat provides for more comfort in the various rooms, while simultaneously reducing energy costs.

- Air temperature can be up to 3K lower (when heating) or higher (when cooling)
- Very good controllability of the system
- High radiant component due to high surface temperature
- Short heating and cooling time of the system through low storage masses



Due to the higher surface temperature, a much lower air temperature is sufficient for a ceiling-mounted radiant heating system in order to give people a sense of comfortable warmth.

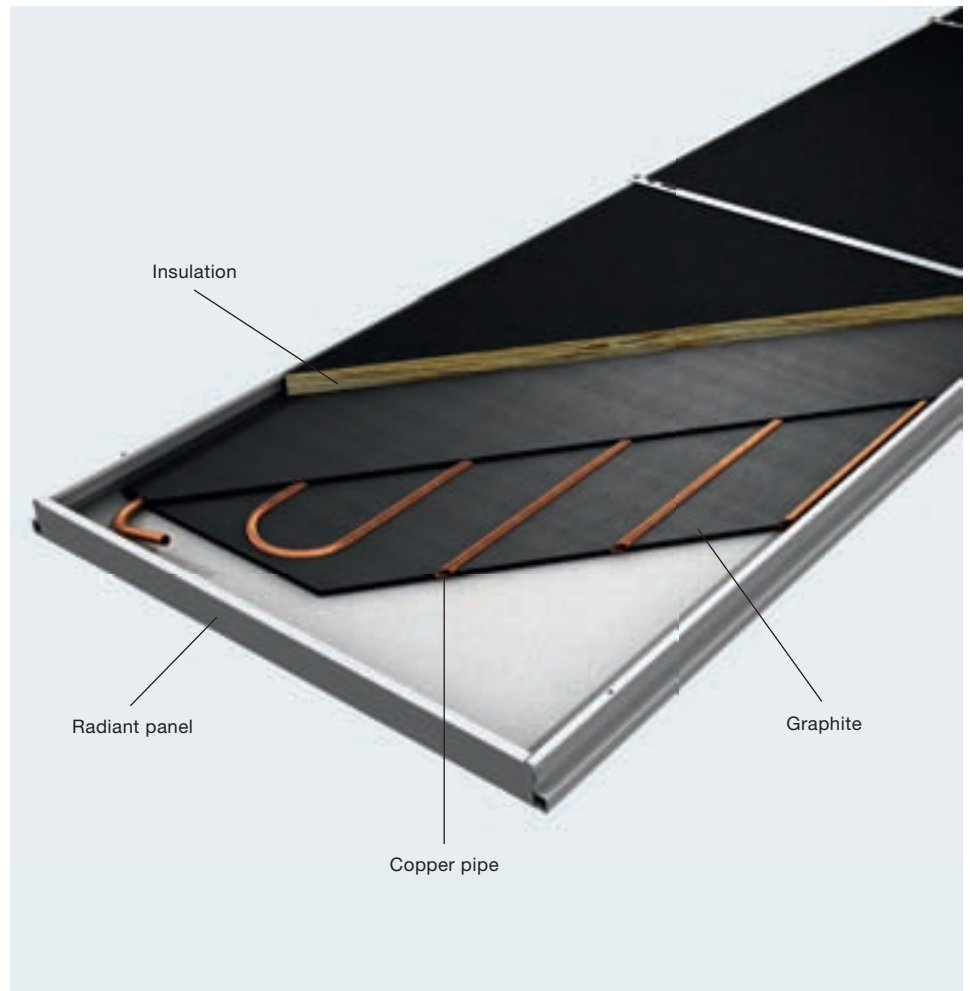
Energy consideration

As the perceived temperature is the arithmetical average of the indoor air temperature and the surface temperatures, the indoor air temperature during heating with a ceiling-mounted heating and cooling system can be kept lower, can be kept higher during cooling, and still be perceived as comfortable. In both case, this reduces energy costs.

The properties of Zehnder Carboline reinforce this saving effect even more both through the even and high surface temperature of the ceiling-mounted heating and cooling panels and through the extremely quick reaction time. This allows indoor temperatures to be controlled as required within a very short time, without unnecessary losses of energy.

Zehnder Carboline: Patented innovation

By choosing Zehnder Carboline, you are opting for high-performance thermal elements. Each individual element has expanded natural graphite at its core. Together with a copper pipe, which is embedded in the graphite layer, the innovative material guarantees ideal heat transfer and excellent performance values.



The substance that makes air conditioning more efficient

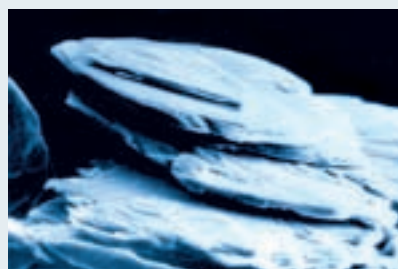
The material used for Zehnder Carboline is made from natural graphite. It is a naturally occurring material and an anorganic modification of carbon. The production process enlarges the volume of the material by 200 to 400 times. To make Zehnder Carboline, the expanded natural graphite is then processed further into lightweight panels.

Expanded natural graphite: An innovative material with ideal properties

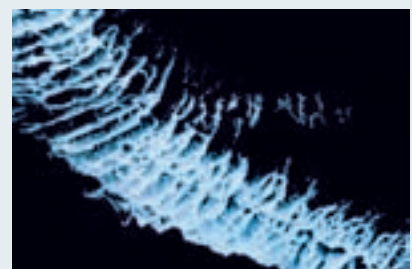
The weight of expanded natural graphite is similar to that of polystyrene. As the thermal conductivity of the material is high, natural graphite is excellent at distributing heat quickly and evenly throughout the room. The material also has many other positive properties for conditioning the air inside buildings.

Properties of expanded natural graphite:

- Good thermal conductivity
- Low density
- Non-combustible
- Non-ageing
- Physically inactive



Natural Graphite

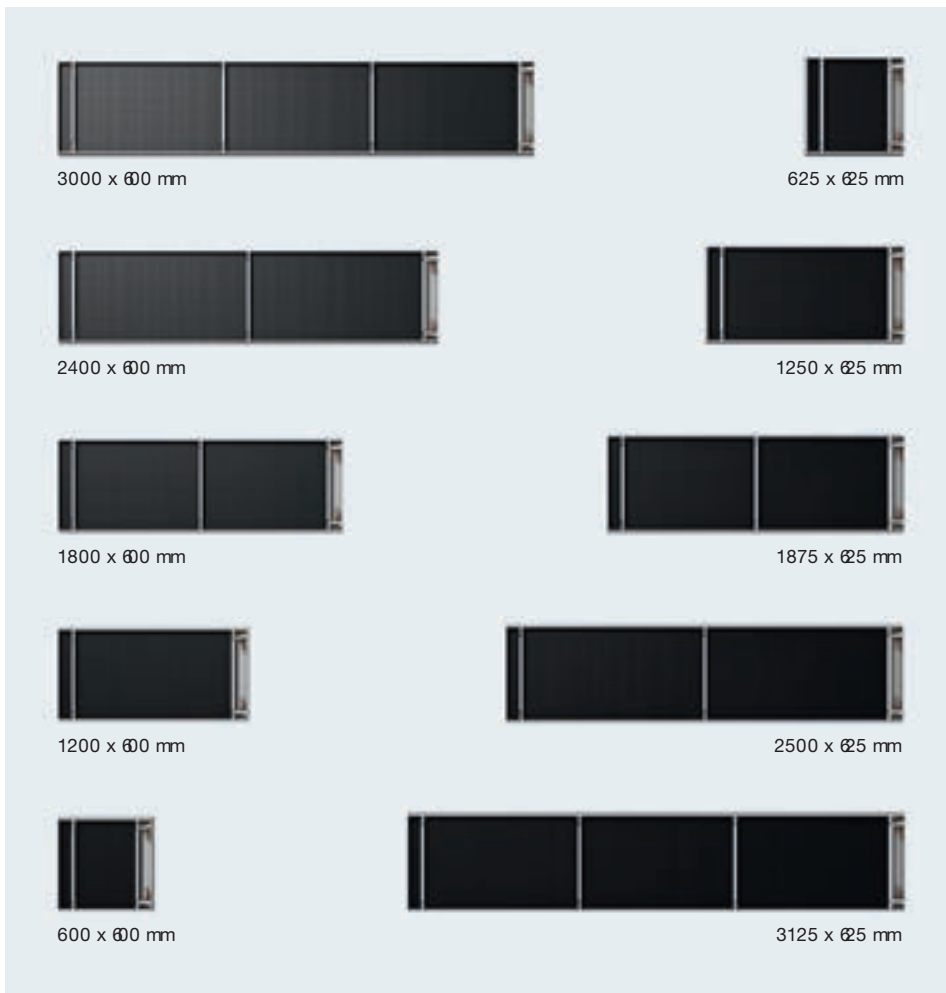


Expanded Natural Graphite

Suitable for all grid ceilings

Zehnder Caroline ceiling-mounted heating and cooling systems have been specially developed for cooling and heating buildings. The elements come in two standard widths and in five standard lengths.

Zehnder Carboline covers the entire range of grid ceilings for offices and meeting rooms, as well as schools, hospitals and doctors' surgeries.



Flexibility and individual design

Zehnder Carboline is optionally available with a smooth or perforated surface (for absorbing sound).

Ceiling cut-outs can be integrated into the panel elements of Zehnder Carboline as required, e.g. for air outlets, projector brackets, loudspeakers, fire alarms and lighting.



Heating – Cooling – Fresh and clean air.

Zehnder also offers you the best climate-control technology for your building project. Do you need to heat a building? Zehnder radiators are effective, economical and visually appealing for bathrooms, living rooms and buildings.

The natural heat radiation is the basis of radiant heating and cooling systems, which are especially suited for offices, sports, event and production halls, where they ensure cosy warmth or refreshing coolness. And all with high efficiency and no maintenance costs.

Proper, healthy heating and cooling go hand in hand with clean and fresh air. Climate-controlled fresh air systems from Zehnder ensure that warmth does not affect the quality of the air. As fresh air is being added, stale air with its odours and humidity is being removed. At the same time, energy is retrieved.

Zehnder Clean Air Solutions provide cleaner air in buildings with especially high dust levels, such as production facilities. Specially patented filters collect fine particles using static electricity, protecting people and materials.

**Whether for warmth, cooling,
or clean and healthy air,
Zehnder systems create a
perfect climate.**

Further information is available at:
www.zehnder.eu

Radiators for bathrooms and living rooms



Radiant heating and cooling systems



Comfort systems for fresh room air.

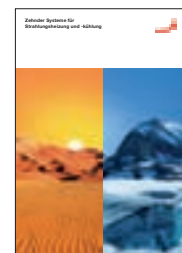


Clean air solutions for clean air

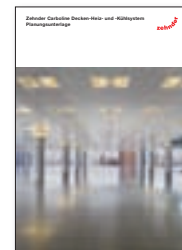




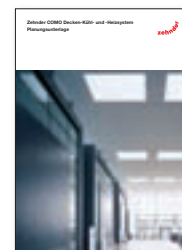
Systems for Radiant Heating and Cooling



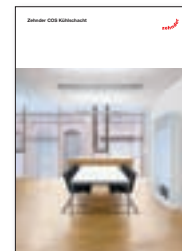
Summary brochure



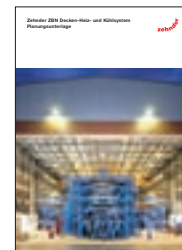
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Zehnder COMO



Zehnder COS



Zehnder ZBN



Zehnder ZIP



RHC-CARBO-BR-E, V0209, English, subject to changes