



Radiant Ceiling Systems



**Our passion
never stops growing.
Just like our Group.**

To be the best you need the **right numbers**.

Such numbers make **our group** one of today's **world leaders** in the production of heating, conditioning and sanitary water distribution components and systems for the residential, industrial and commercial sectors. A reality constantly expanding, just like our goals.

1951

COMPANY
ESTABLISHMENT

More than **900** **EMPLOYEES**

70 TONS
OF BRASS DAILY

130,000 m² PRODUCTION PLANTS

A TURNOVER
CLOSE TO **170** millions

80 % EXPORT



BRANCHES, REPRESENTATIVE OFFICES AND EXCLUSIVE PARTNERS

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| ① ITALY | ⑤ ENGLAND | ⑨ POLAND | ⑬ CANADA | ⑰ JORDANIA |
| ② FRANCE | ⑥ BELGIUM | ⑩ CHINA | ⑭ CZECH REPUBLIC | ⑱ INDIA |
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Radiant Systems. Technical innovation for the ideal climate.



Components for optimization of energy consumptions and metering, distribution of hot and cold fluids.



Radiant floor and wall conditioning, false ceilings for residential and commercial use, thermoregulation and air treatment.



Components for sanitary water distribution lines and system devices.



Distribution products and systems for safe and performing gas transfers.



Components for energy production systems from renewable sources.



Specialized performing components for the professional fire-prevention sector.

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The highest levels of comfort and air quality with first-class energy-saving performance. Radiant ceilings are just a winning choice.

Chapter 1

Radiant ceiling systems

INTRODUCTION

Radiant ceiling systems represent a modern and efficient solution to heat, cool and decorate the ambients where people generally spend most of their time: houses, offices, schools, showrooms, hotels, hospitals, museums are just a few examples of their main applications.

From a mere installation standpoint, radiant ceilings are hydronic systems balancing the sensible loads of air-conditioned spaces, which combined to auxiliary systems, guarantee the most suitable ventilation conditions and keep under control humidity levels.

The physical phenomenon characterizing thermal exchange between radiant ceilings and the ambient of installation is known as irradiation.

IRRADIATION, THE INVISIBLE STRANGER

Despite radiant ceiling systems have been experiencing a steady growth during the last twenty years, offering many people the opportunity to experience first-hand their comfortable “radiant” feeling, the general prejudice that “*heat cannot come from above because hot air tends to climb*” is still widespread, and installers often have to find a way to overcome – but only with those not active in this sector – this misbelief.

Radiant ceilings, with their natural simplicity, are nothing but one of man’s many successful attempts to translate a spontaneous phenomenon from nature into technology.

Just as airplanes were invented by observing a bird’s flight, we can also find a correspondence between the mechanism based on which the sun heats the Earth and radiant ceilings systems.

The keyword: **irradiation**.

But how can one experience it without a radiant ceiling?

The simplest way – and of course not the only one – is to stand under the sun on a clear winter day: who has never tried first hand that with a 9-10 °C air temperature one just needs a sweater to feel comfortable?

And who has never noticed that sweaters of different colors are more or less warm?

This is what we call irradiation; we cannot touch the sun and air can only make us feel cold, but the percentage of irradiation heat is higher than the one which cold air takes from us: the general sensation is pleasant.

By exploiting the infrared field vision, one can have a clear idea of what happens in real life when a radiant ceiling is used to heat.

Picture 1.1 refers to a room heated by a plasterboard radiant ceiling.

Water at 35 °C flows through the coil inside the panel. The black and blue areas show the lowest temperatures, red and yellow the highest.

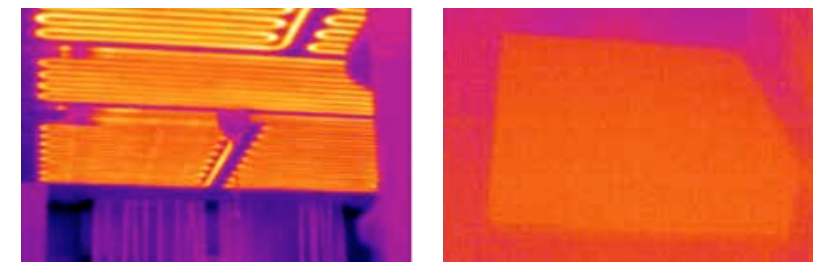


fig. 1.1 Thermovision of a heating radiant ceiling.

It is clear – picture on the left – how the windows of the large French door are cold, while the curtains show both cold areas and areas affected by the ceiling irradiation heating.

The picture on the right is the most significant. It shows the most essential element: the floor below the ceiling radiant panel receives heat in an optimal way and in turn it heats more than the other objects – walls and furnishings – inside the room; the wall on the right is also affected by this thermal exchange and raises its temperature.

The effect of irradiation is to change the temperature of the surfaces that delimit the ambients: this happens independently from the reciprocal position of the surfaces themselves: the more they face one another, the more intense is the exchange, obviously under the same conditions (ceiling surface temperature, materials, emissivity, material blackness degree etc.).

PREROGATIVES OF RADIANT CEILINGS

Radiant ceiling systems represent an efficient solution for heating and cooling. They also confer a high level of comfort and guarantee the achievement of the best energy saving targets. Compared to traditional air conditioning systems, radiant ceilings play a winning role for their multiple peculiarities:

- > Energy saving
- > Air quality
- > Space availability
- > Noise reduction
- > Reduced maintenance costs
- > Reactiveness
- > Comfort
- > Modularity and flexibility
- > Rapid installation
- > Preassembled in-house
- > Inspectionability

Energy saving

The use of radiant ceilings to cut down sensible loads enables to reduce to the minimum ventilation air needs, based on estimated crowding and space use.

The enhanced thermal capacity of water compared to air makes the transfer of the same quantity of heat more efficient with a radiant ceiling versus air systems: this leads to important energy saving by cutting down the costs of electric energy, generally consumed by traditional fans.

The water temperature required by radiant ceilings represents another added value. The specific power which the radiant ceiling exchanges with the room is the sum of a convective exchange component, weighing approximately 25% of the total, and an irradiation exchange component, equal to a total of approximately 75%.

The convective exchange q_c between the radiant ceiling and the room air is expressed as:

$$q_c = \alpha \cdot (T_{\text{room air}} - T_{\text{panel surface}}) \text{ [W/m}^2\text{]}$$

The irradiation exchange q_i between the ceiling and all the room surfaces can be expressed as:

$$q_i = 5.67 \cdot 10^{-8} \cdot \epsilon \cdot F \cdot (T_{\text{surface}}^4 - T_{\text{panel surface}}^4) \text{ [W/m}^2\text{]}$$

- Where:
- α = convective thermal exchange coefficient [W/m² K]
 - ϵ = function considering the emissivity of the surfaces in play, dimensionless value
 - F = view factor between the radiant ceiling and the generic surface, dimensionless value
 - $T_{\text{room air}}$ = room air temperature, in K
 - T_{surface}^4 = fourth power of the generic surface temperature, in K
 - $T_{\text{panel surface}}^4$ = forth power of the radiant panel surface temperature, in K

The formulas clearly show how the radiant panel surface temperature, closely connected to the delivery water temperature, is enhanced during the irradiation exchange due to raising to the fourth power. This is the reason why radiant ceilings typically work with water at 15 °C when cooling and 35 °C when heating. On the contrary, traditional air systems – where thermal exchange occurs only by convection – require water at 6-7 °C when cooling and 50-60 °C when heating. It is clear how radiant systems provide for full exploitation, and the best performance, of modern heating and cooling systems.

Finally, an in-depth observation of what happens inside the room. In addition to the humidity ratio, the operating temperature T_o , expressed as $T_o = (T_s + T_a)/2$ is what determines the wellness feeling; in other words, the operating temperature is the arithmetical average between the average temperature of all the surfaces – T_s – that delimit the ambient and its air temperature – T_a .

When considering the cooling regime, we may expect that the operating temperature of 25 °C is obtainable with a traditional system that sets the air temperature at 23 °C and the surfaces (floor, ceiling, walls) at 27 °C; on the other hand, a radiant ceiling would enable to achieve the same 25 °C operating temperature with room air at 27 °C and with an average surface temperature of 23 °C. It is clear how the heat irradiated from the outside, that we may assume to be at 35 °C, toward the ambient are greater when the room air is at 23 °C.

The same consideration is also valid for the winter regime.

Once again, radiant ceilings represent the perfect solution to take a decisive step toward major building energy savings.

Air quality

Radiant ceilings can be virtually exploited in a wide range of practical applications, especially when the sensible loads are preponderant or in ambients where high levels of indoor air quality are required: it is not by chance that they have been widely used in hospitals in the last fifteen years.

They ensure the best qualitative air conditions in the rooms as they are paired with ventilation systems for air exchange and humidity control.

In winter, the false ceiling reaches 28-30 °C surface temperatures, while the air temperature, as explained above for the operating temperature, remains at about 18-19 °C, immediately providing less dry air.

In summer, dehumidification machines distributed in multiple points of the building are no longer required, also completely eliminating the issues connected to poor, or inexistent, maintenance: wet coils and moisture collection containers are in fact the ideal location for the proliferation of bacteria and fungi. As opposed, one single centralized system for air exchange and humidity control provides for indirect dehumidification and dry air is thus distributed through the ducts, preventing the proliferation of pathogen or allergenic organisms with their low humidity rate.

Availability of space

Bad habits prove our natural inclination of growing deep roots and to define as ‘normal’ and ‘expected’ what is not actually so.

From a constructor and occupant’s point of view, the elevated economic value of the volumes is crystal clear. However, it is not that straightforward to understand that traditional air conditioning systems – air-only or with fan coils – subtract volume from the occupants.

The picture below takes into consideration the same ambient, ideally air conditioned with an air-only system (1.2 – left) and with a radiant ceiling + primary air combined system (1.2 – right).

Vertical space recovery

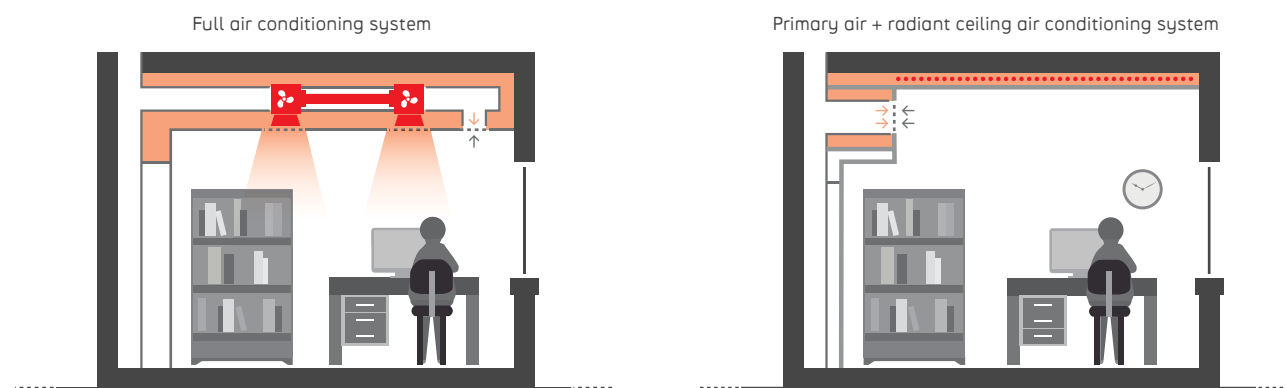


fig. 1.2 Vertical space recovery

It is clear how air-only systems require larger vertical spaces as opposed to radiant ceilings combined to primary air; in multi-storey buildings, typical of the commercial sector, such reduction of “technical volumes” can rapidly reach the equivalent height of a full additional storey.

To make this concept easier, just think of a 10-storey building where each floor requires 50 cm for the air-only system, while a radiant ceiling would just need 20 cm: 30 cm recovered for each floor sum up to 3 metres on 10 floors.

Likewise, the picture below shows the same ambient ideally conditioned with a fan coil + primary air combined system (1.3 – left) and with a radiant ceiling + primary air combined system (fig. 1.3 – right).

Horizontal space recovery

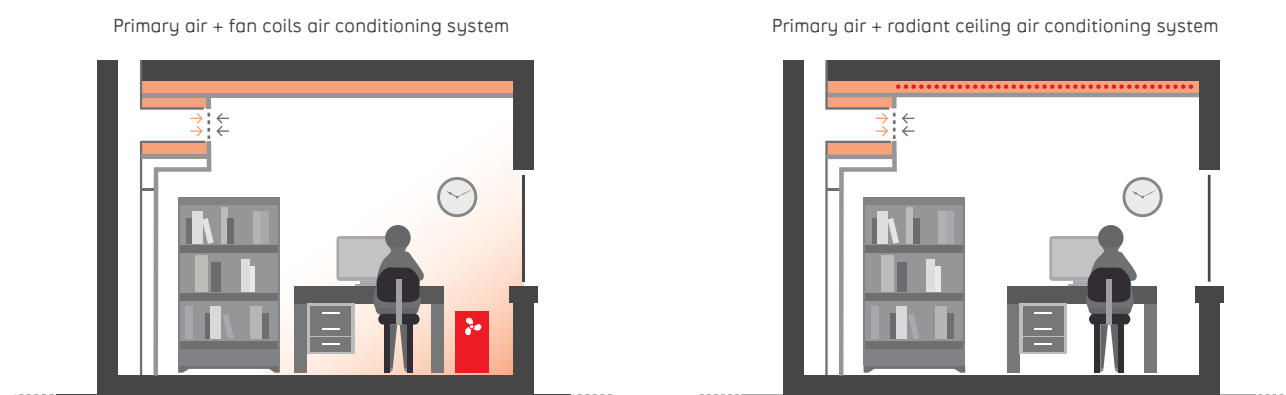


fig. 1.3 Space recovery in the occupied area

This second consideration can be easily extended also to residential buildings, where radiators and fan coils are still widespread.

The picture clearly shows (fig. 1.3 – left) how the installation of a terminal unit subtracts volume: with its overall dimensions, for the distances required to guarantee correct functioning and to enable the occupants to maintain an adequate distance to prevent discomfort.

Radiant ceilings do not subtract space from the occupied areas nor from the walls.

In the end, considering that the examples given above generally provide for traditional false ceilings, it is easy to assume that radiant ceilings do not affect in any way the availability of space.

Noise reduction

It is evident that, under equal conditions, an ambient is less comfortable the higher the level of perceivable noise. Who has never spent a night in a hotel and had to call the reception at midnight to ask them to turn off the too noisy, unhygienic fan coil?

The drastic reduction of the air flow to be managed with radiant ceilings and their remote location as opposed to the space required by ventilation machines provides for a great reduction of the noise typical of moving air-based systems, offering everyone the opportunity to enjoy a quiet and relaxed living experience.

Reduced maintenance costs

Radiant ceilings enable to remarkably reduce the costs connected to ordinary maintenance – no moving mechanical parts, no unit terminal, no filters or motors to be replaced – and ensure a longer useful life compared to the one reasonably expected for traditional systems.

Reactivity

Radiant ceilings are characterized by short-term thermal transistors.

When considering metal panels, their thermal inertia is essentially the same of the water flowing inside; with plasterboard panels the transition duration is imposed by the inertia of the plasterboard sheet.

By using a thermovision camera we can see the evolution of the thermal transition. The pictures below clearly show the activation phases of a metal radiant ceiling and a plasterboard panel. Of course, the deactivation transitions feature the same dynamics.

Both cases clearly show the high reactivity level of the system.



fig. 1.4 Thermovision camera

Metal radiant ceiling:

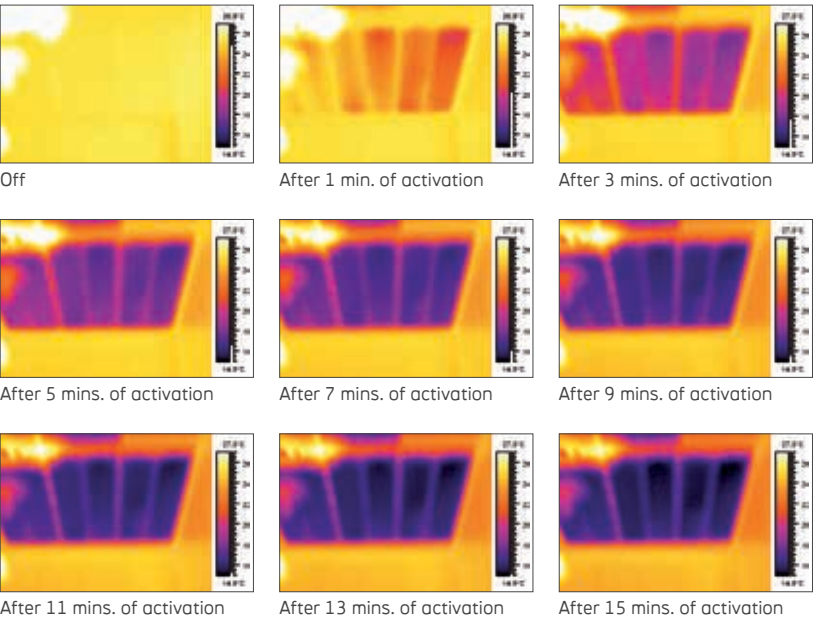


fig. 1.5
Transition of a metal radiant ceiling

Plasterboard radiant ceiling:

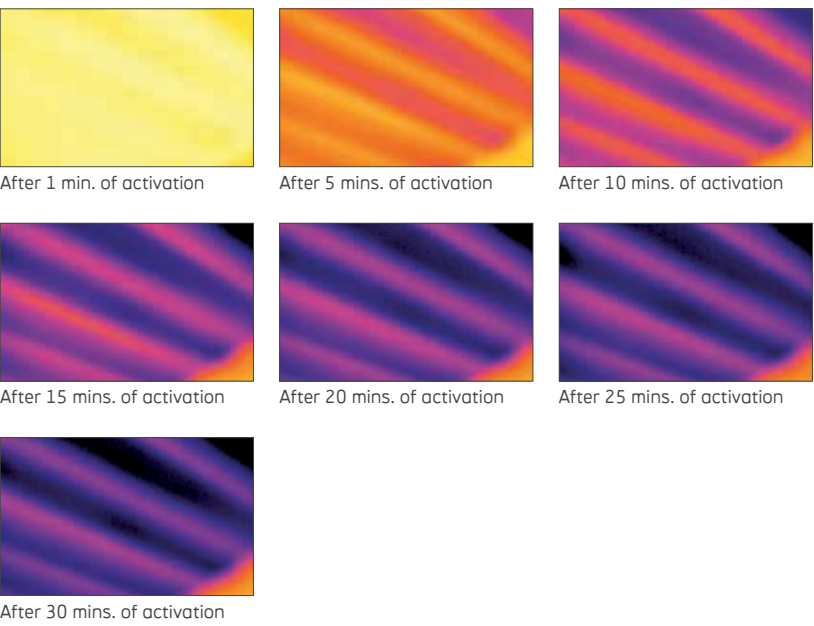


fig. 1.6
Transition of a plasterboard radiant ceiling

Comfort

Radiant ceiling systems represent the best installation solution to achieve the highest levels of comfort.

The important concept of comfort has been widely investigated through researches at the end of the last century; yet, in everyday life, we actually pay little attention to their great scientific results and it usually takes years before “analytical news” actually become an integral part of a more consolidated practice.

If we imagine a climatized environment in terms of comfort, we generally focus on hot, cold and humidity. One may recall - for

example – an uncomfortable dinner in a restaurant while sitting close to an air diffuser ejecting cold air.

These are all valid and correct observations, but the concept of comfort is far more extensive - as we could guess by reading the paragraph dedicated to noise reduction.

Today we can rely on objective tools and methods to actually quantify, and not just describe in terms of quality, the level of comfort of an ambient.

The regulations of reference are:

- > EN ISO 7730: Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD
- > EN 15251: Criteria for the Indoor Environment including thermal, indoor air quality, light and noise
- > EN 13779: Ventilation for non-residential buildings. Output requirements for ventilation and room conditioning systems

To the effects of comfort as a strict thermal feeling, without considering factors such as smell sensations, lights and noise, the EN ISO 7730 rule shall apply, which appeared for the first time in 1994 and subsequently integrated¹.

In short, the thermal comfort level is expressed by the Predicted Percentage of Dissatisfied - PPD.

In order to better understand this variable, one may imagine to ask a sample of individuals standing in a room how comfortable they feel: some will feel hot, some will feel too hot, others a little cold... let's say we have conferred the idea.

This evaluation is given in terms of quality by the Predicted Mean Vote – PMV, a variable considering the parameters included in a range that goes with a central zero, from -3 (extremely cold) to +3 (extremely hot) which expresses the level of thermal wellness perceived by the sample of individuals.

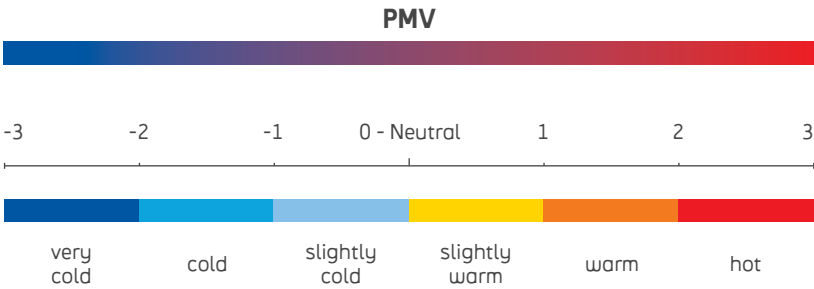


fig. 1.7
Predicted Mean Vote Scale

The PPD global index of thermal comfort is expressed based on the PMV², in turn determined through a set of parametrical equations where physical dimensions characterizing comfort are involved – metabolic activity, wet and dry bulb air temperature, relative humidity, air speed, average surface temperature, operating temperature.

NOTES

¹ UNI EN ISO 7730:2006, - Ergonomics of thermal ambients – Analytic determination and interpretation of thermal wellness through the calculation of PMV and PPD indexes and criteria of local thermal wellness.

² PPD = 100 – 95 · exp (-0.03353 · PMV⁴ - 0.2179 PMV³)

In addition to this main index, the Regulation takes into consideration the factors³ responsible for local discomfort:

- > Air currents (DR % – Draught Rate)
- > Temperature vertical gradient
- > Radiant asymmetry
- > Floor temperature

and it classifies three categories of thermal comfort A, B, and C. The following table summarizes the evaluation of comfort according to UNI EN ISO 7730:2006.

NOTES
³ For a detailed definition of the above please refer to UNI EN ISO 7730:2006.

category	GLOBAL COMFORT		LOCAL DISCOMFORT			
	PPD %	PMV	DR %	temperature vertical gradient [°C]	hot or cold floor [°C]	radiant asymmetry [°C]
A	<6	-0.2 < PMV < 0.2	<10	<3	<10	<5
B	<10	-0.5 < PMV < 0.5	<20	<5	<10	<5
C	<15	-0.7 < PMV < 0.7	<30	<10	<15	<10

Category B, which requires a PPD index lower than 10%, includes most residential and commercial applications suitable for radiant ceilings: it should also represent the comfort target for new constructions and requalification interventions of the existing building patrimony.

With regards to the temperature vertical gradient, and keeping in mind the thermal pictures showing the irradiation phenomenon, the following diagram would be a typical representation:

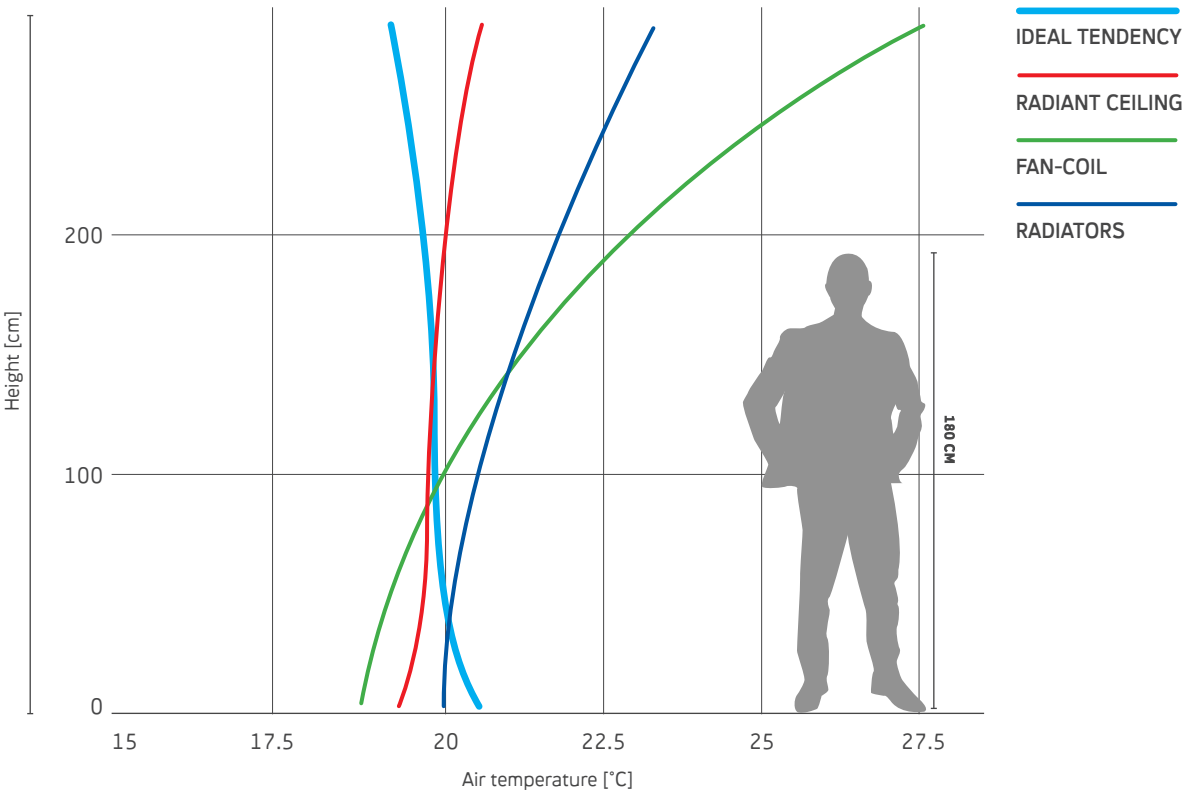


fig. 1.8 Temperature vertical distribution for typical heating systems

The picture distinctly shows how a radiant ceiling is free from any air stratification when heating. The temperature difference between the floor-level and ceiling-level air is extremely contained and it is far lower than the one obtained with traditional heating systems.

This effect becomes an essential coefficient to reduce the air movements - which in turn furtherly reduce heat dispersion toward the walls and increase comfort levels considerably: the great resemblance between the ambient temperature ideal tendency and the temperature vertical profile of radiant ceilings is crystal clear. This is a beneficial result which preconceived ideas would not have taken into consideration.

As an additional proof of the comfort reasonably expected from radiant ceilings, below are the specific results from experimental tests by Giacomini S.p.A.

Comfort measurements: the meeting room

The first ambient is a tough testing ground for radiant ceiling systems: a meeting room where the latent loads may cause the distribution of variable air flows up to 4-5 vol/h, based on crowding, far greater than typical 2 vol/h generally required for ordinary offices – this is an uphill start considering a PPD target lower than 10% and with no air currents.

The room has been used normally during the test which has been extended automatically along a significant period of time for the evaluation of the comfort levels.

The test was performed on a day of July when the outdoor temperature varied between 17 °C during the night and over 32 °C in the afternoon.

It must be pointed out that the radiant ceiling remained active from 8:30 a.m. to 6:30 p.m., while during the hours in between only the ventilation with primary air was left on – again with an incoming air temperature neutral compared to the ambient temperature set point.



fig. 1.9 The meeting room used for the comfort level test

The measurements produced very interesting results as shown below:

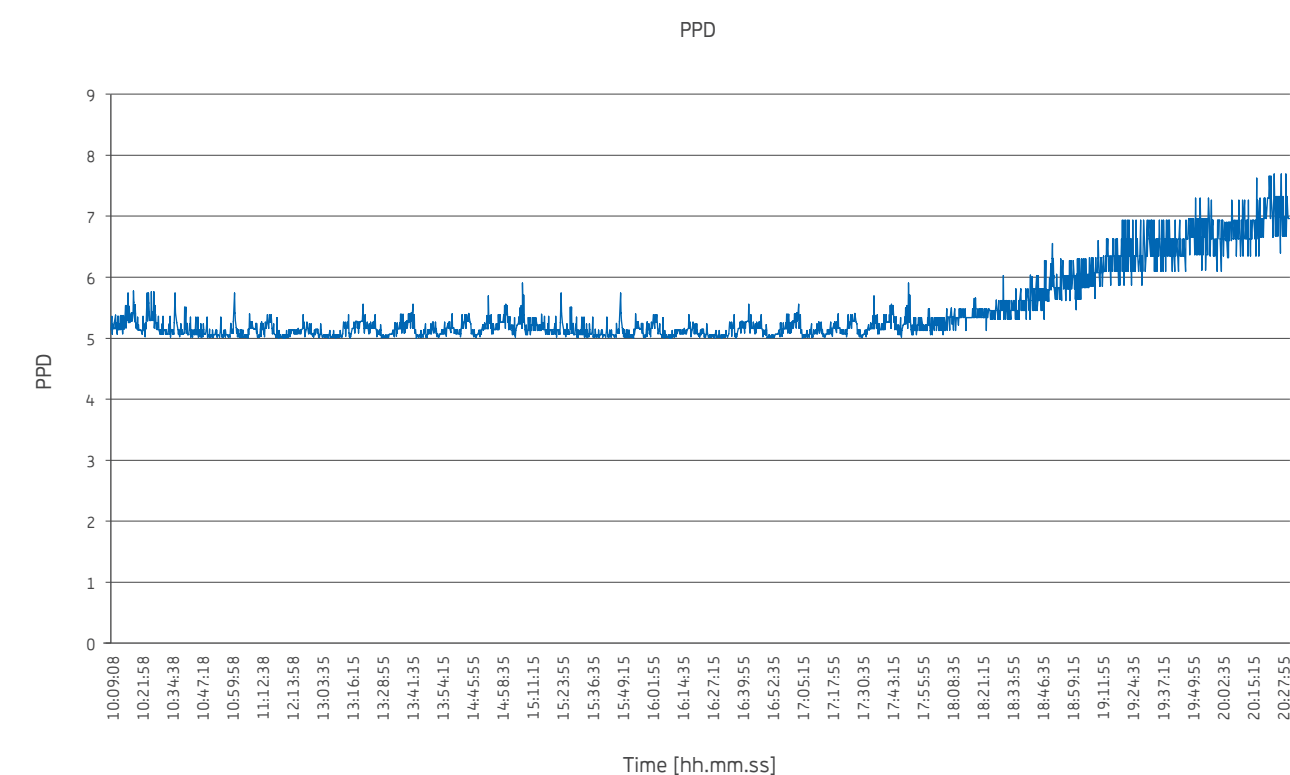


fig. 1.10 PPD tendency

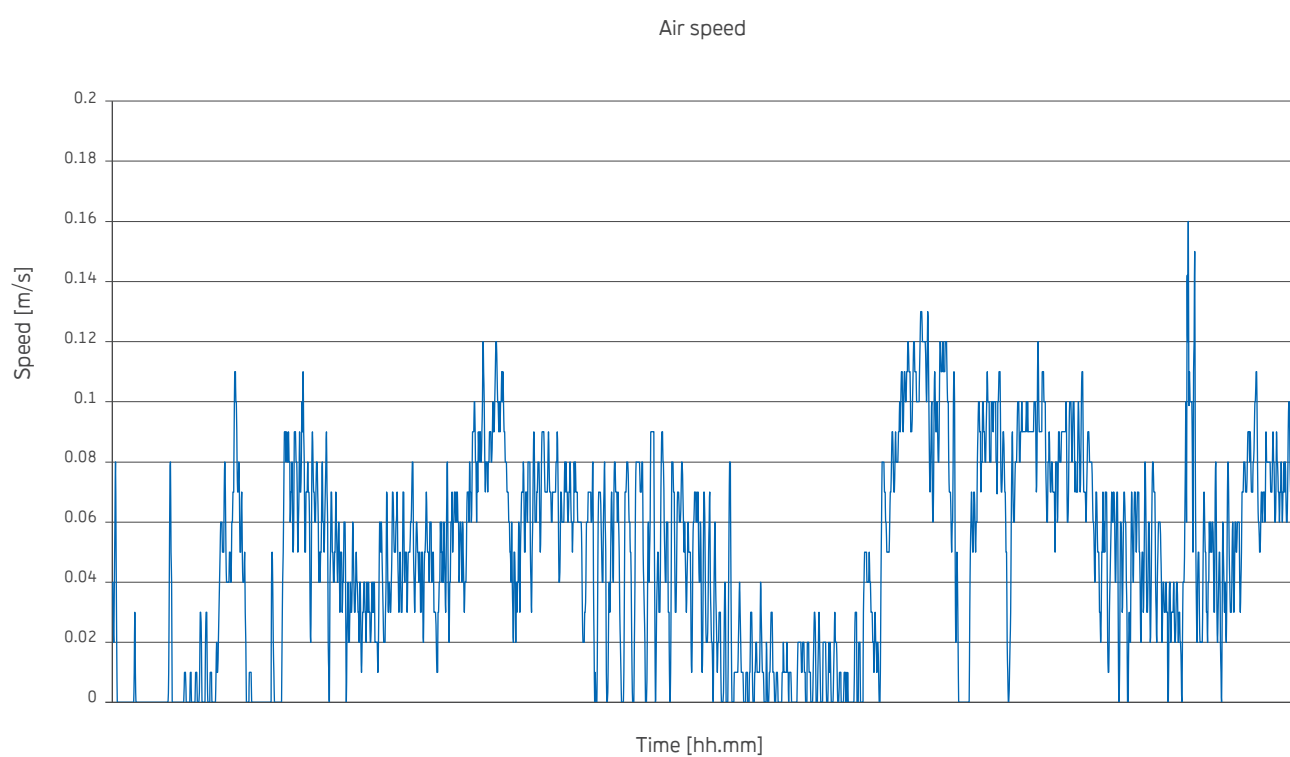


fig. 1.11 Air speed tendency

The PPD tendency clearly shows the level of comfort obtainable with radiant ceiling systems, as well as the progressive decrease of the comfort rate starting from 6:30 p.m., the time at which the system was shut down.

According to the recorded PPD, there is a reduced air speed in the space occupied by the individuals: the graphic is practically below 0.1 m/s, except for the peaks caused by individuals moving near the extremely sensible instruments.

This is an extraordinary result when considering the air flow introduced in the ambient and – as proven by the room image – the apparent absence of air diffusion terminals.

The use of a micro-perforated ceiling panel as means to introduce air enabled to enhance the installation quality, as it improved sound absorption and reduced the air speed in the occupied area. As little as 0.25 m/s would have been a great result with a traditional system.

Mock-up test: from the comfort theory to the final project

The second example is an in-depth analysis carried out in the test room to identify the most suitable radiant panel in terms of target comfort for an office with a window subject to direct solar irradiation and characterized by ventilation introduced near the window itself.

It is an installation planning example with comfort limits.

The realization of model ambients and resorting of experimental test simulations are key to select the most suitable solution among the available options.

The image below shows the testing ambient setup. The temperature target is set at 24 °C.

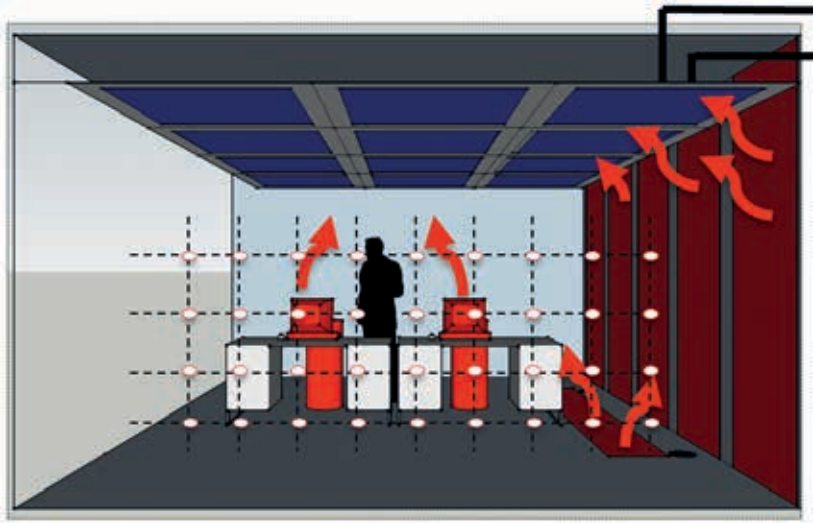


fig. 1.12 Representation of the office and cooling testing conditions.

All the following measurements show the main physical dimensions in different points of the so-called “occupied zone”. As shown, the results are excellent.

NOTES
* According to EN13779

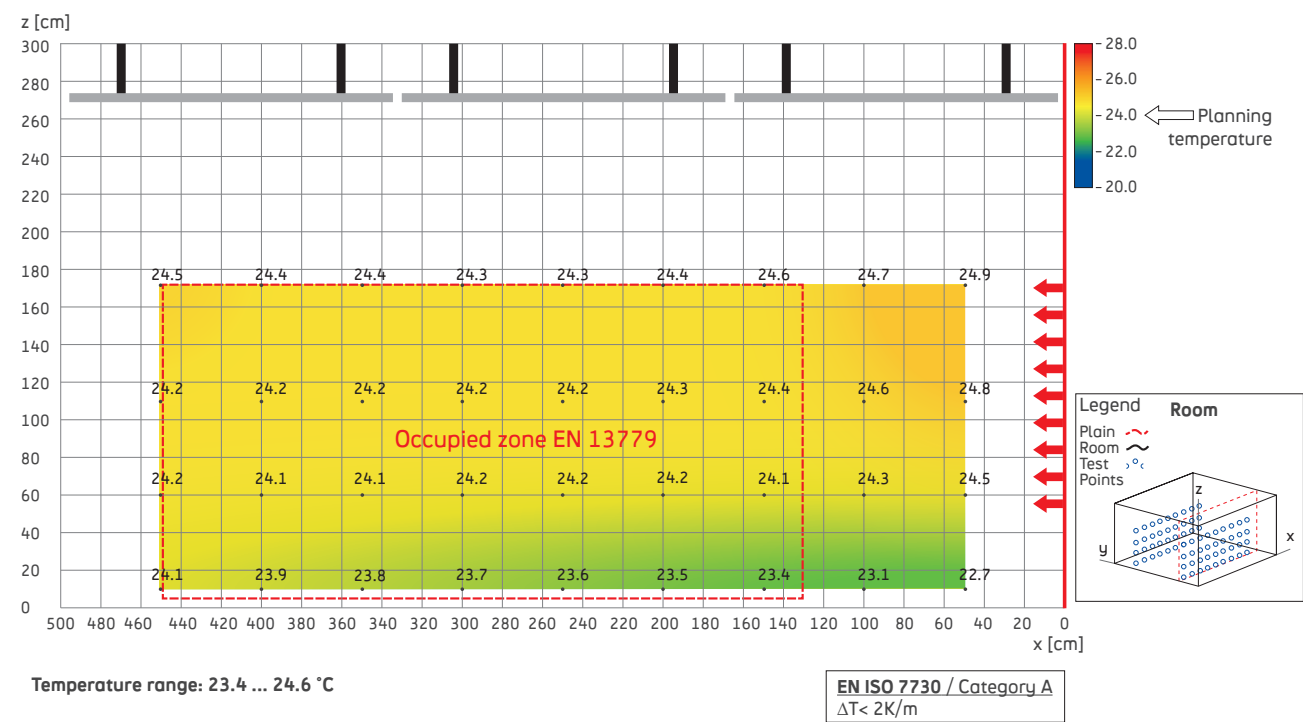


fig. 1.13 Temperature distribution - cooling

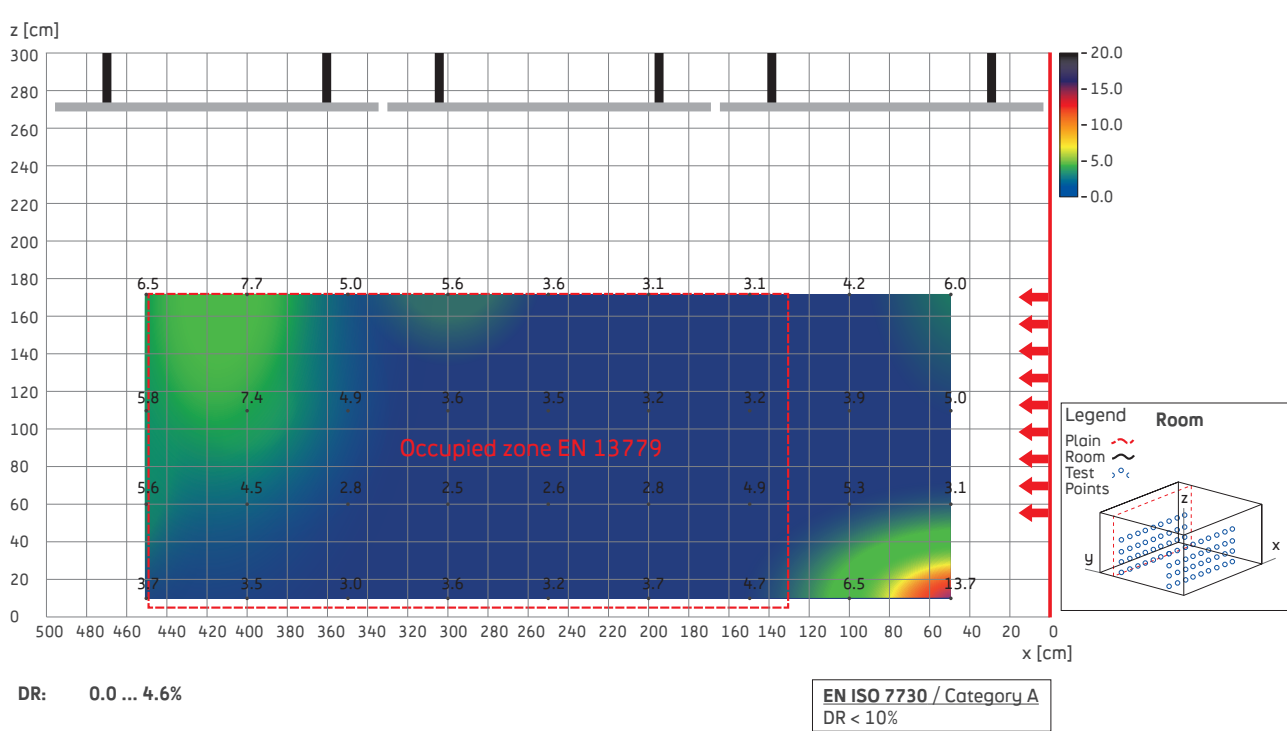


fig. 1.15 Draught Rate - air currents

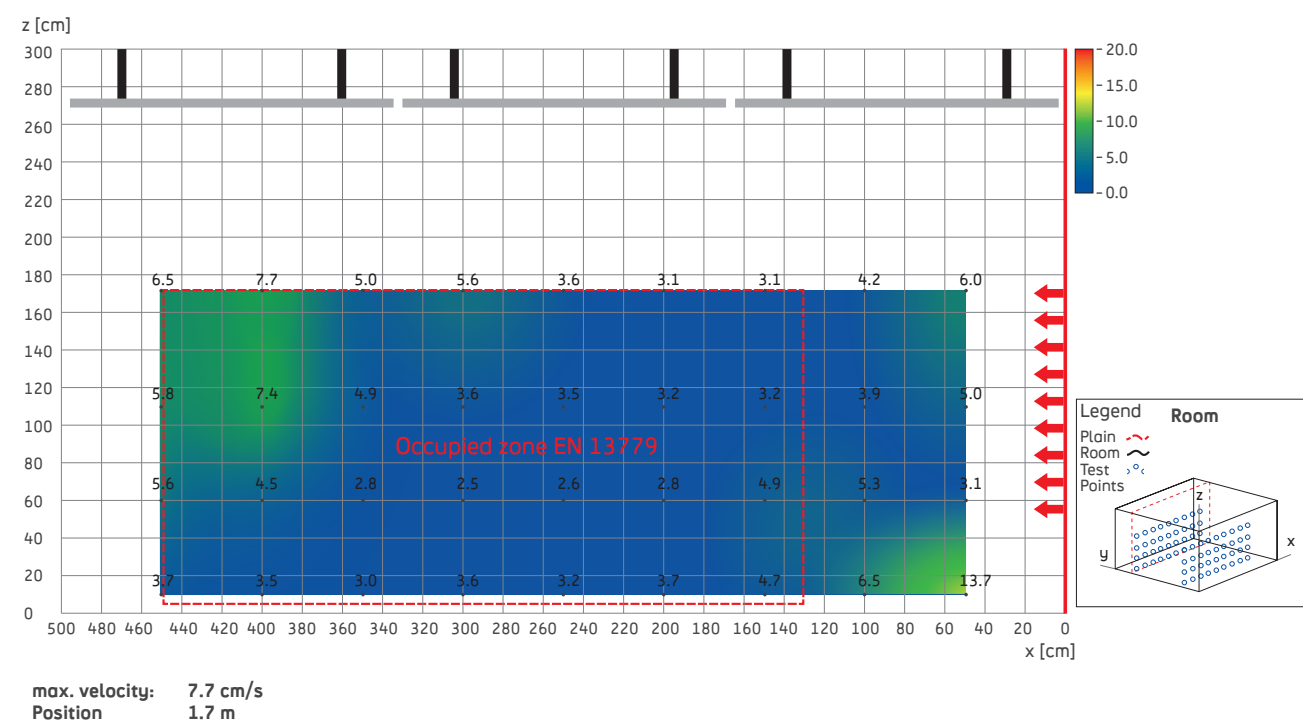


fig. 1.14 Air speed tendency

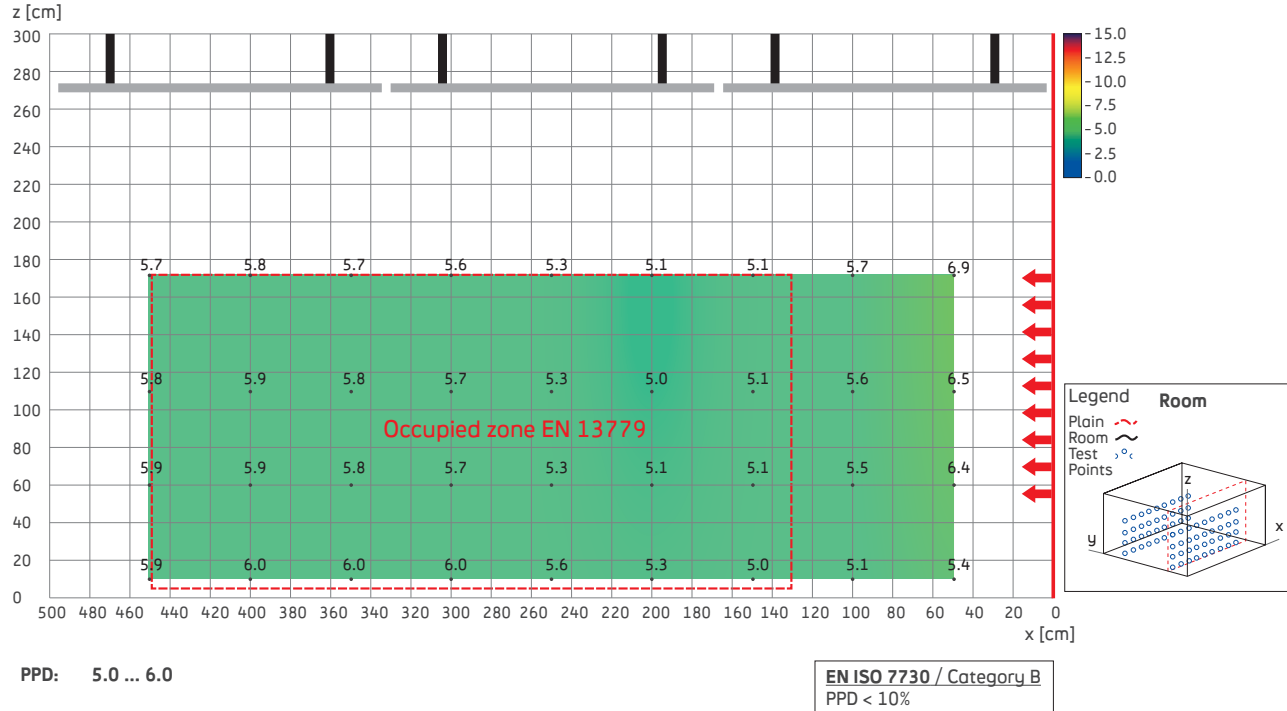


fig. 1.16 PPD – cooling

The heating test has led to very similar results. Below the air temperature distributions (set point 21 °C) and the PPD are the only shown.

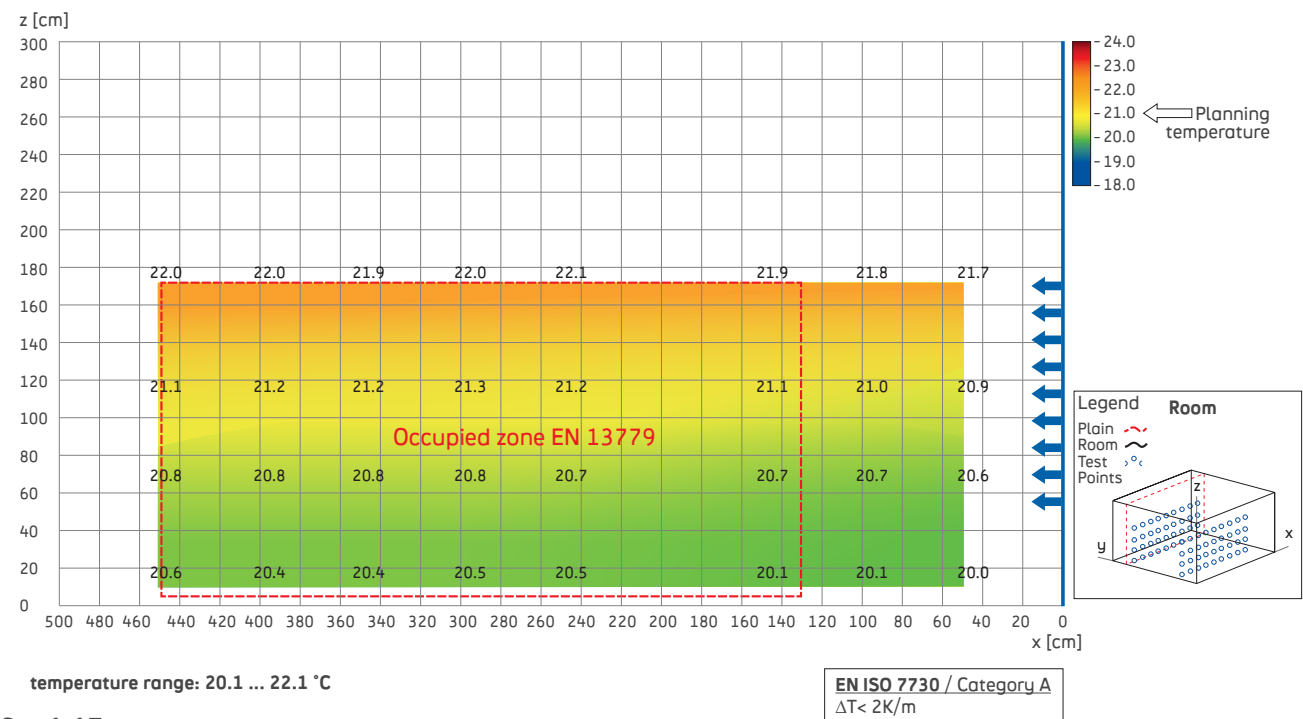


fig. 1.17 Temperature distribution – heating

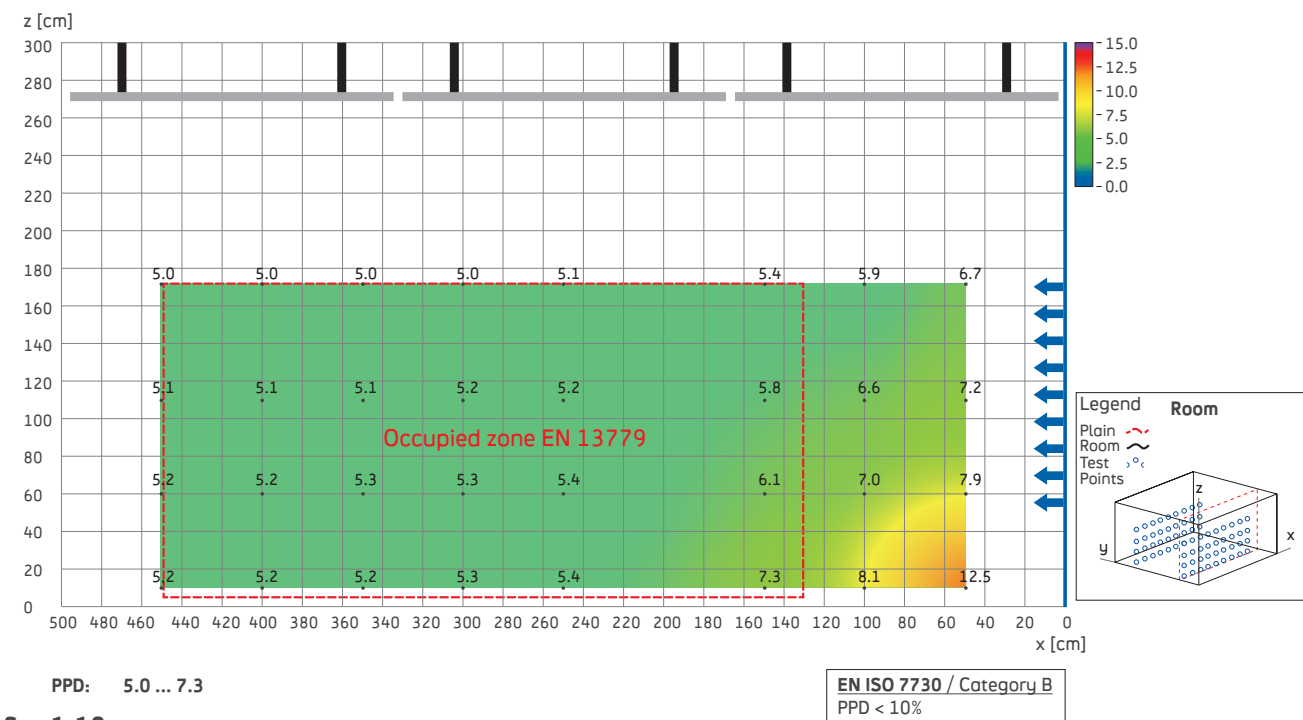


fig. 1.18 PPD –heating

If we compare the results of all these experimental analyses, it is clear that different applications provide the same levels of comfort thanks to the resourcefulness of radiant ceiling systems.

Modularity and flexibility

The simple fact that radiant ceilings represent an important resource in terms of energy saving while offering top comfort levels and space availability, no doubt deserves great attention.

There is however another crucial feature that makes radiant heating and cooling systems worth great appreciation: they provide designers with more possibilities to interpret space and set the basis for flexible planning.

Thanks to the wide range of panel versions and dimensions, the most demanding architectural and installation needs can be fulfilled.

Rapid installation

The support structure components are assembled with preset bolts or joints for a rapid and accurate installation. Connection to the distribution manifolds includes rapid fittings and plastic pipes, or special preassembled kits that make the entire intervention extremely easy and reliable.

In-house preassembly

Panels are preassembled in-house for an extremely easy and rapid installation.

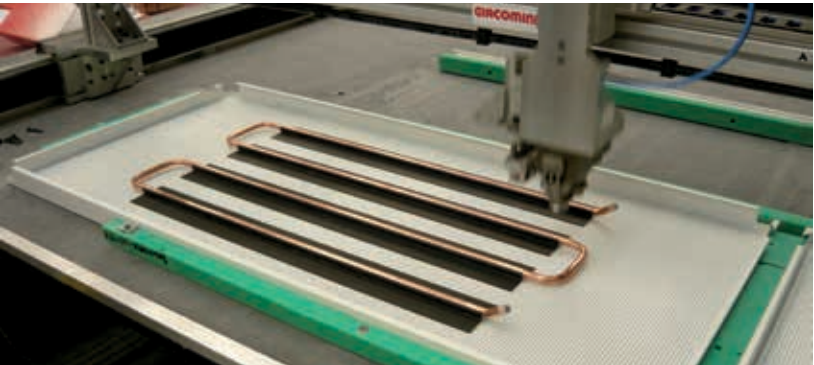


fig. 1.19 In-house assembly of radiant panels

Inspectionability

One of the most beneficial characteristics of metal radiant ceilings is their inspectionability. Inspecting the false ceiling or work in the space above, without turning off the system, is extremely practical, easy and safe.

In fact, access to the false ceiling and the systems inside, modification or maintenance of electric, computer-based, lighting, sound and other installations is very comfortable.

All these interventions can be performed in a targeted and selective way.

Inspectionability of the distribution manifolds through a special and practical trapdoor is guaranteed for the versions with plasterboard panels.

TYPES OF RADIANT CEILINGS

Giacomini's wide range of radiant ceiling systems can satisfy the most varied project and installation requirements characterizing the field of application.

The entire family of radiant ceiling systems is developed into two product classes:

- > **metal-finish panels**, mostly suitable for hospitals and commercial buildings in general
- > **plasterboard-finish panels**, particularly indicated for residential buildings.

The next two chapters describe in depth all the radiant ceiling systems by Giacomini to better guide professionals in identifying the most suitable solution according to their needs.



The modern commercial sector: actual architectural freedom, total valorization of building surface and volume, maximum healthiness and first-class comfort. And last, but not least, tangible energy saving.

Chapter 2

Metal radiant ceilings

INTRODUCTION

The metal radiant ceilings class consists of two basic solutions; the table below shows them in detail:

series	model	modularity [mm x mm]	activation
GK	GK60	600x1200	C75 - A220
	GK120	1200x1200	C75 - A220
GK PSV	GK60x60 PSV	600x1200	C75 - A220
	GK60x120 PSV	600x1200	C75 - A220

Before analyzing each metal radiant ceiling system, it is advisable to describe the system core.

GK AND GK PSV PANEL TYPES

Metal panels can be active or inactive. Active panels provide radiant thermal exchange based on an integrated activation system while inactive panels have obviously only an aesthetic function.

Both panels are made with galvanized steel and are available smooth or micro-perforated; the standard R2516 micro perforation features 2.5 mm holes on the entire panel surface, with the exception of a 15 mm wide band along the entire perimeter. The perforation percentage is equal to 16%, that is 16% of the panel surface is made by holes. Other types of perforation are available on request.

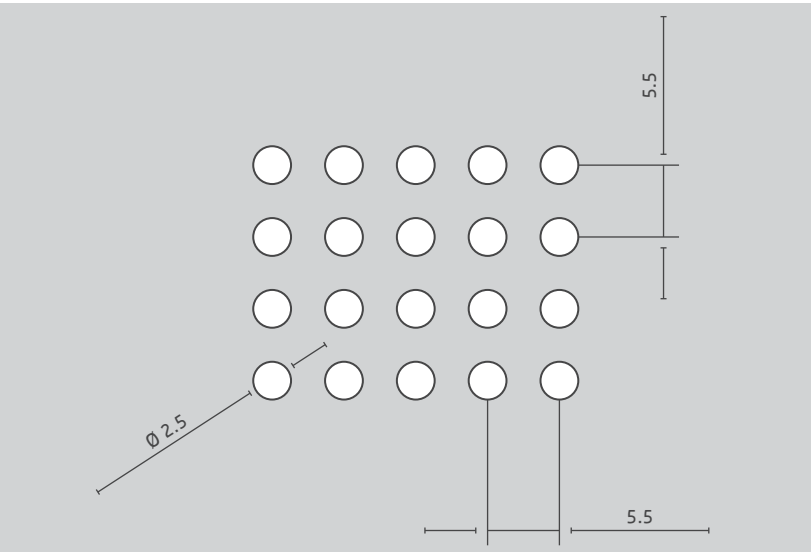


fig. 2.2 R2516 metal panel micro-perforation

fig. 2.1
Types of metal radiant ceilings

THE ACTIVATION SYSTEM

Metal radiant panels are available with two different activation systems, each suitable for specific fields of application. The product technical specification sheets better describe in details every type of activation for every single panel, but here we will consider the GK60 panel as a model to illustrate the nature of the two options.

TYPE A ACTIVATION

Thermal exchange in panels featuring the A220 activation are made by a 16x1.5 mm plastic pipe with anti-oxygen barrier combined to a pair of 220x700 mm anodized aluminium diffusers. The panel-thermal exchange system group is pre-assembled in-house.

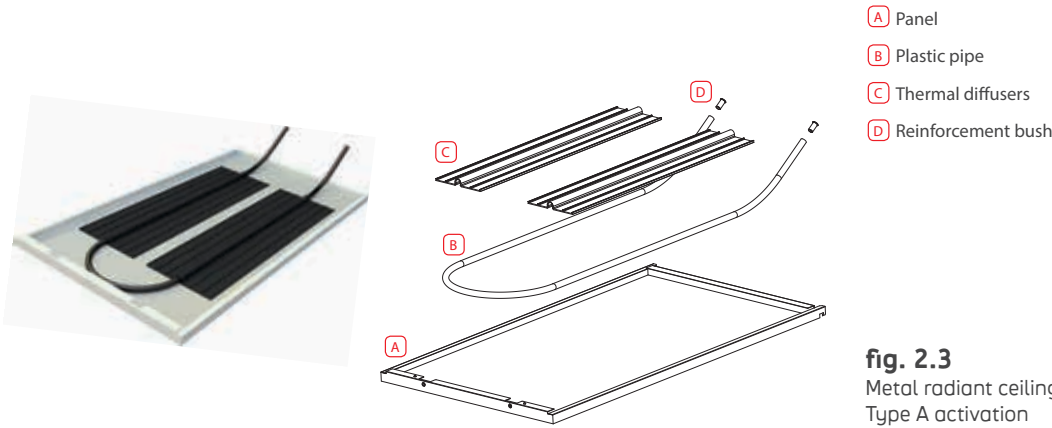


fig. 2.3
Metal radiant ceiling system:
Type A activation

TYPE C ACTIVATION

Thermal exchange in panels featuring the C75 activation are made by a hydraulic circuit realized with a 12x1 mm copper coil combined to a group of four 75x100 mm anodized aluminium diffusers. The panel-thermal exchange system group is pre-assembled in-house.

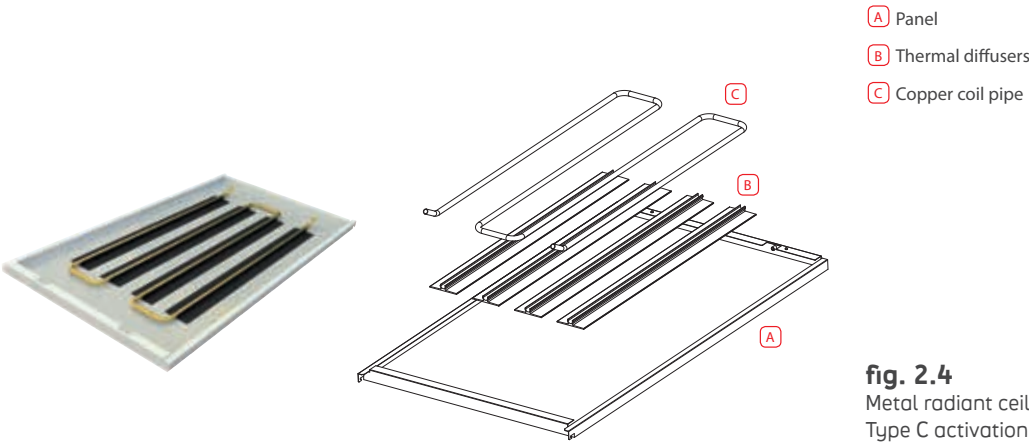


fig. 2.4
Metal radiant ceiling system:
Type C activation

GK120 SYSTEM

METAL RADIANT PANELS

WHY GK120

- particularly indicated for open-space ambients
- easy installation of lighting elements in the structure
- availability of precut panels and supports
- cross-pattern support structure
- fully inspectionable
- two activation systems
- customizable on request

more details on
giacomini.com

INTRODUCTION

GK120 is a metal radiant ceiling system particularly indicated for heating and cooling of open-space ambients such as offices, lounges, commercial spaces, airports, school buildings. Characterized by its 1200x1200 mm modularity, GK20 provides for installation of a cross-pattern support structure which embeds each panel completely.

The hanging system is designed to offer the best false ceiling planarity.

Panels can be micro-perforated or smooth. Side compensation is generally made with plasterboard.

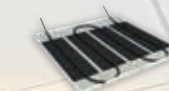
PANEL TYPES



K120C Micro-perforated
➤ Modularity: 1200x1200 mm
➤ Activation: copper



K120LC Smooth
➤ Modularity: 1200x1200 mm
➤ Activation: copper



K120A Micro-perforated
➤ Modularity: 1200x1200 mm
➤ Activation: plastic



K120LA Smooth
➤ Modularity: 1200x1200 mm
➤ Activation: plastic

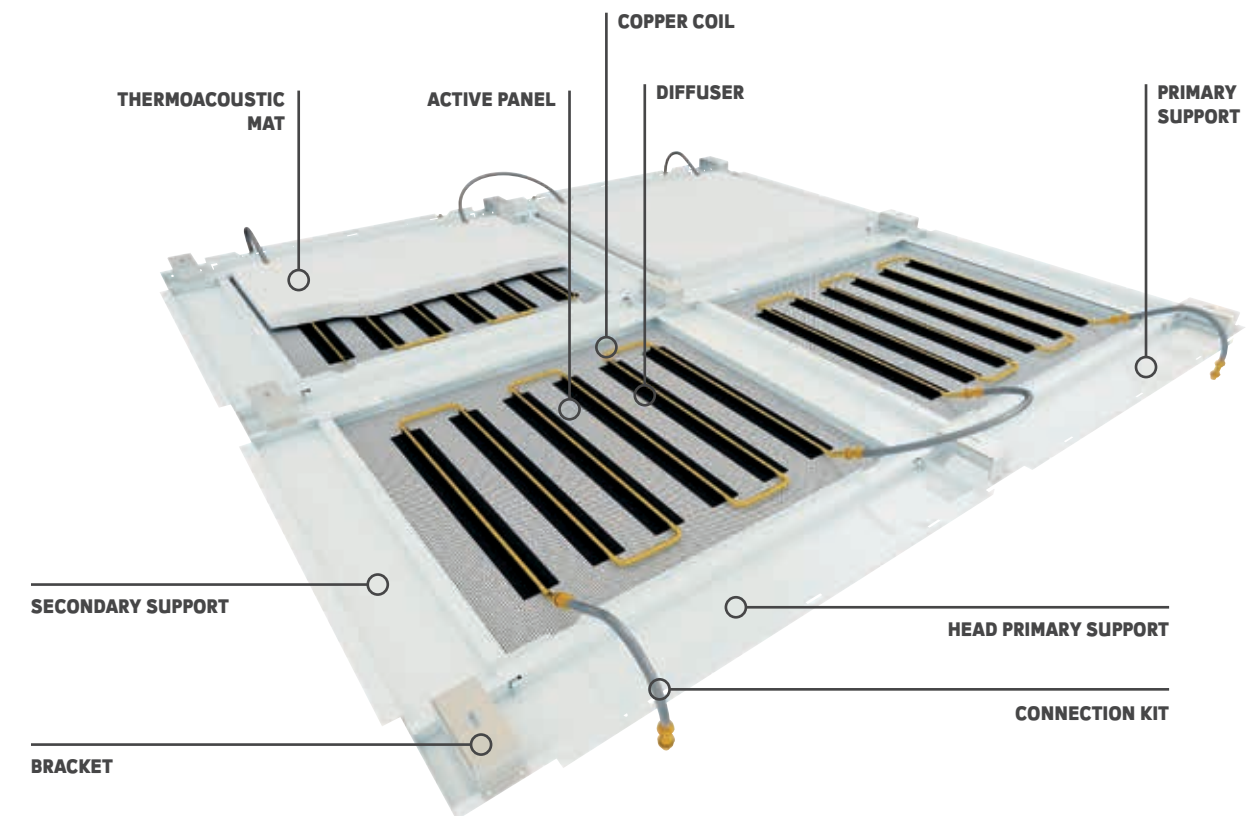


K120 Micro-perforated
➤ Modularity: 1200x1200 mm
➤ Inactive

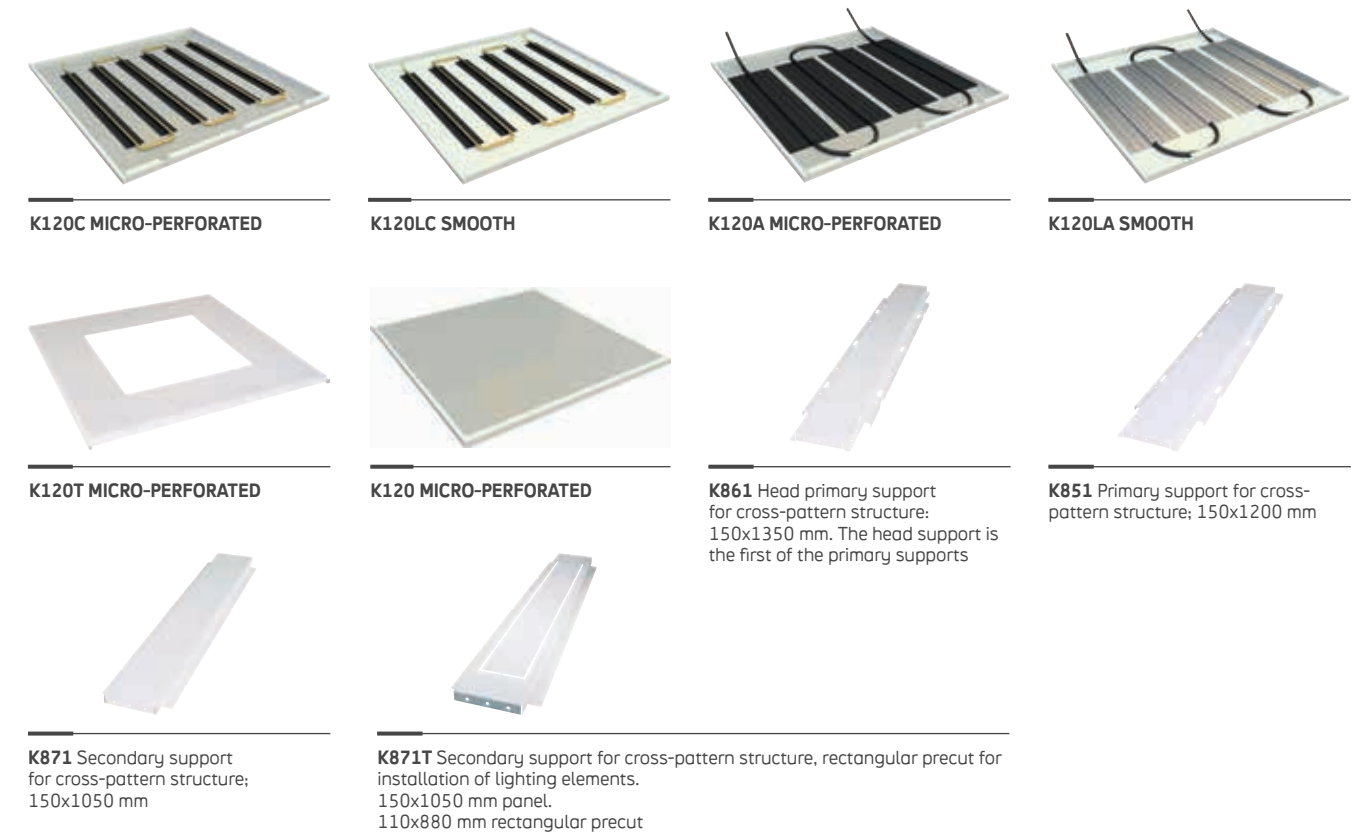
GK120 SYSTEM METAL RADIANT PANELS



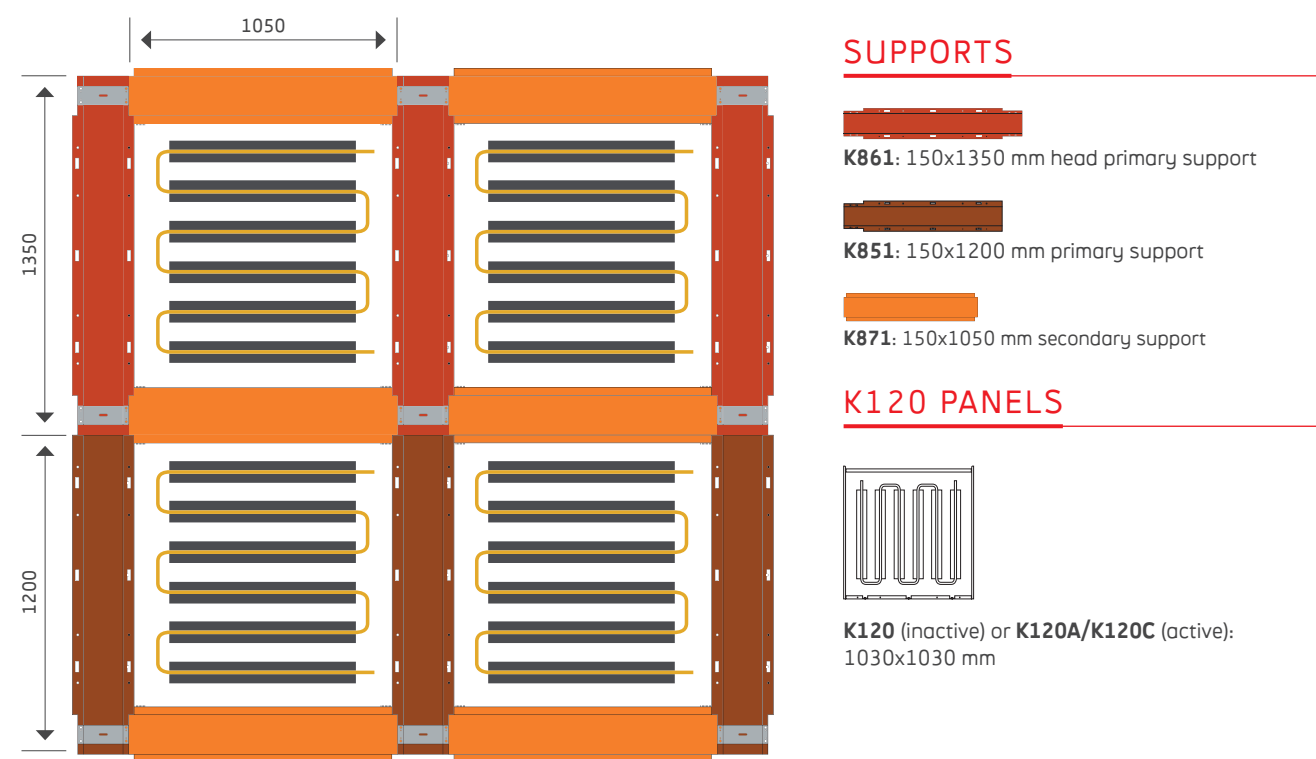
- > Galvanized steel panel, 8/10 thickness, 1030x1030 mm
- > R2516 micro-perforated or smooth panel
- > Installation on exposed cross-pattern support structure, with 150 mm base support
- > Rotation opening system
- > Closing with sealing springs
- > Aluminium diffuser activation and copper coil – C75 or plastic – A 220
- > Basic colours: RAL9010 - white RAL9006 - silver. Other colours available on request
- > 1200x1200 mm false ceiling module
- > Particularly indicated for open-space ambients
- > Possibility to install a thermoacoustic mat to enhance the system performance
- > Easy integration of lighting elements in the false ceiling thanks to panels and supports pre-cut in-house
- > Inspectionability system



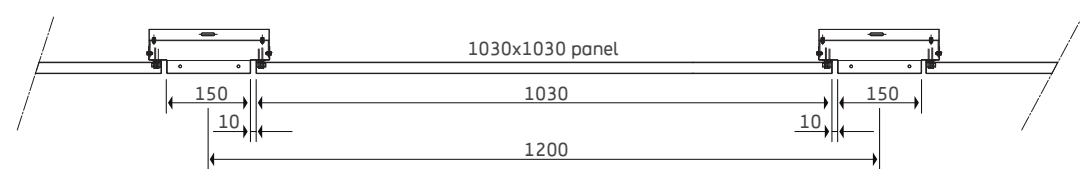
GK120 PANELS AND SUPPORTS



The system is structurally represented below with plan and section views:



The cross-pattern structure presents two rows of supports. The 150 mm primary supports, installed according to parallel directrices with a 1200 mm interdistance – represent the backbone of the false ceiling; transversally, and with the same 1200 mm interdistance, are the secondary supports which complete and stiffen the system. A 10 mm shadow gap is installed between the supports and the panel to easily open the same.



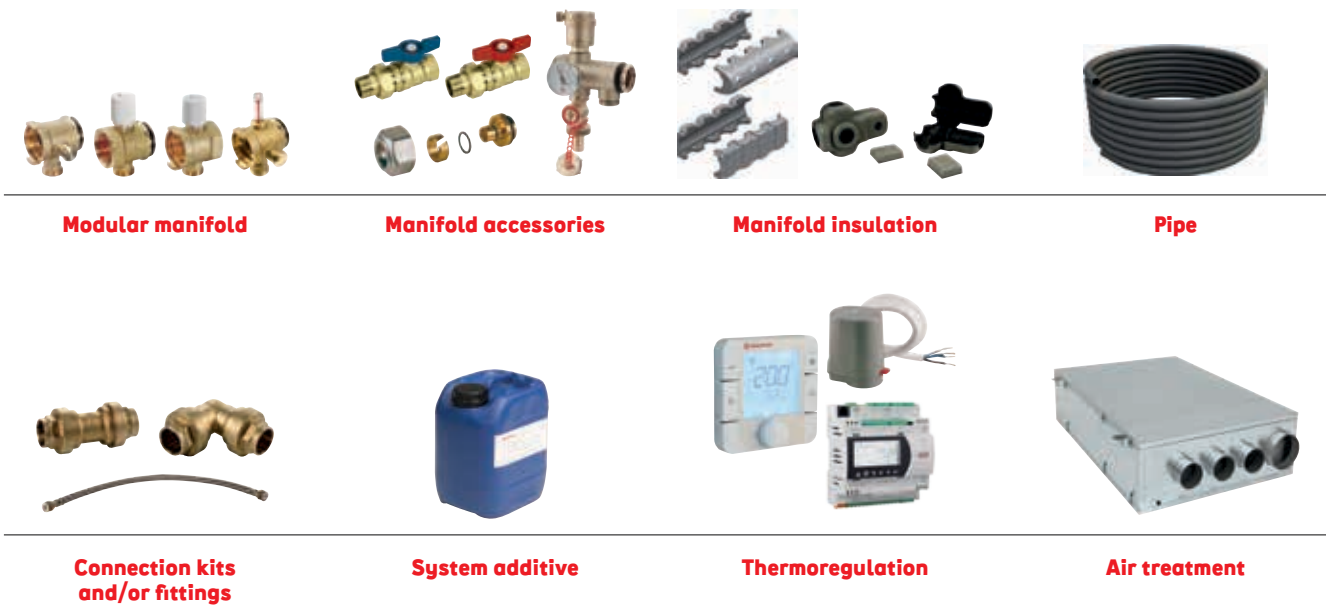
Section view of the GK120 system – cross-pattern structure and 150 mm base supports

APPLICATION EXAMPLES



Exchange Building (Vancouver, BC CANADA)

CORRELATED PRODUCTS



GK60 SYSTEM

METAL RADIANT PANELS

WHY GK60

- indicated for small/medium open-space ambients
- availability of pre-cut panels for integration of lighting elements
- sturdy bearing structure made by supports and finishing heads
- parallel-laying support structure
- fully inspectionable
- two activation systems
- customizable on request

more details on
giacomini.com

INTRODUCTION

GK60 is an extremely versatile metal radiant ceiling. Suitable for heating and cooling of medium/small open-space ambients such as meeting rooms, offices, hospital rooms. It is characterized by a 600x1200 mm modularity and provides for the installation of parallel-laying support structures, completed by the installation of head elements.

The hanging system is designed to offer the best false ceiling planarity.

Panels can be micro-perforated or smooth. Side compensation is generally made with plasterboard.

PANEL TYPES



K60C Micro-perforated
➤ Modularity: 600x1200 mm
➤ Activation: copper



K60LC Smooth
➤ Modularity: 600x1200 mm
➤ Activation: copper



K60A Micro-perforated
➤ Modularity: 600x1200 mm
➤ Activation: plastic



K60LA Smooth
➤ Modularity: 600x1200 mm
➤ Activation: plastic

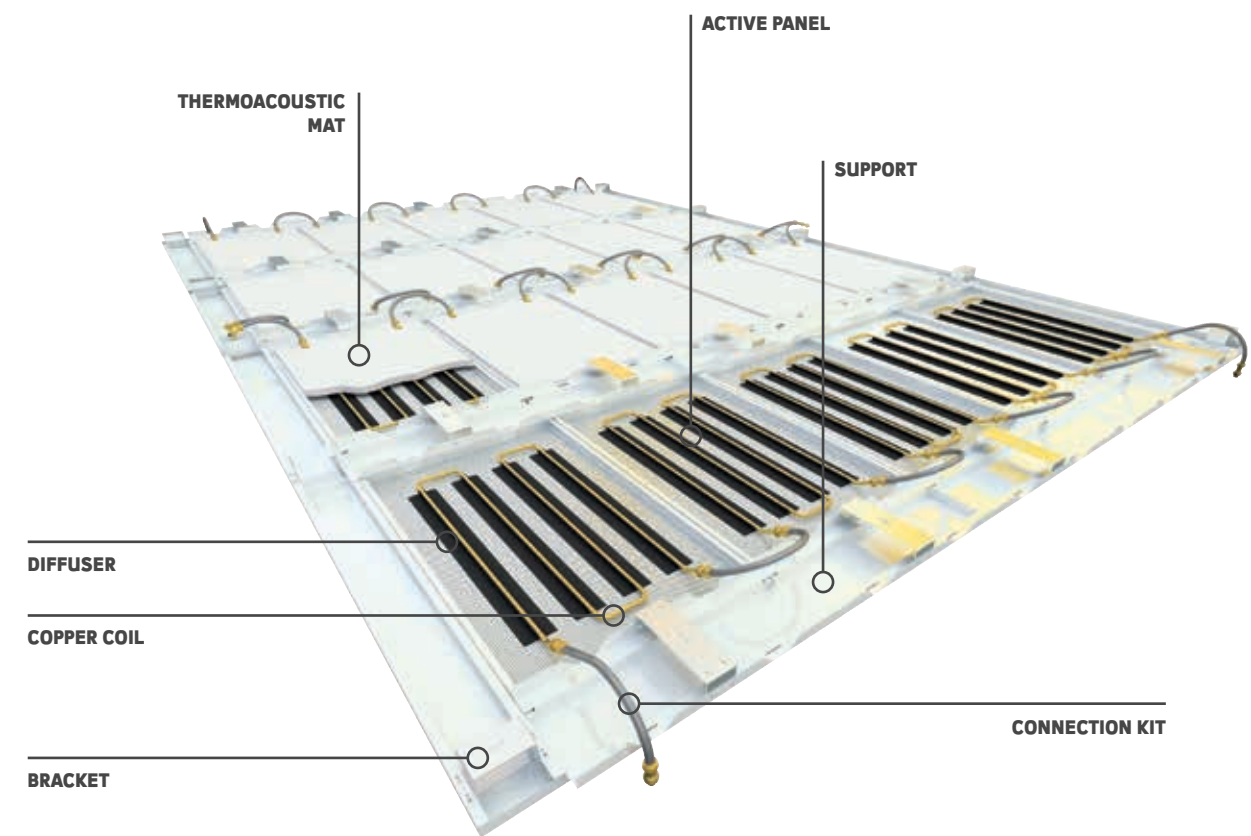


K60 Micro-perforated
➤ Modularity: 600x1200 mm
➤ Inactive

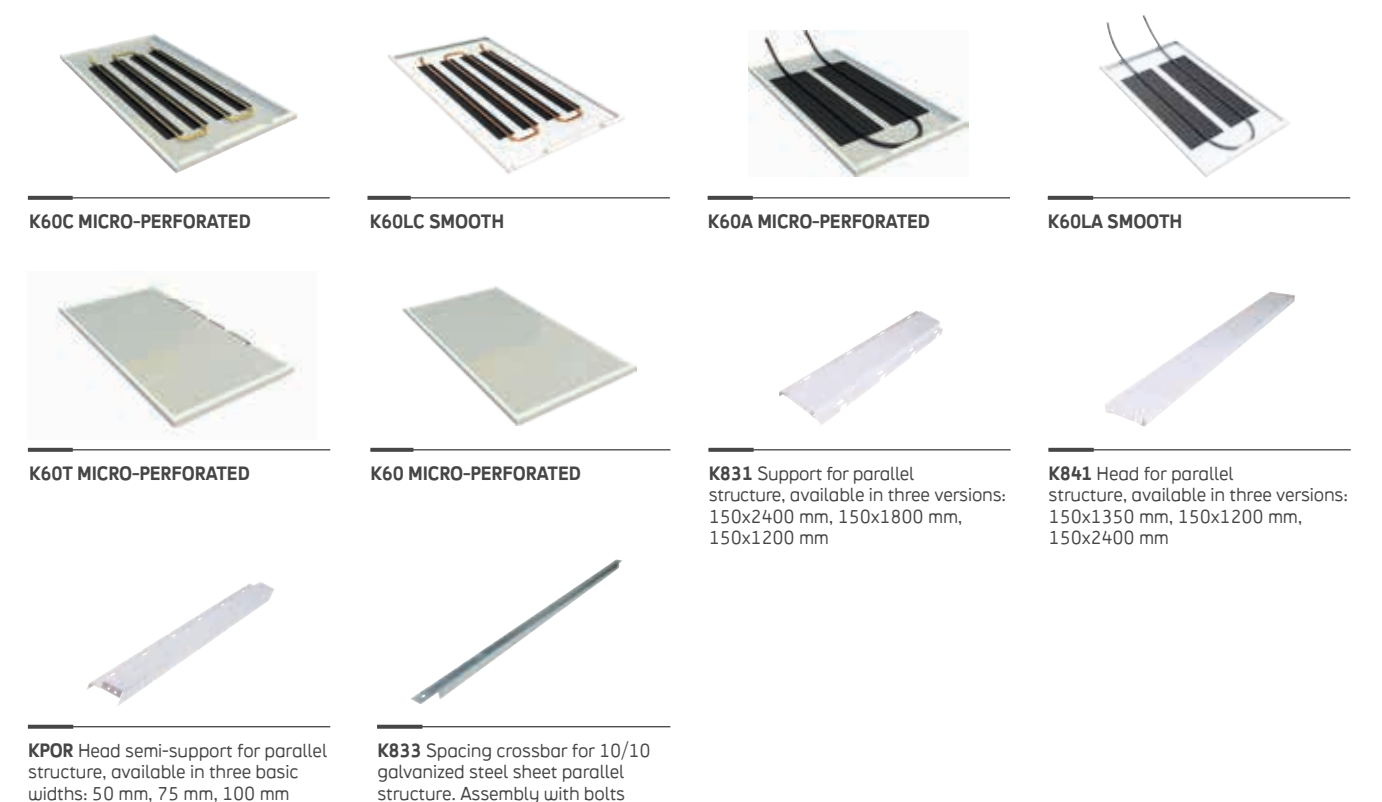
GK60 SYSTEM METAL RADIANT PANELS



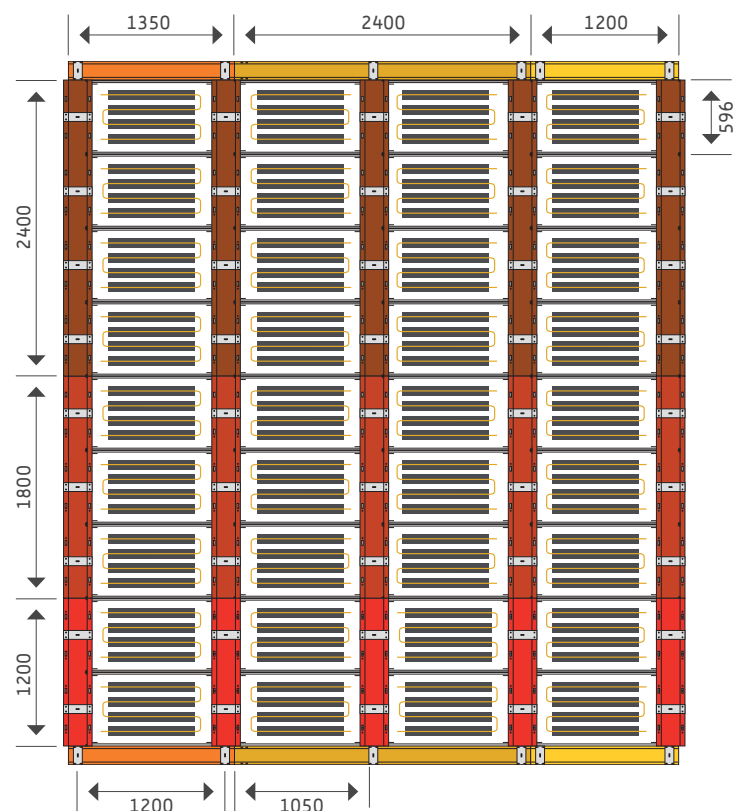
- > Galvanized steel panel, 8/10 thickness, 596x1030 mm
- > R2516 micro-perforated or smooth panel
- > Installation on exposed parallel support structure, with 150 mm base support
- > Rotation opening system
- > Closing with sealing springs
- > Activation with aluminium diffusers and copper – C75 or plastic – A220 coil
- > Basic colours: RAL 9010 – white or RAL9006 – silver. Other colours available on request
- > 600x1200 mm false ceiling module
- > Particularly indicated for open-space ambients, but also for medium/small environments (meeting rooms, offices, hospital rooms)
- > Possibility to install a thermoacoustic mat to improve the system performance
- > Enhances the integration of lighting elements in the false ceiling thanks to in-house pre-cut panels and supports
- > Inspectionable system



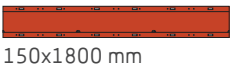
GK60 PANELS AND SUPPORTS



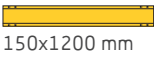
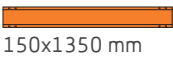
The system is structurally represented below with plan and section views:



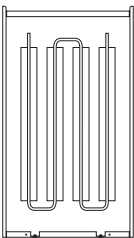
K831SUPPORT



K841 HEADS

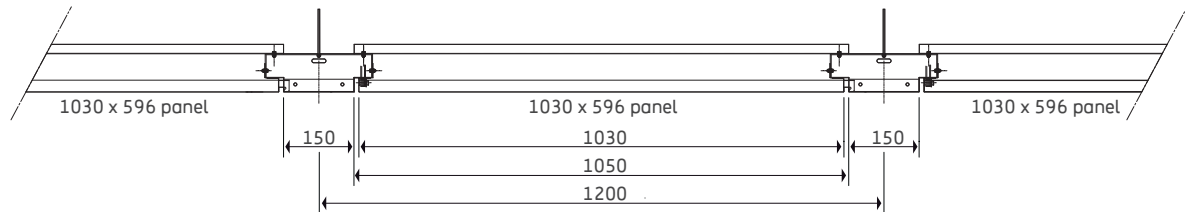


K160 PANELS



The structure features 150 mm-wide primary supports installed in parallel with 1200 mm interdistance. Panels are positioned transversally. A head support completes the system. Between the support and the panel is installed a 10 mm shadow gap to allow for easy opening.

In case of space limits, semi-supports can be used to reduce the overall dimensions and maximize space.



GK60 section view — 150 mm base parallel structure and supports

APPLICATION EXAMPLES



CORRELATED PRODUCTS

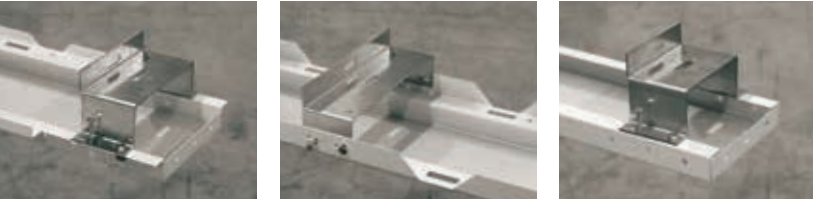
Modular manifold	Manifold accessories	Manifold insulation	Pipe
Connection kits and/or fittings	System additive	Thermoregulation	Air treatment

GK SYSTEM INSTALLATION AND INSPECTIONABILITY

INSTALLATION

The GK system assembly requires the same installation steps provided for traditional metal panel false ceilings.

First of all, set the brackets according to the project; then fit them to the supports: the cross-pattern structure requires K852 brackets for the primary supports and for head primary supports, while K832 brackets are required for the supports of parallel structures and K842 brackets for the heads. Brackets are fixed to the ceiling with K819 L-shaped plates and K818 slotted bars. Complete by levelling the supports.



K852 bracket for primary supports

K832 bracket for parallel structure supports

K842 bracket for parallel structure heads

fig. 2.5 GK60 supports and brackets



K852 - 150x52x70
Bracket for 20/10 galvanized steel primary supports

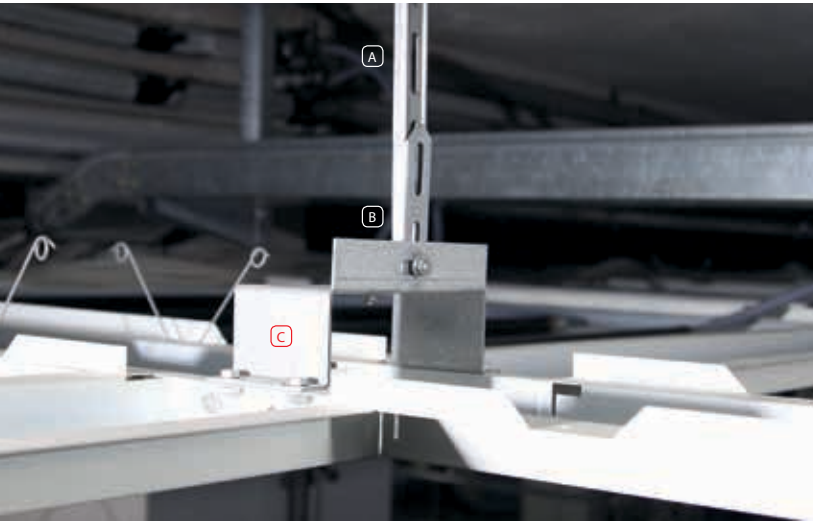
K832 - 228x52x70
Bracket for 20/10 galvanized steel parallel support structure

K842 - 110x52x70
Bracket for 20/10 galvanized steel parallel head structure

K819 - 50x95
Galvanized steel L-shaped plate for slotted bar

K818 - 25x10
Slotted bar for installation of galvanized steel structures

Series GK120 requires the installation of secondary supports every 120 cm. Series GK60 requires K833 spacing crossbars to set the distance between the supports and enhance the sturdiness of the support structure.



A Slotted bar
B L-shaped plates
C Bracket

fig. 2.6 Bracketing detail of a GK120 radiant false ceiling

Each bracket is fixed to the supports with bolts. Once the structure has been assembled, the springs are fitted on panels as shown below. The panels can then be installed and the rotation direction can be set according to the project.

The panels are anchored by their hooks in the corresponding support slots and positioned vertically, and then the hydraulic connections are carried out by carefully following the installation project instructions.

Panels which are part of the same circuit are connected one to the other while the first and last panel of the series are connected to their distribution manifold – one for delivery and the other for return. Finally, the false ceiling is closed by rotating the panels and using the special fitting springs.



The panel is secured by the safety springs and once unhooked it can be placed vertically.

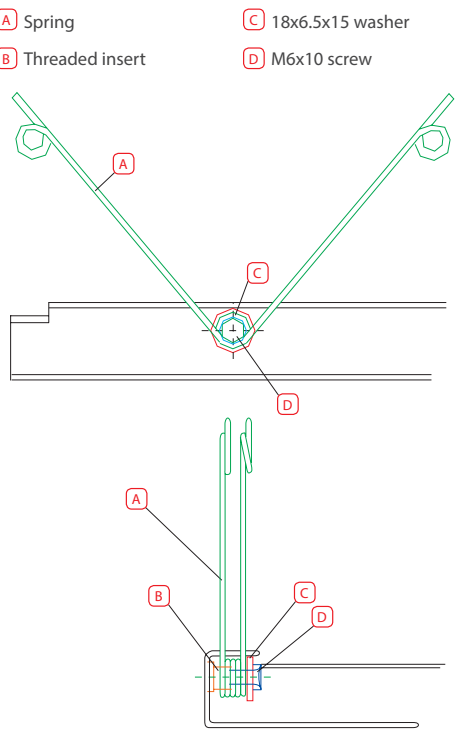


fig. 2.7 GK fitting springs

INSPECTIONABILITY

Each GK panel features two hooks fitted into the special support slots; the panel can pivot by 90° around the hooks to reach the vertical position. This enables to easily access the false ceiling for inspection, even when the system is turned on. Special safety springs keep the panel in place and allow to open and close it.

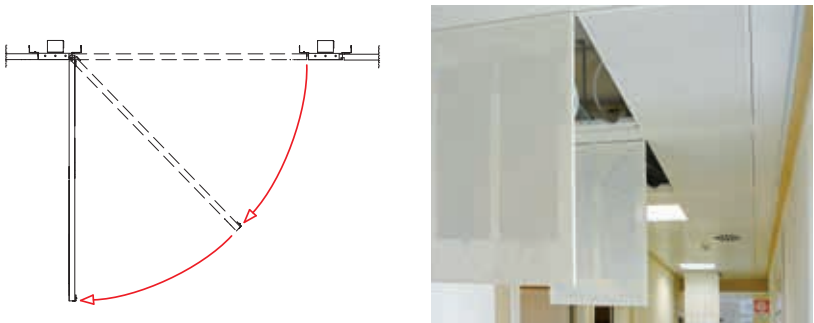


fig. 2.8 Inspectionability of the GK radiant false ceiling: the panels hang from the supports

SYSTEM **GK60x120 PSV**

METAL RADIANT PANELS

WHY GK60x120 PSV

- indicated for any kind of ambient
 - T24 cross-pattern support structure
 - rapid installation
 - fully inspectionable
 - two activation systems
 - customizable on request
- more details on giacomini.com

INTRODUCTION

GK60x120 PSV is a metal radiant ceiling for heating and cooling of medium-sized commercial ambients.

Characterized by a 600x1200 mm modularity, this system requires the installation of an exposed cross-pattern support structure with 24 mm base T-shaped supports.

The hanging system is designed to offer the best false ceiling planarity.

Panels can be micro-perforated or smooth. Side compensation is generally made with plasterboard or cut-to-size passive panels.

PANEL TYPES

 **K12C Micro-perforated**
➤ Modularity: 600x1200 mm
➤ Activation: copper

 **K12LC Smooth**
➤ Modularity: 600x1200 mm
➤ Activation: copper

 **K12A Micro-perforated**
➤ Modularity: 600x1200 mm
➤ Activation: plastic

 **K12LA Smooth**
➤ Modularity: 600x1200 mm
➤ Activation: plastic

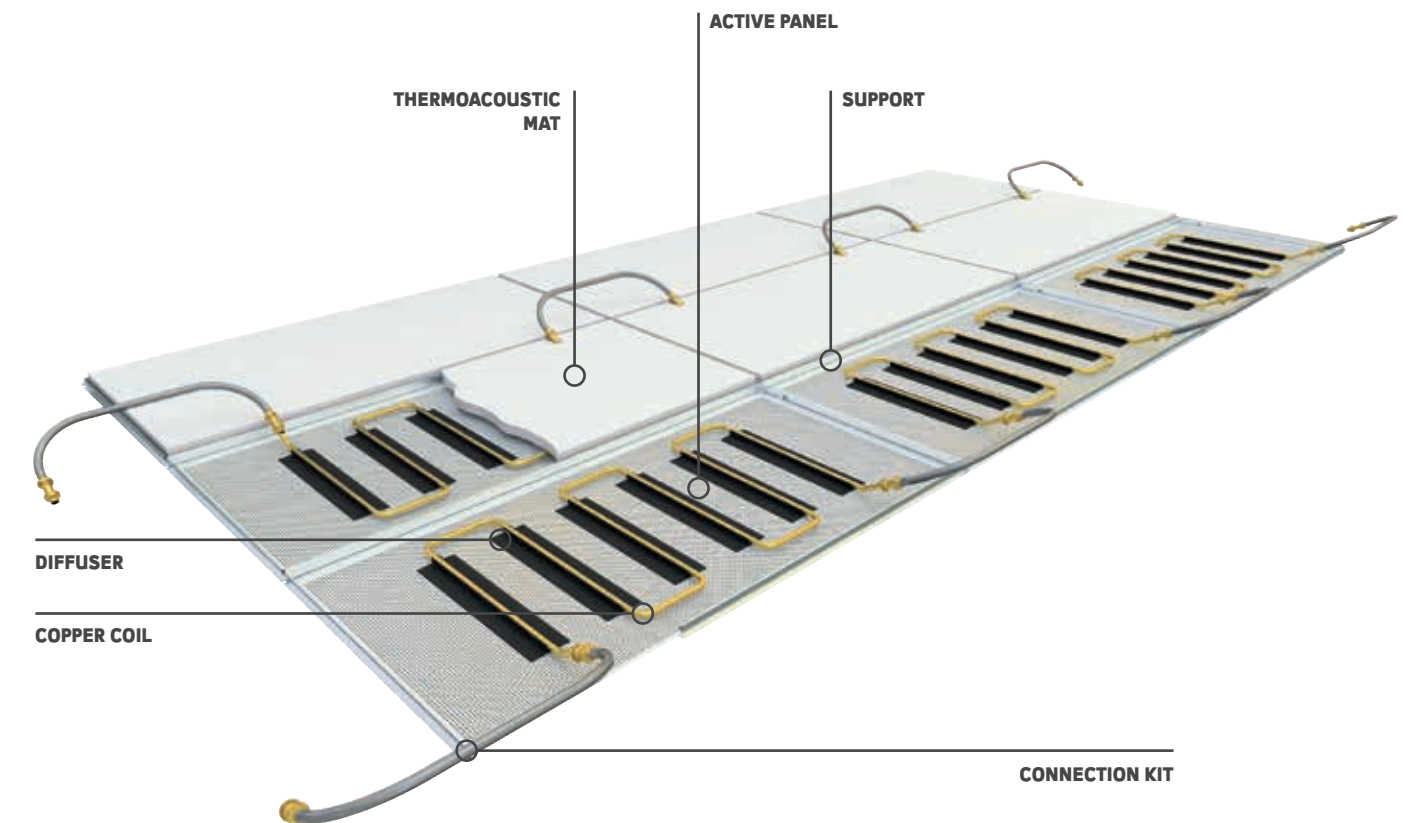
 **K12 Micro-perforated**
➤ Modularity: 600x1200 mm
➤ Inactive

 **K12L Smooth**
➤ Modularity: 600x1200 mm
➤ Inactive

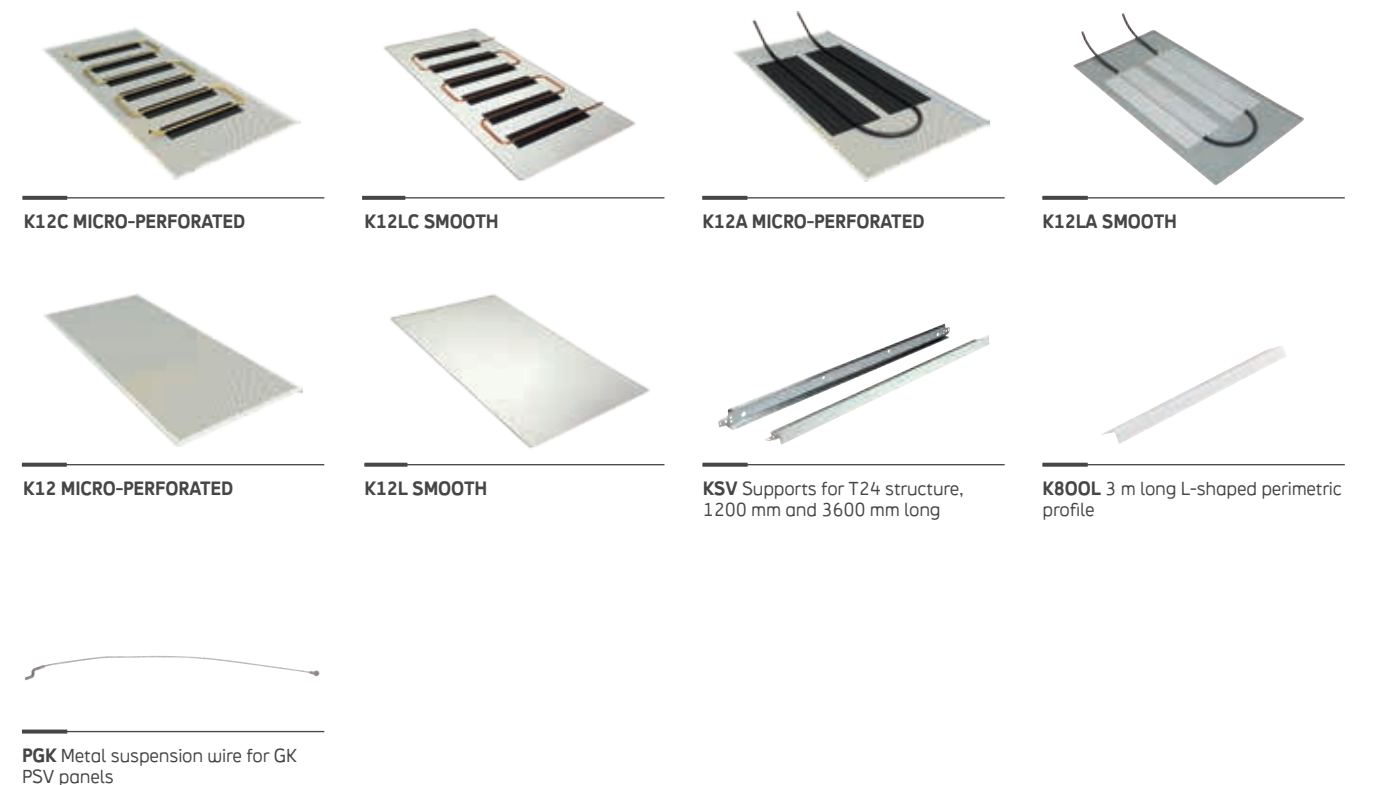
SYSTEM **GK60x120 PSV** METAL RADIANT PANELS



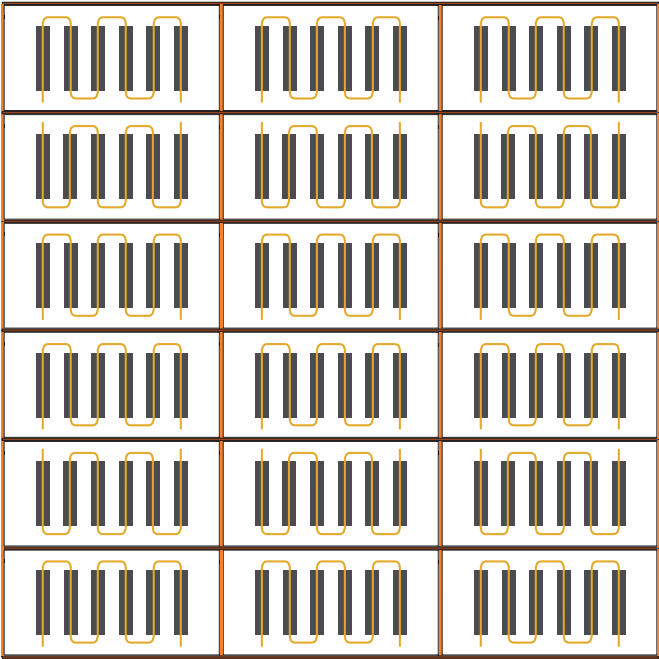
- > Galvanized steel panel, 6/10 thickness, 575x1175 mm
- > R2516 micro-perforated or smooth panel
- > Installation on exposed lightweight reversed T-shaped support structure - 24 mm base
- > Opening and suspension with steel wires
- > Quick-lock installation, no need to use nuts and bolts to fit the elements
- > Activation with aluminium diffusers and copper- C75 or plastic – A220 coil
- > Basic colours: RAL9003 – white, or RAL9006 – silver. Other colours available on request
- > 600x1200 mm false ceiling module
- > Indicated for medium and large ambients
- > Possibility to install a thermoacoustic mat to enhance the system performance
- > The use of standardized components and dimensions offers additional benefits: market availability and easy installation of all accessories, such as lighting elements, air diffusers and any other false ceiling element.
- > Inspectionable system



GK60X120 PSV PANELS AND SUPPORTS

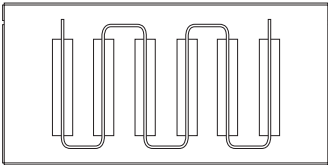


The system is structurally represented below with plan and section views:



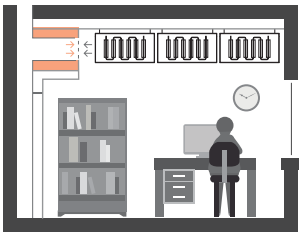
SUPPORT AND PANELS

- KSV36X** 24 mm L=3600 mm base supports
- KSV6X** 24 mm L=600 mm base supports



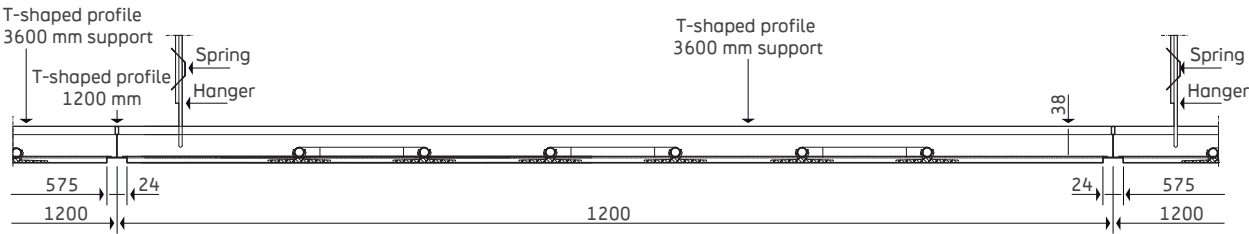
K12C or K12A 575x1175 mm active panel

PANEL SUSPENSION



Exposed reversed T-shaped structure with 24 mm base supports. This standard structure is lightweight, easy to find on the market and is generally used with ordinary false ceilings. The main supports are suspended with a typical spring+hanger system, very common in false ceiling installations.

The side finishes can include passive panels, possibly cut-to-size, or as an alternative, plasterboard which is used more frequently and offers greater design freedom.



GK60x120 PSV 24 mm base T-shaped structure section

APPLICATION EXAMPLES



CORRELATED PRODUCTS

 Modular manifold	 Manifold accessories	 Manifold insulation	 Pipe
 Connection kits and/or fittings	 System additive	 Thermoregulation	 Air treatment

GK60x60 PSV SYSTEM

METAL RADIANT PANELS

WHY GK60x60 PSV

- indicated for any kind of ambient
- T24 cross-pattern support structure
- rapid installation
- fully inspectionable
- two activation systems
- enables to balance the most severe thermal loads
- customizable on request

more details on
giacomini.com

INTRODUCTION

GK60x60 PSV represents the most suitable metal radiant ceiling for commercial solutions. Perfect to heat and cool medium/small ambients, yet proving its versatility at best when integrated in large open-space environments.

Characterized by a 600x600 mm modularity, this system requires the installation of an exposed cross-pattern support structure, with 24 mm base T-shaped supports.

The hanging system is designed to offer the best false ceiling planarity.

Panels can be microperforated or smooth. Side compensation is generally made with plasterboard or passive panels cut to measure.

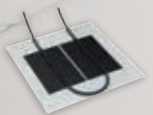
PANEL TYPES



K6C Micro-perforated
> Modularity 600x600 mm
> Activation: copper



K6LC Smooth
> Modularity 600x600 mm
> Activation: copper



K6A Micro-perforated
> Modularity 600x600 mm
> Activation: plastic



K6LA Smooth
> Modularity 600x600 mm
> Activation: plastic



K6 Micro-perforated
> Modularity 600x600 mm
> Inactive



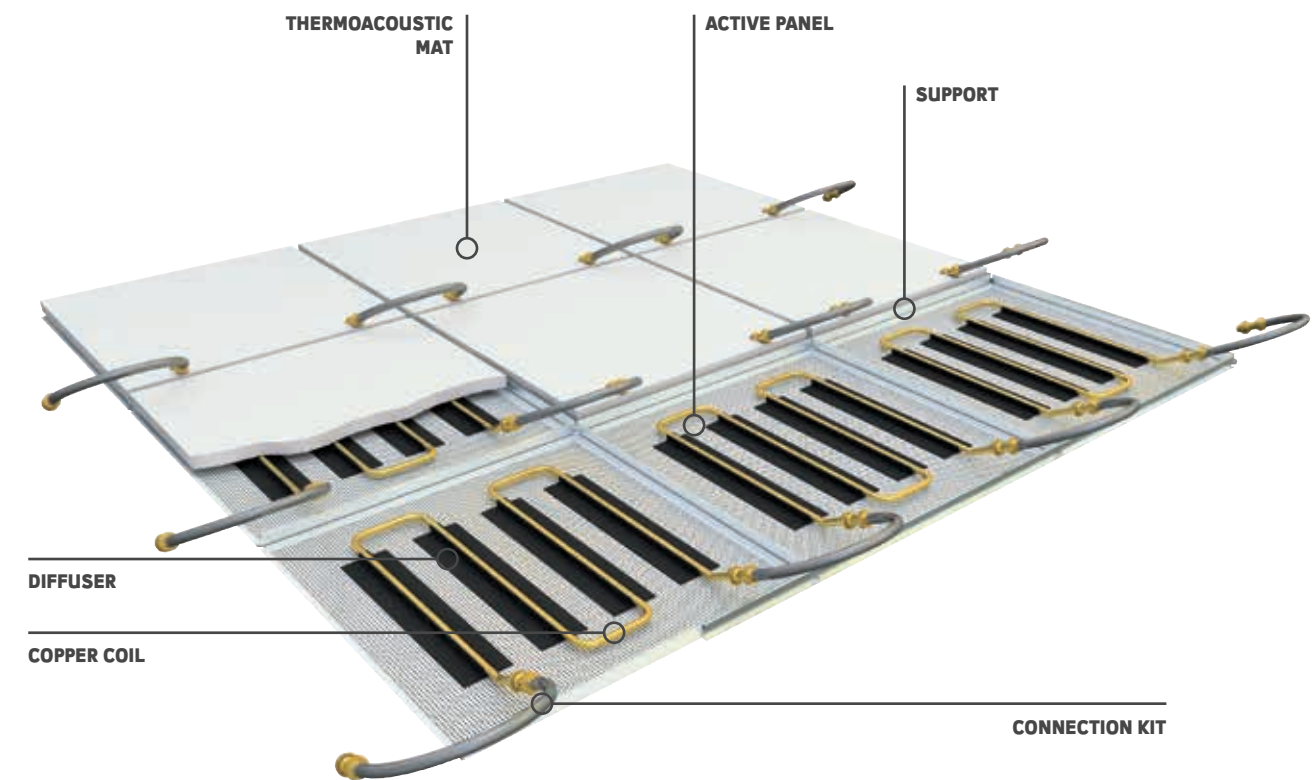
K6L Smooth
> Modularity 600x600 mm
> Inactive



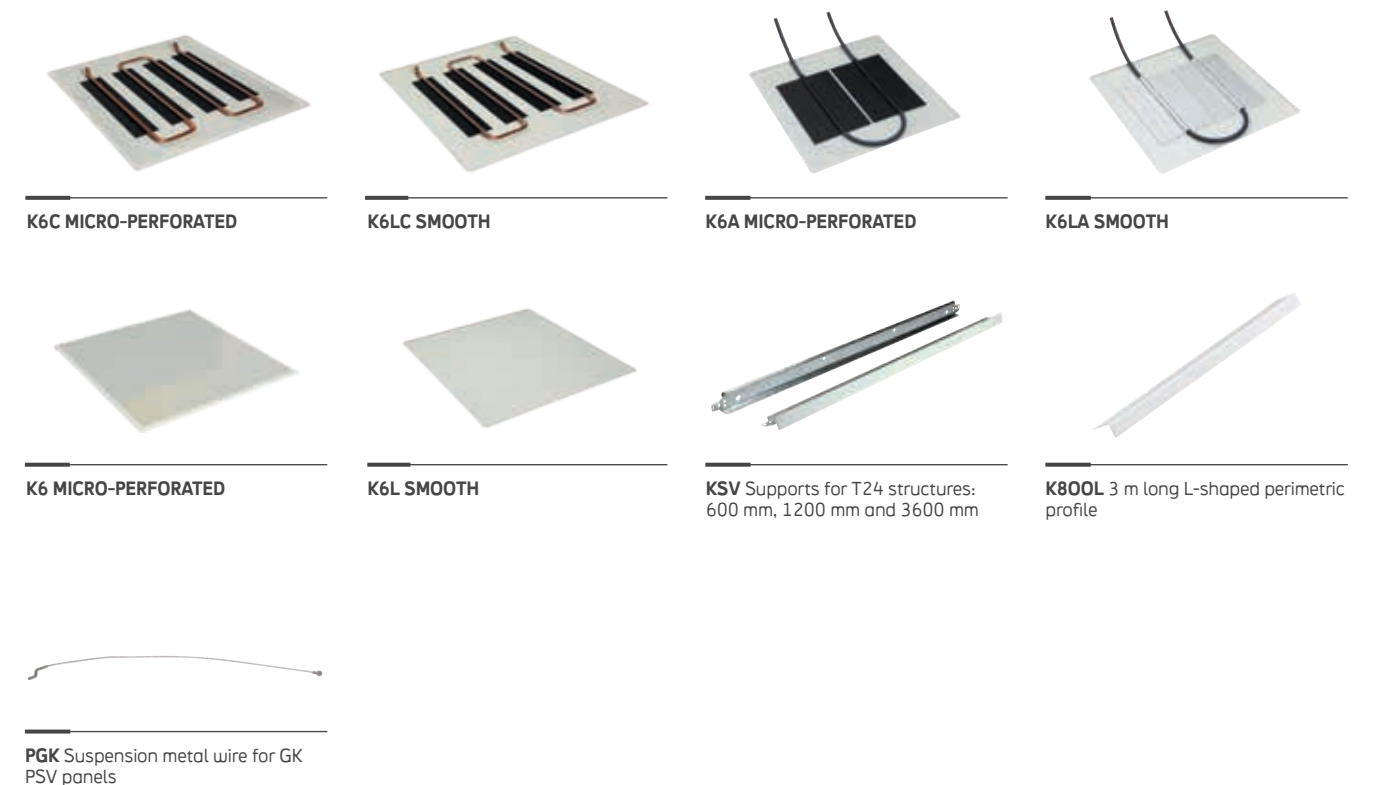
GK60x60 PSV SYSTEM METAL RADIANT PANELS



- > Galvanized steel panel, 6/10 thickness, 575x575 mm
- > R2516 micro-perforated or smooth panel
- > Installation on exposed lightweight reversed T-shaped support structure with 24 mm base supports
- > Opening and suspension with steel wires
- > Quick-lock installation: no need to use nuts and bolts to fit the elements
- > Activation with aluminium diffusers and copper – C75 or plastic – A220 coil
- > Basic colours: RAL9003 – white or RAL9006 – silver. Other colours available on request
- > 600x600 mm false ceiling module
- > Indicated for all kinds of ambients, this system performs at its best in small or irregular spaces thanks to its space-saving modularity and the minimum overall dimensions of the support structure. In such cases, it is the best system guaranteeing the best thermal performance
- > Possibility to install a thermoacoustic mat to increase the system performance
- > The use of standardized components offers additional benefits: market availability and easy installation of all accessories, such as lighting elements, air diffusers and any other false ceiling element
- > Inspectionable system



GK60X60 PSV PANELS AND SUPPORTS

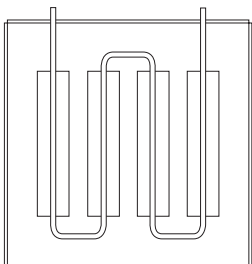


The system is structurally represented below with plan and section views:



SUPPORT AND PANELS

- KSV36X 24 mm base supports L=3600 mm
- KSV12X 24 mm base supports L=1200 mm
- KSV6X 24 mm base supports L=600 mm



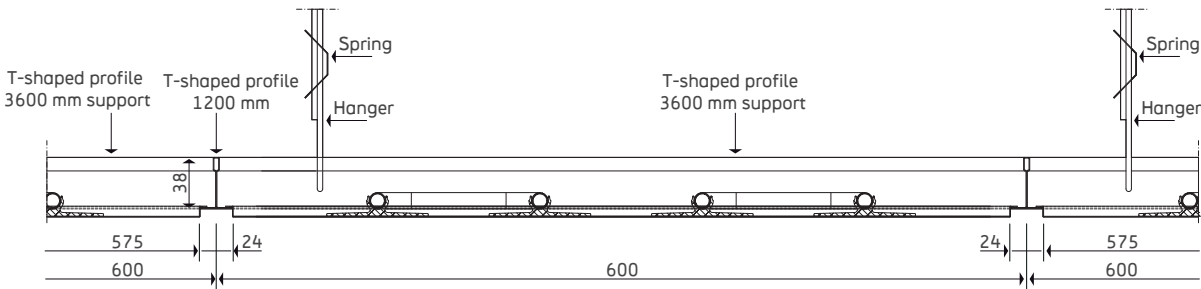
K6C or K6A 575x575 mm active panel

PANEL SUSPENSION



Exposed reversed T-shaped structure with 24 mm base supports. This standard structure is lightweight, easy to find on the market and is generally used with ordinary false ceilings. The main supports are suspended with a typical spring+hanger system, very common in false ceiling installations.

The side finishes can include passive panels, possibly cut-to-size, or as an alternative, plasterboard which is used more frequently and offers greater design freedom.



Section view of 24 mm base T-shaped structure for GK60x60 PSV system

APPLICATION EXAMPLES



CORRELATED PRODUCTS

 Modular manifold	 Manifold accessories	 Manifold insulation	 Pipe
 Connection kits and/or fittings	 System additive	 Thermoregulation	 Air treatment

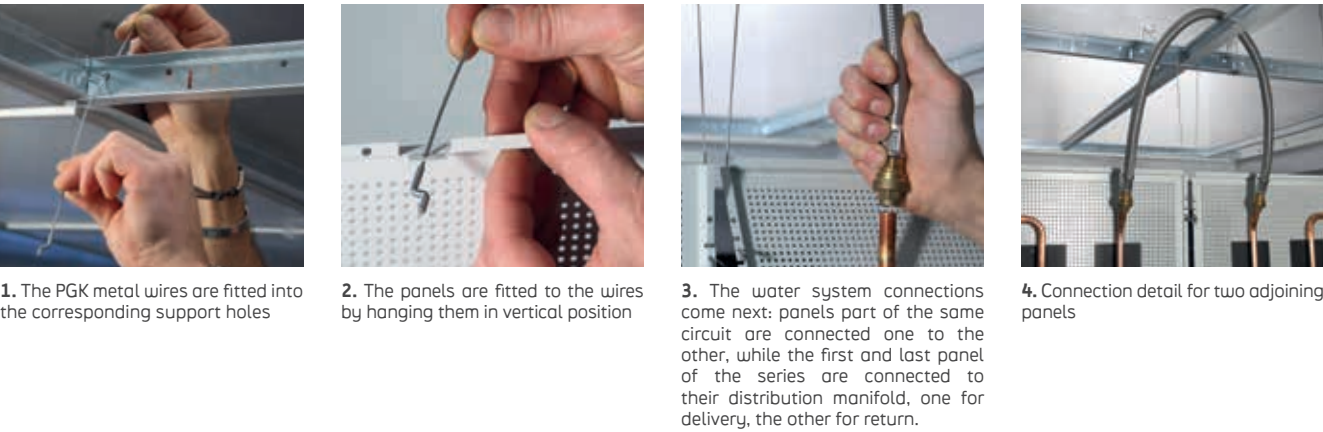
SYSTEM GK PSV

INSTALLATION AND INSPECTIONABILITY

INSTALLATION

The GK PSV system assembly requires the same installation steps provided for traditional false ceilings with a T24 support structure.

First of all, according to the project layout, set the hanging system, then assemble the structure. The installation is completed with panels, according to the steps below:



INSPECTIONABILITY

GK PSV panels – image below – are designed for fitting of two metal suspension wires [A] into the flanged tabs [B] to be folded at the work site. The wires are fitted to the T24 support structure [C] during installation.

GK PSV panels can therefore be fitted and positioned vertically, hanging by the two wires, to access the false ceiling and plenum for inspection or maintenance of other installations, even when the system is turned on.

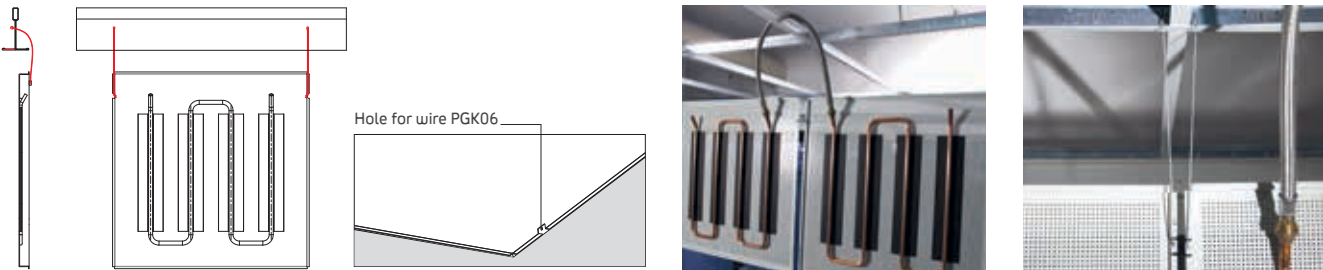


fig. 2.9
Inspectionability of GK PSV radiant ceiling – active and passive panels suspended by wires

ACTIVE METAL PANEL

HYDRAULIC CONNECTION

The metal panels of the radiant ceiling circuit can be fitted one to the other. The circuit generally derives from distribution manifolds.

According to the active panel thermal activation system, there are various hydraulic connection options.

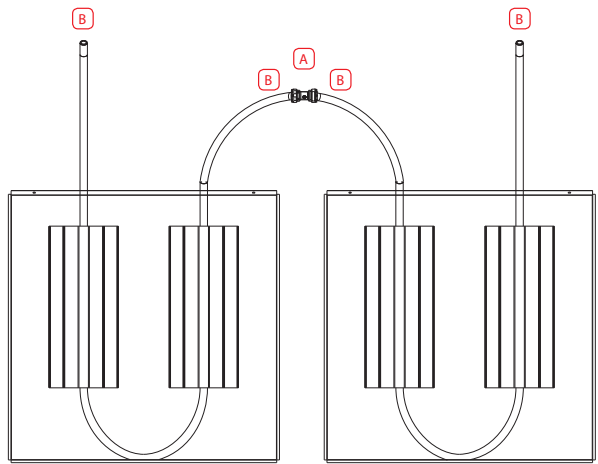
A220 activation panels

Connection between the distribution manifolds and panels is made with an anti-oxygen barrier polybutylene pipe - R986S 16x1.5 mm. The connection includes straight and square-shaped RC push-fittings.

Before fitting the polybutylene pipe into the fittings, the RC900 reinforcement bush must be inserted in the pipe itself.



fig. 2.10
Hydraulic connection components for A220 activation panels



A RC-16 straight connection
B RC-16 reinforcement bush fitted before inserting the pipe

fig. 2.11
Series connection of A220 activation panels

Panels with C75 activation

C75 thermal activation offers two hydraulic connection options.

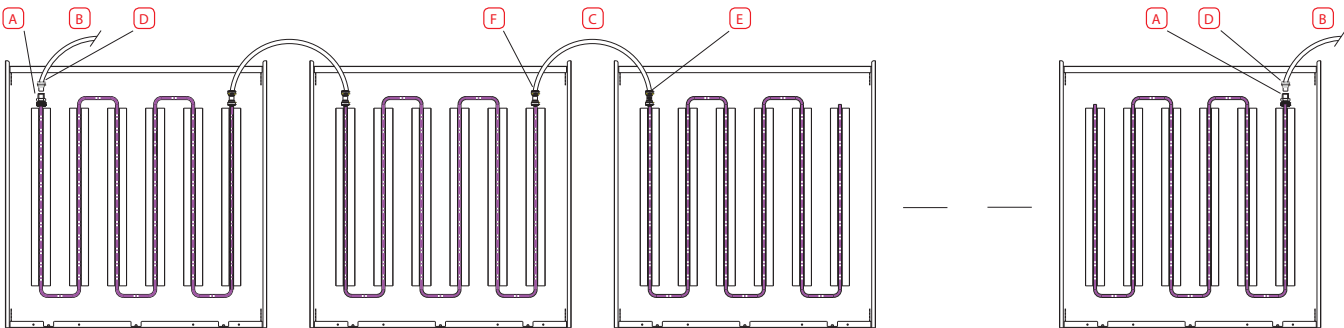
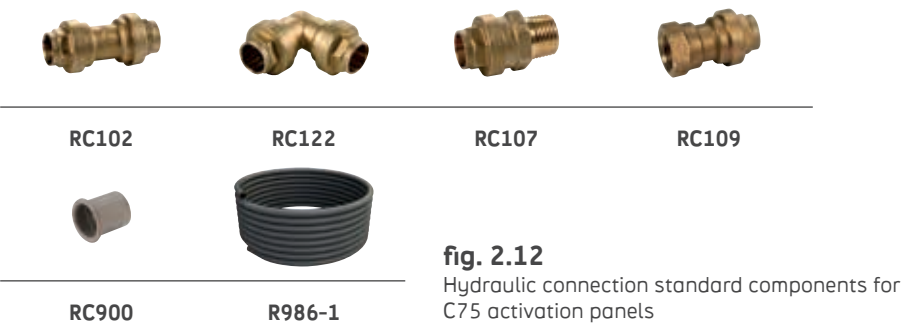
The first consists in using the R986S 16x1.5 mm anti-oxygen barrier polybutylene pipe to make the delivery and return connection between the distribution manifolds and panels.

Panels with an integrated 12x1 mm copper coil can be connected with a R986S 12x1.5 mm polybutylene anti-oxygen barrier pipe.

The system uses straight or square-shaped RC push-fittings.

Before fitting the polybutylene pipe into the fittings, the RC900 reinforcement bush must be inserted in the pipe itself.

This connection technique is highly flexible as it enables to easily adapt to any work site issue.



The use of K85RS and K85RC preassembled connection kits represents a valid, quicker and easier option.

The active panels can be connected in series using a kit including a 900 mm long EPDM flexible pipe with anti-oxygen barrier and a stainless steel mesh sleeve, in addition to two 12 mm RS push-fittings, one at each end of the flexible piping.

The distribution manifold and the panels can be connected using the preassembled kit including a 400 mm EPDM flexible piping with anti-oxygen barrier and a stainless steel mesh sleeve, in addition to a RS push-fitting 12 mm on one side to be fitted into the panel, and a 1/2" F threaded fitting on the other.

The delivery/return section between the manifold and the circuit is connected by an RC107 1/2"M fitting and an R986S 16x1.5 mm polybutylene pipe with anti-oxygen barrier to minimize pressure losses.



TERMOACOUSTIC INSULATION

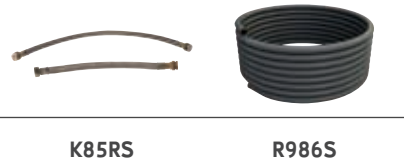
The use of K820 thermoacoustic panels, both for micro-perforated and smooth panels, allows to thermally insulate the plenum and absorb the noise from above.

The thermoacoustic panel is made with 100% polyester fibre, irreversibly thermo-bound and dry carded on a black textile support which is also made with 100% polyester fibre with no addition of chemical glues.

The thermoacoustic panel is easy to install: it must be laid with the black textile facing down. The material used allows to perform various types of maintenance, including machine washing and tumble dry, operations generally required a few years after installation for disinfection or for simply cleaning the panel from dust. Various dimensions are available according to the metal radiant ceiling of installation and the panel can be fitted right away. Density and thickness of the thermoacoustic panel have been optimized to guarantee the best functionality for typical indoor applications.



- > Material: thermobound polyester fibre 100%
- > Density: 20 kg/m³ (mat), 40 kg/m³ (support)
- > Thickness: 25 mm
- > Thermal conductivity: 0.03 W/mK
- > Hygroscopicity: 0.1 % of weight
- > Water resistance: flaking-free and unaltered characteristics
- > Vibration resistance: no particle separation after 1 million cycles at 50 Hz
- > Combustion gas: no acids (AFNOR X 70-100)
- > Odours: none
- > Sound absorption at:
0.64 (250 Hz) 0.78 (500 Hz) 1.06 (1000 Hz) 0.98 (2000 Hz)



The house ceiling becomes an efficient air conditioning system,
the ideal solution also for summer cooling.
So perfectly integrated in the structure to be invisible.

Chapter 3

Plasterboard radiant ceilings

INTRODUCTION

Residential buildings and hotels are the preferential field of application for plasterboard radiant ceilings, in addition to business-oriented ambients and, more in general, the entire commercial sector where civil finishes are required.

The table below (3.1) shows the solutions offered by the category of plasterboard radiant ceilings:

series	panel dimension [mm x mm]	activation
GKC	1200x2000	C100
	1200x1000	C100
	600x2000	C100
GKCS v.2.0	1200x2000	8x1 coil
	1200x1000	8x1 coil
	600x2000	8x1 coil
	600x1200	8x1 coil

GKC AND GKCS V.2.0 PANELS

Plasterboard panels can be active or inactive. Active panels feature thermal exchange thanks to their integrated activation system, while inactive panels have only an aesthetic function.

Both panels are preassembled by combining a plasterboard sheet to an insulating material.



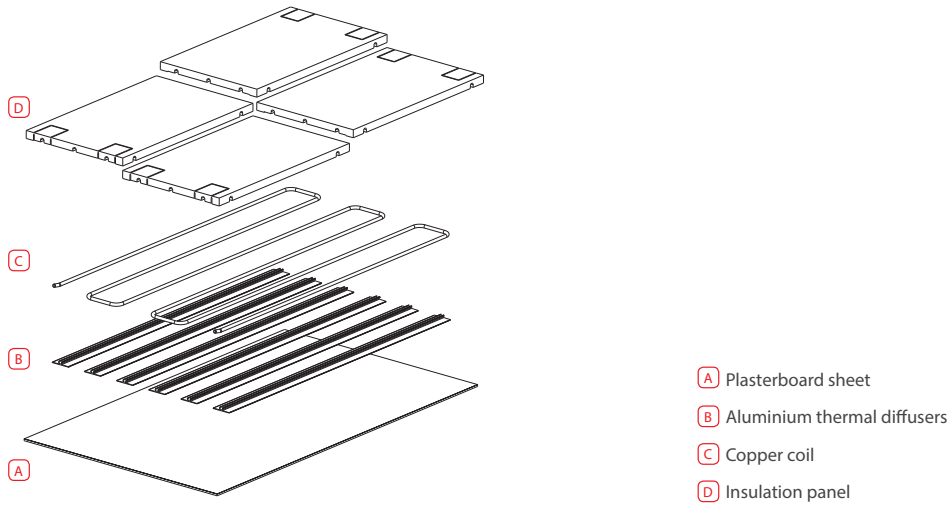
fig. 3.1
Types of plasterboard radiant ceilings

THE ACTIVATION SYSTEM

Plasterboard radiant panels are available with two different activation systems. Each series – GKC or GKCS v.2.0, with or without an integrated activation system - features the same thickness. The insulation layer offers greater levels of thermal insulation while enabling to rapidly install the false ceiling: in fact, as all panels have the same thickness, the false ceiling coplanar areas require the installation of a structure with the same hanging height, i.e. the structure of that same area is coplanar and uninterrupted.

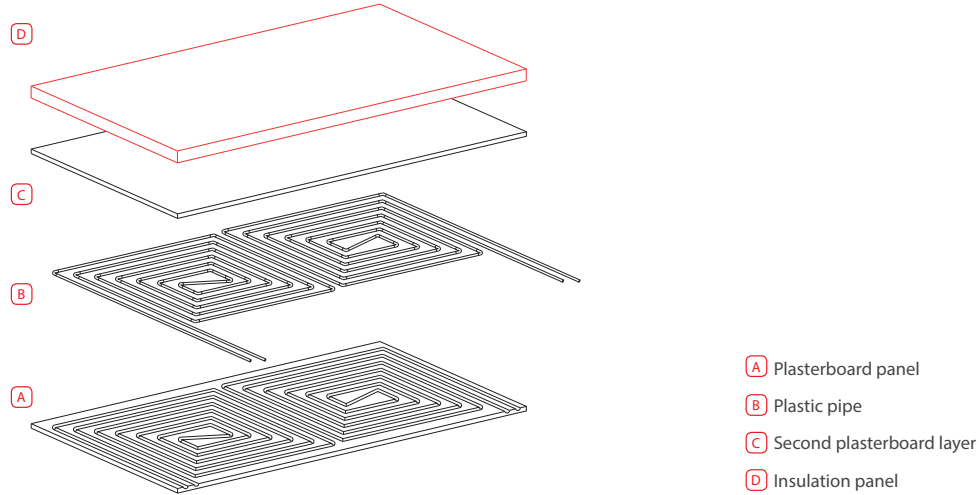
GKC ACTIVATION

The thermal exchange system of C100 activation panels is represented by a 16x1 mm copper coil combined to aluminium diffusers. The 4 cm-thick insulation layer is made with EPS 150 with graphite.



GKCS V.2.0 ACTIVATION

The thermal exchange system of GKCS v.2.0 panels is represented by one (or two for larger panels) PEX 8x1 mm coil integrated in the panel. The 3 cm-thick insulation layer is made of EPS.



GKC SYSTEM

PLASTERBOARD RADIANT PANELS

WHY GKC

- indicated for residential and similar applications
 - possibility to easily integrate elements in the false ceiling
 - distribution manifolds installed inside inspectionable trapdoors
 - manifold-free walls
 - reduced pressure loss system
- more details on giacomini.com

INTRODUCTION

GKC is a radiant ceiling made by preassembled panels, featuring a plasterboard finish and using high quality and thermal performing materials.

Designed with heating and cooling of residential buildings in mind, its field of application naturally extends to hotel rooms, commercial ambients and, more in general, civil buildings requiring a civil-type finish false ceiling.

GKC panels are made by 10 mm-thick plasterboard sheets, an aluminium layer and an EPS150 insulation layer with 40 mm-thick graphite.

The activation system includes a 16x1 mm copper coil embedded in the panel; the system design allowed to combine the heat technology requirements with lighting and architectural needs: the pipe inter-distance enables to easily install the lighting elements fitting them directly into the active panels.

PANEL TYPES



KC120
➤ Modularity: 1200x2000 mm
➤ Thickness: 50 mm
➤ Active



KC120
➤ Modularity: 1200x1000 mm
➤ Thickness: 50 mm
➤ Active



KC120
➤ Modularity: 1200x1000 mm
➤ Thickness: 50 mm
➤ Inactive



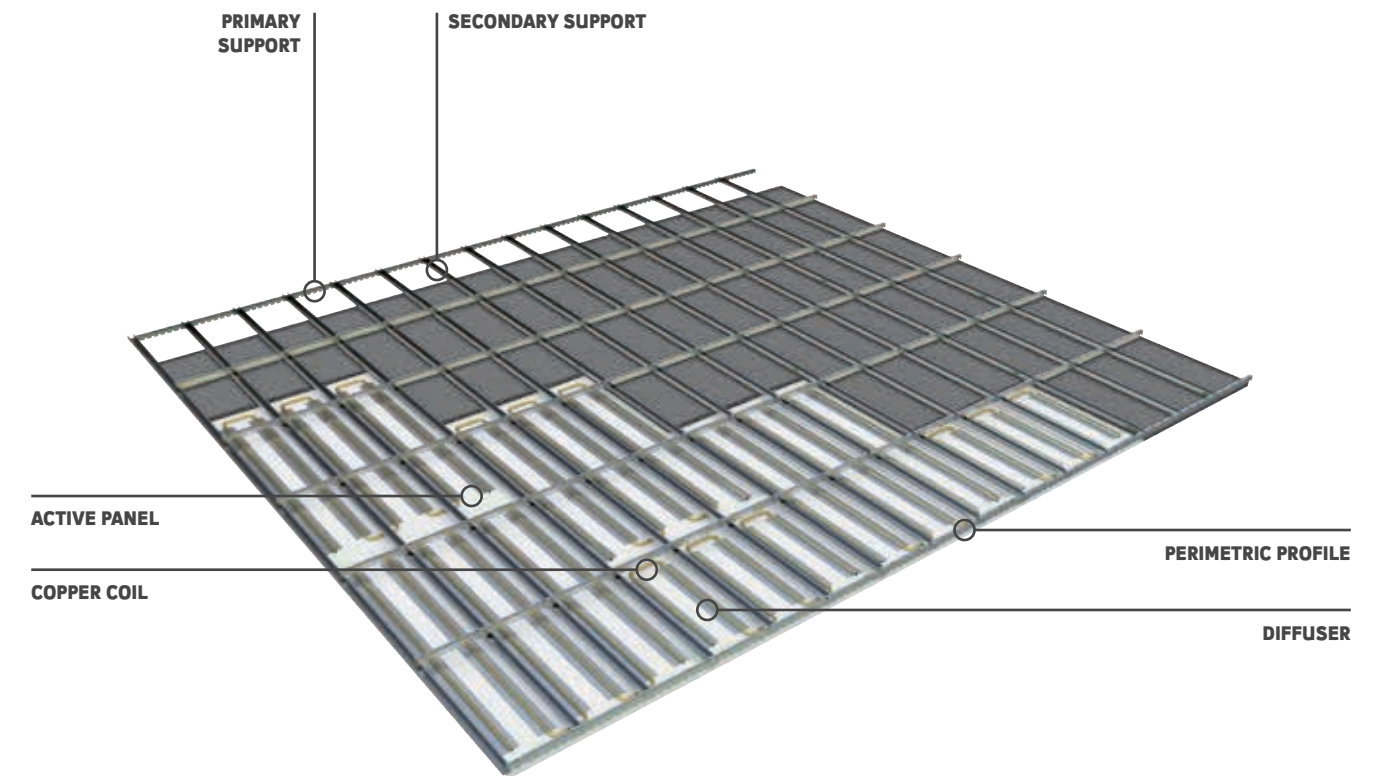
KC60
➤ Modularity: 600x2000 mm
➤ Thickness: 50 mm
➤ Active



GKC SYSTEM PLASTERBOARD RADIANT PANELS



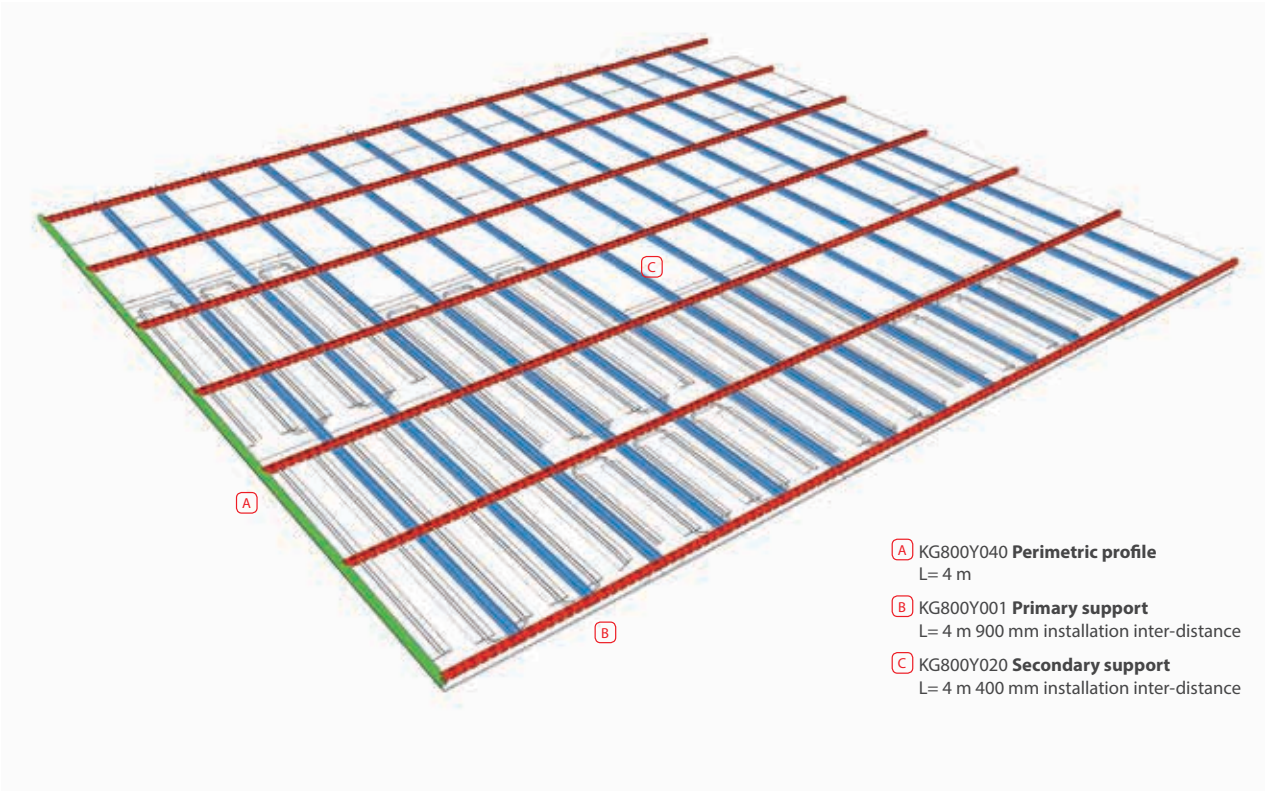
- > False ceiling available with three different module sizes
 - 600x2000 mm
 - 1200x2000 mm
 - 1200x1000 mm
- > 10 mm smooth plasterboard panel, with 0.1 mm aluminium steam-barrier and 40 mm EPS 150 insulation panel with graphite
- > C100 integrated thermal activation made with anodized aluminium thermal diffusers combined to a 16x1 mm copper pipe coil
- > Connection in series of panels part of the same circuit
- > Installable with ordinary plasterboard false ceilings
- > Its modularity makes it suitable for every type of ambient
- > Outstanding integration flexibility as spotlights and other false ceiling elements can be embedded in the active panels
- > Inspectionable system: by installing false ceiling trapdoors near the distribution manifolds, the false ceiling conceals the entire system, without encumbering the ambient walls
- > Inactive panels made by a plasterboard sheet and a 40 mm EPS 150 insulation layer with graphite are used for side compensation. This improves the ambient insulation upwards; in addition, all panels feature the same thickness, greatly reducing the installation times



STRUCTURE PANELS AND COMPONENTS



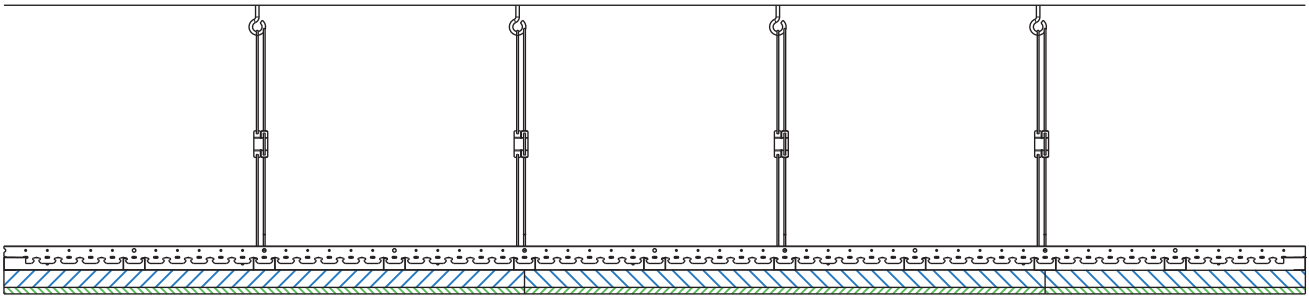
The system is structurally represented below with plan and section views:



The support structure includes primary supports connected to the slab through Ø 4mm suspension hangers and secondary supports fitted on the primary supports:

- 40x28 mm U-shaped primary supports, length 4 m, thickness 0.6 mm
- 50x27 mm C-shaped secondary supports, length 4 m, thickness 0.6 mm

The perimetric areas are covered with KC120 insulated plasterboard inactive panels.

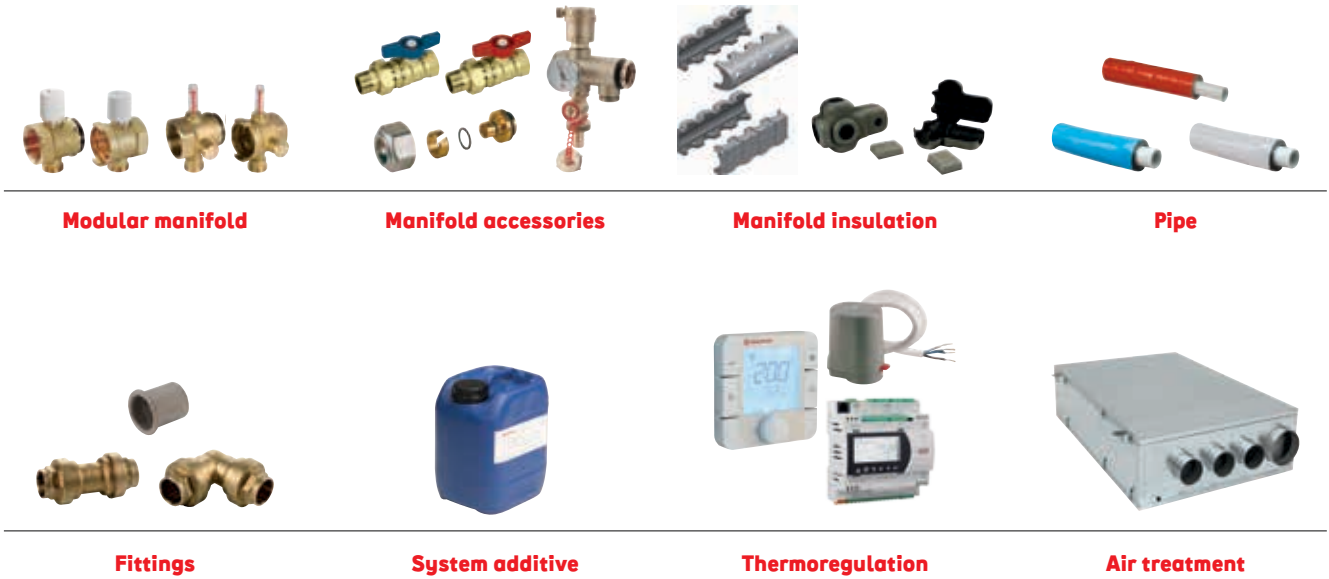


GKC system structure section view

APPLICATION EXAMPLES



CORRELATED PRODUCTS



GKCS V.2.0 SYSTEM

PLASTERBOARD RADIANT PANELS

WHY GKCS V.2.0

- indicated for residential or similar applications
 - possibility to embed devices in the false ceiling
 - walls not encumbered by the distribution manifolds
 - inspection trapdoors for direct access to the distribution manifolds
- more details on giacomini.com

INTRODUCTION

The **GKCS v.2.0** radiant ceiling is made by preassembled plasterboard panels.

Designed for heating and cooling of residential buildings but also suitable for applications in hotel rooms, commercial areas and, more in general, in buildings requiring a civil-finish false ceiling.

GKCS v.2.0 panels are made of a 15 mm-thick plasterboard sheet and an EPS 30 mm-thick insulation layer.

The activation system is situated between these two layers and includes one (or two, according to the panel dimensions) 8x1 mm PEX coil.

PANEL TYPES



KS120
➤ Modularity: 1200x2000 mm
➤ Thickness: 45 mm
➤ Active



KS120
➤ Modularity: 1200x2000 mm
➤ Thickness: 45 mm
➤ Inactive



KS60
➤ Modularity: 600x1200 mm
➤ Thickness: 45 mm
➤ Active



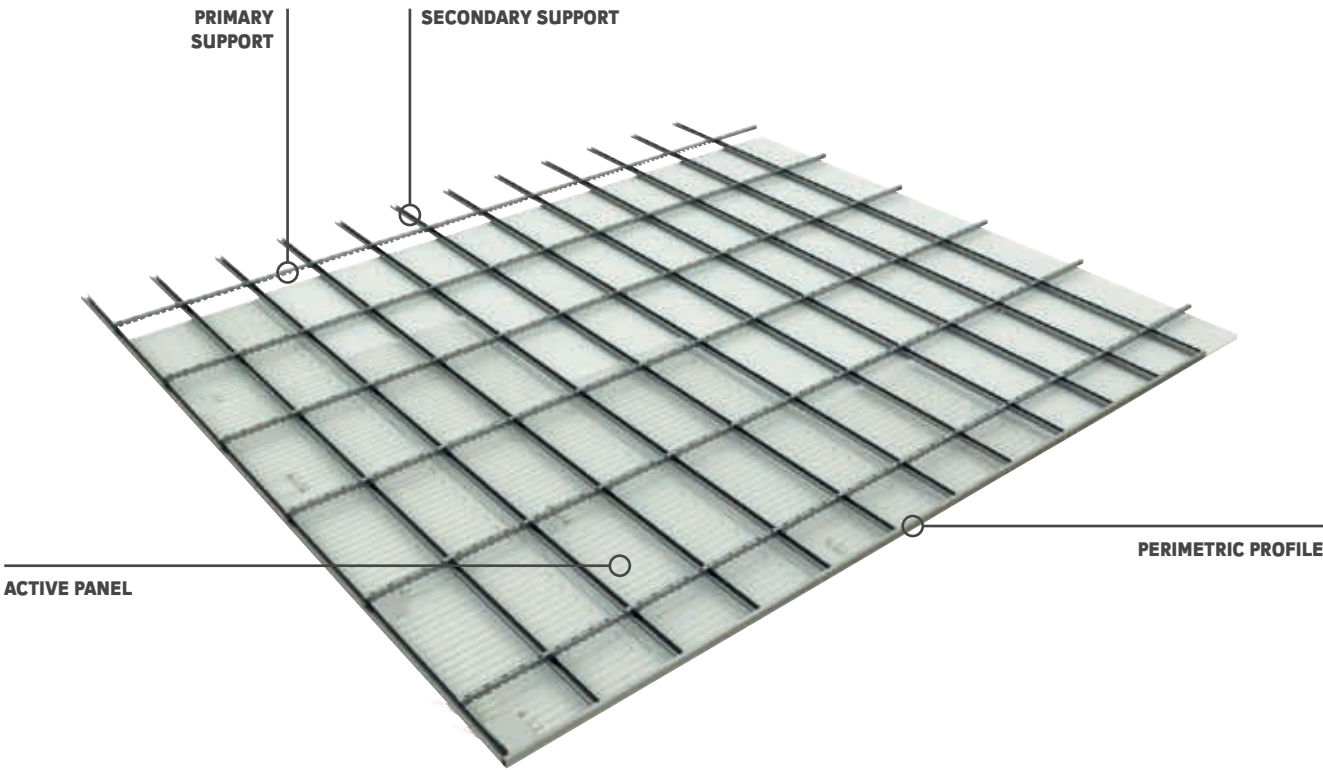
KS60
➤ Modularity: 600x2000 mm
➤ Thickness: 45 mm
➤ Active

GKCS V.2.0 SYSTEM

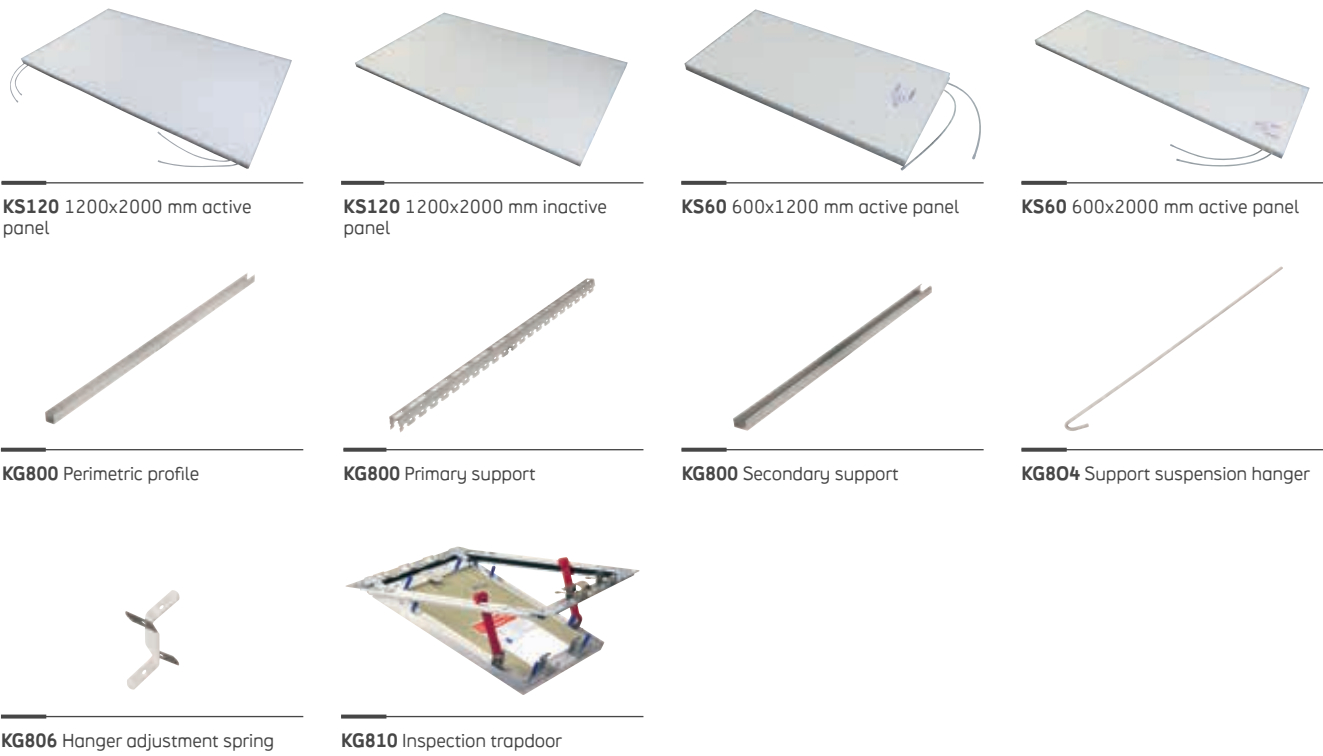
PLASTERBOARD RADIANT PANELS



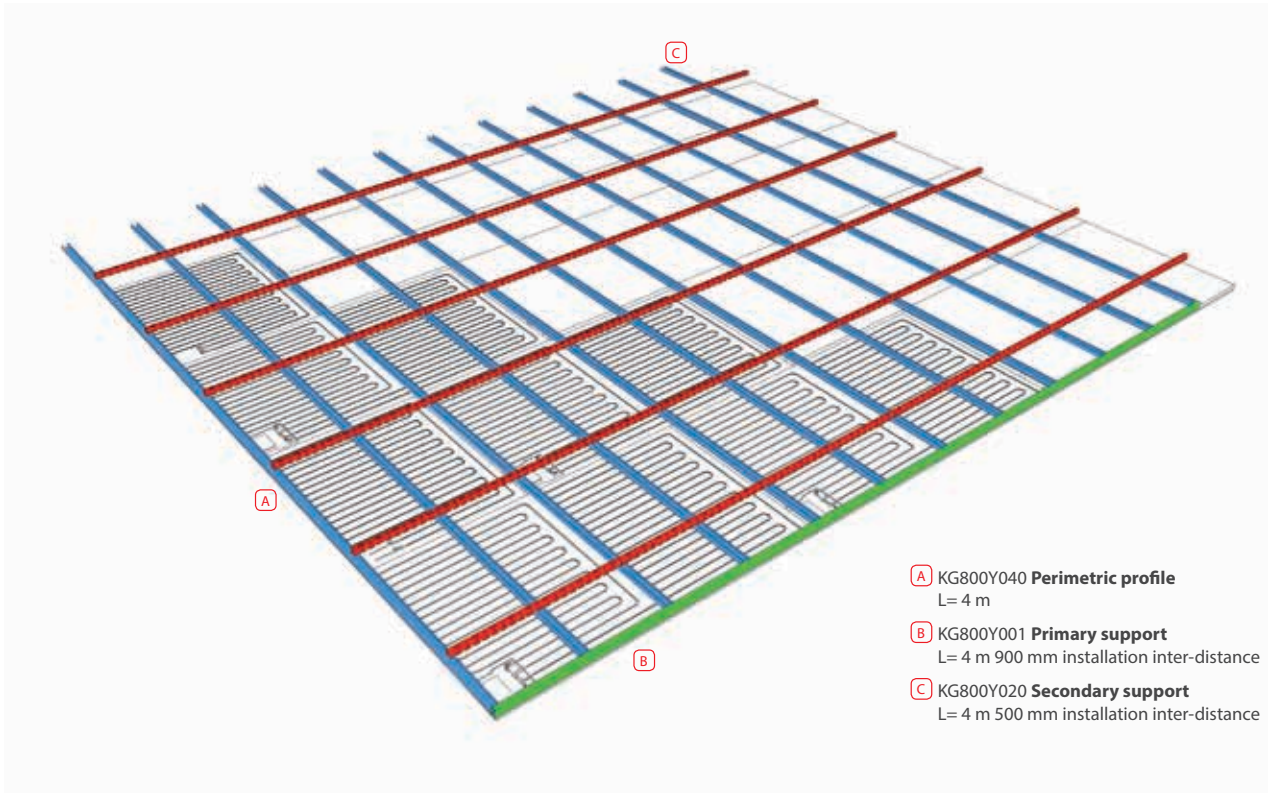
- > Four different modules for false ceiling panels:
 - 600x2000 mm
 - 1200x2000 mm
 - 600x1200 mm
 - 1200x1000 mm
- > 15 mm smooth plasterboard panel, with EPS 30 mm insulation panel. Overall dimension 45 mm
- > Thermal activation integrated in the panel with 8x1 mm PEX coils. The 1200x1200 mm panel integrates two coils positioned so as to obtain two 1200x1000 mm panels with a transversal cut
- > Parallel connection of panels part of the same circuit
- > Installable with ordinary plasterboard false ceilings
- > Recommended for wall installation
- > Its modularity makes it suitable for every type of ambient
- > Possibility to embed spotlights and other false ceiling devices in the compensation panels
- > Inspectionable system: by installing false ceiling trapdoors near the distribution manifolds, the false ceiling conceals the entire system without encumbering the ambient walls.
- > Inactive panels made by a plasterboard sheet and a 30 mm EPS insulation layer are used for side compensation. This improves the ambient insulation upwards; in addition, all panels feature the same thickness, greatly reducing the installation times



STRUCTURE PANELS AND COMPONENTS



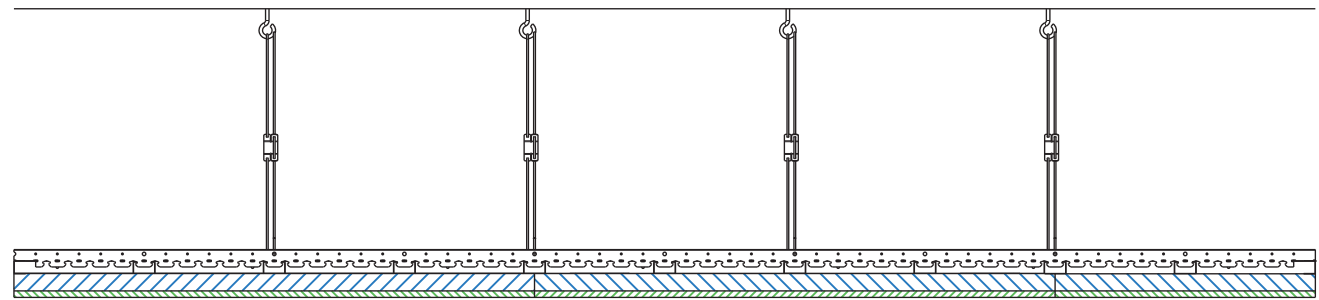
The system is structurally represented below with plan and section views:



The support structure includes primary supports connected to the slab through Ø 4mm suspension hangers and secondary supports fitted on the primary supports:

- 40x28 mm U-shaped primary supports, length 4 m, thickness 0.6 mm
- 50x27 mm C-shaped secondary supports, length 4m, thickness 0.6 mm

The perimetric areas are covered with KS120 insulated plasterboard inactive panels.

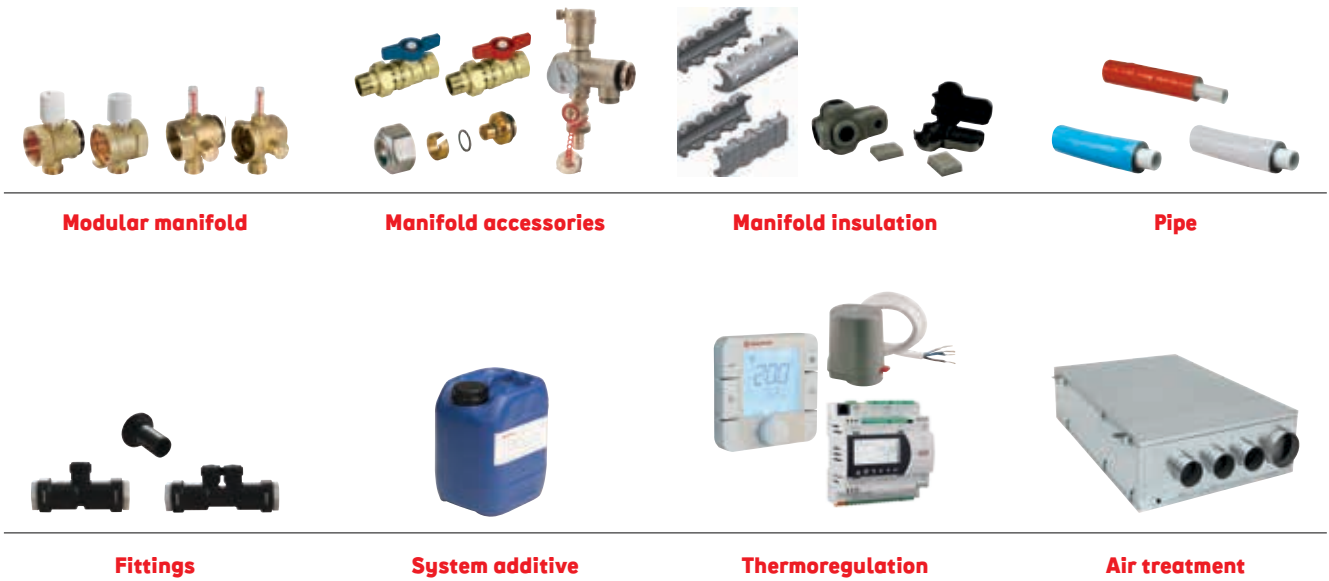


GKCS system structure section

APPLICATION EXAMPLES



CORRELATED PRODUCTS



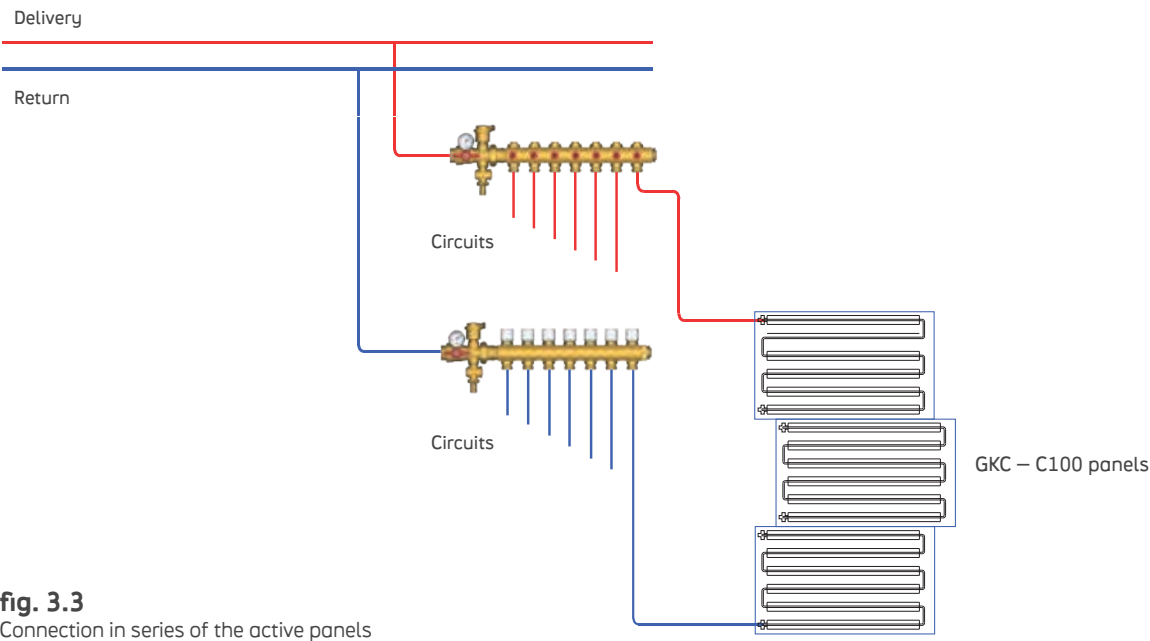
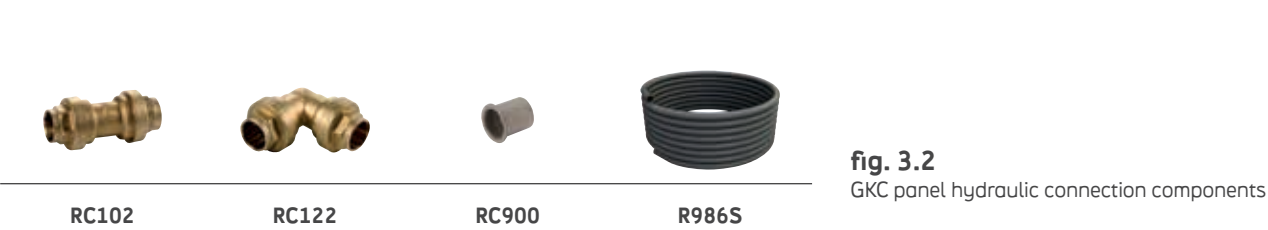
PLASTERBOARD ACTIVE PANEL HYDRAULIC CONNECTION

Hydraulic connection of GKC active panels

The GKC radiant ceiling provides for connection in series of the panels part of the same circuit, which generally derives from distribution manifolds.

Connection between the distribution manifolds and panels is obtained through an R986I - 16x1.5 mm pre-insulated polyethylene pipe with anti-oxygen barrier. The system uses RC straight and L-shaped push-fittings.

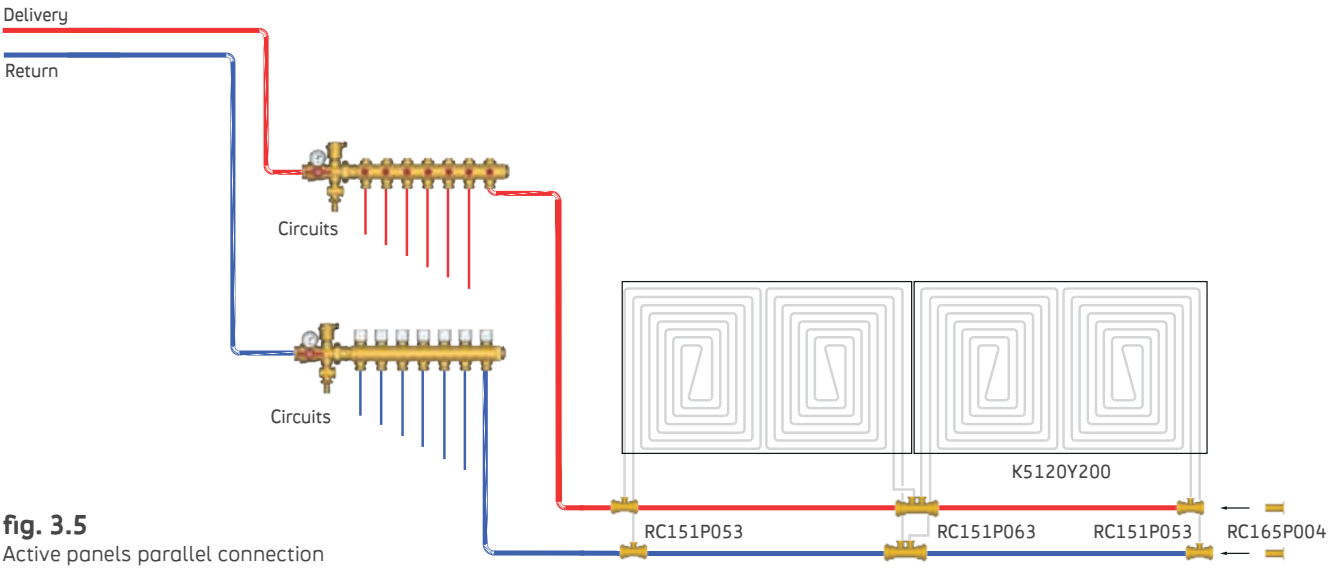
Before inserting the polybutylene pipe into the fittings, the RC900 reinforcement bush must be installed inside the pipe itself. The active panel insulation provides an opening to install RC straight or L-shaped fitting for connection. Parts that are not pre-insulated require adequate thermal insulation.



GKCS v.2.0 active panel hydraulic connection

The GKCS v.2.0 radiant ceiling provides for connection in series of the panels of the same circuit, which generally derives from distribution manifolds. This circuital approach is based on constructive reasons: active panels under nominal conditions feature the same loss of pressure, about 2 m.c.a., so exploiting this factor is helpful to try to obtain self-balanced circuits.

Panel connections use 20x2 mm multilayer pipes available as non-insulated bars or pre-insulated rolls: non-insulated parts must be insulated with adequate thermal insulation. The system uses RC plastic push-fittings.



INSPECTIONABILITY OF GKC AND GKCS PLASTERBOARD RADIANT CEILINGS

Availability of space is a must. By installing trapdoors near the distribution manifolds, the false ceiling conceals the entire system, without encumbering the ambient walls which can be used for other functions.



PLASTERBOARD RADIANT PANELS
GKCD SYSTEM

NEW PRODUCT!



PLASTERBOARD RADIANT PANELS

GKCD SYSTEM

GKCD is a radiant ceiling system using 600x1200 mm EPS200 preformed panels coated with aluminium thermo-conductor sheets 0.3 mm thick where an external Ø16 mm or 1/2" plastic pipe is installed with a pipe pitch of 150 mm.

In addition to holding the pipe, the aluminium thermo-conductor coating evenly distributes the thermal energy along the entire surface of the ceiling.

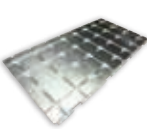
The versatility of the components enables to install them directly on the ceiling or false ceiling.

The system is completed by applying a plasterboard sheet.

The only fittings included by this system are the fully inspectionable pipe-manifold connections, representing one of its greatest benefits.

The system materials are all environment-friendly as they are not connected permanently and can be disposed individually (EPS, plasterboard, aluminium, etc.). The performance of the product is defined in compliance with UNI EN 1264.

PANEL TYPES



R883-1
Preformed panel with aluminium thermo-conductor profile
> Thickness: 28 mm
> Pipe pitch: multiples of 150 mm
> Suitable pipes: plastic 16x2 mm or 1/2"



R884
Preformed head panel
> Thickness: 28 mm
> Pipe pitch: multiples of 150 mm
> Suitable pipes: plastic 16x2 mm or 1/2"

APPLICATION EXAMPLES



Installation of metal structure with 300 mm pitch



R884 head panels cut to measure



Installation and fitting of head panels on the metal support structure with 35 mm screws



Installation and fitting of R883-1 panels and pipes along the preformed panel and head housings



Installation of zone inspection trapdoors where the distribution manifolds are installed



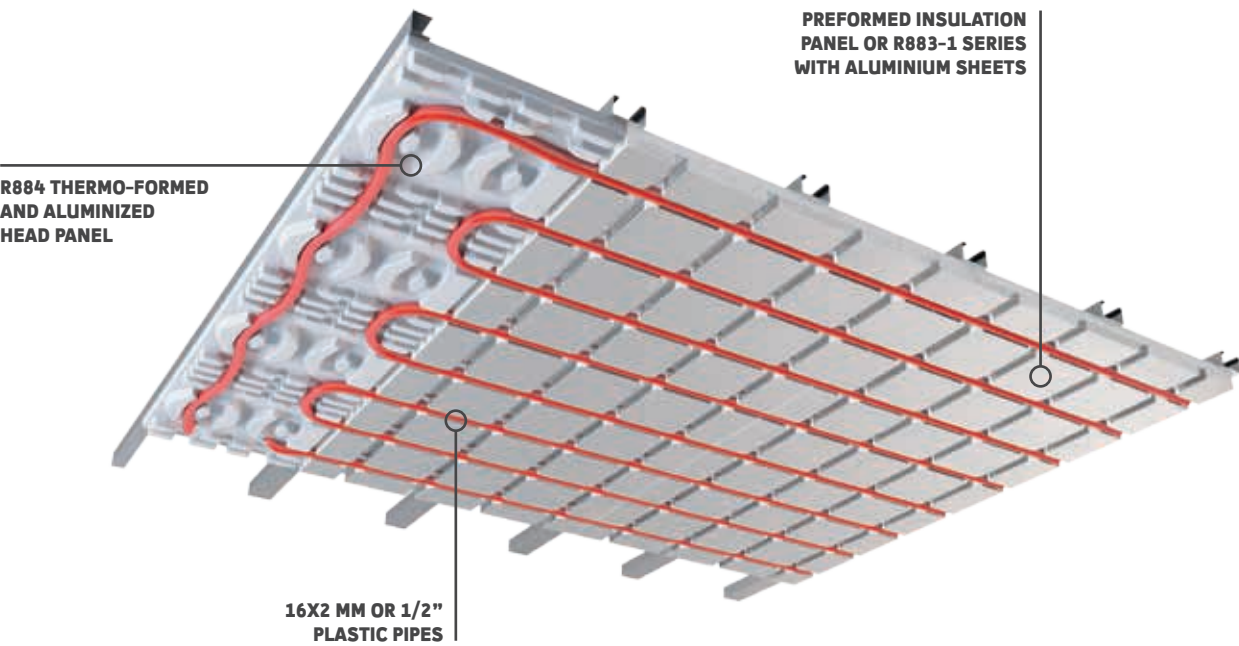
Installation and fitting of plasterboard sheets on the support structure after pressure test performed according to the rules in force

WHY GKCD?

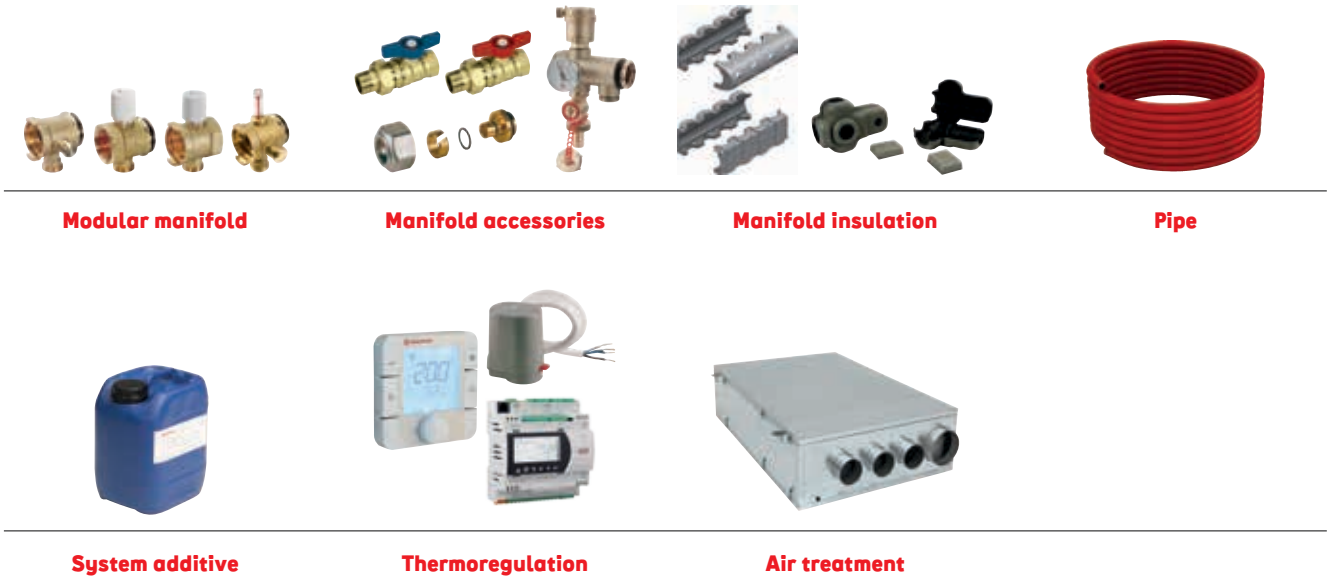
- reduced dimensions of the system components
- no connection fittings required
- use of pipes with Ø 16 mm external diameter or 1/2"

more details on giacomini.com

TECHNICAL DATA



CORRELATED PRODUCTS



A safe product with the renown outputs certified according to the regulations in force.
A top quality choice which speaks by its numbers.

Chapter 4

The outputs

THE OUTPUTS

Planning of a radiant ceiling system requires knowledge of the heating and cooling active panel outputs. This is a crystal clear concept but poorly interpreted when it comes to practice.

The thermal and refrigerating power exchanged by a radiant ceiling with the ambient is always established starting from the outputs certified¹ according to Rules EN 14037 (heating) and EN 14240 (cooling).

Outputs expressed according to these two essential Rules may then be adjusted to establish the actual outputs of an installed radiant ceiling.

Great care and experience are required to establish the “planning” outputs of a radiant ceiling.

We will try to offer below a useful tool to be used as safe guidelines for planners who choose radiant ceiling systems.

NOTES
¹ Issued by a credited lab.



fig. 4.1
Giacomini Labs: detail of the thermostatic chamber certified by Rule EN 14240

OUTPUTS ACCORDING TO RULES EN 14037
AND EN 14240

These two in-context standards determine the criteria to experimentally establish the thermal and refrigerating outputs for an active panel activation system; knowledge of this fundamental data enables to establish the outputs of the active panel according to the Rule provisions.

The EN 14037 and EN 14240 test results allow to create output diagrams for the various activation systems with DeltaT between ambient temperature and the average water temperature expressed by the abscissa and the specific power for active surface unit W/m² by the ordinate.

The picture below shows an example of the C75 activation output diagram:

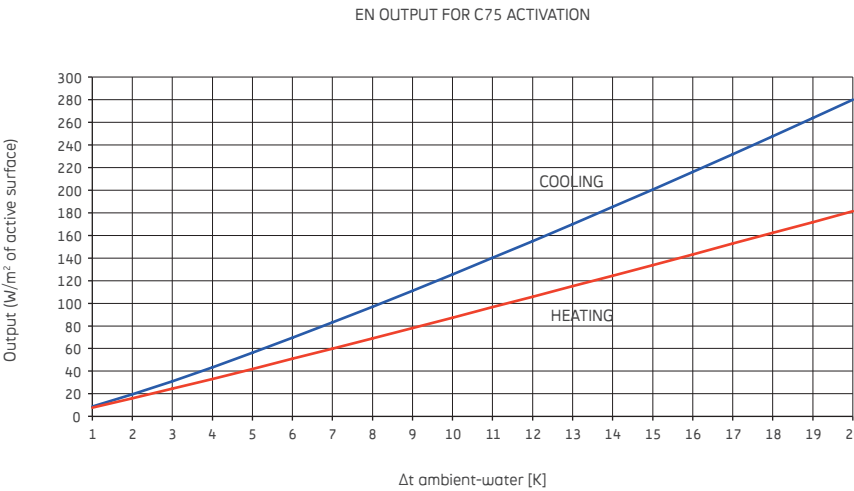


fig. 4.2 EN output for C75 activation

The Rules enable to express the specific outputs with parametric equations easily implementable for calculation:

$q_H = C_H \cdot \Delta T^{nH} \text{ [W/m}^2\text{]}$

> output for heating active surface unit

$q_C = C_C \cdot \Delta T^{nC} \text{ [W/m}^2\text{]}$

> output for cooling active surface unit

Where $\Delta T = \left| T_o - \frac{(T_m + T_r)}{2} \right|$, as:

- T_o = ambient operating temperature
- T_m = delivery temperature to the radiant ceiling
- T_r = return temperature from the radiant ceiling

Parameters typical of the various activation systems to be used in the equations above are specified by the test certificates.

So far only the specific output for panel active surface units could be established. We will need to rely on a diagram to expand the output concept to the entire panel. By using the GK60- C75 activation radiant ceiling with 150 mm base supports as an example, we highlight the following areas:

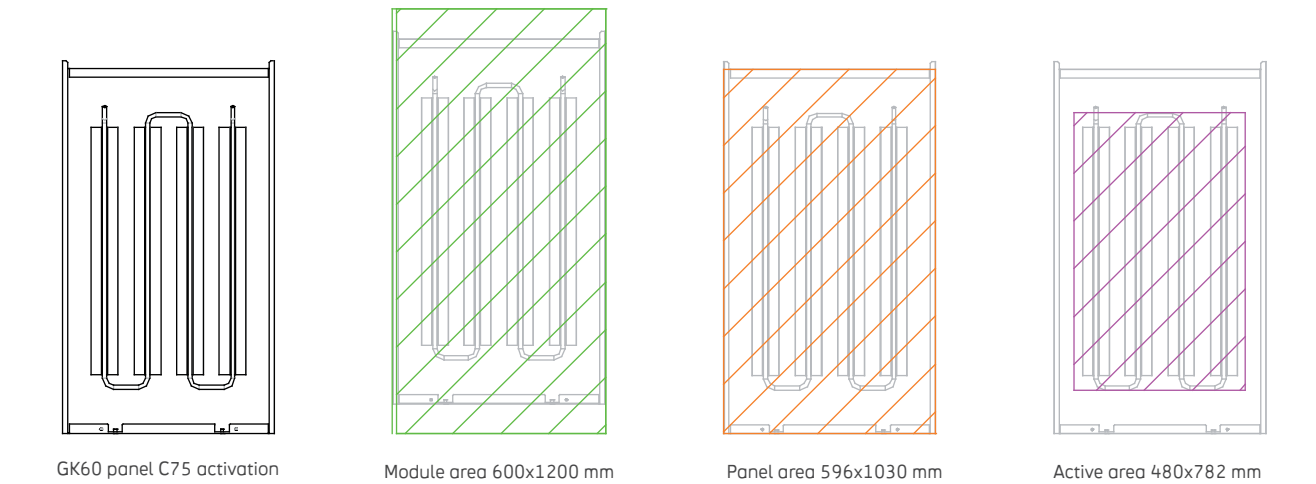


fig. 4.3
The different areas characterizing radiant ceilings

- > Module area: the surface covered by a false ceiling modular unit; in this case it is equal to 600x1200 mm = 0.72 m²
- > Panel area: the surface covered by a panel, equal to 596x1030 mm = 0.614 m²
- > Active area: defined by Rule EN 14240, it is the panel surface covered by activation; in this example it is equal to S_a = 480x782 mm = 0.375 m²

Given these preliminary remarks, it is easy to establish the integral output of an active panel: just multiply the EN output for the active area S_a:

$$Q_H = q_H \cdot S_a \text{ [W]}$$

$$Q_C = q_C \cdot S_a \text{ [W]}$$

These analytical relations enable to create the EN output diagrams below related to the entire panel and representing the main tool for heat technology planners.

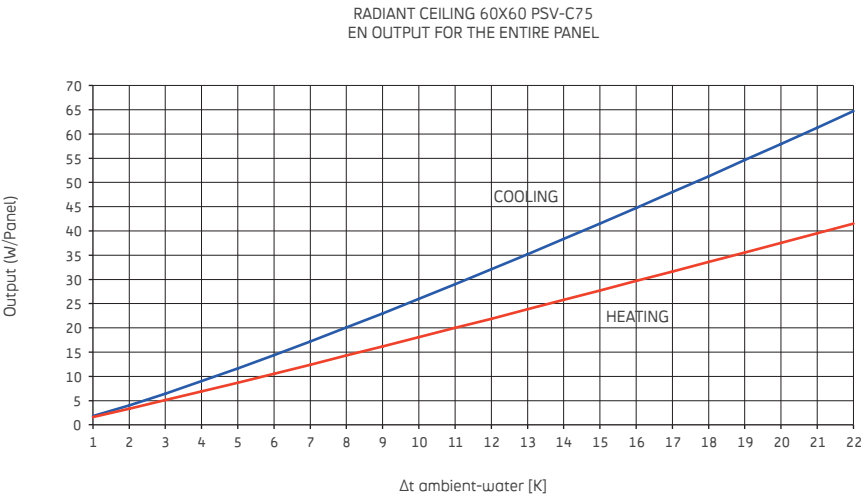


fig. 4.4 EN output for a 60x60 PSV – C75 panel

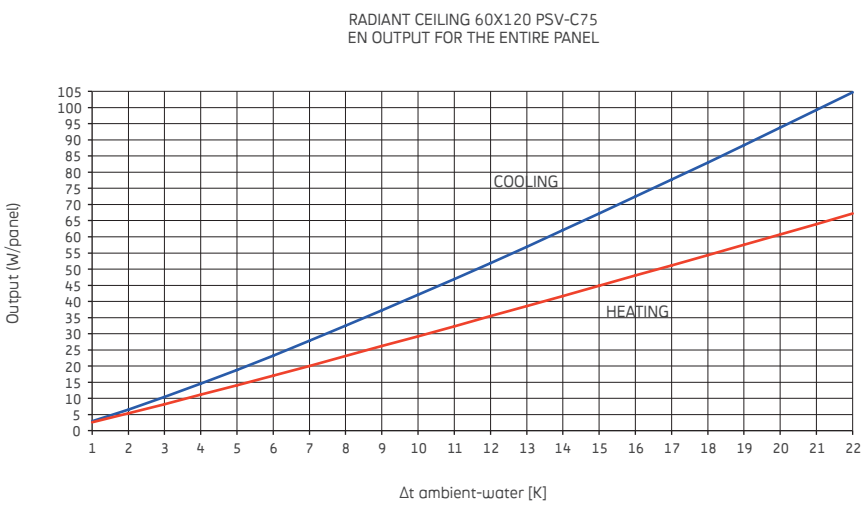


fig. 4.5 EN output for a 60x120 PSV – C75 panel

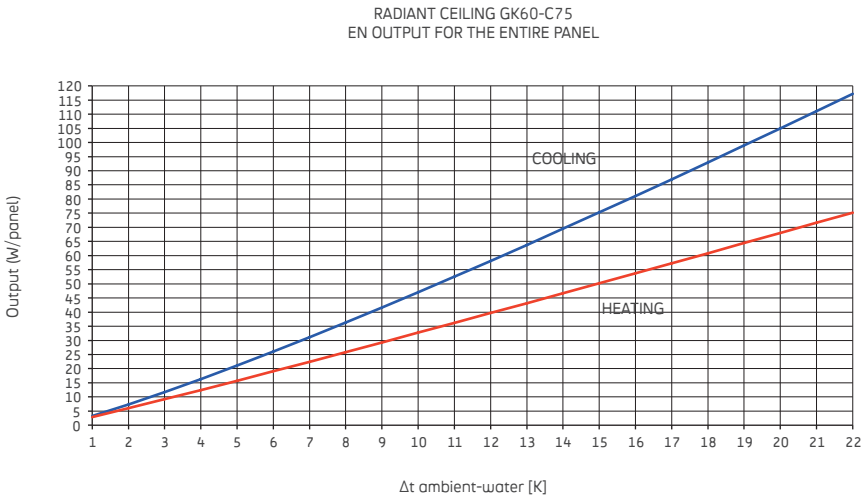


fig. 4.6 EN output for a GK60 – C75 panel

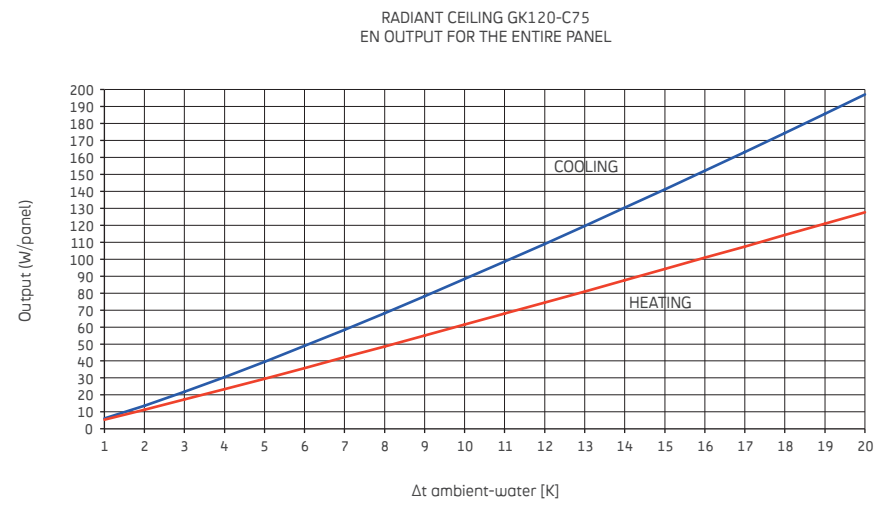


fig. 4.7 EN output for a GK120 – C75 panel

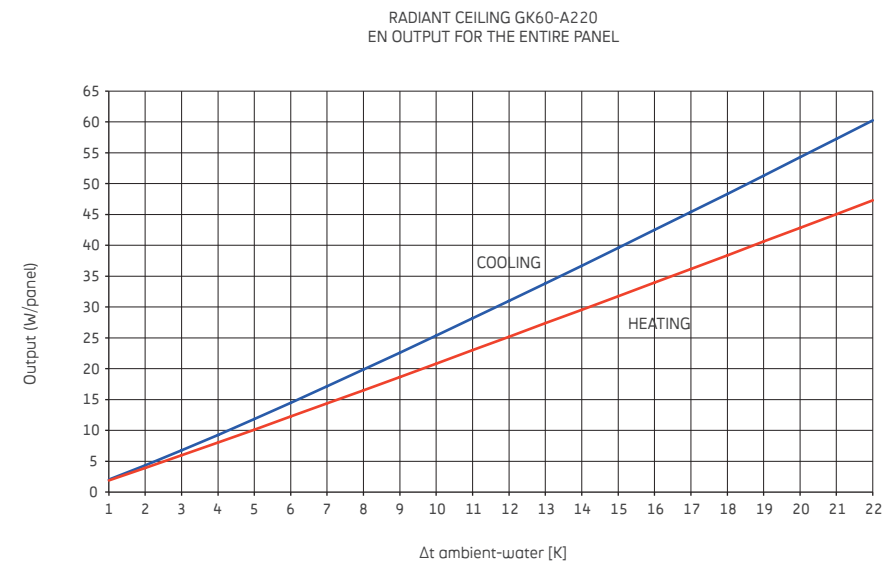


fig. 4.10 EN output GK60 – A220 panel

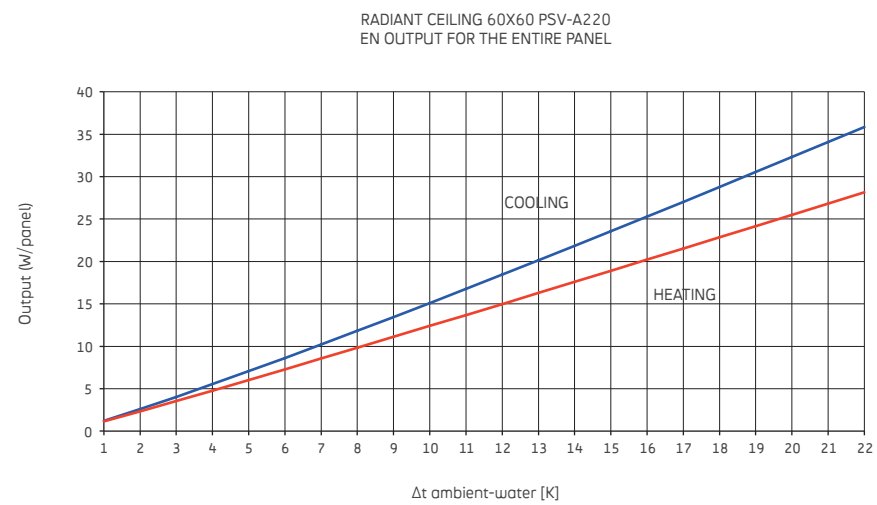


fig. 4.8 EN output for a 60x60 PSV – A220 panel

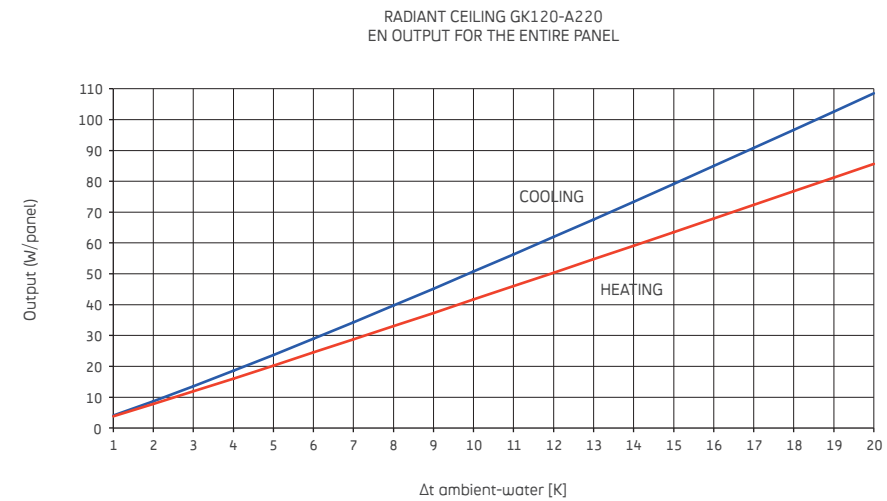


fig. 4.11 EN output for a GK120 – A220 panel

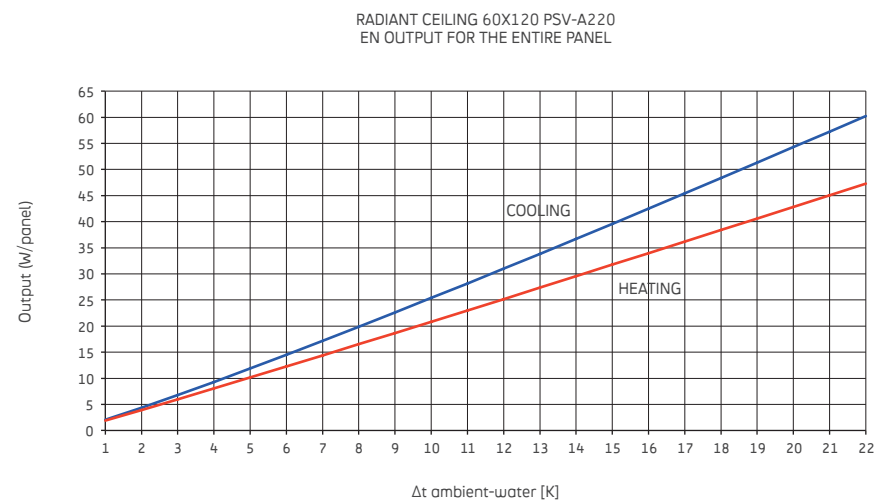


fig. 4.9 EN output of a 60x120 PSV – A220 panel

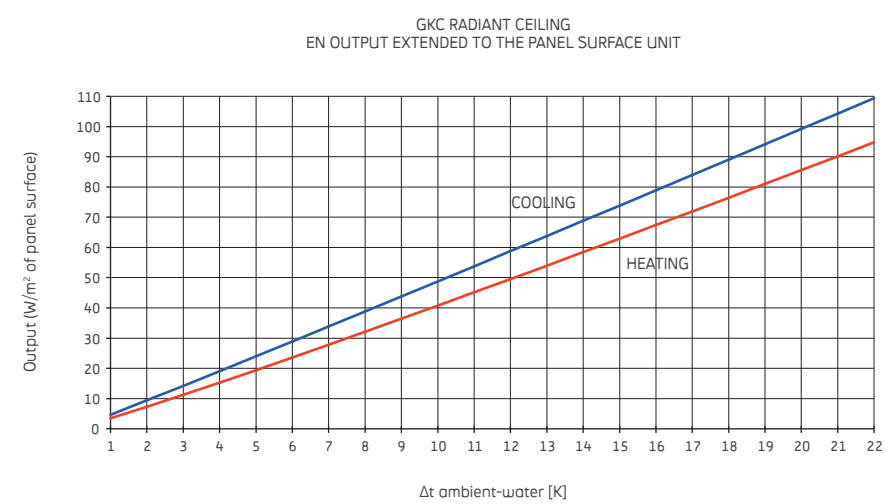


fig. 4.12 EN output for a GKC series panel

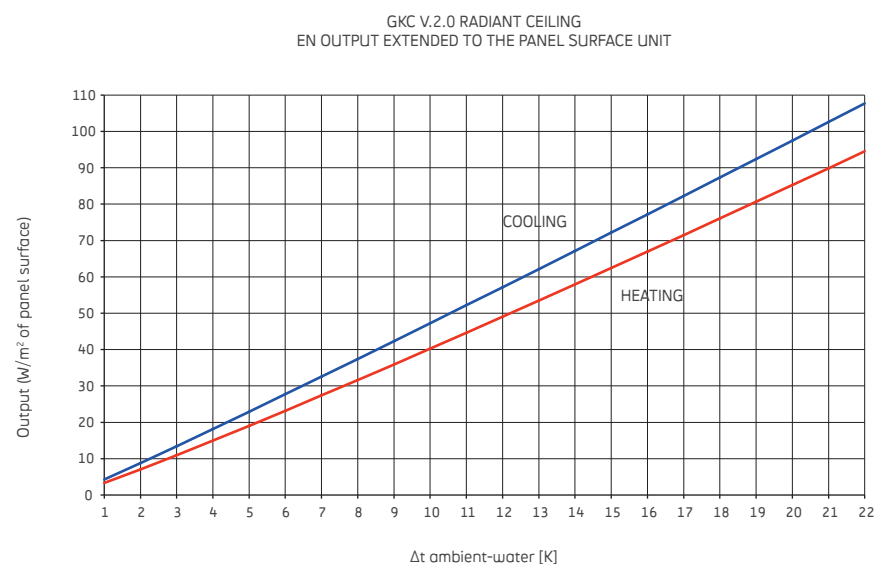


fig. 4.13 EN output for a GKCS v.2.0 panel

OUTPUT CORRECTIVE COEFFICIENTS

The EN thermostatic chamber outputs are generally not those used directly for planning calculations: other additional factors should be taken into consideration: a correct assessment requires in-depth knowledge of the dynamics connected to the installed radiant ceilings.

Height factor - F_o

Thermostatic chamber tests are generally performed with a 2.70 m height; the Height factor F_o is used to take into account the actual installation height and it is defined as:

$$F_o = 1.12 - 0.045 \cdot H$$

where H represents the radiant ceiling installation height from the floor. This formula is valid for H values up to 5 m.

Ventilation factor - F_v

Thermostatic chamber tests are performed with no mechanical ventilation. But this is not a real-life condition and a corrective coefficient F_v should be adopted to take into account an output increase caused by the ambient air movement. Proper evaluation of the F_v coefficient requires great experience; based on numerous and accurate tests in addition to many practical installation examples, we recommend maintaining the F_v coefficient between 1.05 and 1.15, keeping in mind that the distribution system of air, its temperature and the type of radiant false ceiling affect this value. With no ventilation, this value is obviously $F_v=1$.

Façade factor - F_f

Thermostatic chamber tests should be carried out verifying the wall temperature; in practice, however, walls are key for false ceiling energy exchange. Ambients with large windows, especially those with a low solar factor, may experience thermal

exchanges definitely greater than those expected according to the thermostatic chamber tests.

This aspect has been widely evaluated in numerous practical tests by Giacomini as well; with no need to dwell on complex calculations, we simply recommend the introduction of a F_f value of about 1.1, keeping in mind that this can vary in practice between 1.05 and 1.2.

So, the general equation for the integral output of an active panel is:

$$Q = q \cdot S_o \cdot F_o \cdot F_v \cdot F_f [W]$$

The use of these coefficients prevents over dimensioning of radiant ceilings; on the other hand, their improper use may mislead in the wrong direction.

SUMMARY TABLE

With reference to the symbols introduced above, the following planning conditions are taken into consideration:

- > Heating: $T_o = 20^\circ\text{C}$
- > Cooling: $T_o = 26^\circ\text{C}$

Metal radiant ceilings

- > Heating: $T_m = 38^\circ\text{C}$
 $T_r = 35^\circ\text{C}$
- > Cooling: $T_m = 15^\circ\text{C}$
 $T_r = 17^\circ\text{C}$

By considering an installation at about 2.70 m from the floor, we can reasonably, but precautionarily assume a global corrective coefficient of 1.05 in winter and 1.10 in summer. By exploiting the diagrams above, we obtain the table below (fig. 4.14) which summarizes the integral outputs of each panel, useful for a rapid indicative calculation for radiant ceiling systems.

Plasterboard radiant ceilings

- > Heating: $T_m = 40^\circ\text{C}$
 $T_r = 37^\circ\text{C}$
- > Cooling: $T_m = 14^\circ\text{C}$
 $T_r = 16^\circ\text{C}$

TYPICAL PLANNING OUTPUTS

panel	activation	output Q_H [W] when heating	output Q_C [W] when cooling
GK60x60 PSV	C75	32	29
GK60x60 PSV	A220	22	17
GK60x120 PSV	C75	52	46
GK60x120 PSV	A220	37	28
GK60	C75	58	52
GK60	A220	37	28
GK120	C75	109	97
GK120	A220	74	56
GKCS v.2.0 - 1200x2000	8x1 coil	197	138
GKCS v.2.0 - 600x2000	8x1 coil	99	69
GKCS v.2.0 - 600x1200	8x1 coil	59	41
GKCS v.2.0 - 1200x1000	8x1 coil	99	69
GKC - 1200x2000	C100	198	142
GKC - 1200x1000	C100	99	71
GKC - 600x2000	C100	99	71

fig. 4.14

Embracing warmth in winter, refreshing coolness in summer for absolute comfort year round. Thanks to constant control of temperature and humidity, our cooling solutions stand for the perfect balance in every environment.

Chapter 5

Cooling and air treatment



COOLING AND AIR TREATMENT

INTRODUCTION

Constant thermal comfort in an ambient largely depends on the capacity of efficiently controlling its temperature and humidity levels, preventing air currents.

This is a simple and intuitive concept of common practice proven by the fact that heating systems are required in winter to increase the ambient temperature – the level of humidity is generally adequate and does not require specific regulations – while in summer both temperature (cooling) and humidity (dehumidification) must be reduced to prevent discomfort, possibly by preventing excessive sudden temperature changes between the outside and the inside¹.

The use of radiant ceilings combined to machines specifically designed for dehumidification represents the most efficient installation solution to enjoy summer thermal comfort, both from an energy-saving and achievable result standpoint.

The basic regulation strategy of this installation approach is the simplest:

- > Radiant ceilings reduce the temperature by disposing of the sensible thermal loads
- > Dehumidification systems reduce humidity by balancing the latent thermal loads

DEHUMIDIFICATION MACHINES

Giacomini offers a range of dehumidification machines able to satisfy every installation need; although all models exploit their integrated compression refrigerating cycle, the final result goes way beyond mere dehumidification.

Available are:

- > Isothermal dehumidifiers for false ceiling or wall built-in installation
- > Dehumidifiers with sensible cooling integration for false ceiling or wall built-in installation
- > Machines for controlled mechanical ventilation, false ceiling installation

Based on the functioning principle described below, the benefits offered by this type of machines are quite clear:

- they work on water at 15-18 °C, the same temperature required by radiant ceilings, and enable refrigerating groups to work with water temperatures higher than the typical 7 °C of hydronic air conditioning systems, offering a major benefit in terms of energy performance (EER – Energy Efficiency Ratio)
- they feature a high Latent power/Air flow ratio: up to 2.5 W for every m³/h, minimizing the quantity of air required to cover latent loads, thus offering quietness, absence of air currents and minimum consumption of electric energy.

ISOTHERMAL DEHUMIDIFIERS - OR WITH SENSIBLE COOLING INTEGRATION

Basic version dehumidifiers only provide for humidity reduction. These machines are known as “isothermal dehumidifiers” and fig. 5.1 shows their principle diagram.

This type of machine intakes and filters humid air (1), generally at 26-27 °C, which is then cooled down by a hydronic coil (2) fed with water at about 15-18 °C.

The cooling cycle brings the humid air the closest to condensation by exploiting the water already available to feed the radiant ceiling, with no extra work required from the refrigerating circuit electric compressor.

The cooled air is then ready to flow through the refrigerating circuit evaporation coil (3): during this phase, humidity is released by condensation.

The air now available has a lower humidity rate compared to the ambient in which it is ready to be released.

Before being ejected, the air first flows through the condensation coil (5, left side): the air temperature is exploited to condensate the refrigerating fluid and repeat the cycle.

But now the air has been warmed up as it absorbed heat from the condensation fluid, so it is advisable to make it flow through a second post-cooling hydronic coil (5, right side) to bring it back to a temperature not higher than the rate it featured when entering the machine.

The air is then released into the ambient.

By slightly changing the machine diagram we obtain a multi-function dehumidifier, a machine able to work as an isothermal dehumidifier or as one able to integrate sensible cooling by ejecting air cooler than the incoming flow.

The principle diagram is shown by fig. 5.2.

Compared to the isothermal dehumidifier diagram, this model features a double condenser in the refrigerating circuit: next to the one interacting with the air (3) is a second one (4) which dissipates all the condensation heat in water.

When this happens – that is when the machine is working with an integration – the air condenser (3) is blocked and cool dry air can be released in the ambient.

DEHUMIDIFIER RANGE AND TECHNICAL CHARACTERISTICS

Giacomini's dehumidifier machines are for wall built-in or false ceiling installation; the latter solution is specifically suitable when serving multiple ambients with one single machine as side-mount fan, and guarantees a prevalence able to sustain pressure losses of small distribution networks, typical of residential applications.

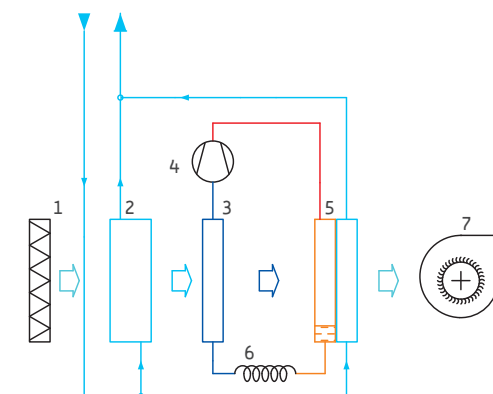


fig. 5.1
Principle diagram of an isothermal dehumidifier

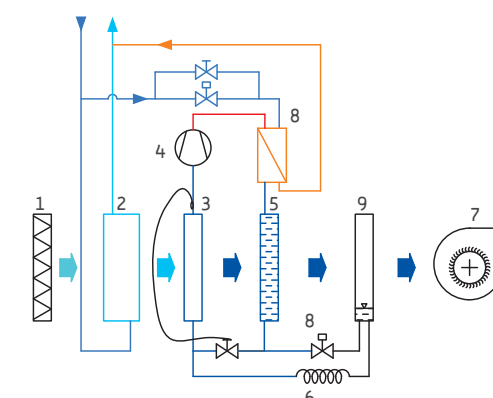


fig. 5.2
Principle diagram of a sensible integration dehumidifier

NOTES

¹ In summer, health authorities generally recommend a difference of 7-8 °C between the outside and inside temperatures.

Below the available versions and corresponding accessories are described. All models include a galvanized sheet monoblock unit lined inside with sound-absorbing material: models for wall built-in installation include a metal outer case and a white lacquered wood front panel.

KDP – Built-in installation machines

- Isothermal dehumidifier or with sensible power integration (mod. KDPRY024) to be combined with radiant cooling systems
- monoblock unit with galvanized metal sheet structure lined with sound-absorbing material
 - removable filtering section
 - centrifugal fan with direct coupling 3-speeds motor
 - 230V
 - availability of steel outer case for wall built-in installation (KDPCY024) and front MDF white-lacquered wood panel (KDPFY024)



KDS – Machines for false ceiling installation

- Duct-type dehumidifier, isothermal or with sensible power integration, to be combined with cooling radiant systems
- galvanized sheet structure mono-block unit lined with sound-absorbing material
 - removable filtering section
 - water-based condenser made with ASI 316 stainless steel braze-welded plates
 - centrifugal fan with direct coupling 3-speeds motor
 - availability of 4-ways (KDSY026 and KDSRY026) or 6-ways (KDSRY350) delivery plenums



The table of fig. 5.3 shows KDP and KDS technical data.

	KDPY024	KDPRY024		KDSY026	KDSRY026		KDSRY350	KDSRY500
		dehumidification	integration		dehumidification	integration		
latent power [W] air at 26 °C -65 % feeding water at 15 °C	700		700	740		740	1,110	1,740
sensible power [W] air at 26 °C -65 % feeding water at 15 °C	-	-	900	-	-	950	1,390	2,070
required water flow [l/h]	220	220	290	240	240	320	350	500
water circuit loss of pressure [mm.c.a.]	600		1,200	1,100	1,100	1,100	1,200	1,600
air flow [m³/h]	200	200	300	250	200	300	350	500
max. available prevalence [Pa]	-		-	45	68	60	40	60
absorbed electric power [W] monophasic feeding 230 V - 50 Hz	410	410	430	410	440	460	528	750

fig. 5.3
KDP and KDS technical characteristics

CONTROLLED MECHANIC VENTILATION MACHINES (VMC)

These are complete monoblock machines: in addition to dehumidification, they provide air exchange along with high-efficiency heat recovery. As logically expected, they are suitable for continuous use year round and can be installed in a distribution network of average extension, as long as within the range of residential applications.



They feature a removable filtering section, air heat/high-efficiency air recovery system, centrifugal fans activated by brushless motors, motorized dampers – for delivery, recirculation, extraction, external air outlet, foul air ejection, refrigerating circuit and hydronic coils. The air released in the ambient is made by two flows: exchange and recirculation air which ratios can be easily set by the user on the control panel within the limits of 80÷160 m³/h for the exchange air flow and 260÷300 m³/h for the released air flow.

As the fans are regulated according to the circulating instant flows, no specific calibration is required based on the topology of the aeraulic network. These machines have the same refrigerating circuit of the one described above for dehumidifiers with sensible integration: two condensers, one for post-heating and one for dissipation. The two VMC machines differ not only for their internal device layout, but also for their dissipative condenser: water-based for KDVRWY300 and air-based for KDVRAY300.

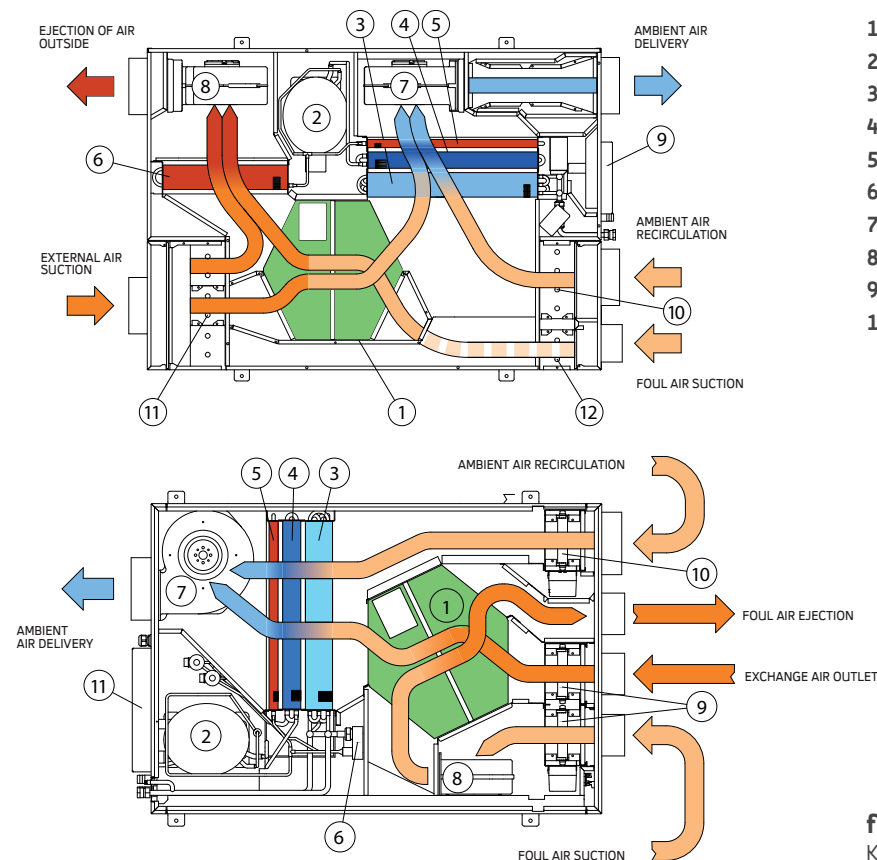
The cooling functioning principle is shown in the diagrams of fig. 5.4, page 100.

The external air flows through the air/air recovery unit (1), where it exchanges sensible heat with the ejection air; once it leaves the recovery unit it mixes with the recirculation air to then undergo a first sensible cooling phase through the water-based coil (3). Then the air mixture undergoes a cooling and dehumidification phase in the evaporator (4), followed by the heating process in the condenser (5). Finally, the air is released in the ambient. The dampers regulate the recirculation and external air flows so as to reach the set points required for the incoming air flow and the exchange air share.

The KDVRAY300 dissipative condenser (6) is cooled down by the extraction air flow and, if necessary, with a supplementary external air flow.

Main functions

- > summer and winter air exchange with high-efficiency heat recovery
- > summer dehumidification with regulation of the air inlet temperature
- > works with water at the temperature required by the radiant ceiling system, 15-18 °C in summer, 35-40 °C in winter
- > foul air extraction
- > ambient air recirculation
- > free-cooling control
- > air inlet temperature and air flows adjustable through the control panel
- > possibility to set activation times
- > when off, closed dampers separate the ambient from the outside



- 1 Air/air recovery unit
- 2 Refrigerating compressor
- 3 Water coil
- 4 Refrigerating evaporator
- 5 Post-heating condenser
- 6 Dissipative condenser
- 7 Delivery fan
- 8 Ejection fan
- 9 Electric panel
- 10-11-12 Dampers

fig. 5.4
KDVRAY (above) and KDVRW (below) diagrams

TECHNICAL DATA

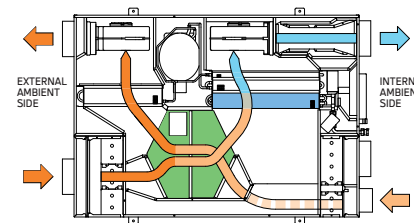
	KDVRWY300	KDVRAY300
total latent power [W] – external air at 35 °C -50 %	1,083	
useful latent power – referred to recirculation, air at 26 °C -55 %	625	
useful sensible refrigerating power [W] – referred to recirculation, air at 26 °C -55 %	1,050	
useful thermal power*, feeding water at 45 °C and 60 °C	2,200 - 3,500	
required water flow [l/h]	400	300
water circuit loss of pressure [mm.c.a.]	800	1,000
delivery fan flow [m³/h]	80-300	
delivery fan useful prevalence [Pa]	120	
[m³/h] ejection fan flow	80-160	80-300
ejection fan useful prevalence [Pa]	100	
heat recovery unit efficiency – winter: outside -5 °C, inside 20 °C	95 %	
heat recovery unit efficiency – summer: outside 35 °C, inside 26 °C	93 %	
level of free-field acoustic pressure – distance 1 m [dB(A)]	39	
weight [kg]	71	85
absorbed electric power [W] monophasic feeding 230 V – 50 Hz	560	600

* referred to a 300 m³/h
recirculation of ambient
air at 20 °C

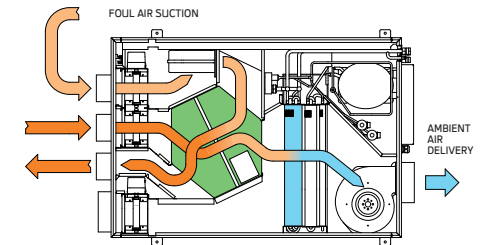
FUNCTIONING DIAGRAMS

EXCHANGE AIR ONLY Exchange air exchanges heat with the extraction air through the recovery unit before flowing through the treatment section and being released in the ambient. The delivery air temperature is adjusted by the water coil.

KDVRAY300

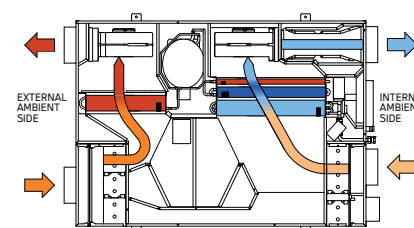


KDVRWY300

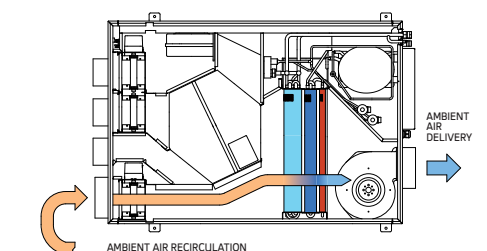


RECIRCULATION ONLY The treatment process involves only the ambient air, which is withdrawn and returned after dehumidification, cooling or heating according to the operational conditions. The KDVRAY300 unit working in summer provides for circulation of an external air flow to cool down the dissipative condenser. The delivery air temperature is adjusted by the water coil.

KDVRAY300

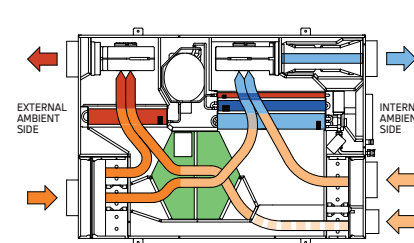


KDVRWY300

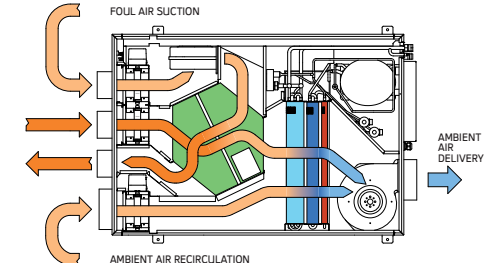


EXCHANGE with RECIRCULATION Exchange air exchanges heat with the extraction air through the recovery unit before mixing with a recirculation air flow, then it is processed by the treatment section and finally released into the ambient. The delivery air temperature is adjusted by the water coil.

KDVRAY300

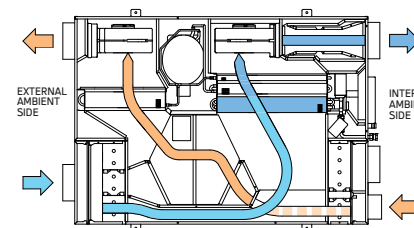


KDVRWY300

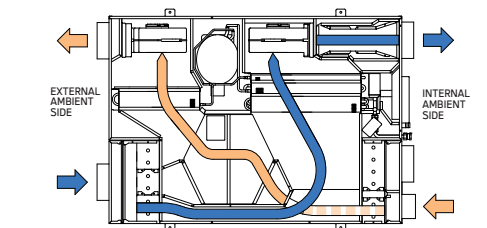


FREE COOLING Enables to exploit free feeds of external air when its temperature ranges between the limits set on the control panel. The preset flow of external air is sucked while an equal air flow is extracted from the ambient.

SUMMER



WINTER



Temperature control for every climate need.
Functional wellness and absolute convenience, to enjoy high levels
of thermal comfort in every season.

Chapter 6

Regulation

THERMOREGULATION

INTRODUCTION

The diagram of figure 6.1 shows the devices involved when planning a radiant ceiling for heating and cooling.

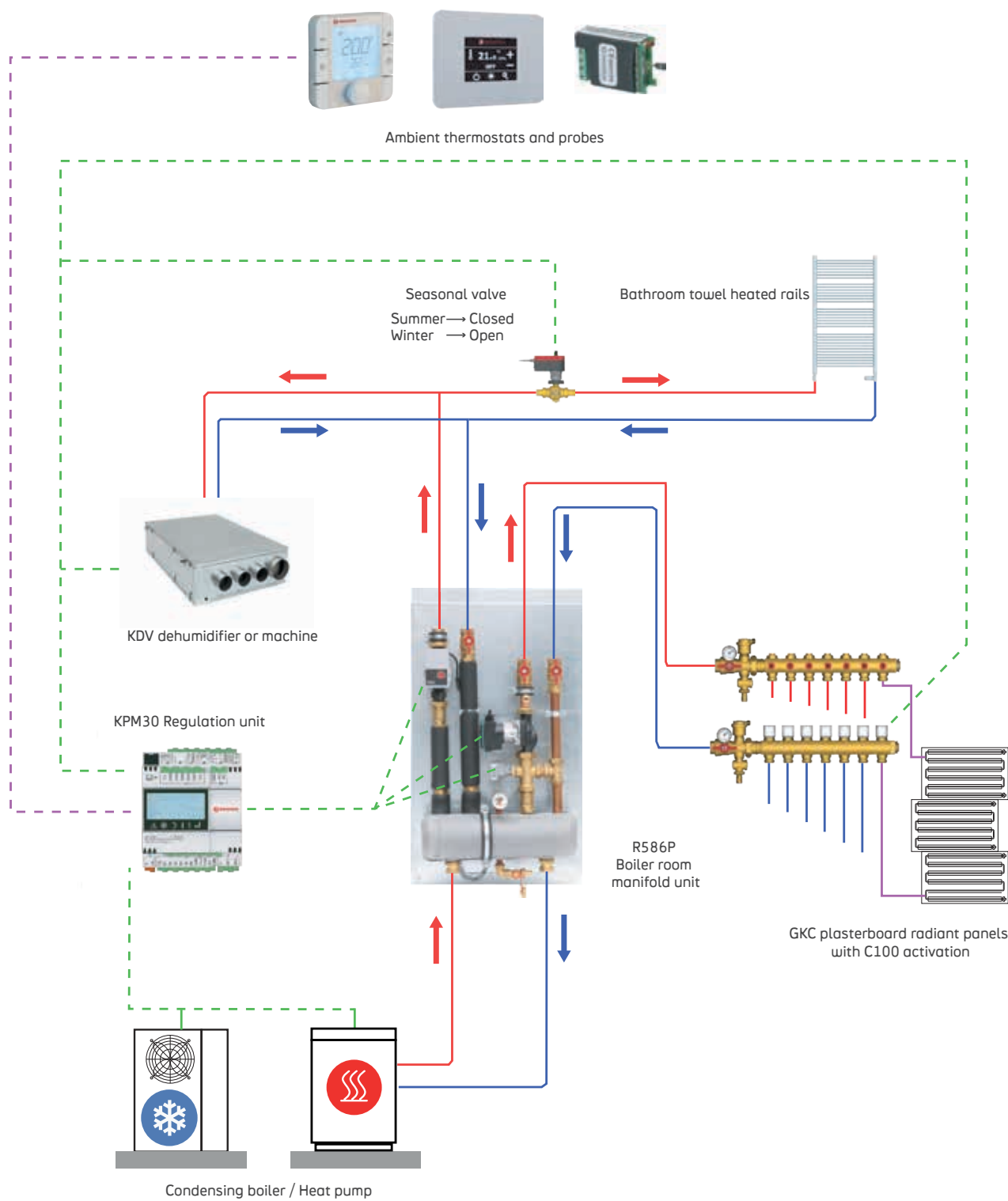


fig. 6.1
Principle diagram for connection of the devices installed in a radiant ceiling system

The following systems are included:

- > **Ambient regulation:** ambient thermostats with integrated relative humidity sensor enable the user to set the desired comfort conditions
- > **Heating and cooling systems:** the radiant ceiling – supported by the towel heated rails installed in bathrooms – and the dehumidification or VMC machines provide the ambient thermal balance
- > **Machines for the production of hot and cold fluids:** condensing boilers, heat pumps, biomass generators are fitted in proper technical spaces
- > **Devices for fluid temperature control:** the compact R586P boiler room units enable to adjust the temperature of the fluids feeding the various devices involved
- > **Boiler room unit regulation:** based on the user's choices set through the thermostats set-points, the KPM30 electronic unit works as master regulator and controls the boiler room unit, the activation/deactivation of boilers or heat pumps, the centralized seasonal summer/winter commutation. It also offers the possibility to extend the basic functions of the devices involved.

PRIMARY REGULATION

The primary regulation technique implemented by Giacomini control systems follows two different strategies: one for heating, the other for cooling.

Heating: winter climate compensation

Regulation of the delivery temperature when heating follows a specific climatic curve, according to which the heat generators are required low delivery temperatures when the outside temperature remains within relatively high values, while the delivery temperature is also increased until reaching the maximum project temperature when the outside temperature progressively decreases to minimum values:

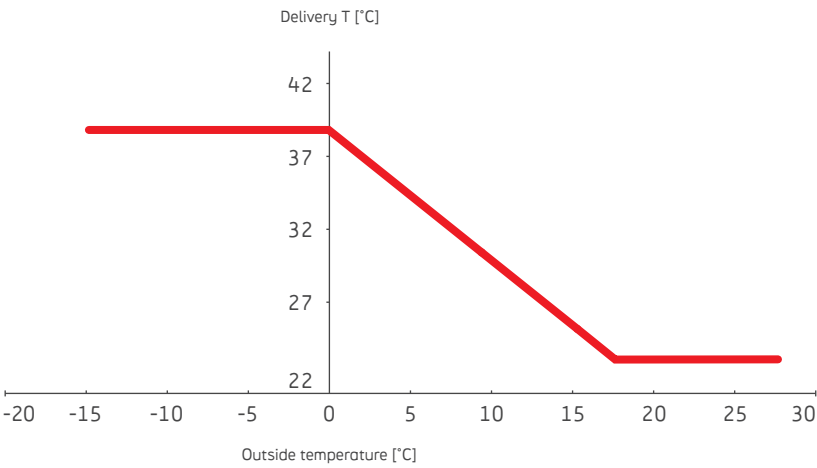


fig. 6.2
Winter climatic curve

This approach is quite significant for applications with uninterrupted use and aims at modulating the thermal emission of the system based on the gradual increase of the building – or apartment – dispersion. At the same time, it enables to optimize the performance of the heat generators¹ and minimizes the dispersions of the distribution network.

Cooling: set point of maximum output power

Regulation of the delivery temperature when cooling aims at a very different goal: search of the delivery temperature maximizing the refrigerating power provided by the radiant ceiling.

This control technique is not possible without using ambient thermostats with integrated relative humidity sensors, which read the dew temperature of every ambient: once the highest is known, the delivery temperature set-point providing the maximum power is immediately set:

$$T_m = \text{Max} (T_{\min}, T_{dp} + F_s)$$

delivery temperature T_m is therefore chosen as the maximum between two values: the minimum delivery temperature $T_{\min}$ set in the regulator and the highest dew temperature T_{dp} increased by a convenient safety factor F_s ².

NOTE

¹ To determine the proper climatic curve an accurate thermal calculation of the monthly average energetic needs of the building is required.

² The safety factor changes according to the system to be adjusted. Typical values are +1 °C for metal radiant ceilings and 0 °C, or also negative values, for plasterboard radiant ceilings.

AMBIENT THERMOSTATS, ELECTRONIC UNITS AND REGULATION SYSTEMS

The range of thermostats that can be combined with radiant ceiling systems is wide and they can satisfy every installation requirement, from basic to the most refined and automatized installations, which are becoming more popular in modern buildings.

The complete range of thermostats and regulation units includes two different technologic classes:

- > **stand alone** series: thermostats, chrono-thermostats and chrono-thermohumidistats able to function as units autonomous from the regulation units
- > **klimabus** series: blind probes and thermostats with relative humidity sensor which are part of a logic, smart and articulated system culminating in the master regulation unit. This type of devices enables the radiant ceiling to work at its best.

STAND ALONE SERIES

The main characteristic of stand alone regulation systems is their capability to interface the primary – in the boiler room – and the secondary regulation within the ambient, a process which takes place through simple heat exchange of a clean contact. Diagrams 6.3 and 6.4 schematically explain this concept:

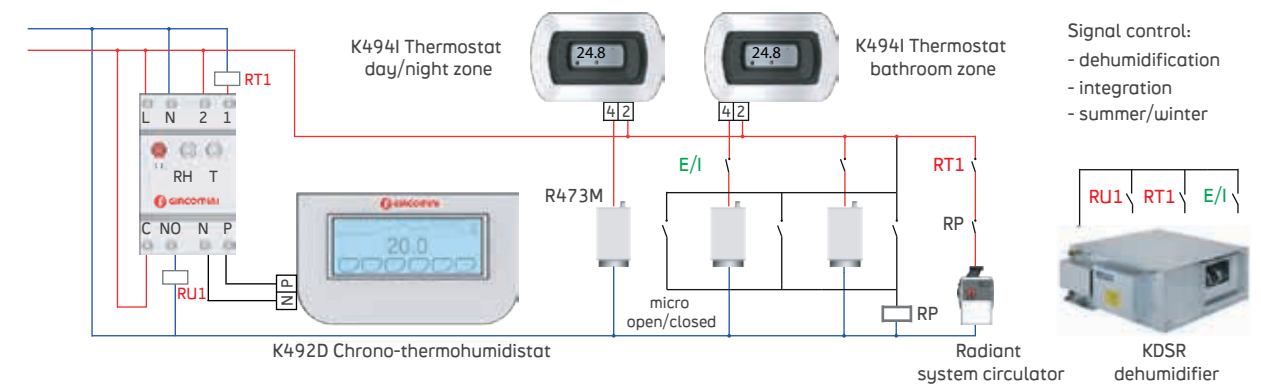


fig. 6.3

Stand alone regulation: radiant ceiling and dehumidifier control

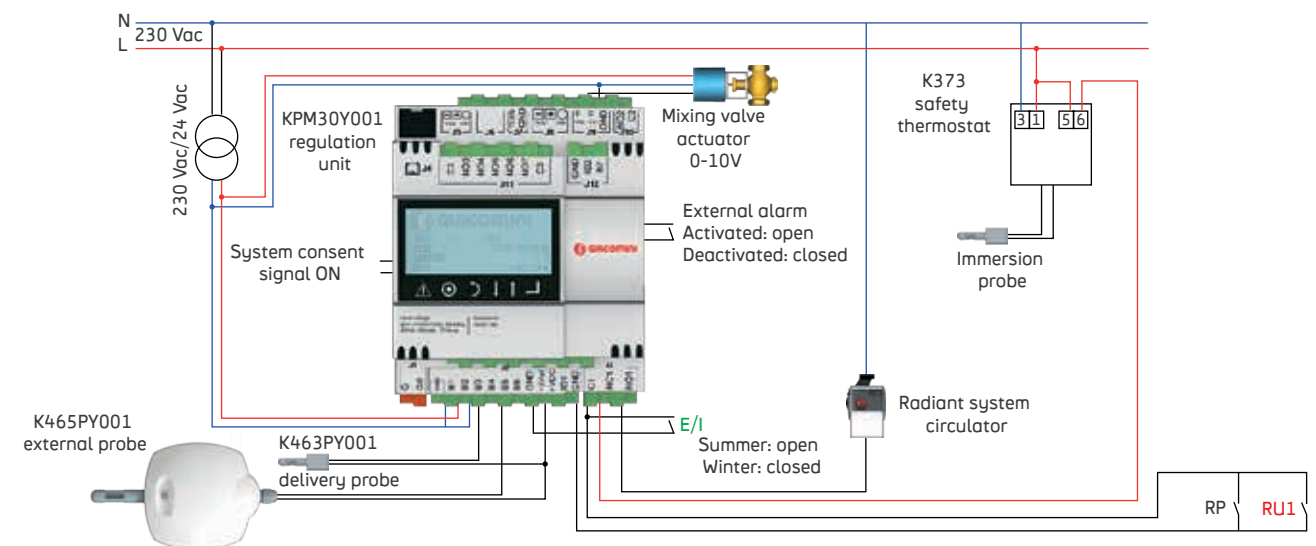


fig. 6.4

Stand alone regulation: mixing valve control

The regulation strategy is based on uncoupling of the local regulation from the boiler room regulation. The ambient includes a chronothermohumidistat that works as master and activates the dehumidification machine, in addition to controlling the temperature of its area of pertinence³; other thermostats control the temperature of the corresponding areas. The KPM 30 unit turns the circulator ON/OFF and regulates the radiant system mixing valve. The benefit of this regulation technique stands in its simplicity: a very reduced number of devices successfully controls a complex system. Its limit is that the radiant ceiling cannot reach its maximum power when cooling.

NOTES

³ When installing the system in an apartment equipped with a heat metering module, the same master chronothermohumidistat can also turn ON/OFF the zone valve installed in the metering module.

KPM30, KPM31 - stand alone versions

Stand alone control units for heating and/or cooling. The KPM30 model features a display for monitoring, configuration and control of the system.

- 24 Vac power supply, dimension 6 DIN modules
- Possibility to control one or two mixing valves and one or two circulators
- On/off voltage-free contacts for the exchange of summer/winter signals and start/stop consents of boiler room, heat pump, dehumidifiers, fan-coils, thermo-electric actuators
- Possibility to extend the functions with KPM35 expansion modules

The KPM31 unit features the same characteristics of the KPM30 except for the integrated graphic display, so it has to be installed with the KD201 remote graphic terminal (optional for KPM30).



KD201

Semi-graphic terminal with keypad for system monitoring, configuration and control.

- White backlit LCD semi-graphic display
- To be combined with KPM30 or KPM31 regulation modules. Direct power from the regulation module
- Installation in 503 3-compartments wall case



K465P

External temperature passive sensor, range -50÷105 °C, in IP68 protection grading case.



K463P

Delivery temperature immersion passive sensor, range -50÷105 °C.

- Wire length 6 m, bulb diameter 6 mm



K494

Ambient thermostat for wall-mount exposed installations.

- Battery powered
- Outlet relay with voltage-free exchange contact, 5(3)A, 250 Vac
- Heating and cooling modes with 2 fading levels
- Temperature regulation range 2÷40 °C
- 0.5 K differential
- IP20 protection grading



K494I

Electronic ambient thermostat, wall built-in installation

- White or black
- 230 V / 50Hz power or battery feed
- Voltage-free commutation contact; contact range 5(3)A, 250 Vca
- IP 20 protection grading
- Display with graphic icons combined to front keys, setup: comfort, economy, off/ antifreeze
- Available in two versions: winter-only or summer/winter control



K490I

Weekly chronothermostat, for wall built-in installation in civil 3-compartments case.

- Battery-powered or electric energy network
- For use with most common civil lines featuring a wide range of covers, frames and adapters
- Outlet relay with voltage-free exchange contact, 5(3)A, 250 Vac
- Heating and cooling mode with weekly, daily, timer and manual programs
- Temperature regulation range 2÷40 °C
- 0.25 K differential



K492A, K492D, K492P

Weekly chronothermostat for exposed wall built-in installation, with large touch-screen display.

- Also available as chronothermohumidistat
- For control of thermo-electric actuators (K492A), dehumidifiers (K492D) or fan-coils (K492P)
- Battery-powered. Integrated external module fed by electric network
- Heating and cooling modes with weekly, daily, timer and manual programs
- Integrated relative humidity sensor
- Temperature regulation range 2÷40 °C
- 0.25 K differential
- IP20 Protection grading



K499

Control module for all ambient chronothermostats of the K490I and K492 series.

- K499Y001: for GSM remote control
- K499Y010: for local centralized control



KLIMABUS SERIES

A fieldbus-based regulation system enables to enjoy the highest levels in terms of comfort and efficiency. The KPM30Y003 control unit represents the basic diagram of reference to fully understand its potential as shown in the picture (fig. 6.5).

The control unit works as master and with its own bus it exchanges information with one, two or three zone thermostats. It provides three clean output contacts for activation of the actuators corresponding to each zone: in addition, it features two clean contacts for dehumidification or integration of the dehumidification machine or a possible fan-coil.

Plus, the display enables to control or modify the operational set-points or to set the chronoprograms for each thermostat.

The boiler room manifold unit is controlled in an extremely rational way: by exchanging information with the ambient thermostats the control unit can activate the radiant ceiling mixing valve and circulator.

The control unit reads the dew temperature of each of the three zones and based on this information it calibrates the temperature set-point for the water to be delivered to the radiant ceiling in order to maximize the provided refrigerating power, while preventing condensation.

With four or more zones, the fieldbus must be extended: each KPM30Y004 control unit – regulating only one mixing valve – or KPM30Y005 – regulating two – can control up to 16 thermostats and 7 dehumidification machines. Control of such an extended system requires a KPM35 expansion modules - according to the diagram of fig. 6.6 on page 112-113.

With this kind of approach, each pair of thermostats is combined to an expansion module to control the actuators based on a temperature signal (upper part of the diagram), while other expansion modules are exclusively dedicated to control the dehumidifiers (or fan coils, if applicable) based on one, or more - according to the system setup- humidity signals.

The primary regulation follows the same principle described for the KPM30Y003 3-zones control unit.

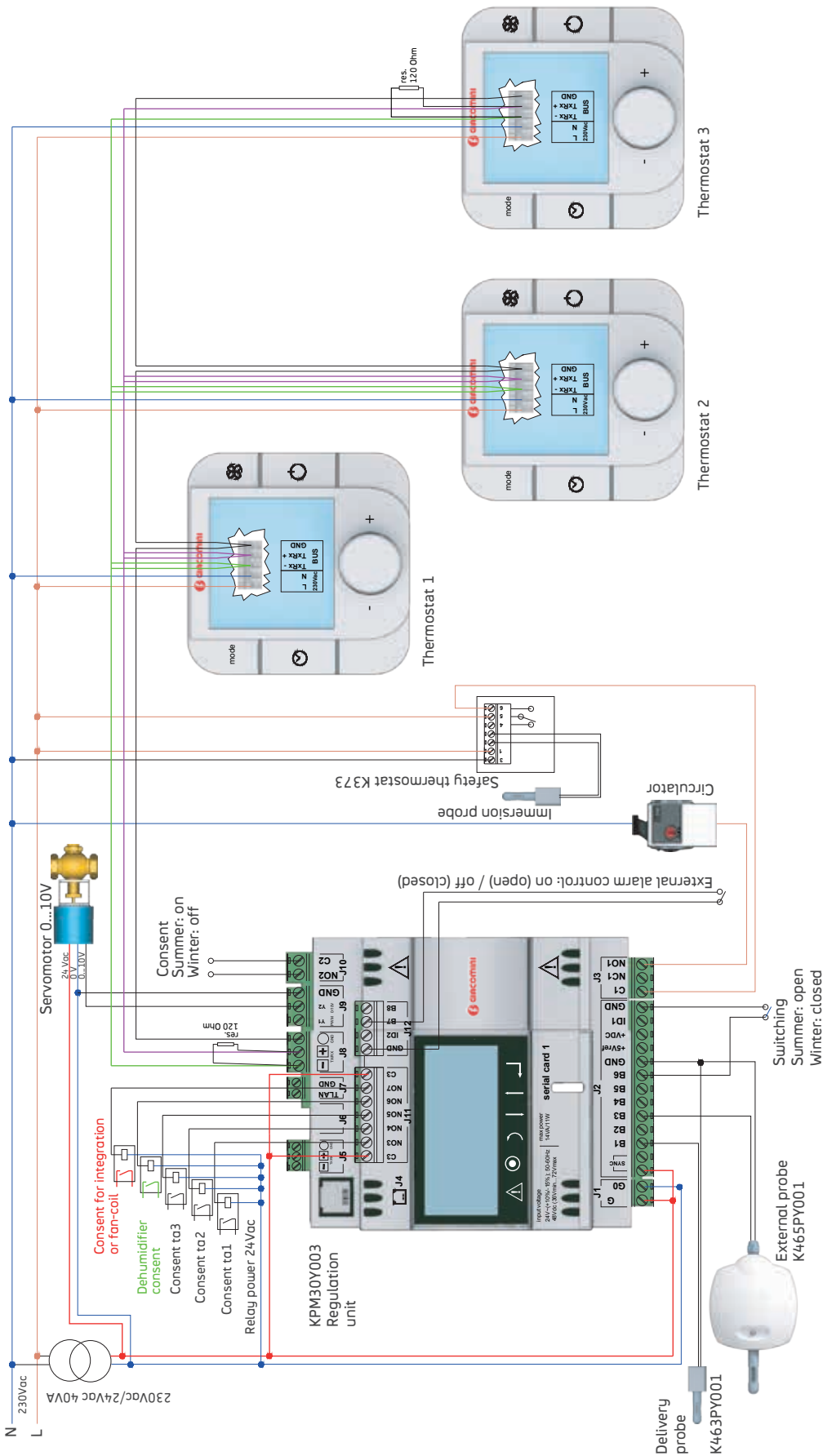


fig. 6.5
Klimabus regulation: complete control of three zones, radiant ceiling and dehumidifier

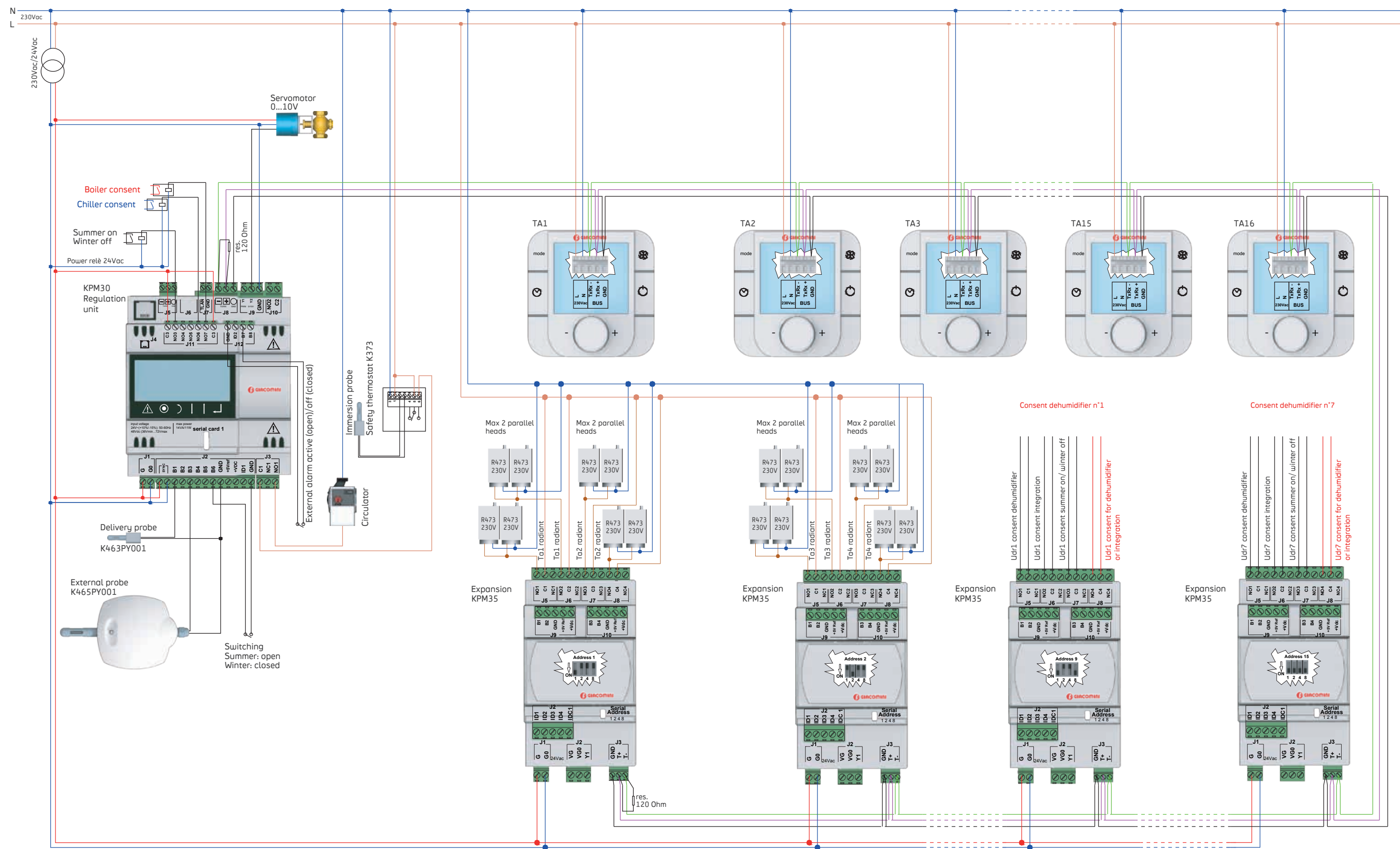


fig. 6.6

Klimabus regulation: complete control of 16 zones, one mixing valve, radiant ceiling and dehumidifiers

KPM30, KPM31 - klimabus versions

Klimabus units for heating/cooling. KPM30 is equipped with a display for system monitoring, configuration and control.

- 24 Vac, dimension 6 DIN modules
- Possibility to control one or two mixing valves, and one or two circulators
- Voltage-free contact outlets to exchange summer/winter signals and start/stop consents from boiler room, heat pump, dehumidifiers, fan-coils, thermo-electric actuators
- Possible integration of KPM35 expansion modules for more functions
- Fieldbus: MODBUS

The KPM31 unit features KPM30's same characteristics except for the integrated graphic display which can only be installed with the KD201 remote graphic terminal (optional for KPM30).



KD201

Semi-graphic terminal with keypad for system monitoring, configuration and control.

- White backlit semi-graphic LCD display
- To be combined with KPM30 or KPM31 regulation modules. Direct feeding from regulation module
- Wall-mount installation with 503 civil 3-compartments case



KPM36

Additional card for KPM30/KPM31 regulation modules. It provides integration with other communication protocols: KNX, MODBUS, Ethernet.



K465P

External temperature passive sensor, range -50÷105 °C, IP68 protection grading case.



K463P

Delivery temperature immersion passive sensor, range -50÷105 °C.

- Wire length 6 m, bulb diameter 6 mm



K492B

Thermostat with backlit display and local interface for temperature and humidity control.

- 230 Vac, MODBUS communication
- Wall mount built-in installation with civil round case



K495L

Thermostat with backlit display and local interface for temperature and humidity control.

- 230 Vac, MODBUS communication
- Wall-mount installation in 503 civil 3-compartment case



K495B

Blind probe with temperature and humidity sensor.

- 24 Vac, MODBUS communication
- Wall-mount installation in 503 civil 3-compartment case



K493I

Relative humidity and temperature blind probe.

- Built-in installation on civil hole cover
- 12 VDC, MODBUS communication
- IP20 protection class
- Temperature sensor range -10÷50 °C ± 0.5 °C
- Relative humidity sensor range 0÷100 % ± 5 %



K493T

Touch thermostat with 2.8" TFT color display, for temperature and humidity control. Color: white.

- 12 VDC, MODBUS communication
- IP10 protection class
- Horizontal installation in 3-compartment modules for Italian standard or wall-mount
- Measuring range 5÷50 °C



KPM35

Output expansion module for KPM30 o KPM31 control units.

- Voltage-free contact outputs with optional control of thermo-electric actuators, servomotors for zone valves or air treatment systems for dehumidification or integration
- 24 Vac, dimension 4 DIN modules



4-PIPES DISTRIBUTION

Radiant ceiling systems are widespread in commercial buildings and hospitals; these applications generally require a “4-pipes” distribution system.

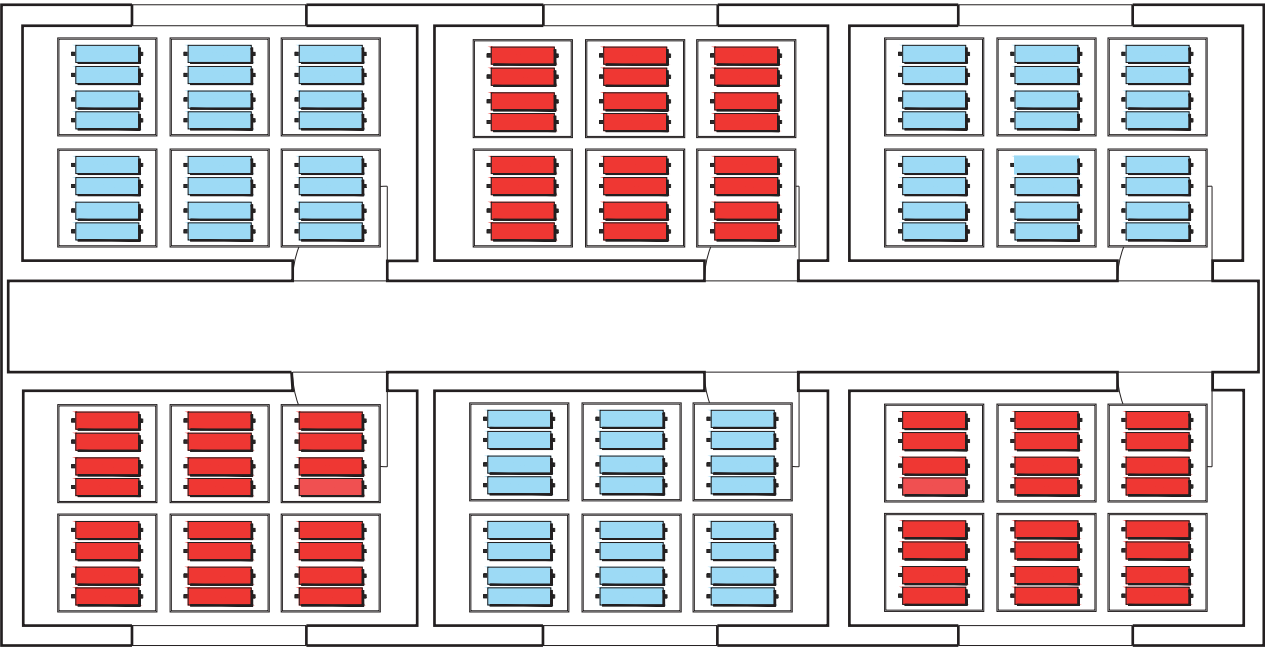


fig. 6.7
Diagram of a 4-pipes distribution radiant ceiling system; the example requires heating of some ambients while simultaneously cooling others.

The R274 6-ways valve, specifically designed for this purpose, enables to easily realize 4-pipes radiant ceiling systems:

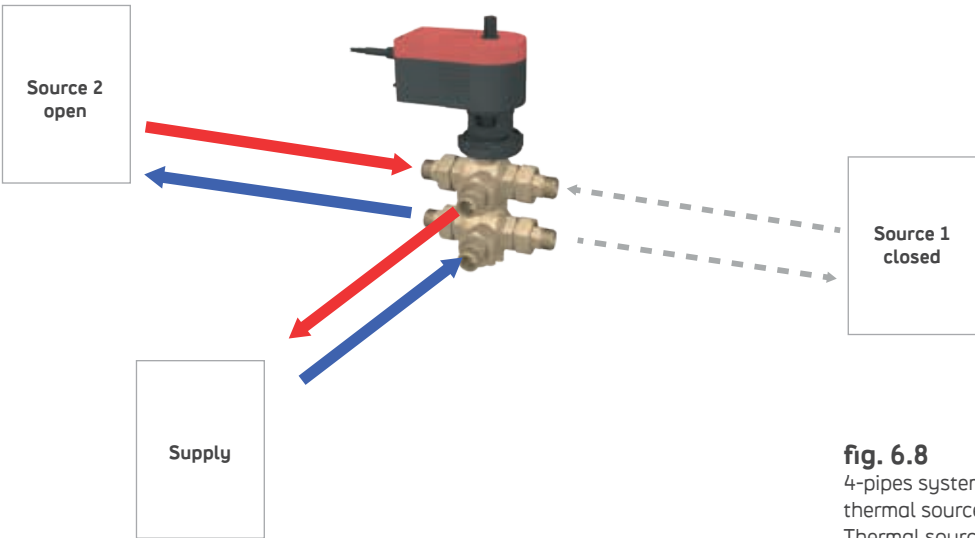


fig. 6.8
4-pipes system: the 6-ways valve connects thermal source 1 to the radiant ceiling. Thermal source 2 is intercepted.

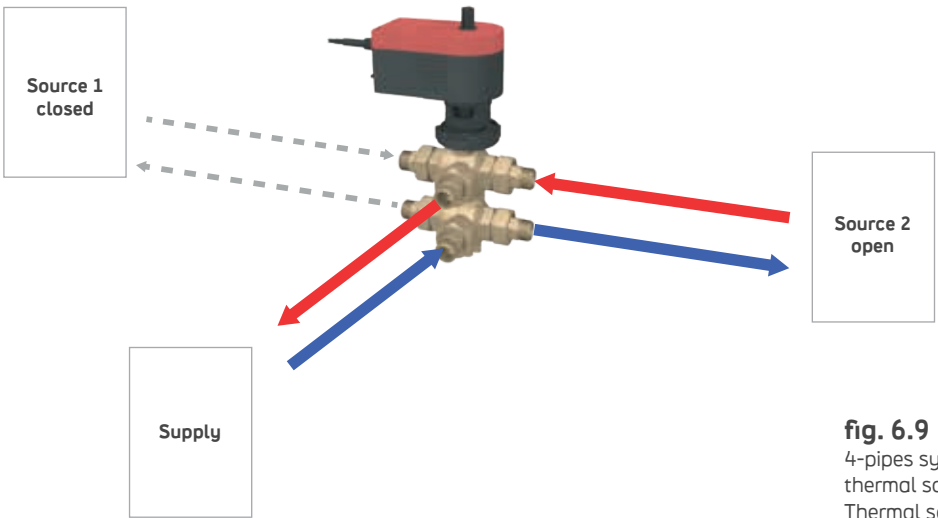


fig. 6.9
4-pipes system: the 6-ways valve connects thermal source 2 to the radiant ceiling. Thermal source 1 is intercepted.

A single motorized valve can then replace two motorized valves, easily synchronizing opening/closing towards the two thermal fluid sources.

The R274 6-ways valve enables to switch from heating to cooling, or vice versa, and also to simultaneously shut-off the flow of both thermal sources, acting as a zone valve.

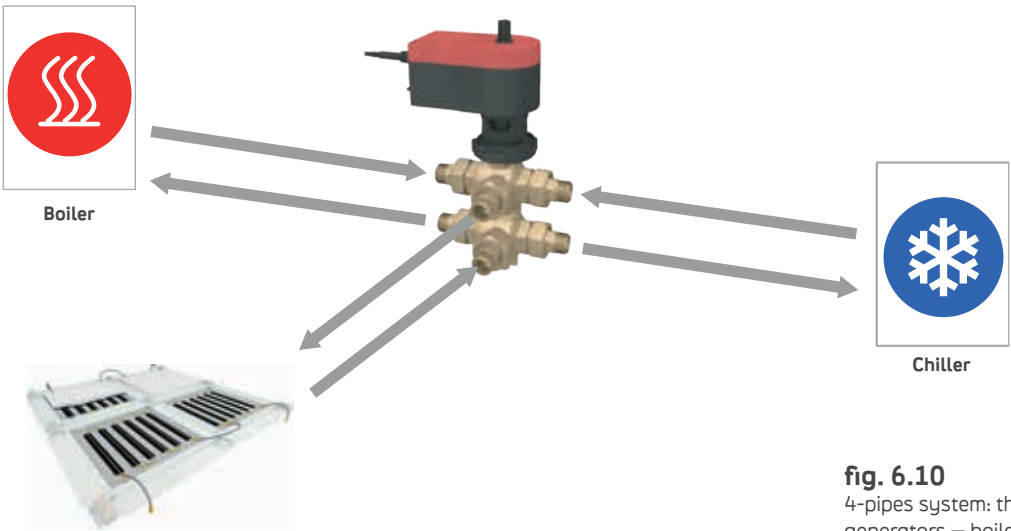


fig. 6.10
4-pipes system: the 6-ways valve is between the generators – boiler and chiller – and the user system – radiant ceiling.

A range of solutions designed to adapt to every type of architectural project.
A choice that involves the most diverse professionals but always, absolutely unique.

Chapter 7

The system project

THE SYSTEM PROJECT

INTRODUCTION

After reading the previous chapters, it can be assumed that planning radiant ceiling systems is actually a transversal process requiring the cooperation of many different professionals involved in the construction or renovation works.

When considering a residential building, heating and cooling systems are generally considered integral parts – and not something simply “contained” by them. Therefore, the more discrete their presence, the better. The installation of false ceilings, possibly with built-in lighting devices, should not be something the planner has to give up for practical reasons; all the same, should one wish to decorate by fully exploiting the walls, the heating terminals should not represent an obstacle. By keeping in mind everyday needs, one can actually see how many flexible decorating solutions a plasterboard radiant ceiling can offer.

When considering an office building, there will be other kinds of architectural requirements: presumably an inspectionable false ceiling, integrating technical devices of various gender and complying with specific modularity criteria.

The evaluation of the aspects above represents the most important step when planning a radiant ceiling and it is the time when planners have to choose the most suitable panels and support structures.

Actual thermal dimensioning takes place after dealing with these considerations. The calculation starts from the output graphics described in chapter 4 and is generally carried out for cooling first, followed by verification of the conditions imposed when heating.

PLANNING OF A PLASTERBOARD RADIANT CEILING

In order to illustrate the project approach for a plasterboard radiant ceiling, we may take into consideration the apartment represented in figure 7.1.

The plan shows the wide open-space daytime area – living room, dining room and entrance – and the night time area, including three bedrooms. There are two half baths and a main bathroom. The project provides for a plasterboard false ceiling including several built-in spotlights, all shown on the plan. The dining area features a false ceiling not completely coplanar, as it includes a round-shaped portion at a higher level from the floor compared to the rest of the false ceiling. Finally, the living room features a pillar which does not represent an obstacle in case of installation of passive plasterboard panels, as they can be cut to measure, but it certainly represents a sensible impediment when installing active panels that must be kept into account to exploit the useful surface at its best.

Upon consideration of such limits, the best choice would be the GKC series that enables to easily embed the spotlights in the active panels, without reducing the radiant surface.

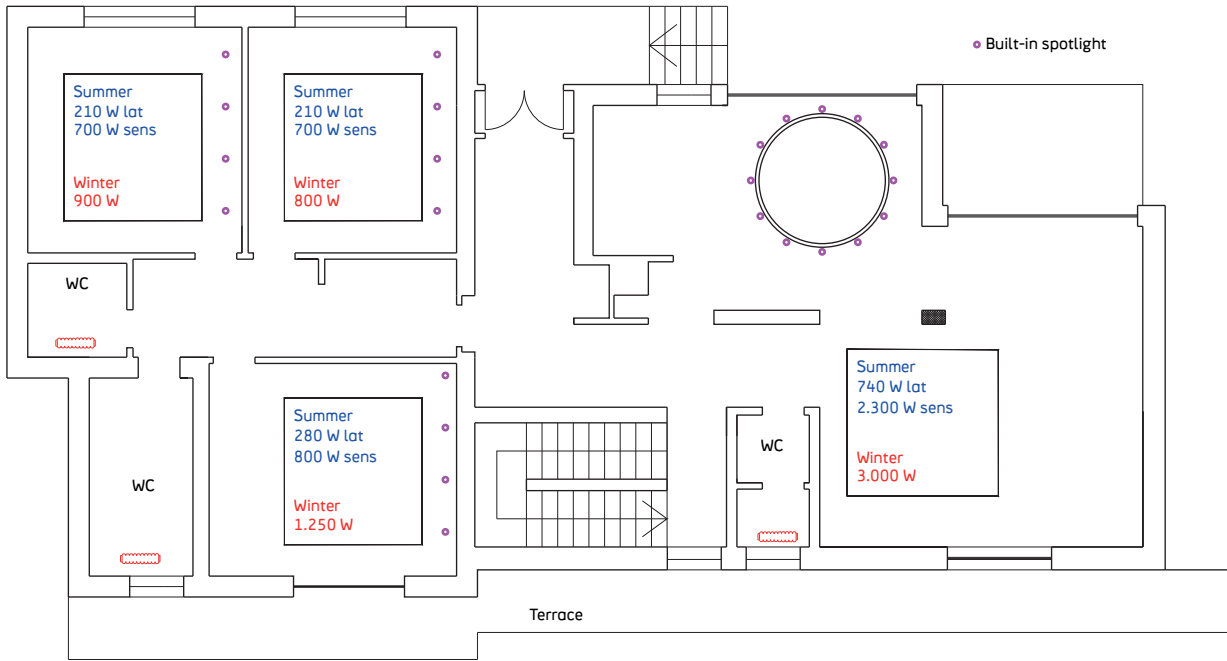


fig. 7.1
Apartment with thermal loads, built-in spotlights and circular decoration not coplanar with the rest of the false ceiling

The dimensions of the bathrooms, in addition to the fact that they do not require cooling, would call for heating with furnishing radiators.

The plan shows the thermal loads, both for heating and cooling: in this case the load includes the sensible and latent components. Considering the ambient layout and the latent loads involved, it would be reasonable to install two machines for dehumidification, one serving the night time zone and one dedicated to the daytime zone.

The overall latent load of the night time area is 700 W, while the daytime zone is 740 W.

Two KDSRY026 machines are fit for the application.

Besides dehumidification, each machine also provides 950W of sensible refrigerating power. The planner can decide to consider this contribution as a power reserve, and can then proceed with dimensioning of the false ceiling by integrally considering the sensible loads of the plan.

Thermal and refrigerating calculations related to the radiant ceiling are carried out according to the specifications of chapter 4. To simplify, the panel outputs indicated in the table “Project typical outputs” (fig. 4.14) at the end of chapter 4 will be used.

The radiant false ceiling of fig. 7.2 is the result of considerations based on the loads and architectonic limits, and only the active panels are indicated: panels of the same color are part of the same hydraulic circuit.

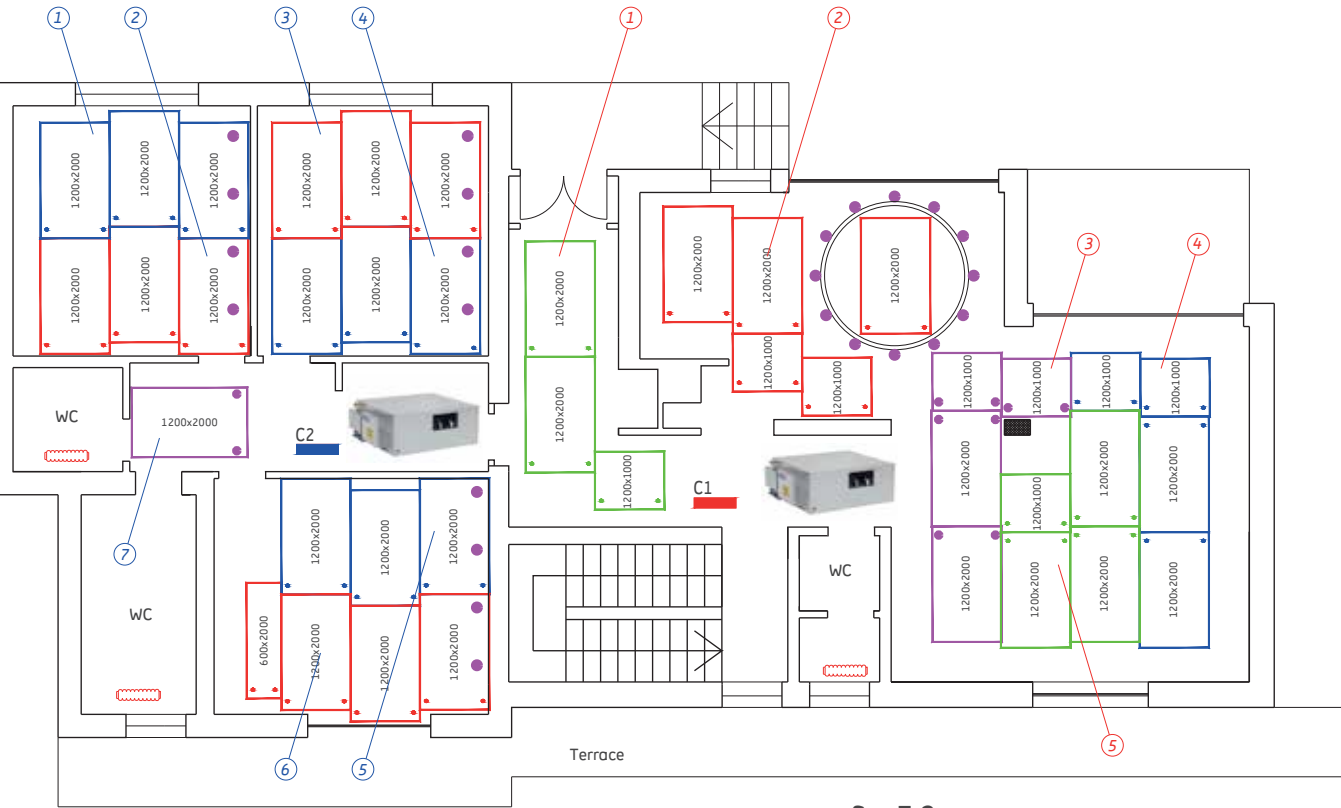


fig. 7.2
Diagram of GKC radiant ceiling with circuits, manifolds and dehumidifiers

By exploiting the Kv values indicated in fig. 7.6 and considering the load losses of the pipe segments connecting the panels and the manifolds, we obtain the table in fig. 7.3 that sums up the calculations and shows how the system satisfies the project limits and balances the thermal and refrigerating loads.

GKC RADIANT CEILING CALCULATION

manifold	circuit	panel no. 1200x2000	panel no. 1200x1000	panel no. 600x2000	summer output [W]	winter output [W]	flow [l/h]	Circuit Δ _p [mm.c.a.]
C1	Circuit 1	2	1		355	495	153	1137
	Circuit 2	3	2		568	792	245	3057
	Circuit 3	2	2		426	594	184	1627
	Circuit 4	2	2		426	594	184	1627
	Circuit 5	3	1		497	693	214	2245
C2	Circuit 1	3			426	594	184	1767
	Circuit 2	3			426	594	184	1544
	Circuit 3	3			426	594	184	1544
	Circuit 4	3			426	594	184	1289
	Circuit 5	3			426	594	184	1289
	Circuit 6	3		1	497	693	214	2075
	Circuit 7	1			142	198	61	389

fig. 7.3

According to chapter 6, the overall diagram of the entire system is the one shown by fig. 6.1, while the regulation strategy more convenient is the one corresponding to the diagram of fig. 6.6.

PLANNING OF A METAL RADIANT CEILING

As an example for planning of a metal radiant ceiling, let's consider the ambients of the plan in fig. 7.4. It is an area that includes in part an open-space and some compartmental ambients, among which a meeting room. The space internal division is obtained through moving walls ending with the false ceiling, which therefore has to be treated as a continuous coplanar false ceiling. The lighting system includes suspended bodies beneath the false ceiling which do not interfere with the system distribution scheme.

There is, however, a modularity limit – irregular because of the inter-distances of 4,842 mm, 4,842 mm, 4,998 mm – introduced by the pillars placed on the perimeter of the entire ambient. The best solution would be the GK series, particularly indicated for large ambients and with moving wall structures. The final choice is the refined GK120, silver, though under a strict thermal performance standpoint also GK60 is equally adequate.

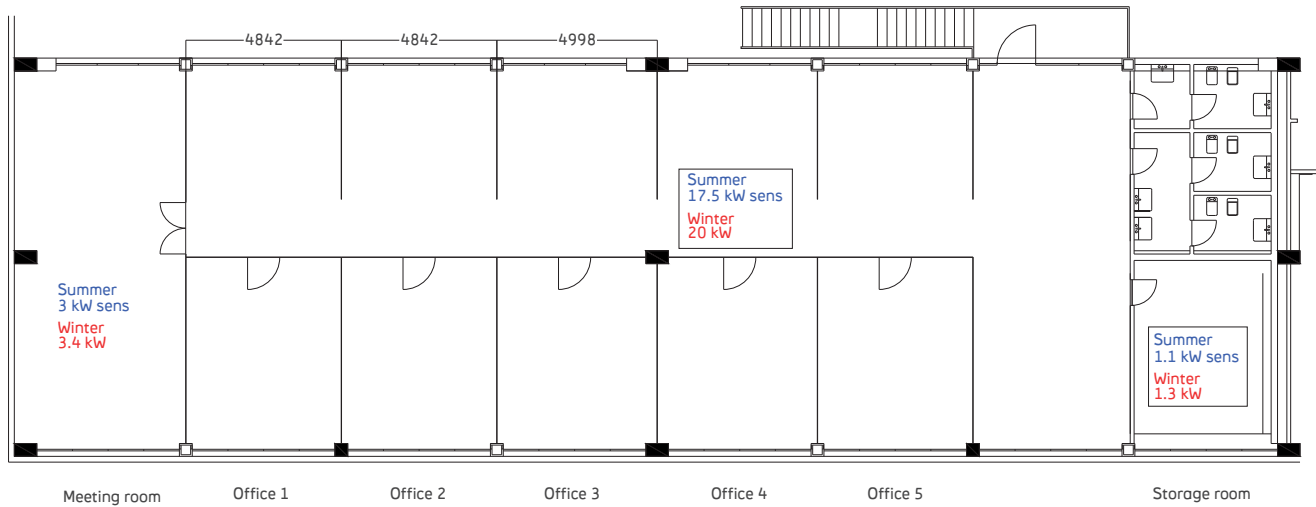


fig. 7.4
Office area, part open space, part compartmental. The pillar irregular modularity is clear.

The system is completed with an air treatment device for hygienic exchange and participates in balancing the thermal loads, based on the introduction of chapter 5; for this reason, the plan shows only the sensible thermal loads for proper dimensioning of the radiant ceiling.

As in the previous example, this uses the panel outputs indicated in the table “Typical project outputs” (fig. 4.14) at the end of chapter 4.

The false ceiling diagram of fig. 7.7. of pages 126-127 is based on the loads and architectonical limits and it shows how it was

necessary to use non-standard elements for part of the support structure: the use of only 150 mm base components would have not enabled to respect the modularity limit and that is why 192 mm and 492 mm supports have been introduced.

Although this type of choices may be given for granted, they must be carefully evaluated together with Giacomini S.p.A.'s technical support.

In this scheme as well, panels of the same color are part of the same hydraulic circuit.

As easily noticeable, the architectonical modularity translated into installation modularity. The system geometry leads to identify a “base unit” made by grouping multiple circuits, all including 4 panels connected in series.

To make things easier, we will limit the calculation to the “standard manifolds”; in this case we identify one C1 manifold serving 4 circuits, each of the 4 GK120 panels and one C2 manifold serving 3 circuits, again made of 4 panels.

There are 14 C1 manifolds and one C2; therefore, the calculation result of the C1 manifold must be multiplied by 14 to establish the powers and flows involved in a radiant ceiling system.

Based on the above, by exploiting the Kv values of the table in fig. 7.6 and considering the pressure losses of the pipe segments connecting the panels and the manifolds, we obtain the table in fig. 7.5 that sums up the calculations and shows how the system complies with the project limits and balances the thermal and refrigerating loads.

The system regulation is shown by the schemes of chapter 6.

CALCULATION OF GK120 RADIANT CEILING

manifold	circuit no.	no. of active panels installed	summer output [W]	winter output [W]	summer flow [l/h]	winter flow [l/h]	pipe length 16x1.5 [m]	Δ_p [mm c.a.]	max Δ_p to manifold	manifold ways
C1	Circuit 1	4	388	436	167	125	15	2519	2,519	4
	Circuit 2	4	388	436	167	125	15	2519		
	Circuit 3	4	388	436	167	125	15	2519		
	Circuit 4	4	388	436	167	125	15	2519		
C2	Circuit 1	4	388	436	167	125	15	2519	2,519	3
	Circuit 2	4	388	436	167	125	15	2519		
	Circuit 3	4	388	436	167	125	15	2519		

fig. 7.5

SUMMARY TABLES

The tables below show the technical data useful for planning of radiant ceiling systems.

WATER CONTENT AND Kv

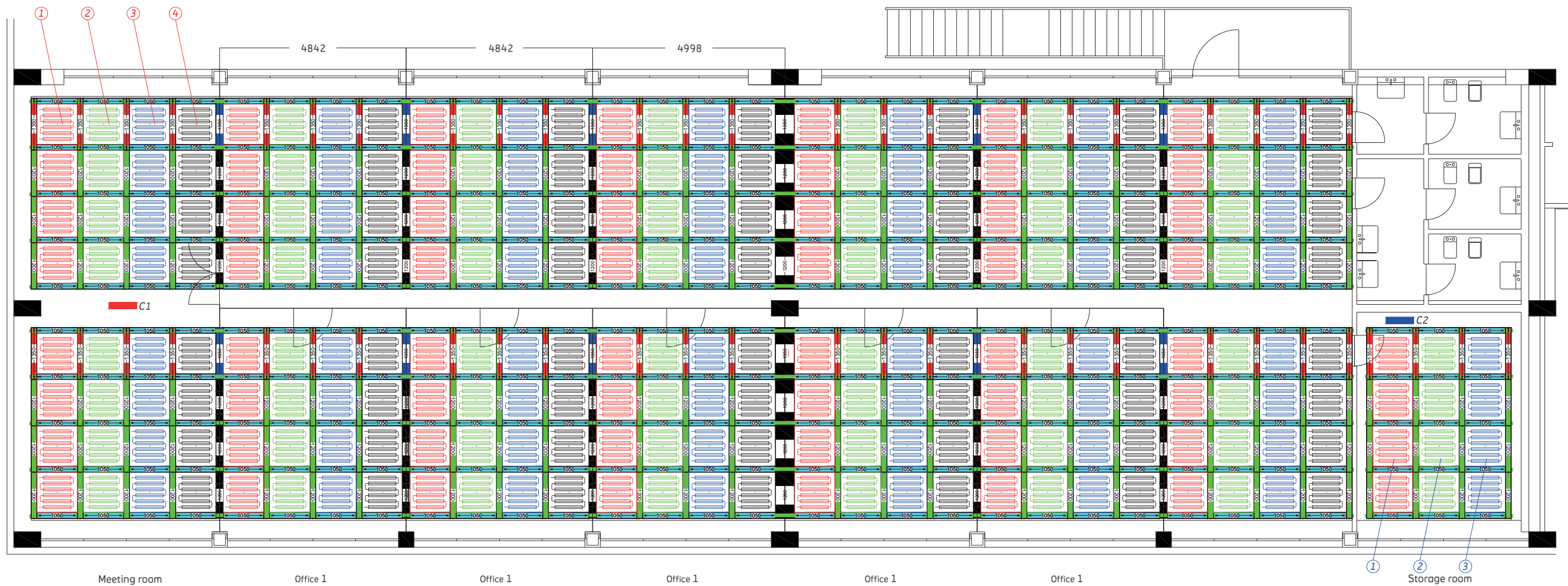
panel	activation	water content [Lt]	Kv
GK60x60 PSV	C75	0.16	0.95
GK60x60 PSV	A220	0.31	2.30
GK60x120 PSV	C75	0.24	0.77
GK60x120 PSV	A220	0.64	2.11
GK60	C75	0.29	0.86
GK60	A220	0.64	2.11
GK120	C75	0.43	0.73
GK120	A220	1.18	1.52
GKCS v.2.0 - 1200x2000	8x1 coil	1.00	0.10
GKCS v.2.0 - 600x2000	8x1 coil	0.50	0.10
GKCS v.2.0 - 600x1200	8x1 coil	0.30	0.12
GKCS v.2.0 - 1200x1000	8x1 coil	0.50	0.10
GKC - 1200x2000	C100	2.00	1.42
GKC - 1200x1000	C100	1.10	1.97
GKC - 600x2000	C100	1.10	2.70

fig. 7.6

WEIGHTS

radiant ceiling	inactive ceiling weight	active ceiling weight
GK series	11	16
GK PSV series	11	12
GKC series	12	19
GKCS v.2.0 series	15	15

The indicated weights include the support structure



SYMBOL LEGEND

Head primary support 192x1350	Primary support 150x1200
Primary support 192x1200	Secondary support 150x1050
Head primary support 492x1350	Support brackets
Primary support 492x1200	GK 120 radiant panel
Head primary support 150x1350	Radiant ceiling manifold

fig. 7.7
GK120 radiant ceiling scheme

Essential steps to ensure a flawless installation
and maximum efficiency of use in total safety.

Chapter 8

General instructions and testing procedures

GENERAL INSTRUCTIONS FOR THE REALIZATION OF RADIANT CEILING SYSTEMS

Indications for pre-installation steps

- > Check available spaces and installation height
- > Check the stability of the hanging system anchoring surface
- > Check project drawings correspond to the actual worksite conditions
- > Check that surfaces correspond to project drawings

Instructions for material stocking

- > Make sure the delivered materials are in good conditions
- > Store the materials in a dry place not exposed to sunlight
- > Handle the materials with care to prevent scratches, bending and breaking

Installation instructions

- > Before installation, analyze the project drawings and read the instructions contained both in project and the instruction sheets included with the single products
- > Follow the project drawings; contact the worksite manager in case of modifications
- > When connecting the RC push-fittings use the RC900 reinforcement bushes and check the fitting depth of the pipes
- > Only use Giacomini S.p.A.'s materials for anchoring unless otherwise agreed
- > In case of components with protective film (for example pre-varnished elements) remove the film upon installation

Supply water specifications

- > Analyze a sample of at least 1 liter of supply water to verify the parameters indicated in table of fig. 8.1 (minimum requirements for supply water) and adjust with appropriate treatment system if necessary

MINIMUM REQUIREMENTS FOR SUPPLY WATER

parameters		value	expected inconveniences when exceeding the indicated limit breaks
pH		6.8-8.0	Corrosion and scales
electric conductivity	[mS/m] a 25 °C	<10	Corrosion and scales
chlorides	[mg Cl/l]	<25	Corrosion
sulphates	[mg SO42-/l]	<25	Corrosion
hardness	°F	<15	Scales
iron	[mg Fe/l]	<0.2	Corrosion and scales
copper	[mg Cu/l]	<0.1	Corrosion
sulfide ion	[mg H2S/l]	ABSENT	Corrosion
ammonium ion	[mg NH+4/l]	<0.5	Corrosion

fig. 8.1

Instructions for system testing and activation

- > Follow the indications for the pressure and filling test (if not available, contact Giacomini S.p.A.)
- > Feed the system with K375 protective solution, according to the modes and doses indicated in the enclosed instructions

How to clean the panels

- > For proper cleaning of panels wipe the varnished surfaces with a clean and soft cloth. Grease and fingerprints must be removed with a suitable delicate detergent. Do not use abrasive detergents and do not scratch the surfaces

RADIANT CEILING TESTING PROCEDURE

Radiant ceiling systems, as all fluid-based systems, must be hydraulically tested after installation and before use.

The testing steps must be carried out strictly following the order indicated below:

1. Air pressure test
2. Pressure test with water at room temperature
3. Pressure test with heated water
4. Pressure test with refrigerated water

1. Air pressure test

Once the panels have been connected to the distribution manifolds and the latter to the distribution network, we recommend performing an initial pressure test with air compressed at at least 4 relative bar: in case a sufficiently powered compressor is available, perform the test at a nominal working pressure of 6 bar.

The pressure test must be performed on all radiant ceiling circuits.

To carry out the test correctly, first intercept the automatic air vents and feed the system circuits one by one. In case of localized leakage inside a circuit, close the ball valves on the supply lines and identify and eliminate the cause of the leakage.

The circuits must be tested for at least 24 hours; the air can then be released so as to restore the circuit atmospheric pressure.

2. Pressure test with water at room temperature

After reopening the air vent and ball valves on the supply lines, feed the distribution network with water at room temperature; after releasing all the air, feed the radiant circuits one by one, giving enough time to the air to be ejected from the automatic vents. When all circuits are filled with water, increase the working pressure value and check for possible leakages. Then, activate the system circulators to let any air bubble in the circuit out.

To correctly perform this operation on large systems, first perform a general balancing of the rings to prevent the water from flowing only through those with less pressure losses and circulating little or not at all in those with greater pressure losses.

When the air has been completely removed from the system – after about 24 hours – the circulators can be stopped and the pressure can be increased to 1.5 times the working pressure with a minimum of 6 bar. The system must be left under such conditions for at least another 24 hours during which the system sealing must be verified. In case of water leaks, intercept the ball valves on the supply lines, identify and eliminate the cause of the leakage. Once completed the test cycle, the pressure working value can be restored.

3. Pressure test with heated water

Keep the system pressure at the working value, with the circulators running, and slowly increase the water temperature to 40°C. Let the system run for about 24 hours. Then, with the circulators still running, let the water cool down to room temperature.

The purpose of this test is to verify the water circulation inside all the radiant ceiling circuits and to test the pipes, fittings and connections between the panels with a thermal cycle that enables to eliminate installation tensions, thus stabilizing the couplings.

4. Pressure test with refrigerated water

By keeping the system pressure at the working value, with the circulators running, slowly decrease the water temperature to 12°C – for plasterboard radiant ceilings – or to 15°C – for metal radiant ceilings – and leave the system running for about 24 hours. Then, with the circulators still running, let the water cool down to room temperature.

To prevent condensation on the panel surface, this test requires low values of absolute humidity in the installation ambients.

In case of high humidity levels, i.e. with dew temperatures over 13°C, we recommend activating the air treatment machines so as to control the ambient humidity and maintain it on values that prevent condensation.

Final notes

The testing operations described at points 1 and 2 are indispensable.

Testing operations of points 3 and 4 are strongly recommended because the system components undergo a temperature cyclical test and confer the test a very high safety grade. In addition, during the test of point 3 or 4, we recommend a complete thermovision of the system, in order to verify correctness of the radiant ceiling surface temperatures.

NOTES

[illegible][illegible]



Radiant Ceiling Systems

Product codes

RADIANT CEILING SYSTEMS

Metal radiant false ceilings - Series GK

☐ **K60C** p. 41



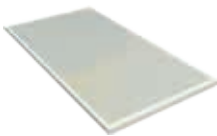
DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
596 x 1030 mm active panel, 8/10 galvanized steel, oven-varnished, for exposed parallel installation. 4 anodized aluminium diffusers and 12 x 1 mm copper coil hydraulic circuit.	K60CX501	C75	micro-perforated R2516	white RAL9010
	K60LCX501	C75	smooth	white RAL9010
	K60CX701	C75	micro-perforated R2516	silver RAL9006
	K60LCX701	C75	smooth	silver RAL9006

☐ **K60A** p. 41



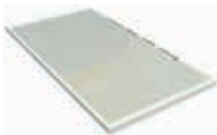
DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
596 x 1030 mm active panel, 8/10 galvanized steel, oven-varnished, for exposed parallel installation. 2 anodized aluminium diffusers and 16 x 1.5 mm plastic pipe hydraulic circuit with anti-oxygen barrier.	K60AX501	A220	micro-perforated R2516	white RAL9010
	K60LAX501	A220	smooth	white RAL9010
	K60AX701	A220	micro-perforated R2516	silver RAL9006
	K60LAX701	A220	smooth	silver RAL9006

☐ **K60** p. 41



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
596 x 1030 mm active panel, 8/10 galvanized steel, oven-varnished, for exposed parallel installation.	K60X501	none (inactive)	micro-perforated R2516	white RAL9010
	K60LX501	none (inactive)	smooth	white RAL9010
	K60X701	none (inactive)	micro-perforated R2516	silver RAL9006
	K60LX701	none (inactive)	smooth	silver RAL9006

☐ **K60T** p. 41



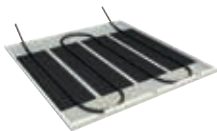
DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
596 x 1030 mm active panel, 8/10 galvanized steel, oven-varnished, for exposed parallel installation. Square pre-cutting for built-in installation of lighting elements or air diffusers.	K60TX511	none (inactive)	micro-perforated R2516	white RAL9010
	K60LTX511	none (inactive)	smooth	white RAL9010
	K60TX711	none (inactive)	micro-perforated R2516	silver RAL9006
	K60LTX711	none (inactive)	smooth	silver RAL9006

☐ **K120C** p. 35



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
1030 x 1030 mm active panel, 8/10 galvanized steel, oven-varnished, for exposed cross-pattern installation. 6 anodized aluminium diffusers and 12 x 1 mm copper coil hydraulic circuit.	K120CX501	C75	micro-perforated R2516	white RAL9010
	K120CX502	C75	smooth	white RAL9010
	K120CX701	C75	micro-perforated R2516	silver RAL9006
	K120CX702	C75	smooth	silver RAL9006

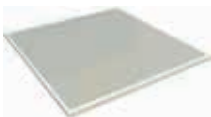
☐ **K120A** p. 35



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
1030 x 1030 mm active panel, 8/10 galvanized steel, oven-varnished, for exposed cross-pattern installation. 4 anodized aluminium diffusers and 16 x 1.5 mm plastic pipe hydraulic circuit with anti-oxygen barrier.	K120AX501	A220	micro-perforated R2516	white RAL9010
	K120AX502	A220	smooth	white RAL9010
	K120AX701	A220	micro-perforated R2516	silver RAL9006
	K120AX702	A220	smooth	silver RAL9006

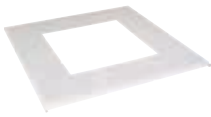
RADIANT CEILING SYSTEMS

☐ **K120** p. 35



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
1030 x 1030 mm inactive panel, 8/10 galvanized steel, oven-varnished, for exposed cross-pattern installation.	K120X501	none (inactive)	micro-perforated R2516	white RAL9010
	K120LX501	none (inactive)	smooth	white RAL9010
	K120X701	none (inactive)	micro-perforated R2516	silver RAL9006
	K120LX701	none (inactive)	smooth	silver RAL9006

☐ **K120T** p. 35



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
1030 x 1030 mm inactive panel, 8/10 galvanized steel, oven-varnished, for exposed cross-pattern installation. Square pre-cutting for built-in installation of lighting elements or air diffusers.	K120TX521	none (inactive)	micro-perforated R2516	white RAL9010
	K120TX721	none (inactive)	micro-perforated R2516	silver RAL9006

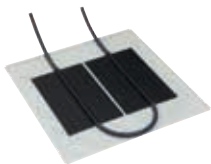
Metal radiant false ceilings – Series GK PSV

☐ **K6C** p. 55



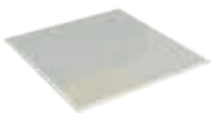
DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
575 x 575 mm active panel, 6/10 galvanized steel, pre-varnished, for installation on 24 mm T-shaped structure. 4 anodized aluminium diffusers and 12 x 1 mm copper coil hydraulic circuit.	K6CX300	C75	micro-perforated R2516	white RAL9003
	K6LCX300	C75	smooth	white RAL9003
	K6CX200	C75	micro-perforated R2516	silver RAL9006
	K6LCX200	C75	smooth	silver RAL9006

☐ **K6A** p. 55



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
575 x 575 mm active panel, 6/10 galvanized steel, pre-varnished, for installation on 24 mm T-shaped structure. 2 anodized aluminium diffusers and 16 x 1.5 mm plastic pipe hydraulic circuit with anti-oxygen barrier.	K6AX501	A220	micro-perforated R2516	white RAL9003
	K6LAX501	A220	smooth	white RAL9003
	K6AX701	A220	micro-perforated R2516	silver RAL9006
	K6LAX701	A220	smooth	silver RAL9006

☐ **K6** p. 55



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
575 x 575 mm inactive panel, 6/10 galvanized steel, pre-varnished, for installation on 24 mm T-shaped structure.	K6X300	none(inactive)	micro-perforated R2516	white RAL9003
	K6LX300	none(inactive)	smooth	white RAL9003
	K6X200	none(inactive)	micro-perforated R2516	silver RAL9006
	K6LX200	none(inactive)	smooth	silver RAL9006

☐ **K12C** p. 49



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
575 x 1175 mm active panel, 6/10 galvanized steel, pre-varnished, for installation on 24 mm T-shaped structure. 6 anodized aluminium diffusers and 12 x 1 mm copper coil hydraulic circuit.	K12CX300	C75	micro-perforated R2516	white RAL9003
	K12LCX300	C75	smooth	white RAL9003
	K12CX200	C75	micro-perforated R2516	silver RAL9006
	K12LCX200	C75	smooth	silver RAL9006

RADIANT CEILING SYSTEMS

☐ **K12A** p. 49



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
575 x 1175 mm active panel for installation on 24 mm T-shaped structure. 2 anodized aluminium diffusers and 16 x 1.5 mm plastic pipe hydraulic circuit with anti-oxygen barrier.	K12AX300	A220	micro-perforated R2516	white RAL9003
	K12LAX300	A220	smooth	white RAL9003
	K12AX200	A220	micro-perforated R2516	silver RAL9006
	K12LAX200	A220	smooth	silver RAL9006

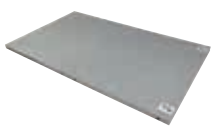
☐ **K12** p. 49



DESCRIPTION	CODE	ACTIVATION	FINISH	COLOR
575 x 1175 mm inactive panel, 6/10 galvanized steel, pre-varnished, for installation on 24 mm T-shaped structure.	K12X300	none (inactive)	micro-perforated R2516	white RAL9003
	K12LX300	none (inactive)	smooth	white RAL9003
	K12X200	none (inactive)	micro-perforated R2516	silver RAL9006
	K12LX200	none (inactive)	smooth	silver RAL9006

Plasterboard radiant false ceilings - Series GKC

☐ **KC120** p. 69



DESCRIPTION	CODE	THERMAL DIFFUSERS	SURFACE [m²]	DIMENSIONS [mm]
Plasterboard active/inactive panel, with steam barrier and upper thermal insulation. Thermal activation with anodized aluminium diffusers and 16 x 1 mm copper coil hydraulic circuit.	KC120Y200	n. 6 (100 x 1700 mm)	2.4	1200 x 2000 x 50
	KC120Y100	n. 6 (100 x 700 mm)	1.2	1200 x 1000 x 50
	KC120X300	none (inactive)	2.4	1200 x 2000 x 50

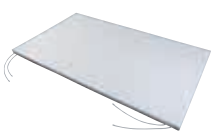
☐ **KC60** p. 69



DESCRIPTION	CODE	THERMAL DIFFUSERS	SURFACE [m²]	DIMENSIONS [mm]
Plasterboard active panel with steam barrier and upper thermal insulation. Thermal activation with anodized aluminium diffusers and 16 x 1 mm copper coil hydraulic circuit.	KC60X200	n. 3 (100 x 1700 mm)	1.2	600 x 2000 x 50

Plasterboard radiant false ceilings - Series GKCS v. 2.0

☐ **KS120** p. 75



DESCRIPTION	CODE	HYDRAULIC CIRCUITS	SURFACE [m²]	DIMENSIONS [mm]
Plasterboard active panel with upper thermal insulation. Thermal activation with 8 x 1 mm PE-X pipe hydraulic circuits and anti-oxygen barrier.	KS120Y200	n. 2	2.4	1200 x 2000 x 45

☐ **KS60** p. 75



DESCRIPTION	CODE	THERMAL DIFFUSERS	SURFACE [m²]	DIMENSIONS [mm]
Plasterboard active panel with upper thermal insulation. Thermal activation with 8 x 1 mm PE-X pipe hydraulic circuits and anti-oxygen barrier.	KS60Y120	n. 1	0.72	600 x 1200 x 45
	KS60Y200	n. 1	1.2	600 x 2000 x 45

Structures and accessories for metal radiant false ceilings

☐ **K832** p. 44



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Bracket for parallel structure supports, 20/10 galvanized steel.	K832X001	for 150 mm base supports	228 x 52 x 70	
	K832X002	for 100 mm base supports	178 x 52 x 70	

☐ **K831** p. 41



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Support for parallel structure, 8/10 galvanized steel sheet, oven-varnished.	K831X522		150 x 1200	white RAL9010
	K831X532		150 x 1800	white RAL9010
	K831X542		150 x 2400	white RAL9010
	K831X722		150 x 1200	silver RAL9006
	K831X732		150 x 1800	silver RAL9006
	K8317542		150 x 2400	silver RAL9006
	K831X524		100 x 1200	white RAL9010
	K831X534		100 x 1800	white RAL9010
	K831X544		100 x 2400	white RAL9010
	K831X724		100 x 1200	silver RAL9006
	K831X734		100 x 1800	silver RAL9006
	K831X744		100 x 2400	silver RAL9006

☐ **KPOR** p. 41



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Head semi-support for parallel structure, 8/10 steel sheet, oven-varnished.	KPOR1X522		50 x 1200	white RAL9010
	KPOR1X532		50 x 1800	white RAL9010
	KPOR1X542		50 x 2400	white RAL9010
	KPOR2X522		75 x 1200	white RAL9010
	KPOR2X532		75 x 1800	white RAL9010
	KPOR2X542		75 x 2400	white RAL9010
	KPOR3X522		100 x 1200	white RAL9010
	KPOR3X532		100 x 1800	white RAL9010
	KPOR3X542		100 x 2400	white RAL9010

☐ **KSTA**



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Bracket for parallel structure semi-support, 20/10 galvanized steel.	KSTA1X001	for 50 mm base semi-supports	88 x 52 x 70	
	KSTA2X001	for 75 mm base semi-supports	113 x 52 x 70	
	KSTA3X001	for 100 mm base semi-supports	138 x 52 x 70	

RADIANT CEILING SYSTEMS

☐ **K841** p. 42



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Head for parallel structure, 8/10 galvanized steel sheet, oven-varnished.	K841X521	for 150 mm base structures	150 x 1200	white RAL9010
	K841X531	for 150 mm base structures	150 x 1350	white RAL9010
	K841X541	for 150 mm base structures	150 x 2400	white RAL9010
	K841X721	for 150 mm base structures	150 x 1200	silver RAL9006
	K841X731	for 150 mm base structures	150 x 1350	silver RAL9006
	K841X741	for 150 mm base structures	150 x 2400	silver RAL9006
	K841X523	for 100 mm base structures	100 x 1150	white RAL9010
	K841X533	for 100 mm base structures	100 x 1250	white RAL9010
	K841X543	for 100 mm base structures	100 x 2300	white RAL9010
	K841X723	for 100 mm base structures	100 x 1150	silver RAL9006
	K841X733	for 100 mm base structures	100 x 1250	silver RAL9006
	K841X743	for 100 mm base structures	100 x 2300	silver RAL9006

☐ **K842** p. 44



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Head bracket for parallel structure, 20/10 galvanized steel.	K842X001	for 150 mm base supports	110 x 52 x 70	
	K842X002	for 100 mm base supports	60 x 52 x 70	

☐ **K833** p. 41



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Spacing crossbar for parallel structure 10/10 galvanized steel.	K833X001	for 150 mm base supports	30 x 1050	

☐ **K852** p. 44



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Bracket for cross-pattern primary supports, 20/10 galvanized steel.	K852X001		150 x 52 x 70	white RAL9010

☐ **K851** p. 35



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Primary support for cross-pattern structure, 8/10 galvanized steel, oven-varnished.	K851X501		150 x 1200	white RAL9010
	K851X701		150 x 1200	silver RAL9006

☐ **K861** p. 35



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Head primary support for cross-pattern structure, 8/10 galvanized steel, oven-varnished.	K861X501		150 x 1350	white RAL9010
	K861X701		150 x 1350	silver RAL9006

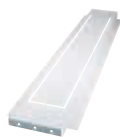
RADIANT CEILING SYSTEMS

☐ **K871** p. 35



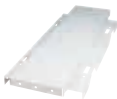
DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Secondary support for cross-pattern structure, 8/10 galvanized steel, oven-varnished.	K871X501		150 x 1050	white RAL9010
	K871X701		150 x 1050	silver RAL9006

☐ **K871T** p. 35



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Secondary support for cross-pattern structure, 8/10 galvanized steel, oven-varnished. Rectangular pre-cutting for lighting elements.	K871TX501		150 x 1050	white RAL9010
	K871TX701		150 x 1050	silver RAL9006

☐ **K891**



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Special primary support for installation of GK60 panels on GK120 cross-pattern structures. 8/10 galvanized steel, oven-varnished.	K891X501		150 x 616	white RAL9010
	K891X701		150 x 616	silver RAL9006

☐ **K800L**



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
L-shaped perimetric profile, 8/10 galvanized steel, oven-varnished.	K800LX201	pre-varnished	18 x 28 x 3000	silver RAL9006
	K800LX301	pre-varnished	18 x 28 x 3000	white RAL9003
	K800LX501	oven-varnished	18 x 28 x 3000	white RAL9010

☐ **K800C**



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
C-shaped perimetric profile, 8/10 varnished galvanized steel.	K800CX201	pre-varnished	18 x 32 x 18 x 3000	silver RAL9006
	K800CX301	pre-varnished	18 x 32 x 18 x 3000	white RAL9003
	K800CX501	oven-varnished	18 x 32 x 18 x 3000	white RAL9010

☐ **K800S**



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
S-shaped perimetric profile, 8/10 varnished galvanized steel.	K800SX201	pre-varnished	18 x 12 x 18 x 3000	silver RAL9006
	K800SX301	pre-varnished	18 x 12 x 18 x 3000	white RAL9003
	K800SX501	oven-varnished	18 x 12 x 18 x 3000	white RAL9010

☐ **K835**



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Side compensation stave, 6/10 varnished galvanized steel.	K835X511		300 x 200	white RAL9010
	K835X521		300 x 300	white RAL9010
	K835X531		300 x 400	white RAL9010
	K835X541		300 x 500	white RAL9010
	K835X551		300 x 600	white RAL9010

RADIANT CEILING SYSTEMS

☐

KSV

p. 49-55



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
24 mm base T-shaped structure, pre-varnished steel.	KSV6X300	crossbar	600	white RAL9003
	KSV12X300	crossbar	1200	white RAL9003
	KSV36X300	support	3600	white RAL9003
	KSV6X200	crossbar	600	silver RAL9006
	KSV12X200	crossbar	1200	silver RAL9006
	KSV36X200	support	3600	silver RAL9006

☐

K818

p. 44



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Galvanized steel slotted bar for structure assembly.	K818X001		25 x 10 x 4000	

☐

K819

p. 44



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Galvanized steel L-shaped plate for slotted bar.	K819X001		50 x 95	

☐

K820

p. 61

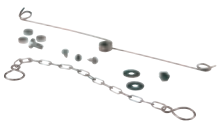


DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Polyester fiber thermo-acoustic panel with TNT class 1 coupled membrane.	K820X002	for GK60 panels	610 x 960 x 25	black
	K820X003	for GK120 panels	1040 x 960 x 25	black
	K820X004	for GK60 PSV panels	580 x 580 x 25	black
	K820X005	for GK120 PSV panels	580 x 1180 x 25	black

☐

PKG

p. 49-55



DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
Installation accessories.	PGK01X001	2 springs + 2 gaskets + 2 screws		
	PGK06X002	metal wire for GK PSV panel suspension		
	PGK08X001	M6 x 10 screw		
	PGK09X001	M6 nut		
	PGK10X001	gasket for M6 screw		
	PGK11X001	4.2 x 9.5 self-threading screw		
	PGK12X001	4.2 x 13 self-threading screw		

Structures and accessories for plasterboard radiant false ceilings

☐ **KG800** p. 69-75

	DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
	Galvanized steel structure for metal framework of low-set false ceilings.	KG800Y001	U-shaped primary support with shaped hooks	40 x 28 x 4000	
		KG800Y020	C-shaped secondary support	50 x 27 x 4000	
		KG800Y040	U-shaped perimetric profile	27 x 30 x 4000	
		KG800Y060	L-shaped edge protector	31 x 31 x 3000	

☐ **KG804** p. 69-75

	DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
	Suspension hanger for slab supports.	KG804Y001			

☐ **KG806** p. 69-75

	DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
	Adjustment spring for double hangers.	KG806Y001			

☐ **KG814**

	DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
	Support steel joints.	KG814Y001	for primary	40 x 28	
		KG814Y002	for secondary	50 x 27	

☐ **PKG**

	DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
	Self-drilling screw for plasterboard panel fitting on metal framework.	PKG03Y003	flat flared head	70	

☐ **KG810** p. 69-75

	DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
	Square inspection trapdoor with invisible hinge closing system, for built-in installation on low-set plasterboard false ceilings.	KG810Y001			
		KG810Y002			
		KG810Y003			

☐ **KGNAS**

	DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
	Joint mesh tape.	KGNASY001	glass fiber		

☐ **KGSTU**

	DESCRIPTION	CODE	TYPE	DIMENSIONS [mm]	COLOR
	Chalk and additive-based powder mixture for joint (armed with mesh tape) and groove plastering.	KGSTUY001	for joints	5 kg pack	
		KGSTUY002	for grooves	5 kg pack	

Connection components and other accessories

☐ **K85RS** p. 60



Panel connection kit with copper activation, including RS "push fittings" and low-permeability butyl flexible pipes lined with stainless steel plait.

DESCRIPTION	CODE	SIZE
	K85RSY001	RS12 x RS12 - length 750 mm
	K85RSY002	RS12 x 1/2"F - length 400 mm
	K85RSY003	RS12 x RS12 - length 900 mm
	K85RSY022	RS16 x RS16 - length 750 mm
	K85RSY023	RS16 x RS16 - length 900 mm

☐ **R179**



DESCRIPTION

Plastic pipe adapter.

CODE

SIZE

DESCRIPTION	CODE	SIZE
	R179X055	18 x (12 x 1.5)
	R179X077	18 x (16 x 1.5)

☐ **RC102** p. 59-60-78



DESCRIPTION

Straight rapid "push fitting" for plastic pipes.

CODE

SIZE

DESCRIPTION	CODE	SIZE
	RC102X004	Ø 12
	RC102X007	Ø 16

☐ **RC122** p. 59-60-78



DESCRIPTION

90° elbow rapid "push fitting" for plastic pipes.

CODE

SIZE

DESCRIPTION	CODE	SIZE
	RC122X004	Ø 12
	RC122X007	Ø 16

☐ **RC150**



DESCRIPTION

T-shaped rapid "push fitting" for plastic pipes.

CODE

SIZE

DESCRIPTION	CODE	SIZE
	RC150X007	Ø 16

☐ **RC102P** p. 79



DESCRIPTION

Straight rapid "push fitting" with internal fluidic seal and pipe connection bayonet.

CODE

SIZE

DESCRIPTION	CODE	SIZE
	RC102P009	20 x 2

☐ **RC122P** p. 79



DESCRIPTION

90° elbow rapid "push fitting" with internal fluidic seal and pipe connection bayonet.

CODE

SIZE

DESCRIPTION	CODE	SIZE
	RC122P009	20 x 2

☐ **RC151P** p. 79



DESCRIPTION

T-shaped rapid "push fitting" with internal fluidic seal and pipe connection bayonet.

CODE

SIZE

DESCRIPTION	CODE	SIZE
	RC151P053	20 x 2 + one 8 x 1 outlet
	RC151P063	20 x 2 + two 8 x 1 outlets

RADIANT CEILING SYSTEMS

☐ **RC165P** p. 79



DESCRIPTION	CODE	SIZE
Plastic rapid fitting caps.	RC165P001	for 8 x 1 fitting
	RC165P004	for 20 x 2 fitting

☐ **RC211P** p. 79



DESCRIPTION	CODE	SIZE
Template for Ø 20-10-8 pipes.	RC211P001	Ø 20-10-8

☐ **R986-1** p. 59-60-78



DESCRIPTION	CODE	SIZE
Polybutylene pipe with intermediate anti-oxygen barrier.	R986IY113	16 x 1.5 - insulated
	R986SY120	16 x 1.5 - no insulation
	R986SY100	12 x 1.5 - no insulation

☐ **RC900** p. 59-78



DESCRIPTION	CODE	SIZE
Reinforcement bush for connection of rapid fittings and plastic pipes.	RC900Y011	12 x 1.5
	RC900Y016	16 x 1.5

☐ **K375S** p. 37-43-51-57-71-77



DESCRIPTION	CODE	SIZE
Protective additive for radiant ceilings.	K375SY002	5 liters
	K375SY003	10 liters
	K375SY004	25 liters

Regulation

☐ **R478M**



DESCRIPTION	CODE	POWER	☐	☐
Thermo-electric actuator normally open with limit micro-switch.	R478MX021	230 V	1	25
	R478MX022	24 V	1	25
	R478VX021	230 V	1	25

☐ **R473**



DESCRIPTION	CODE	POWER	☐	☐
Thermo-electric actuator normally closed.	R473X121	230 V	1	25
	R473X122	24 V	1	25
	R473VX121	230 V	1	25

☐ **R478**



DESCRIPTION	CODE	POWER	☐	☐
Thermo-electric actuator normally open.	R478X121	230 V	1	25
	R478X122	24 V	1	25
	R478VX121	230 V	1	25

RADIANT CEILING SYSTEMS

☐ **K490I** p. 109



DESCRIPTION	CODE	POWER		
Weekly chrono-thermostat for built-in installation in civil 3-compartments case. Battery powered or power network.	K490IY001	230 V	1	-
	K490IY002	2 AAA 1.5 V batteries	1	-

☐ **K492** p. 109



DESCRIPTION	CODE	POWER		
Weekly chrono-thermostat for exposed wall-mount installation with large touch-screen display.	K492AY001	2 AA 1.5 V batteries	1	-
	K492DY001	AA batteries + 230 V	1	-
	K492PY001	AA batteries + 230 V	1	-

☐ **K494** p. 108



DESCRIPTION	CODE	POWER		
Thermostat for exposed wall-mount installation. Display not backlit. Battery powered.	K494AY001	2 AAA 1.5 V batteries	1	-

☐ **K494I** p. 109



DESCRIPTION	CODE	POWER		
Electronic thermostat for built-in wall-mount installation. Power 230 V / 50 Hz or battery-powered.	K494IY001	230 V	1	-
	K494IY002	230 V	1	-
	K494IY011	3 AAA 1.5 V batteries	1	-
	K494IY012	3 AAA 1.5 V batteries	1	-

☐ **K499** p. 109



DESCRIPTION	CODE	POWER		
Control modules for all K490I and K492 chronothermostats. Remote control via GSM (K499Y001) or local centralized control (K499Y010).	K499Y001	10-22 Vcc or ac, 12 VA	1	-
	K499Y010	12-24 Vcc or ac, 5 VA	1	-

☐ **KPM30** p. 108-114



DESCRIPTION	CODE	POWER		
Heating/cooling regulation module. With built-in display panel for system monitoring, configuration and control. Power 24 Vac.	KPM30Y001	24 V	1	-
	KPM30Y002	24 V	1	-
	KPM30Y003	24 V	1	-
	KPM30Y004	24 V	1	-
	KPM30Y005	24 V	1	-

RADIANT CEILING SYSTEMS

☐ **KPM31** p. 108-114



DESCRIPTION	CODE	POWER		
Heating/cooling regulation module. No built-in display, use with KD201 remote terminal for system monitoring, configuration and control. Power 24 Vac	KPM31Y001	24V	1	-
	KPM31Y002	24V	1	-
	KPM31Y003	24V	1	-
	KPM31Y004	24V	1	-
	KPM31Y005	24V	1	-

☐ **KPM35** p. 115



DESCRIPTION	CODE	POWER		
Inlet/outlet expansion module for KPM30 or KPM31 regulation module.	KPM35Y001	24V	1	-

☐ **KPM36** p. 114



DESCRIPTION	CODE	CHARACTERISTICS		
Additional cards for KPM30/KPM31 regulation modules for system integration with other communication protocols.	KPM36Y001	Modbus card	1	-
	KPM36Y002	Konnex card	1	-
	KPM36Y003	Ethernet card	1	-

☐ **KD201** p. 114



DESCRIPTION	CODE	POWER		
Semi-graphic terminal with keypad for system monitoring, configuration and control. Semigraphic LCD display, white backlit. Klimabus series.	KD201Y001	By KPM30 / KPM31	1	-

☐ **K495B** p. 115



DESCRIPTION	CODE	POWER		
Ambient probe with no display and local interface (blind), with temperature and humidity sensor. Klimabus series.	K495BY002	24V	1	-

☐ **K495L** p. 115



DESCRIPTION	CODE	POWER		
Ambient thermostat with backlit display and local interface for temperature and humidity control. Klimabus series.	K495LY002	24V	1	-

☐ **K492B** p. 114



DESCRIPTION	CODE	POWER		
Ambient thermostat with backlit display and local interface for temperature and humidity control. Klimabus series.	K492BY002	230V	1	-

RADIANT CEILING SYSTEMS

☐ **K493T** p. 115



DESCRIPTION	CODE	POWER		
Ambient thermostat with temperature and humidity probe. Backlit color touch-screen display. Serie Klimabus.	K493TY002	12 Vdc	1	-

☐ **K493I** p. 115



DESCRIPTION	CODE	POWER		
Temperature and humidity blind probe for built-in installation on civil hole cover. Klimabus series.	K493IY002	12 Vdc	1	-

☐ **K463P** p. 108-114



DESCRIPTION	CODE	POWER		
Delivery temperature immersion probe, passive type.	K463PY001	-	1	-

☐ **K465P** p. 108-114



DESCRIPTION	CODE	POWER		
External temperature passive probe.	K465PY001	-	1	-

☐ **R586P** p. 104



DESCRIPTION	CODE	SIZE		
Mixing group for heating and cooling systems, non-mixed direct outlet and mixed outlet with 3-ways valve with piston stopper and actuator. Self-modulating circulators included (ErP 2009/125/CE-complying).		For KPM30 regulation module		
	R586PY014	1" - Kv 5	1	-
	R586PY015	1" - Kv 10	1	-
	R586PY016	1 1/4" - Kv 16	1	-

☐ **R586R**



DESCRIPTION	CODE	SIZE		
Mixing or circulation module for secondary zone control in heating or cooling systems. Includes self-modulating circulator complying with ErP 2009/125/CE.	R586RY001	1" - no mixing valve	1	-
	R586RY002	1" - with R296 mixing valve	1	-
	R586RY003	1" - with R298 mixing valve	1	-
	R586RY004	1" - with R462L (fix point)	1	-

☐ **K274J**



DESCRIPTION	CODE	POWER		
Actuator for K297 mixing valve. Power 24 V.	K274Y022	24 V - 3-ways floating control	1	-
	K274Y042	24 V - 0÷10 V	1	-

RADIANT CEILING SYSTEMS

☐ **K281**



DESCRIPTION	CODE	POWER		
Actuator for R298 mixing valve for use with Giacomini thermoregulation systems. Power 24 V.		M28 x 1.5 mm connection		
	K281X002	24 V - 3-ways floating control	1	-
		M30 x 1.5 mm connection		
	K281X022	24 V - 3-ways floating control	1	-
	K281X012	24 V - 0÷10 V	1	-

☐ **K282**



DESCRIPTION	CODE	POWER		
Actuator with automatic control of R298 mixing valve, temperature probe and integrated electronic regulator. Power 24 V.		Attacco M28 x 1.5 mm		
	K282X002	24 V - 3-ways floating control	1	-

☐ **K274**



DESCRIPTION	CODE	POWER		
Actuator for R296 mixing valve, for use with Giacomini thermoregulation systems. Power 24 V.	K274Y102	24 V - 3-ways floating control	1	-

Dehumidification and air treatment

☐ **KDP** p. 98



DESCRIPTION	CODE	CHARACTERISTICS		
Humidity control monoblock unit, built-in wall-mount installation, use with cooling radiant systems. Possible integration of sensible power. Countercase and white lacquered wood panel available on request.	KDPY024	dehumidification	1	-
	KDPRY024	dehumidification+ integration	1	-
		Accessories		
	KDPCY024	countercase	1	-
	KDPFY024	front panel	1	-

☐ **KDS** p. 98



DESCRIPTION	CODE	CHARACTERISTICS		
Humidity control monoblock unit for false ceiling installation, use with cooling radiant systems. Possible integration of sensible power and primary air treatment.	KDSY026	dehumidification	1	-
	KDSRY026	dehumidification+ integration	1	-
	KDSRY350	dehum. + integr. + primary air	1	-
	KDSRY500	dehum. + integr. + primary air	1	-
		Accessories		
	KDSPLY026	plenum for KDSY026, KDSRY026	1	-
	KDSPLY350	plenum for KDSRY350	1	-

☐ **KDV** p. 99



DESCRIPTION	CODE	CHARACTERISTICS		
Duct-type air treatment monoblock unit for ventilation, dehumidification and sensible power integration, false ceiling installation, use with cooling radiant systems. Includes high-efficiency countercurrent air recovery unit.	KDVRWY300	water condensation	1	-
	KDVRAY300	air condensation	1	-