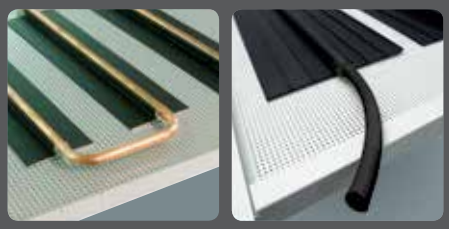
# RADIANT CEILING SYSTEMS

giacoklima®

## Technical manual

METALLIC



# GK and GK PSV SERIES

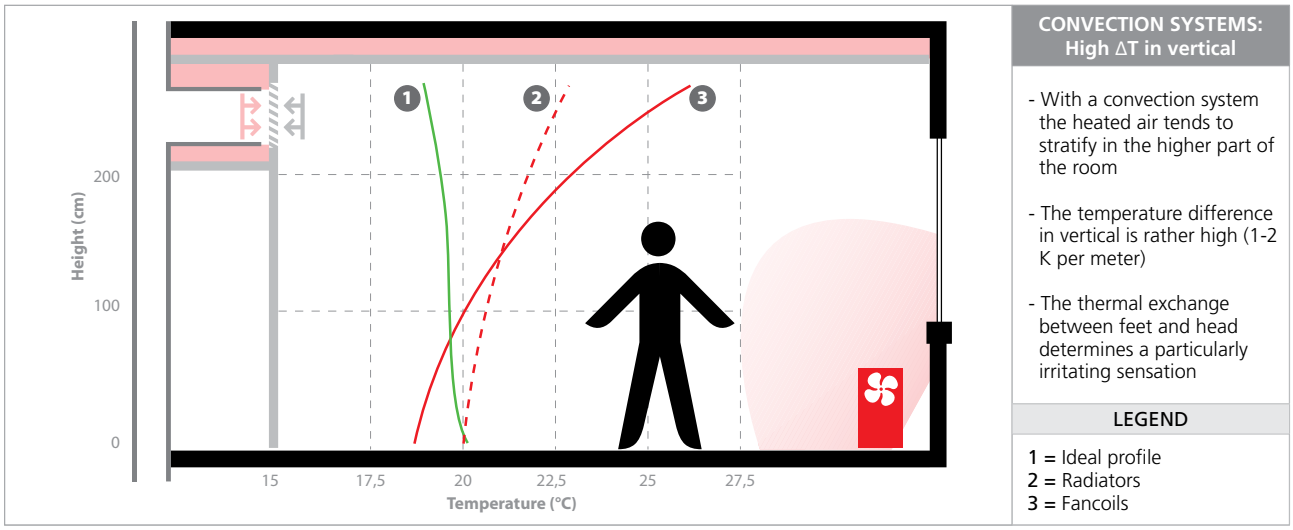
GIACOMINI

*Technology in Comfort*

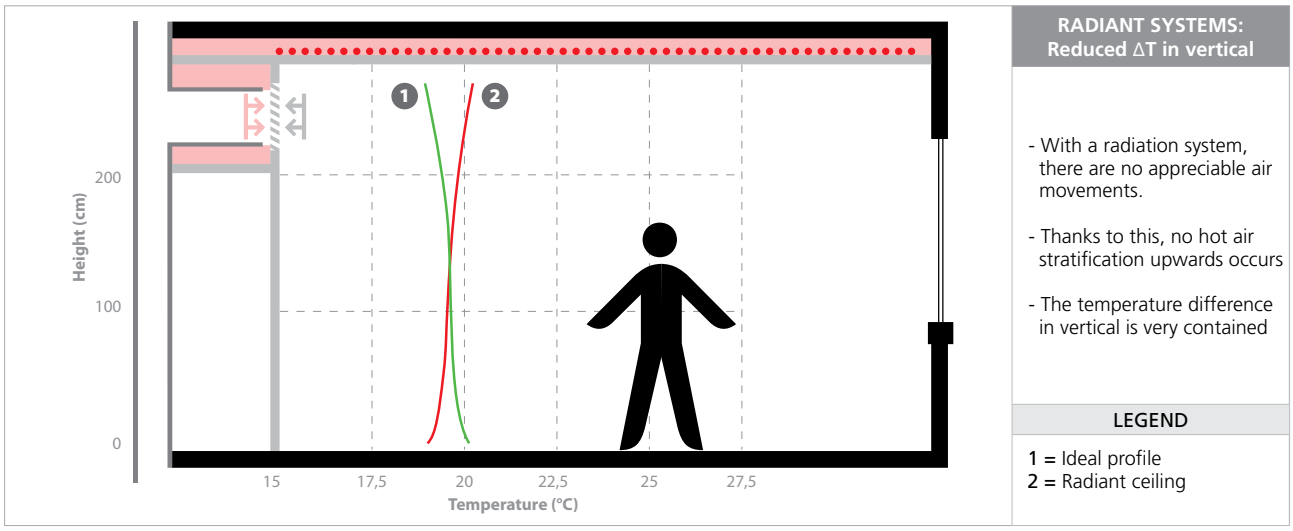
## CONTENTS

# Introduction

The use of a system of radiant type is able to assure high comfort conditions due to a more natural thermal exchange system for the human body, eliminating the unpleasant draughts, duster circulation and the noises typical of the traditional air systems. The radiant systems maintain an homogeneous wellbeing inside the room, minimizing the temperature differences either in vertical, or in horizontal. Moreover by acting on the surface temperature, therefore on the operating temperature of the room, it is possible to obtain the same wellbeing sensation by maintaining internal air temperatures closer to the one of the external air as regards to traditional systems: this allows to achieve remarkable energy saving.




With traditional conditioning systems, high air stratification with perceivable gradient




With radiant ceiling systems, vertical profile of the ideal temperature with non perceivable gradient

A further saving can be obtained thanks to the possibility to use more efficient systems for the energy production, since this kind of systems requires flow temperatures definitely less extreme as regards to the traditional conditioning systems. Moreover giacoklima® system allows the maximum space exploitation and a large design and architectural freedom in the room interpretation. The radiant ceiling system in cooling shall be always combined with a de-humidification system; if this is used also as mechanical ventilation system to guarantee the hygienic air changes, you obtain a room into which, in addition to the thermo-hygrometric comfort, a high quality of the internal air is guaranteed too.

Offices

Commercial rooms

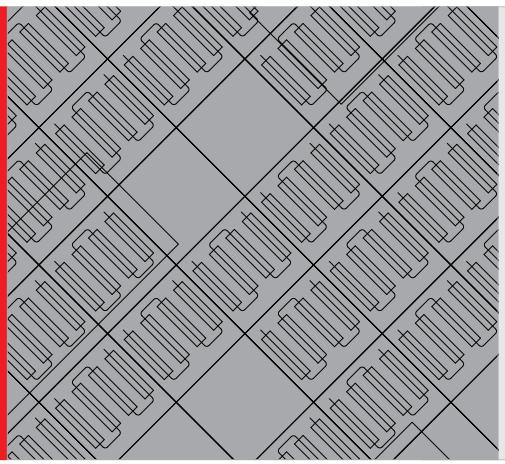
School buildings

Professional offices


Airports

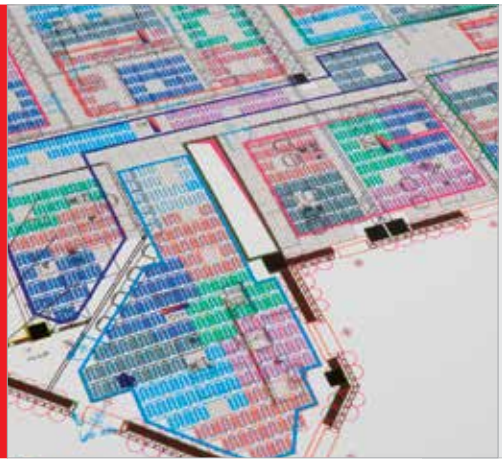
Hospitals

## Modularity



The series of GK metallic panels permits to build radiant false ceiling according to modules of 300x1200mm, 600x600mm, 600x1200mm and 1200x1200mm; it is therefore able to meet all designer needs. The structure is very flexible and it offers the possibility to personalize the realizations adapting it to all room and dimension requests. Various solutions are possible to carry out the lateral finishing and the compensations.

## Maximum flexibility



The division into zones from the plant engineering point of view can be conceived in a personalized way according to the specific exigencies. The hydraulic connections can be done with large freedom making possible very flexible solutions. It is also possible to vary the hydraulic connections between the panels to adapt the system , in case of changes in the internal subdivision of the rooms.

## Total ease of inspection

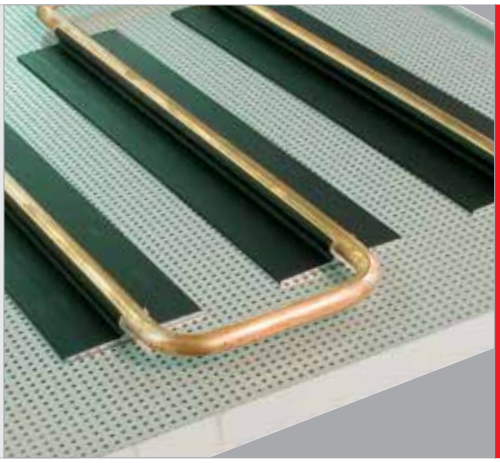
The panels can be unhooked and brought in vertical position making possible the access to the overhanging zone of the false ceiling to easily effect maintenance and control operations, without stopping the system. The panel opening is effected with extreme ease and safety.

## Mounting quickness

The components of the carrying structure are assembled by means of bolts or joints whose position is forced, making the operation rapid and precise. The connections to the manifolds or to the distribution lines are made by means of push fittings and pipes made of plastic material, or appropriate pre-assembled kits that makes the operation extremely easy and reliable.

## High thermal output

In active panels, it has been adopted a technology that expects thermal diffusers in anodized aluminium glued on the panel with special adhesives. The circuits are made with pipes made of copper or plastic material, guaranteeing the more appropriate output of the system in cooling and in heating in each application situation.



## Preassembly

The active panels are preassembled in the factory to make simpler and reduce the mounting operations and to ensure the correct installation.

## Integration with other plant systems

In the ceiling it is possible to integrate also the plant engineering part concerning the renewal air and humidity control. The false ceiling can integrate lighting appliances, air diffusers and other components of the building systems as loudspeakers, sensors for the smoke/fire survey, presence sensors, etc. with extreme flexibility and without altering the aesthetic and functional aspect.

## Thermal and acoustic insulation

Above active and inactive panels, it is possible to put sound absorbing and insulating layers for the thermal insulation.

## System offer

Giacomini product range offers components and materials to make all distribution, shunt and connection versions; in particular it is possible to use manifolds (modular or in bar) or make direct connection from the distribution dorsal.

The clear division of the air conditioning tasks between the primary air, responsible of the air renewal and dehumidification, and the radiant ceiling, in charge of treating the sensible part of the summer thermal loads, permits to adopt more compact canalizations and air machines of lower size. The energy need is very limited and lower as regards to a traditional system, thanks to the use of a radiant ceiling system in combination with primary air instead of all air system.

## Energy saving

Choosing the giacoklima® radiant ceiling, means relying upon the long experience matured by Giacomini in the design, production and supply of radiant ceiling systems, that puts into practice high competence, opportunities of specialized training for designers and installers and targeted consulting in the planning and executive phases.

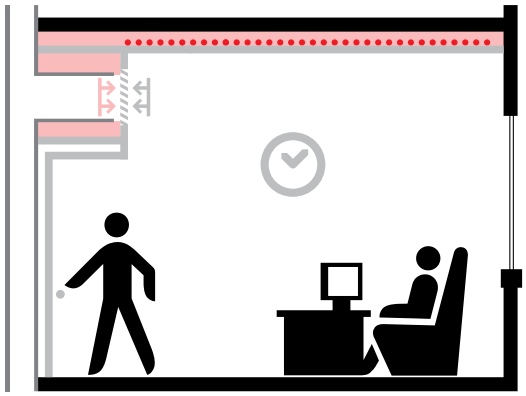

## Well-established competence and experience

## Full exploitation of surfaces and volumes

The adoption of the radiant ceiling system allows the maximum valorization of the building surfaces and volumes: it does not weigh upon the space exploitation, if not as a traditional not radiant false ceiling – though always expected in the tertiary buildings – and it allows therefore an integral exploitation of the built part. Considering the high cost for square meter that characterizes the real estate market, this brings to a not marginal economic advantage.

SPACE RECOVERY IN VERTICAL

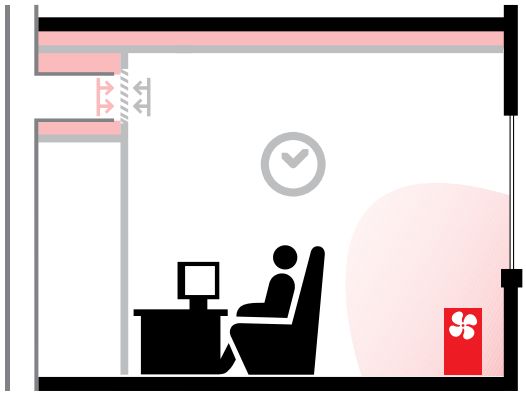
All air conditioning systems



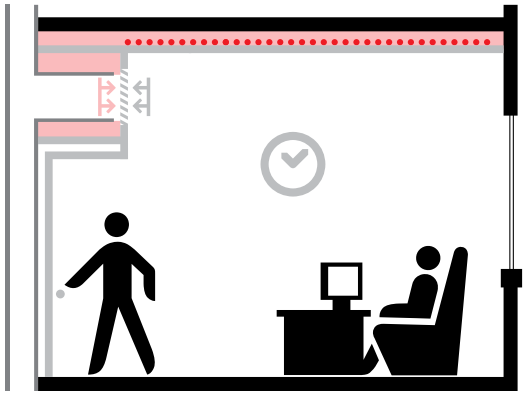
Primary air conditioning system + radiant ceiling

In the first case, the comparison between the two systems underlines that the use of the radiant ceiling in combination with primary air permits to save in height the space due to the bigger space of the canalizations of the all air systems. The volume saving is particularly sensible in multilevel buildings, where the sum of the technical gaps, needed to contain the canalizations and the appliances, rapidly reaches the value of a whole level.

SPACE RECOVERY IN HORIZONTAL



Primary air conditioning system + fancoils



Primary air conditioning system + radiant ceiling

In the second case, the use of the radiant ceiling permits to use also the not available surface – intended as the sum of that one physically occupied by the terminal of a system installed in the room (in the examples, a fancoil), and that one around the appliance – where a person is subjected to discomfort condiction because of the speed and temperature of the air. This is present even where the system expects simple grids of air distribution, embedded on the floor or on wall.

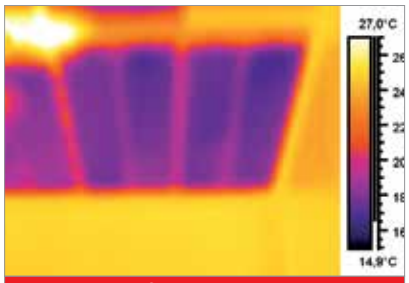
## Reply rapidity

For the transmission of the thermal energy from/to the room, giacoklima® Radiant ceiling system exploits the large metallic surface of the false ceiling and reacts therefore in an extremely rapid manner to the performance variations requested by the thermoregulation system. The images reported as follows have been taken with a thermo-graphic camera and show the reaction rapidity of the radiant ceiling in summer functioning (cooling) starting from the condition of switched off system.

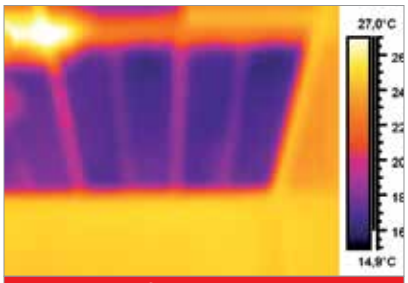
Switched off

After 1 minute

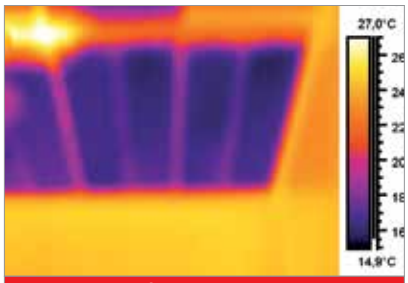
After 3 minutes



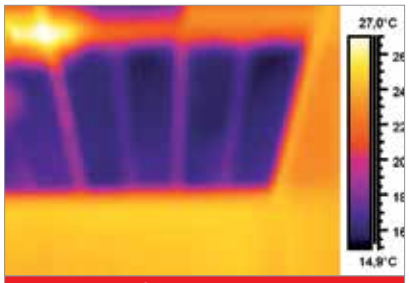
After 5 minutes



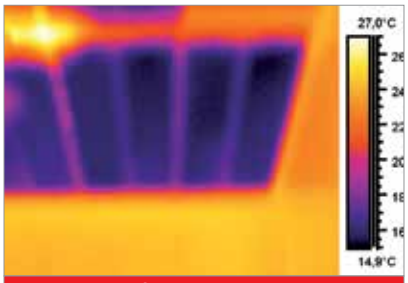
After 7 minutes



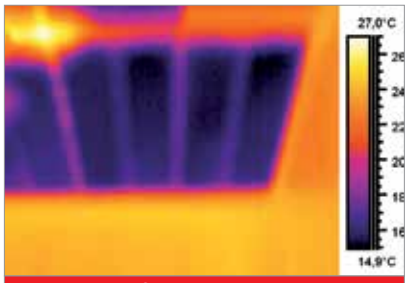
After 9 minutes



After 11 minutes

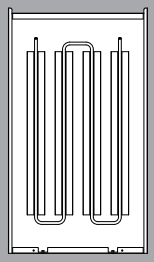


After 13 minutes

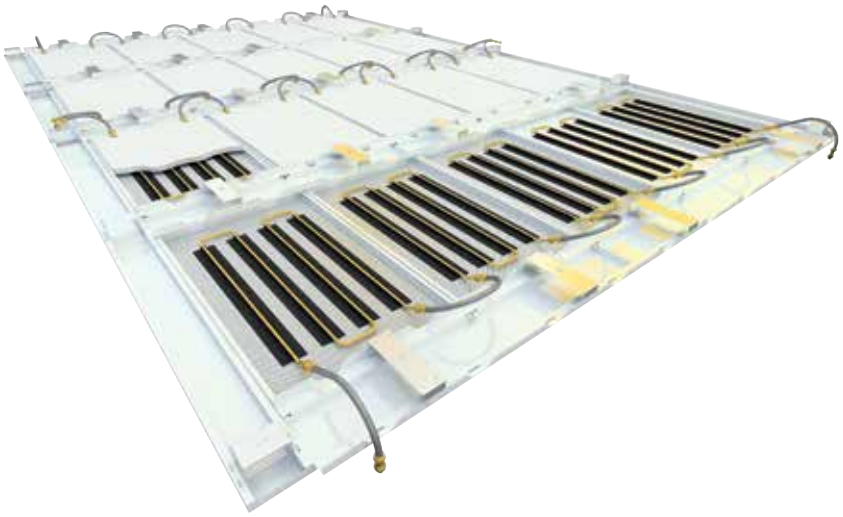


After 15 minutes

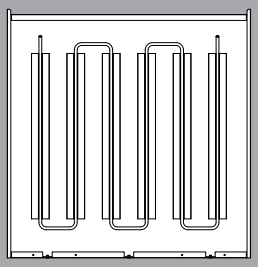
## GK60



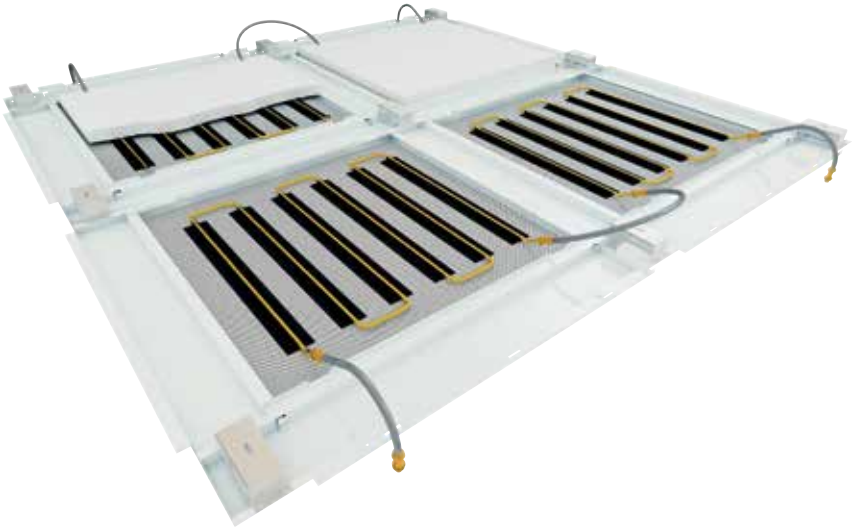
- Panel of 596x1030 mm, steel sheet 08/10 zinc coated
- False ceiling modularity: 600x1200 mm
- Laying on parallel structure at sight
- Opening at rotation
- R2516 micropunched and plain versions
- Activation with aluminium diffusers and copper pipe (Type C) or in plastic material (type A)
- Stove enameled, white RAL9010 or silver RAL9006 (upon demand, other colors of the RAL range)



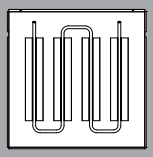
## GK120



- Panel of 1030x1030 mm, steel sheet 08/10 zinc coated
- False ceiling modularity: 1200x1200 mm
- Laying on crossed structure at sight
- Opening at rotation
- R2516 micropunched and plain versions
- Activation with aluminium diffusers and copper pipe (Type C) or in plastic material (type A)
- Stove enameled, white RAL9010 or silver RAL9006 (upon demand, other colors of the RAL range)

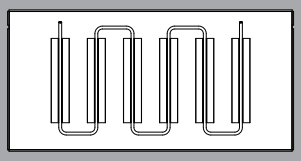


## GK60x60 PSV

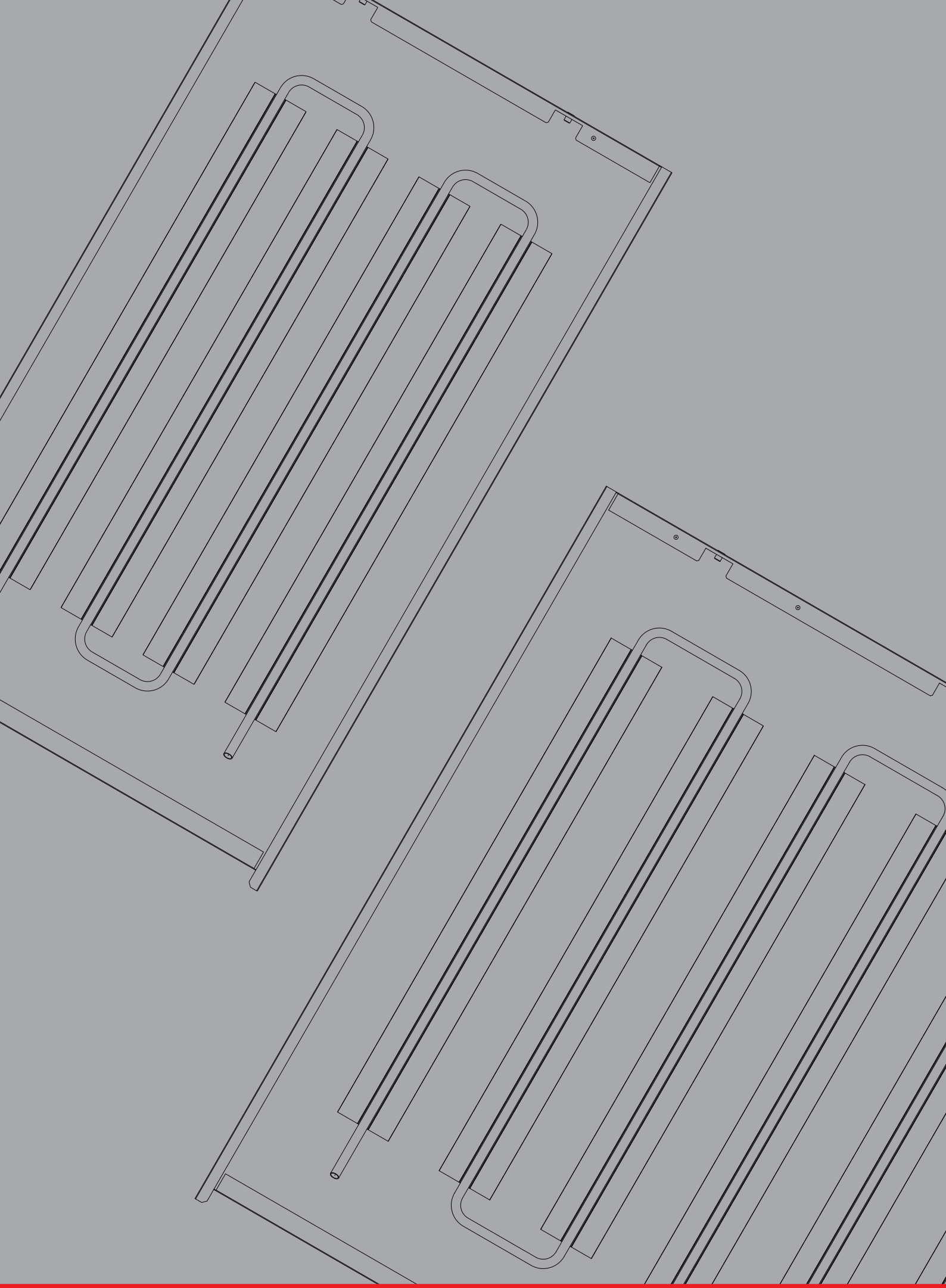


- Panel of 575x575 mm, steel sheet 06/10 zinc coated
- False ceiling modularity: 600x600 mm
- Laying on light structure at sight with T shape carrying element base 24mm
- Opening and suspension by means of cables
- Activation with aluminium diffusers and copper pipe (Type C) or in plastic material (type A)
- R2516 micropunched and plain versions
- Pre-painted white RAL9003 or silver RAL9006 (upon demand, other colors of the RAL range)

## GK60x120 PSV



- Panel of 575x1175 mm, steel sheet 06/10 zinc coated
- False ceiling modularity: 600x1200 mm
- Laying on light structure at sight with T shape carrying element base 24mm
- Opening and suspension by means of cables
- R2516 micropunched and plain versions
- Activation with aluminium diffusers and copper pipe (Type C) or in plastic material (type A)
- Pre-painted white RAL9003 or silver RAL9006 (upon demand, other colors of the RAL range)



# GK **SERIES**

## Description

GK giacoklima® series allows to make radiant false ceilings having modularity:

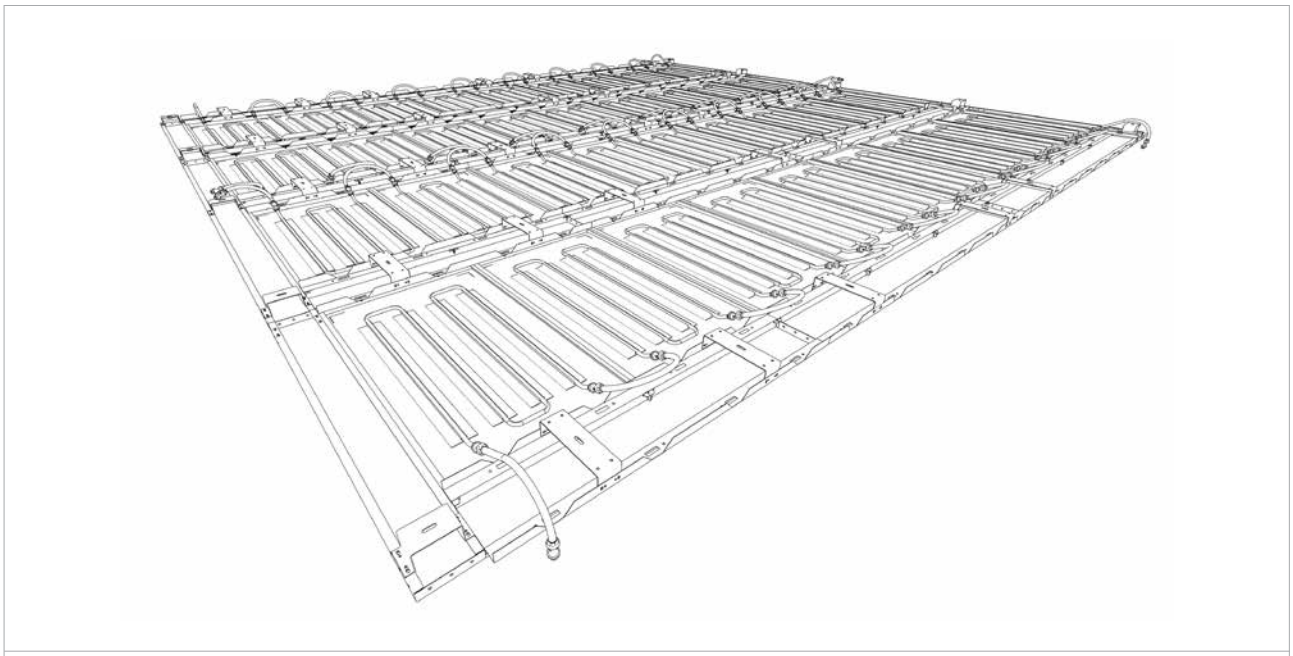
- 600x1200 mm (GK60 series).
- 1200x1200 mm (GK120 series);

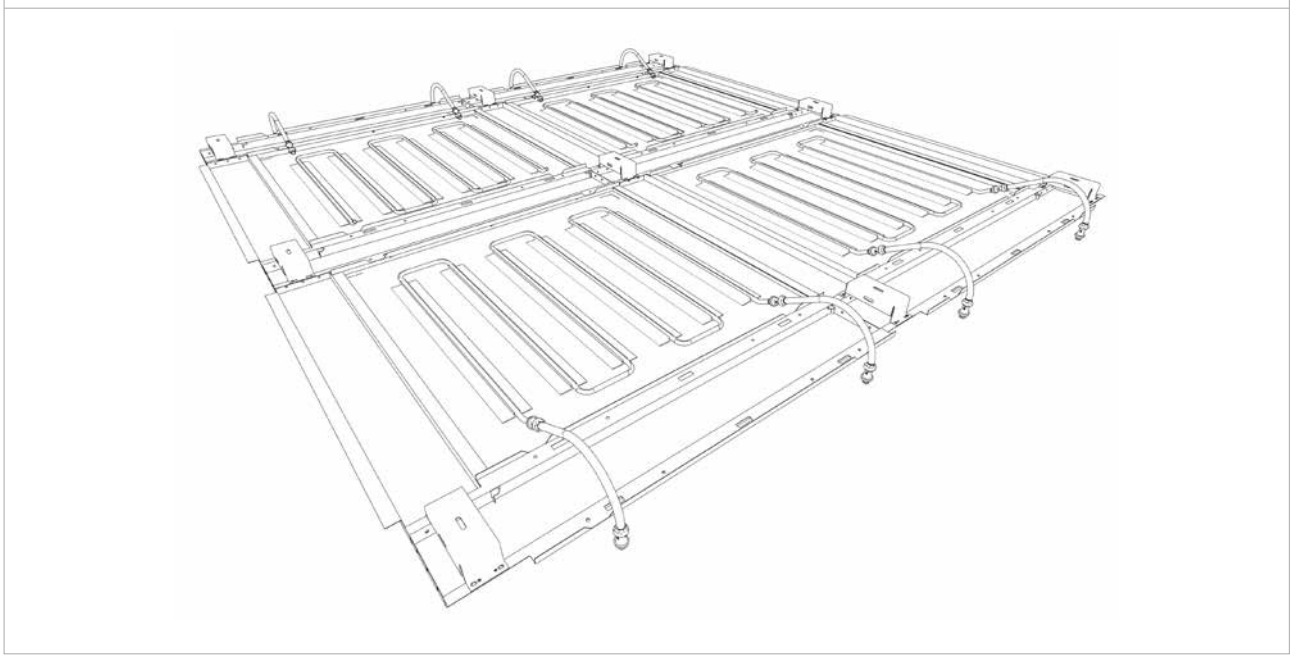
On demand also GK30 series is available. It offers a modularity of 1200x300mm.

The panels of GK60 and GK30 series are mounted on a parallel structure at sight; the panels of the GK120 series are installed on a crossed structure at sight.

The parallel structure shows primary carrying elements 1200 mm far; in the crossed structure secondary carrying elements come in addition, again at a distance of 1200 mm, giving a higher rigidity to the structure.

For the lateral finishing, you can use some headers that reproduce the aspect of the carrying elements and the various available profiles for the connection with walls or lateral compensations, for which a large realization freedom exists.

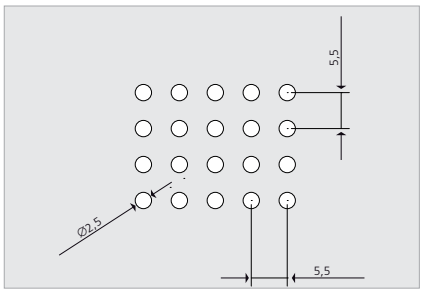




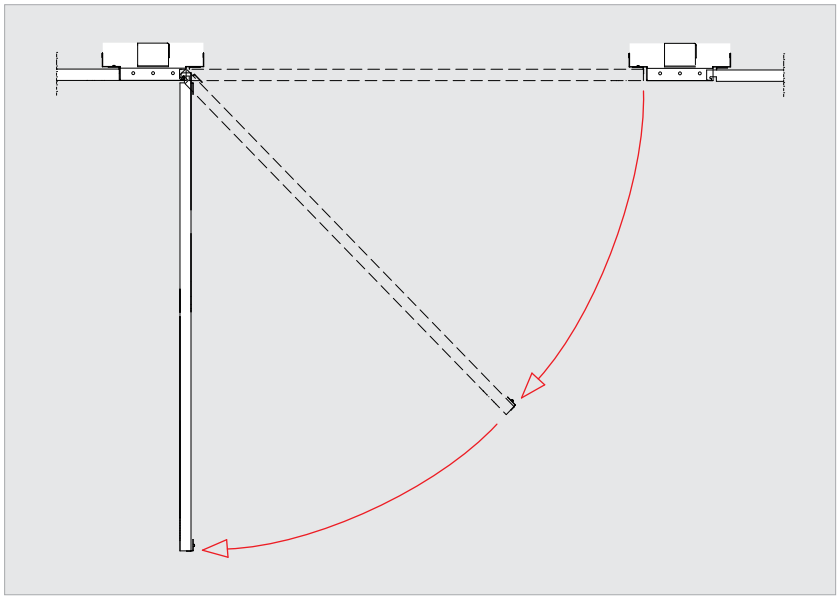
(Radiant false ceilings of the GK60 series (above) and GK120 (below)

## Panel types

There are two types of GK panels: active and inactive. The active panels have radiant capacity, thanks to the thermal diffusers in anodized aluminum glued to the panel, while the inactive ones have solely an aesthetic function and show no diffusers. Both panel types are made of zinc coated steel having a thickness of 0,8 mm. A plain and micropunched version are available; standard R2516 micropunching shows a 2,5 mm diameter hole on all surface  except for a perimeter area of 20 mm width.




## Ease of inspection



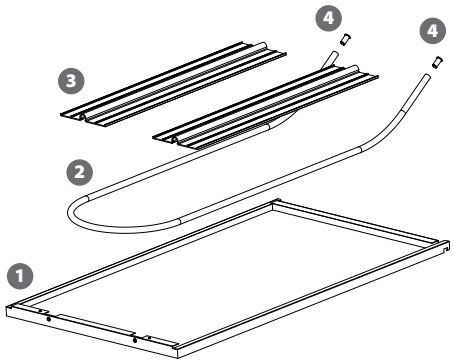
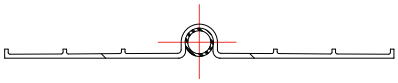
Each GK panel has two hooks fixed on the provided buttonholes of the carrying elements, around which the panel can rotate of 90° up to attainment of the vertical position, by guaranteeing a total ease of inspection, also with running system. Appropriate safety springs keep the panel on seat and permit its opening and closing.

## Activations

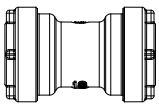
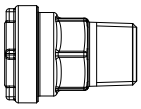
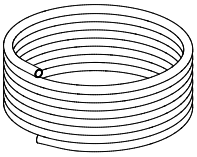
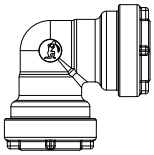
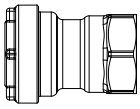
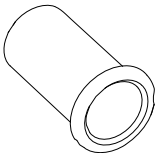
For the various panel types, it is possible to choose two activation types:

- type A, circuits with plastic material pipes;
- type C, circuits with copper pipes.

## Type A activation

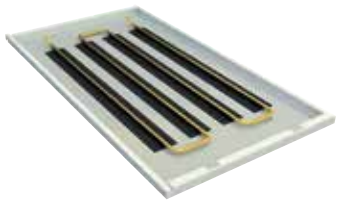
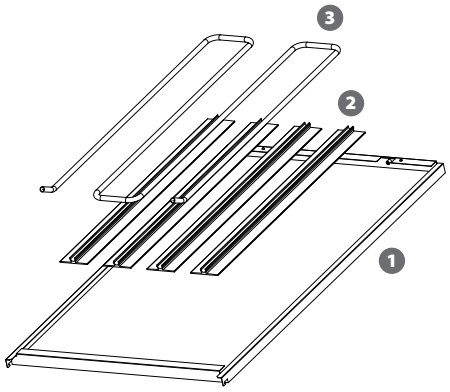
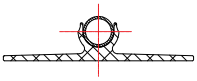
| TYPE A ACTIVATION | |
|---|---|
|  |   |
| LEGEND | DIFFUSER AND PIPE SECTION |
| 1 = Panel<br>2 = Plastic material pipe<br>3 = Thermal diffuser<br>4 = Stiffening sleeves |  |

GK panels with type A activation have thermal diffusers in anodized aluminium of 220mm width, glued on the panels in the factory. The K60A panel has two diffusers, the K120A has 4 diffusers. The water circulation occurs through a circuit made with a 16x1,5 plastic material pipe having anti-oxygen barrier.

| FITTING FOR PANEL - PANEL CONNECTION | FITTING FOR PANEL - MANIFOLD CONNECTION | OTHER CONNECTION COMPONENTS |
|---|---|---|
|  |  |  |
| RC102 | RC107 | R986 (16x1,5 mm) |
|  |  |  |
| RC122 | RC109 | RC900 |

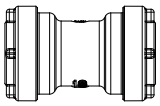
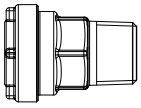
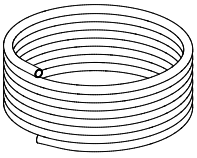
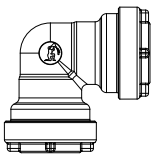
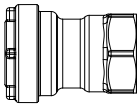
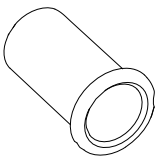
The series connection between the panels and to the delivery-return manifolds is made with straight or angle RC push fittings. The connections made with RC push fittings are irreversible. The end section of the plastic material pipe shall be necessarily completed by the RC900 support sleeve before the introduction into the RC fitting.

## Type C activation

| TYPE C ACTIVATION | |
|---|---|
|  |   |
| LEGEND | DIFFUSER AND PIPE SECTION |
| **1** = Panel<br>**2** = Plastic material pipe<br>**3** = Serpentine in copper pipe |  |

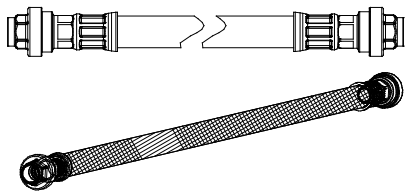
GK panels with type C activation have thermal diffusers in anodized aluminium of 75mm width, glued on the panels in the factory. The K60C panel has 4 diffusers, the K120C has 6 diffusers. The water circulation occurs through a circuit made with a serpentine with copper pipe size 12 mm (external diameter).

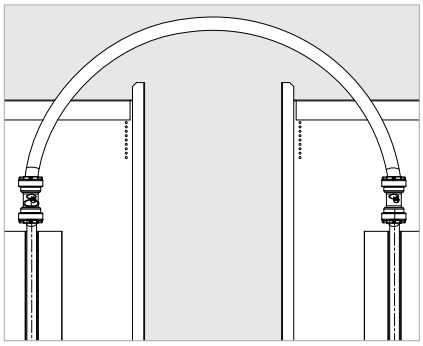
You can choose between two connection methods:

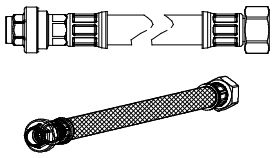
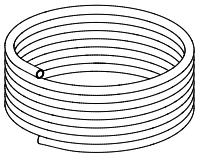
| FITTING FOR PANEL - PANEL CONNECTION | FITTING FOR PANEL - MANIFOLD CONNECTION | OTHER CONNECTION COMPONENTS |
|---|---|---|
|  |  |  |
| RC102 | RC107 | R986 |
|  |  |  |
| RC122 | RC109 | RC900 |

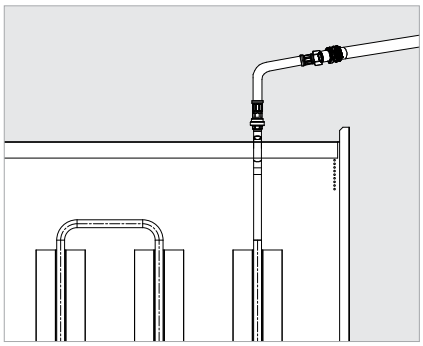
- **Type 1 connection.** The panels are connected in series by means of brass push fittings (straight or angle) and a 12x1,5 mm plastic material pipe with anti-oxygen barrier. For the connection between the distribution manifold and the panel series, you can turn to push fittings and (if needed) preinsulated plastic material pipe of 16x1,5 mm diameter, to limit the loss of pressure (and also the thermal dispersions). The end section of the plastic material pipe shall be necessarily completed by the RC900 support sleeve before the introduction into the RC fitting.

- **Type 2 connection.** The panels are connected in series by means of preassembled kits composed by EPDM flexible pipes with anti-oxygen barrier and covering in stainless steel net, 750 mm length and 2 push fittings size 12 mm. For the connection between the distribution manifold and the panel series, you can turn to preassembled kits composed by EPDM flexible pipe with anti-oxygen barrier and covering in stainless steel net, 400 mm length and a push fitting size 12 mm on one side and ½" threaded fitting on the other one.

| PANEL - PANEL CONNECTION |
|---|
|  |
| K85RCY001 |



| PANEL - MANIFOLD CONNECTION | |
|---|---|
|  |  |
| K85RCY002 | R986 (16x1,5 mm) |



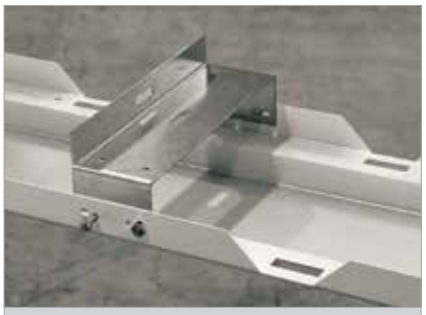
## Coloring

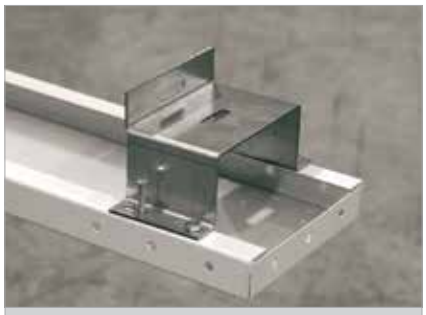
The panels (active and base inactive without diffusers), carrying elements and profiles are available in the standard white (RAL9010) and silver (RAL9006) colors. On demand and depending on the order quantities, other colorings of the RAL range are available.

## Installation

The mounting of the giacoklima® GK series ceiling requires the normal laying operations of a traditional false ceiling: according to the layout expected for the panels, proceed with the bracket arrangement. With the crossed structure, K852 brackets are used for the primary carrying elements and primary headers.
For the parallel structure K832 brackets are used for the carrying elements and K842 for the headers. The brackets are fixed to the ceiling by means of the K819 brackets for perforated bars and the K818 perforated bars. Then the carrying elements are leveled at the same height: for GK120 series, secondary carrying elements are mounted each 120 cm. For GK60 and GK30 series, C shaped distance bars keep fixed the distance between the carrying elements and increase the robustness of the carrying structure.


K852 bracket for primary carrying elements


K832 bracket for carrying elements of the parallel structure


K842 bracket for header of the parallel structure

**K852**

**150x52x70 mm**
Bracket for primary carrying elements in steel 20/10 zinc coated

**K832**
**228x52x70 mm**
Bracket for parallel structure carrying element in steel 20/10 zinc coated

**K842**

**110x52x70 mm**
Bracket for parallel structure header in steel 20/10 zinc coated

**K819**

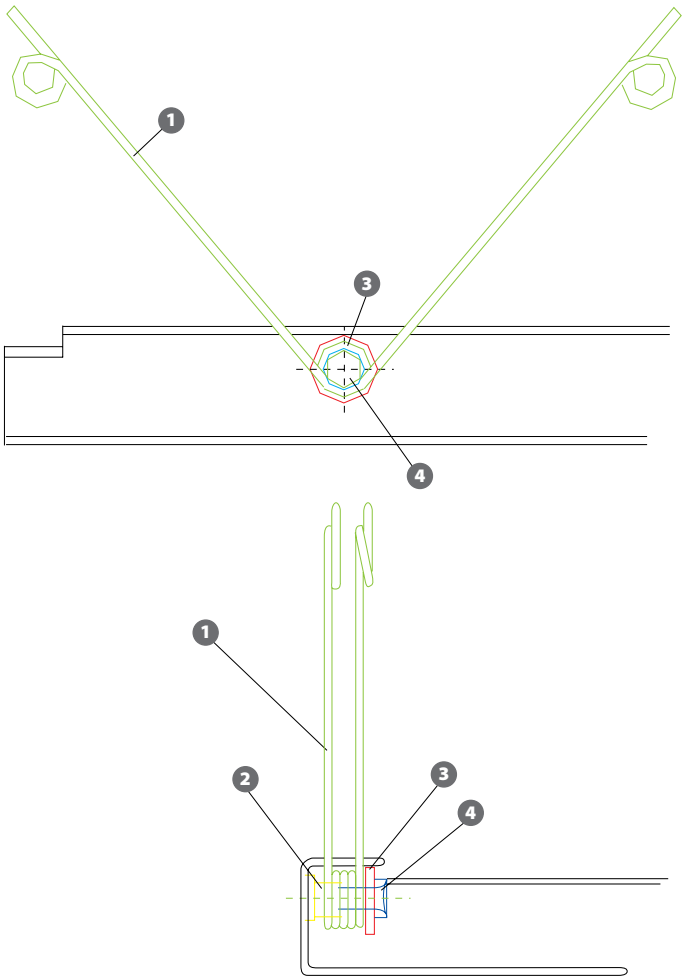
**50x95 mm**
Bracket for perforated bar in zinc coated steel sheet

**K818**

**25x10 mm**
Perforated bar for mounting of zinc coated steel sheet structures

Each bracket can be fixed to the carrying elements with bolts. Once the structure has been installed, the springs shall be mounted on the panels according to the scheme below. It is therefore possible to fit in the panels by arranging the rotation direction, according to what has been decided by the project. The panels are secured, by means of their hooks, in the carrying element openings and vertically positioned. In the subsequent phase the hydraulic connections are done: the panels of the same module are joined in series, while the first and the last one panel are connected to the delivery and return pipes respectively. At the end the panels are reclosed by using the related springs.

The panel is kept in safety position by the springs, unhooking them it can be brought in vertical position.

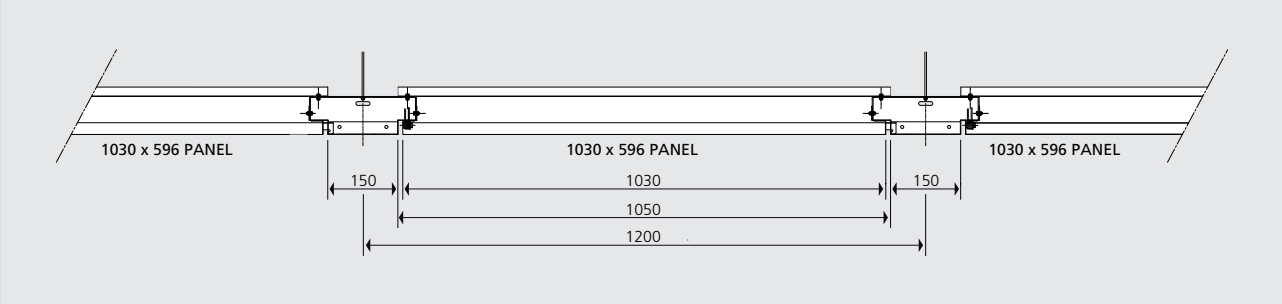



**SPRING MOUNTING ON GK PANEL**

**1** = Spring
**2** = Threaded insert
**3** = 18x6,5x15 washer
**4** = M6x10 screw

## Standard configuration example for the GK60 series

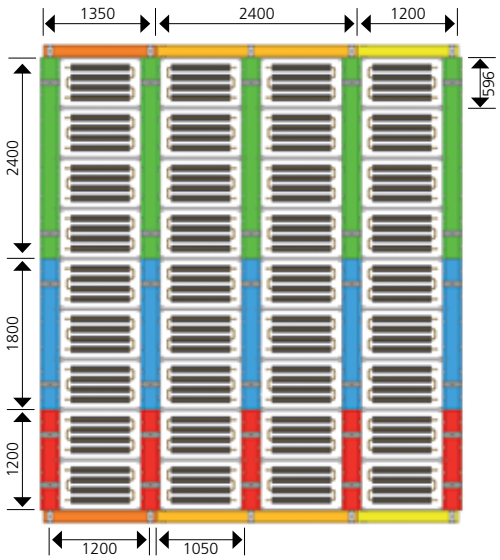
This page reports a standard configuration for the parallel structure (GK60 series ceiling); there is also the possibility to personalize the solutions according to the specific requirements.




Section view of the giacoklima® radiant false ceiling GK60 series (parallel structure, base 150 mm carrying elements)

**K831:** Carrying element size 150x2400 mm, 150x1800 mm or 150x1200 mm for parallel structure.
**K841:** 150x1350 mm header for parallel structure, it is the first header of the row (it includes the width of two carrying elements and that one of the panel, see figure), size 150x2400 mm or, finally size 150x1200 mm.
**K60A/K60C (active) o K60 (inactive):** panel size 596x1030 mm.
Between the panel and the carrying elements, a fissure of 1 cm is left to permit the panel opening.

**PARALLEL STRUCTURE DETAIL**




**LEGEND**

**K831 CARRYING**

**K831**: CARRYING ELEMENT

150x2400 mm

150x1800 mm

150x1200 mm

**K481 HEADERS**

**K841**: carrying element for parallel structure

150x1350 mm

150x2400 mm

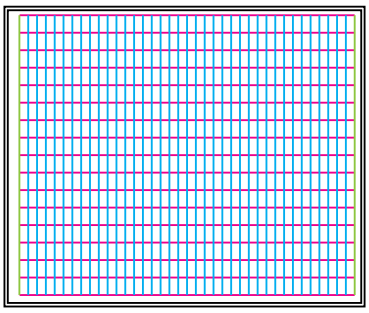
150x1200 mm

**K60 PANELS**

K60 (inactive) or K60A/K60C (active) :

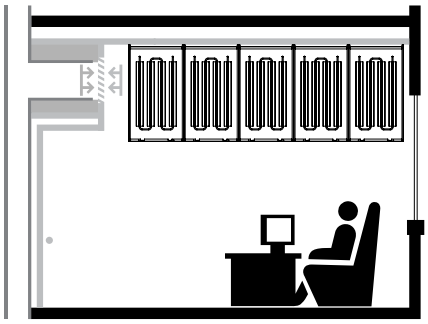
596x1030 mm

**GENERAL SCHEME**



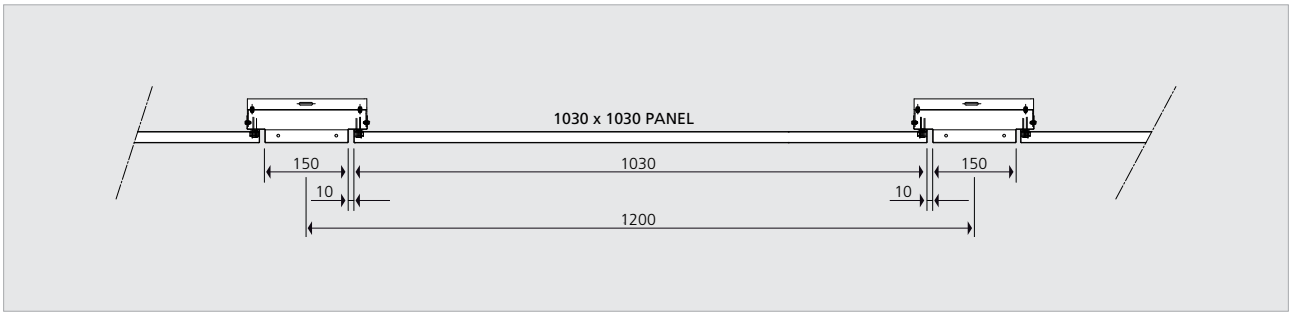
| | |
|---|---|
| | K831 Carrying element |
| | K481 Header |
| | GK60 Module |

**SUSPENSION WITH HOOKS IN THE CARRYING ELEMENT BUTTONHOLES**



## Standard configuration example for the GK120 series

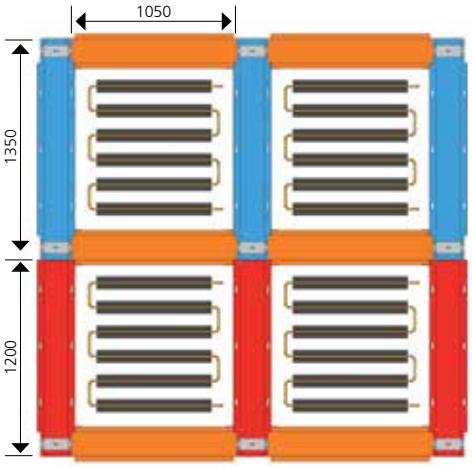
This page reports a standard configuration for the crossed structure (GK120 series ceiling); there is also the possibility to personalize the solutions according to the specific requirements.




Section view of the giacoklima® radiant false ceiling GK120 series (crossed structure, base 150 mm carrying elements)

**K861:**: 150x1350 mm header primary carrying element for crossed structure; the header carrying element is the first of the primary carrying elements (see figure).
**K851:** 150x1200 mm primary carrying element for crossed structure.
**K120C/K120A (active) or K120 (inactive):** panel size 1030x1030 mm.
**K871:** secondary carrying element size 150x1050 mm for crossed structure.
Between the panel and the carrying elements, a fissure of 1 cm is left to permit the panel opening.

**CROSSED STRUCTURE DETAIL**




**LEGEND**

**CARRYING**

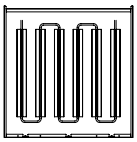
**K861**: header primary carrying element 150x1350 mm

**K851**: primary carrying element 150x1200 mm

**K871**: secondary carrying element 150x1050 mm

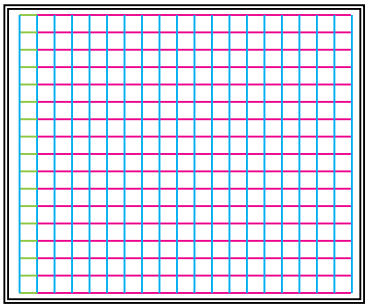
**K120 PANELS**

K120 (inactive) or K120A/K120C (active):



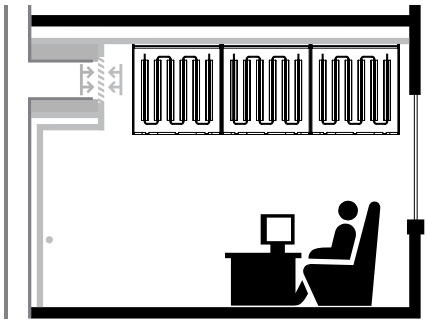
1030x1030 mm

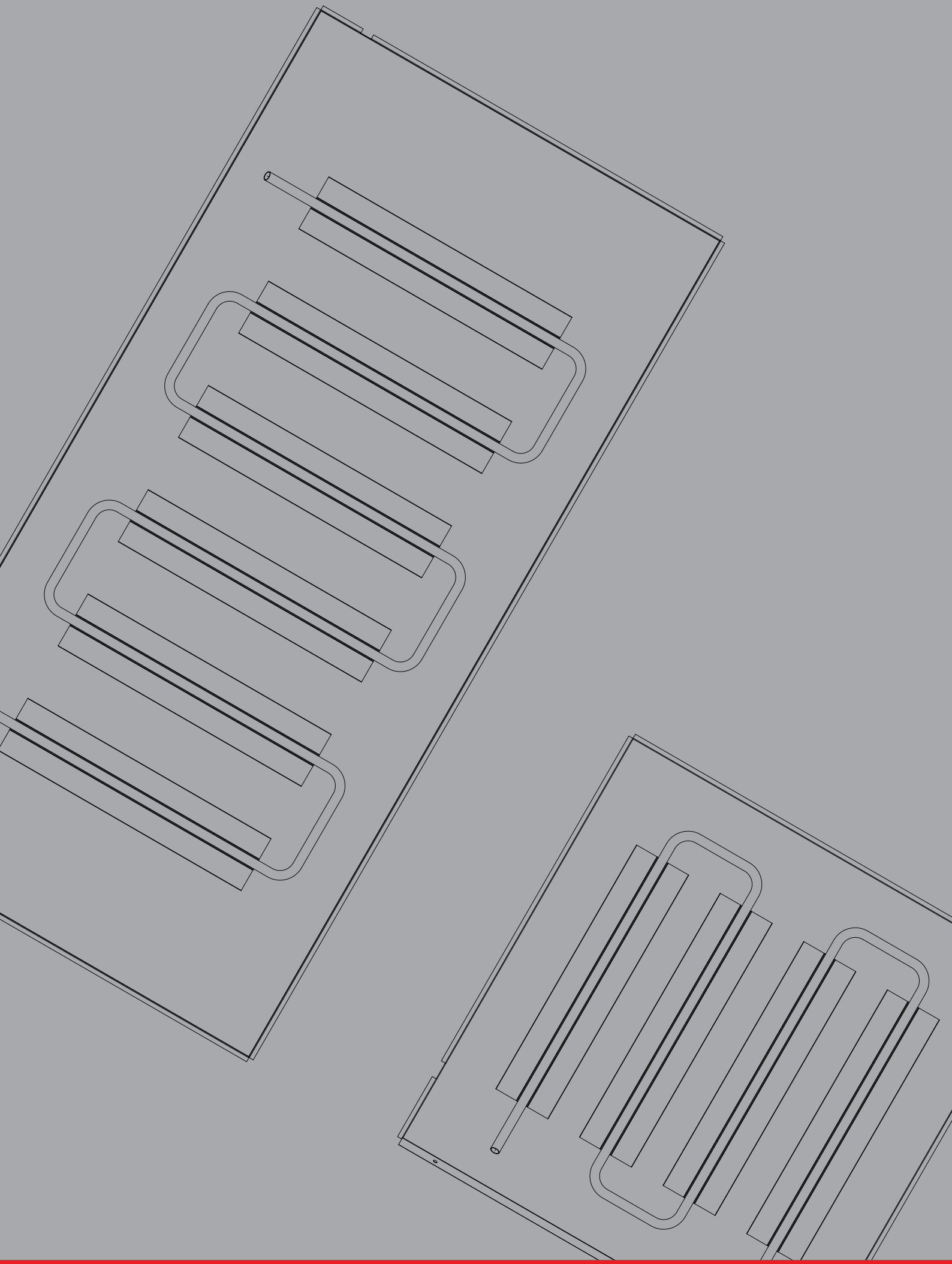
**GENERAL SCHEME**



| | |
|---|---|
| | K851 Primary carrying element |
| | K861 Header primary carrying element |
| | K871 Secondary carrying element |

**SUSPENSION WITH HOOKS IN THE CARRYING ELEMENT BUTTONHOLES**





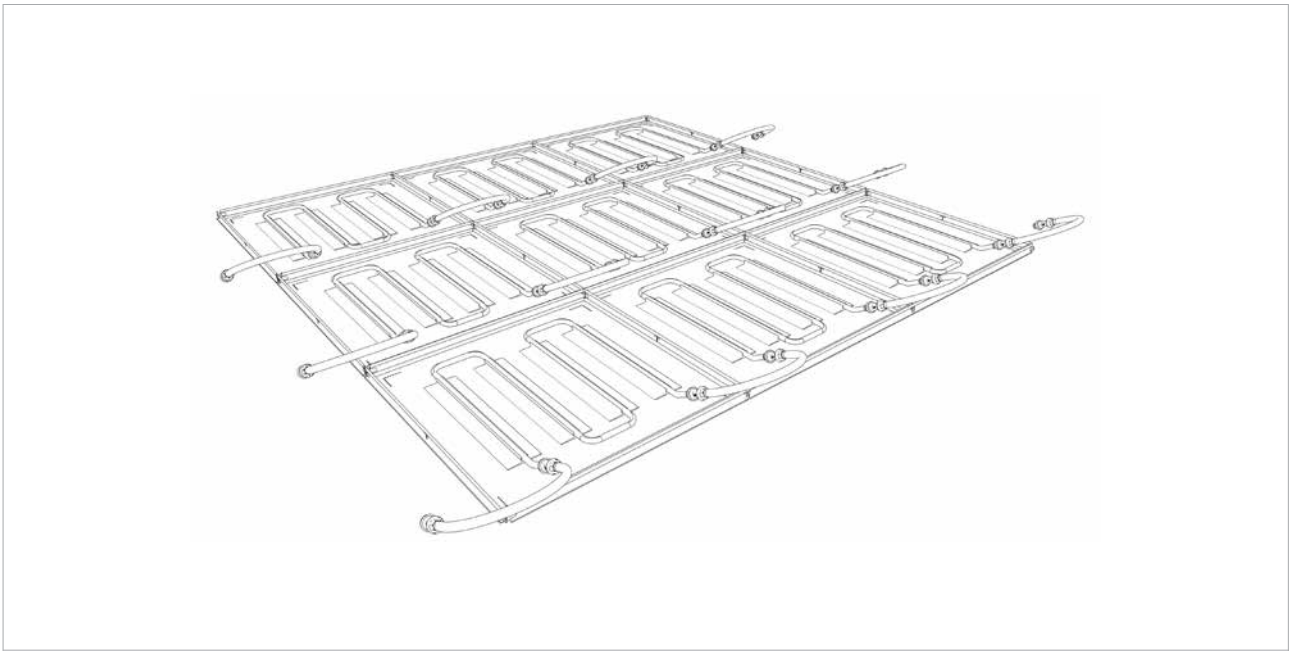
# GK PSV **SERIES**

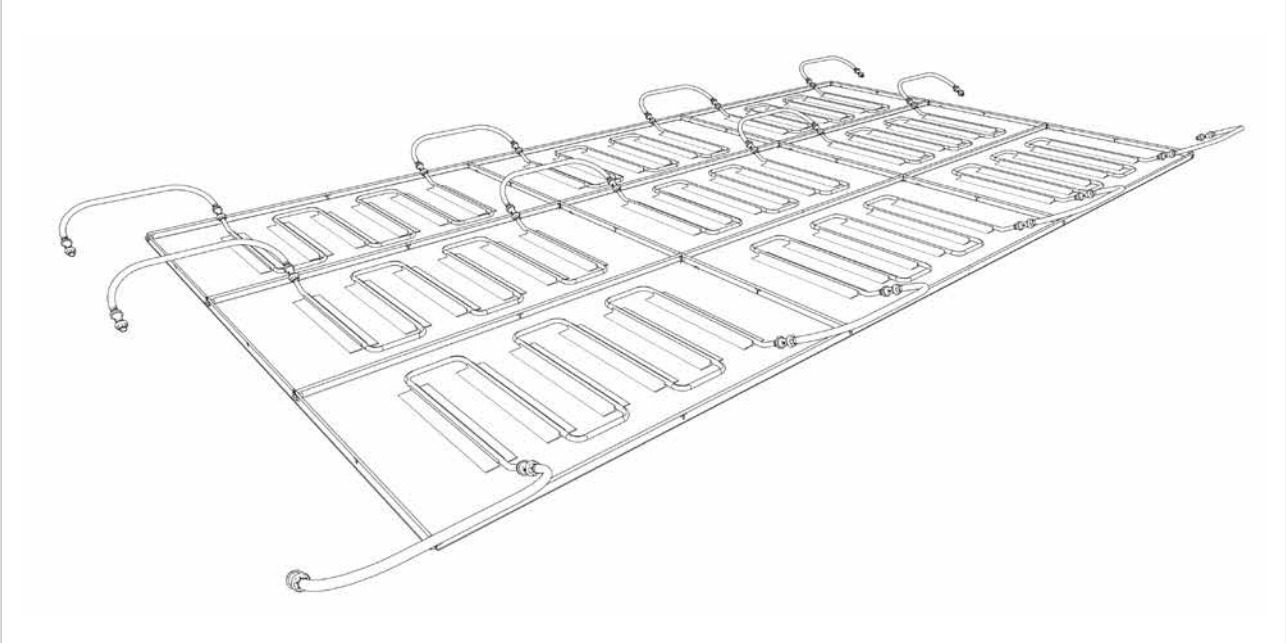
## Description

giacoklima® GK PSV series allows to make radiant false ceilings with modularity:

- 600x600 mm (GK60x60 PSV series)
- 600x1200 mm (GK60x120 PSV series)

The panels of the GK60x60 PSV and GK60x120 PSV series are mounted with a structure at sight with type T carrying elements, base 24 mm. This structure represents a commercial standard of large diffusion, normally used to make traditional false ceilings (not radiant). The structure assembles quickly at joint without using springs and bolts. The suspension to the slab is made with hangers and springs. The dimension standardization allows also to find lighting appliances, air diffusers and other embedded elements already designed for the introduction into this kind of structure. The GK60x60 version is particularly suitable for small dimension rooms, as it adapts easily to them; it avoids the excessive loss of radiant surface, as it limits the need to make compensation parts on the perimeter.

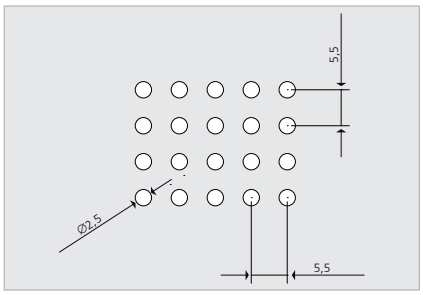




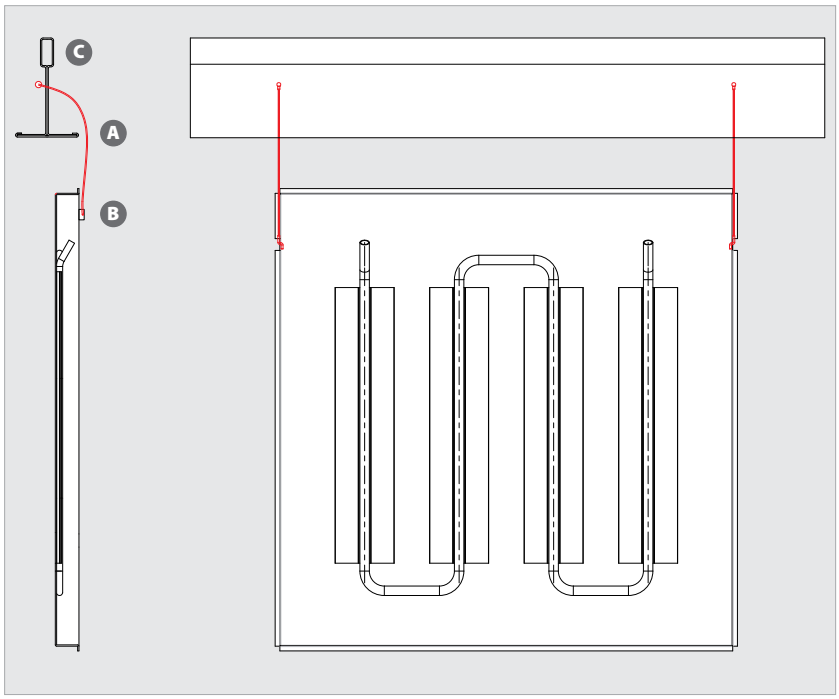
GK60x60 PSV series radiant false ceilings (above) and GK60x120 PSV (below)

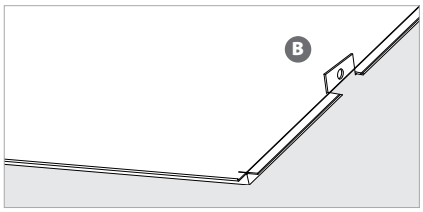
## Panel types

GK PSV panels are of two types: active and inactive. The active panels have radiant capacity, thanks to thermal diffusers in anodized aluminium glued to the panel, while the inactive ones have only an aestethic function and have no diffusers. Both panel types are made of zinc coated steel with a thickness of 0,6 mm. They are available in a plain and a micropunched version; the standard R2516 micropunching presents a 2,5 mm diameter hole on all surface except for a perimeter area of 15 mm width. The punching percentage is equal to 16%. On demand other micropunchings are available.




## Ease of inspection



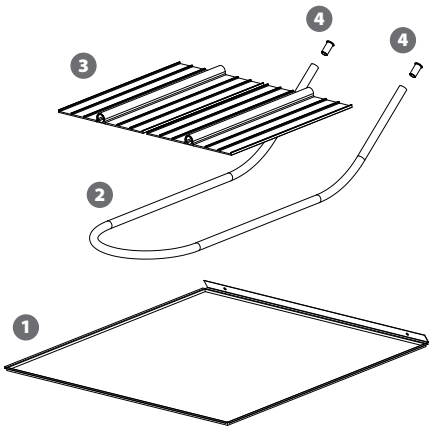
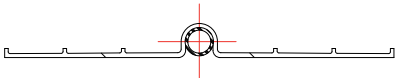

The panels of the GK PSV series are prearranged for the insertion of two metallic suspension cables (A) in the flanged tongues (B) to be unwrapped on site. The cables are fixed to the T carrying structure (C) during the mounting. GK PSV panels can be so unhooked and vertically positioned, remaining hanged to the two cables, to open the false ceiling and reach the plenum for inspection or maintenance of other devices, even with working system.

## Activations

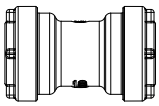
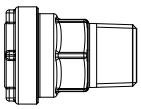
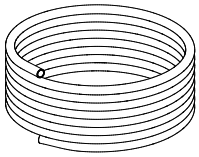
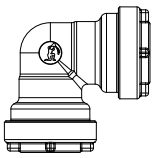
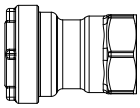
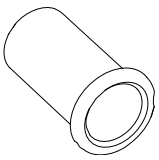
For the various panel types, you can choose between two activations:

- A type, circuits with plastic material pipes
- C type, circuits with copper pipes.

## Activation type A

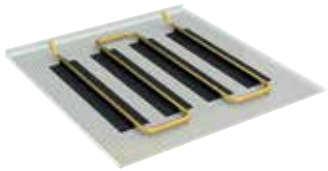
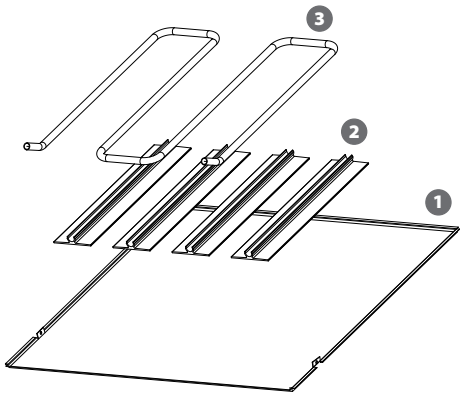
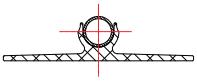
| A TYPE ACTIVATION | |
|---|---|
|  |   |
| **LEGEND** | **DIFFUSER AND PIPE SECTION** |
| **1=** Panel<br>**2=** Plastic material pipe<br>**3=** Thermal diffusers<br>**4=** Support sleeves |  |

GK PSV panels with A type activation have thermal diffusers made of anodized aluminium, 220 mm width, glued on the panels in the factory. K6A and K12A have two diffusers. The water circulation occurs through a circuit made with 16x1,5 mm plastic material pipe with anti-oxygen barrier.

| FITINGS FOR PANEL-PANEL CONNECTION | FITINGS FOR PANEL-MANIFOLD CONNECTION | OTHER CONNECTION COMPONENTS |
|---|---|---|
|  |  |  |
| RC102 | RC107 | R986 (16x1,5 mm) |
|  |  |  |
| RC122 | RC109 | RC900 |

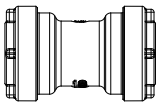
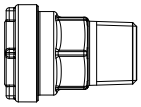
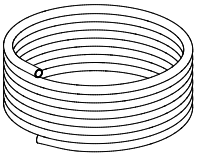
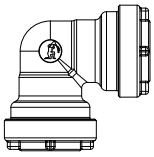
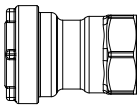
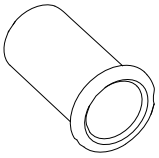
The connection in series of the panels and to the delivery and return manifold is made with straight or angle RC push fittings. The connections made by means of RC push are irreversible. The end section of the plastic material pipe shall be necessarily completed with a RC900 support sleeves before introducing it into RC fittings.

## Activation type C

| C TYPE ACTIVATION | |
|---|---|
|  |   |
| LEGEND | DIFFUSER AND PIPE SECTION |
| 1 = Panel<br>2 = Thermal diffusers<br>3 = Copper pipe serpentine |  |

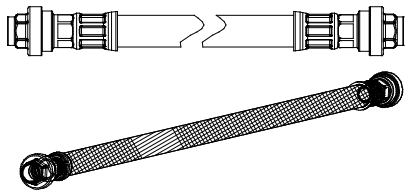
GK PSV panels with C type activation have thermal diffusers made of anodized aluminium, 75 mm width, glued on the panels in the factory. K6C panel has four diffusers. K12C has 6 diffusers. The water circulation occurs through a circuit made by means of a serpentine with 12 mm copper pipe (external diameter).

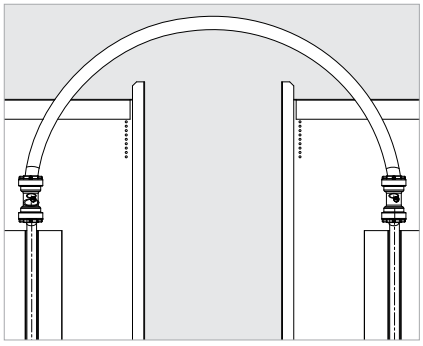
You can choose between two connection methods:

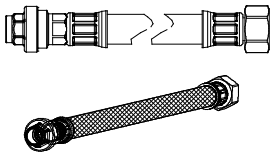
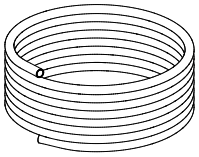
| FITINGS FOR PANEL-PANEL CONNECTION | FITTINGS FOR PANEL-MANIFOLD CONNECTION | OTHER CONNECTION COMPONENTS |
|---|---|---|
|  |  |  |
| RC102 | RC107 | R986 |
|  |  |  |
| RC122 | RC109 | RC900 |

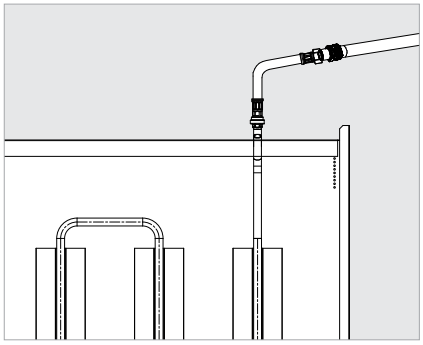
**-Type 1 connection.** The panels are connected in series by means of brass push fittings (straight or angle) and a 12x1,5 mm plastic material pipe with anti-oxygen barrier. For the connection between the distribution manifold and the panel series, you can turn to push fittings and a preinsulated plastic material pipe of 16x1,5 mm diameter, to limit either the loss of pressure or the thermal dispersions. The end section of the plastic material pipe shall be necessarily completed by a RC900 support sleeve before the introduction into the RC fitting.

**-Type 2 connection.** The panels are connected in series by means of preassembled kits composed by EPDM flexible pipes with anti-oxygen barrier and covering in stainless steel net, 750 mm length and 2 push fittings size 12 mm. For the connection between the distribution manifold and the panel series, you can turn to preassembled kits composed by EPDM flexible pipe with anti-oxygen barrier and covering in stainless steel net, 400 mm length and a push fitting size 12 mm on one side and ½" threaded fitting on the other one.

| PANEL-PANEL CONNECTION |
|---|
|  |
| K85RCY001 |



| PANEL-MANIFOLD CONNECTION | |
|---|---|
|  |  |
| K85RCY002 | R986 (16x1,5 mm) |

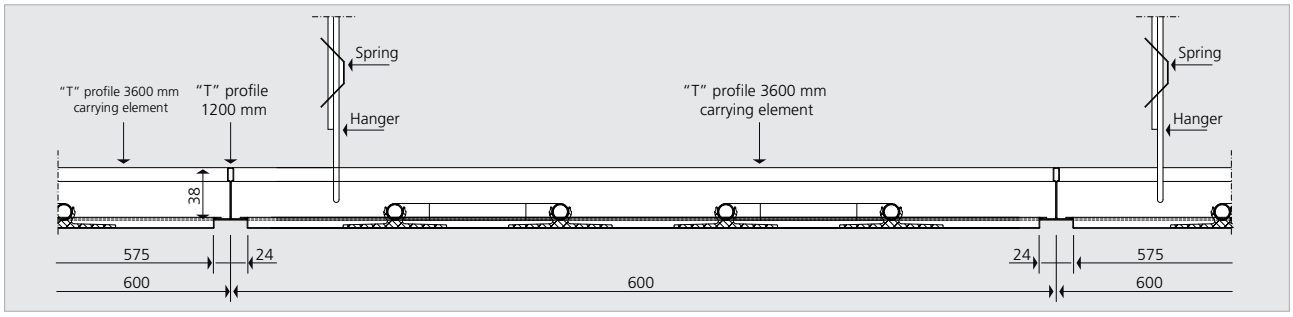


## Coloring

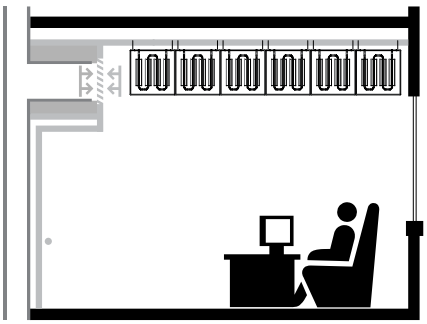
The panels (active and base inactive without diffusers), carrying elements and profiles are available in the standard white (RAL9010) and silver (RAL9006) colors. On demand and depending on the order quantities, other colorings of the RAL range are available.

## Standard configuration example for GK60x60 PSV series

In this page it is reported the standard configuration for the "T" structure 24 mm base (GK60x60 PSV series ceiling)

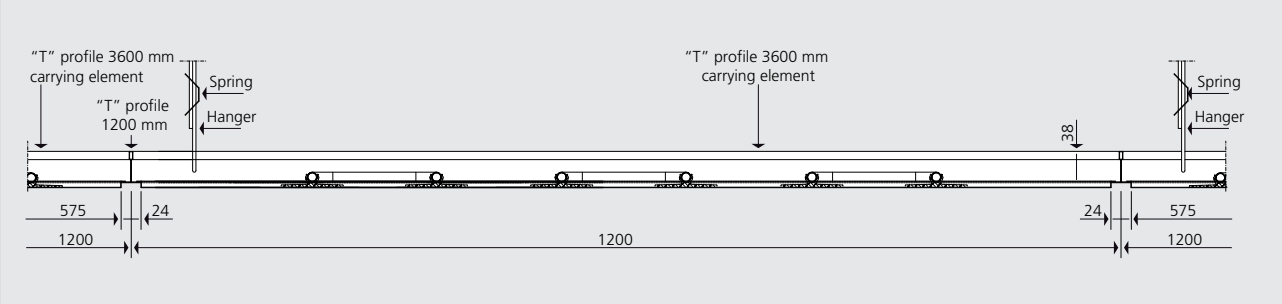



Configuration of the "T" structure base 24mm for GK60x60 PSV series

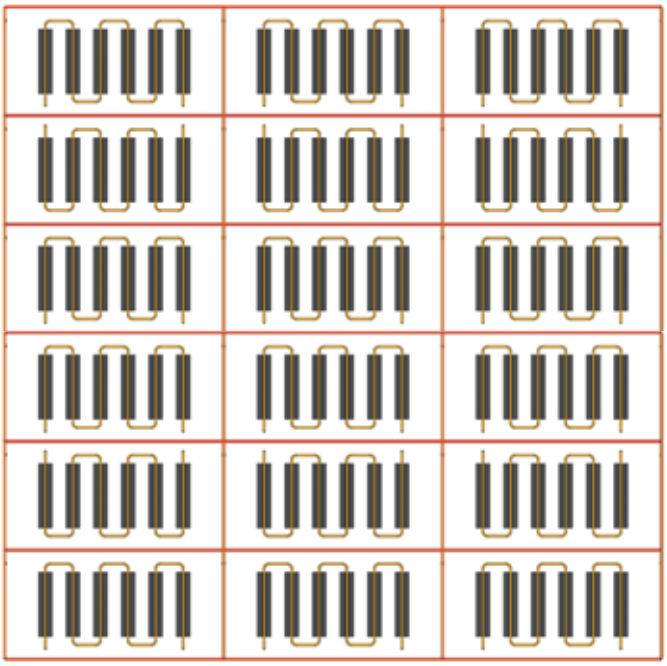
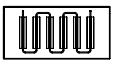
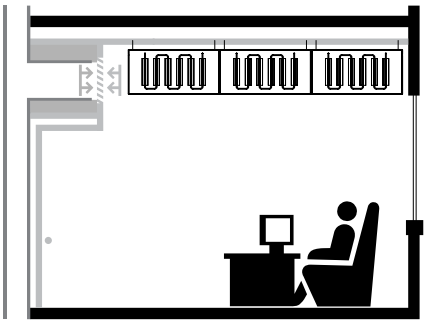
| T STRUCTURE BASE 24 MM DETAIL | LEGEND | |
|---|---|---|
|  | | Carrying elements base 24 mm<br>L=3600 mm<br>**KSV36X** |
| | | Carrying elements base 24 mm<br>L=1200 mm<br>**KSV12X** |
| | | Carrying elements base 24 mm<br>L=600 mm<br>**KSV6X** |
| | | Active panel<br>575x575 mm<br>**K6C o K6A** |
| | PANEL SUSPENSION BY MEANS OF CABLES | |
| |  | |

## Standard configuration example for GK60x120 PSV series

In this page it is reported the standard configuration for the "T" structure 24 mm base (GK60x120 PSV series ceiling)

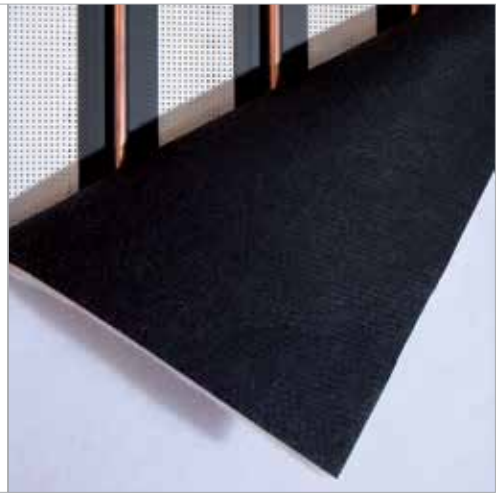



Configuration of the "T" structure base 24mm for GK60x120 PSV series

| T STRUCTURE BASE 24 MM DETAIL | LEGEND | |
|---|---|---|
|  | | Carrying elements base 24 mm<br>L=3600 mm<br>**KSV36X** |
| | | Carrying elements base 24 mm<br>L=600 mm<br>**KSV6X** |
| |  | Active panel<br>575x1175 mm<br>**K12C o K12A** |
| | PANEL SUSPENSION BY MEANS OF CABLES | |
| |  | |

## Thermoacoustic insulation

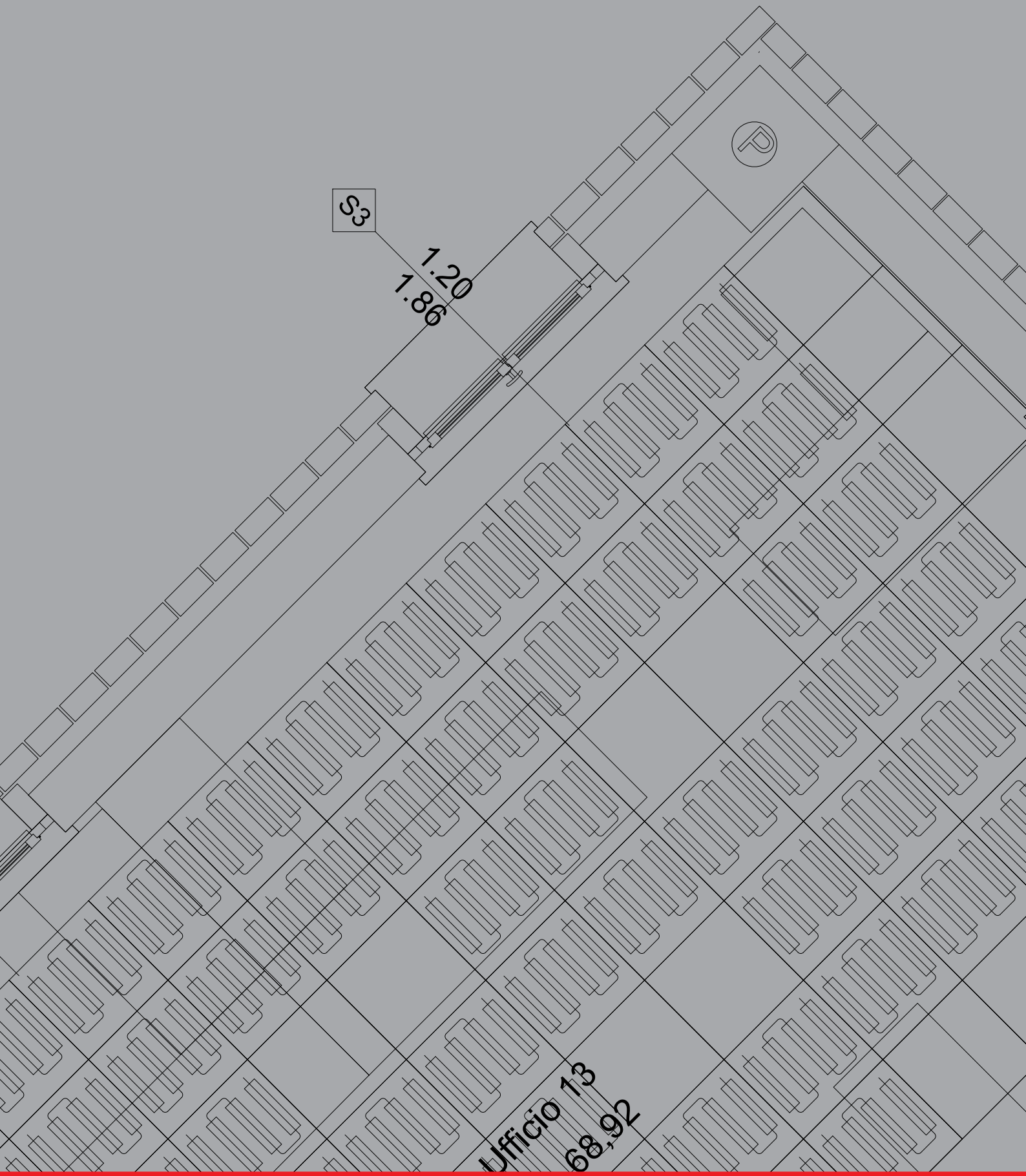
To thermally insulate the room from the plenum and absorb the noises coming from above, it is possible to use the appropriate K820 thermoacoustic panel either with micropunched panels, or with the plain ones. The thermoacoustic panel is constituted by polyester fibre at 100%, irreversibly thermobound, and made by means of dry carding on a support of black fabric still in polyester fibre at 100% without addiction of chemical binders. K820 panel is simple to lay and requires minimum maintenance. It shall be laid so that the black fabric support is turned downwards. The panel is available in various dimensions according to the chosen giacokima GK ceiling series. The density and the thickness of the K850 panel have been optimized to guarantee the maximum operation in the typical internal applications. The material used (polyester fibre) allows each sort of maintenances, included an eventual wahing in water, followed by drying in centrifuge; this can become necessary after some years since the laying to disinfect or simply re-clean the panel from dust and foreign bodies.



Principal features

- Material: thermobound polyester fibre 100%
- Density: 20 kg/m³ (mat), 40 kg/m³ (support)
- Thickness: 25 mm
- Heat conductivity: 0,03 W/mK
- Hygroscopicity: 0,1% of the weight
- Resistance to water: no flaking or feature loss
- Resistance to vibrations: no particle separation after 1 million cycles at 50 Hz
- Combustion gas: free from acids (AFNOR X 70-100)
- Odour: absent
- Acoustic absorption at: 0,64 (250 Hz) 0,78 (500 Hz) 1,06 (1000 Hz) 0,98 (2000 Hz)

| PRODUCT CODE | FALSE CEILING MODULE [mm] | FOR PANEL VERSIONS | RADIANT CEILING SERIES | DIMENSIONS [mm] |
|---|---|---|---|---|
| K820X002 | 600 x 1200 | K60, K60C, K60A | GK60 | 610 x 960 x 25 |
| K820X003 | 1200 x 1200 | K120, K120C, K120A | GK120 | 1040 x 960 x 25 |
| K820X004 | 600 x 600 | K6, K6C, K6A | GK60x60 PSV | 580 x 580 x 25 |
| K820X005 | 600 x 1200 | K12, K12C, K12 | GK60x120 PSV | 580 x 1180 x 25 |

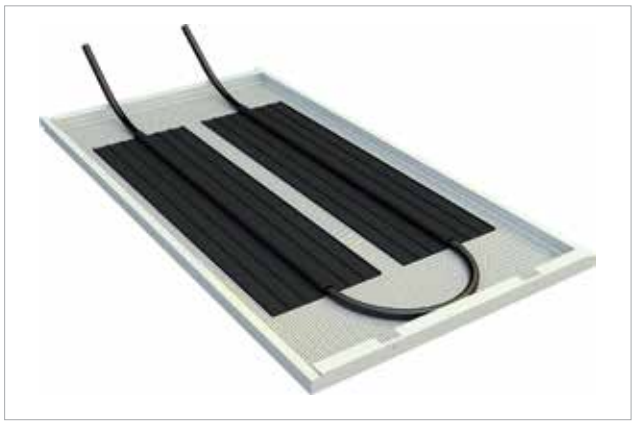



# TECHNICAL AND PROJECT DATA

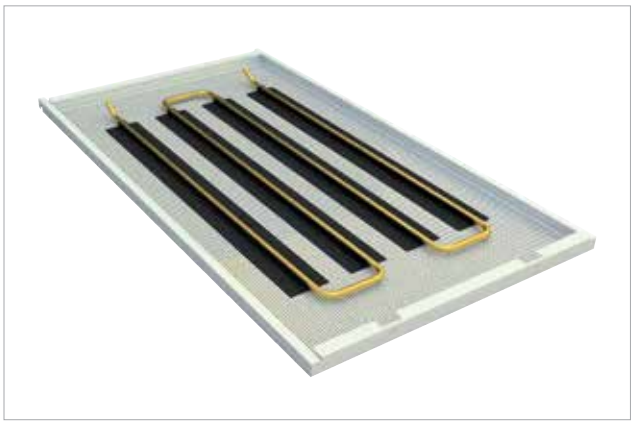
## Panel activation types

Two activation types are available for GK giacoklima® radiant ceilings.

- **A220 activation:** constituted by a circuit with plastic material pipe size 16x1,5 mm with anti-oxygen barrier and thermal diffusers in aluminium, 220 mm width.
- **C75 activation:** constituted by a circuit of copper pipe size 12x1 mm and thermal diffusers in aluminium, 75 mm width.



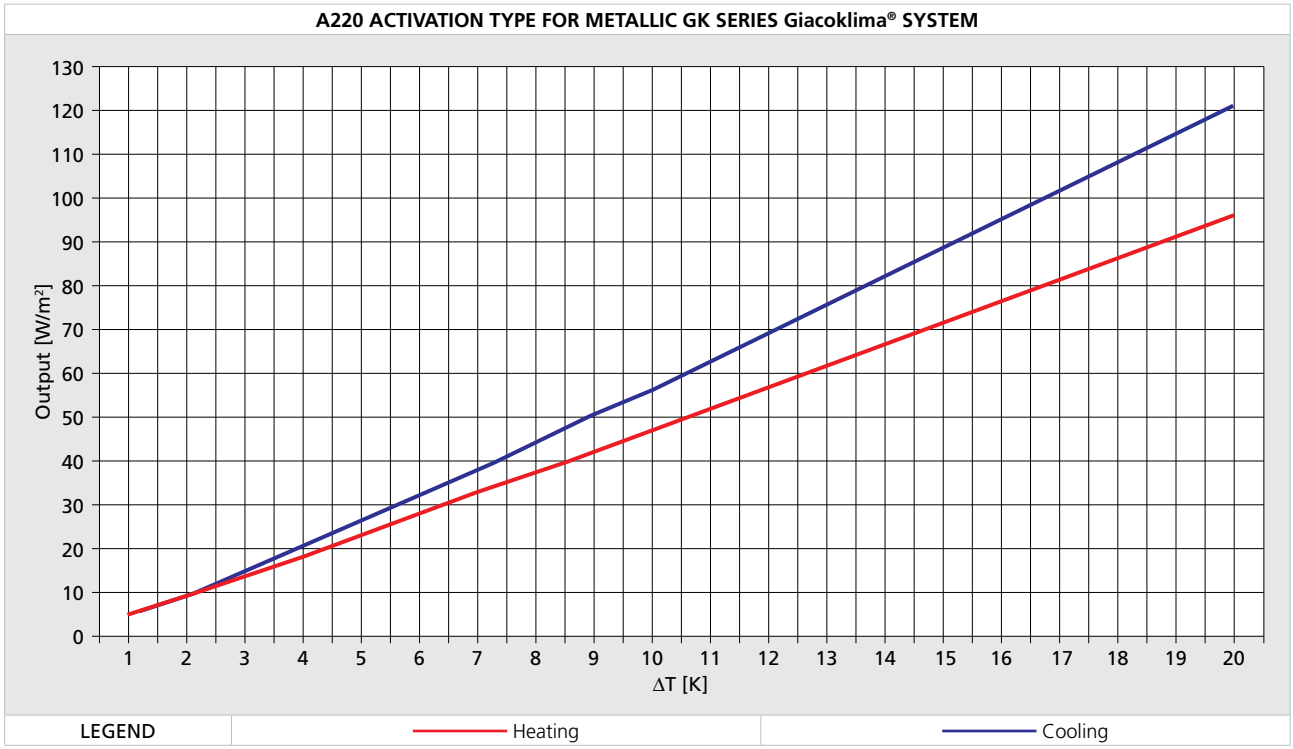
A220 activation



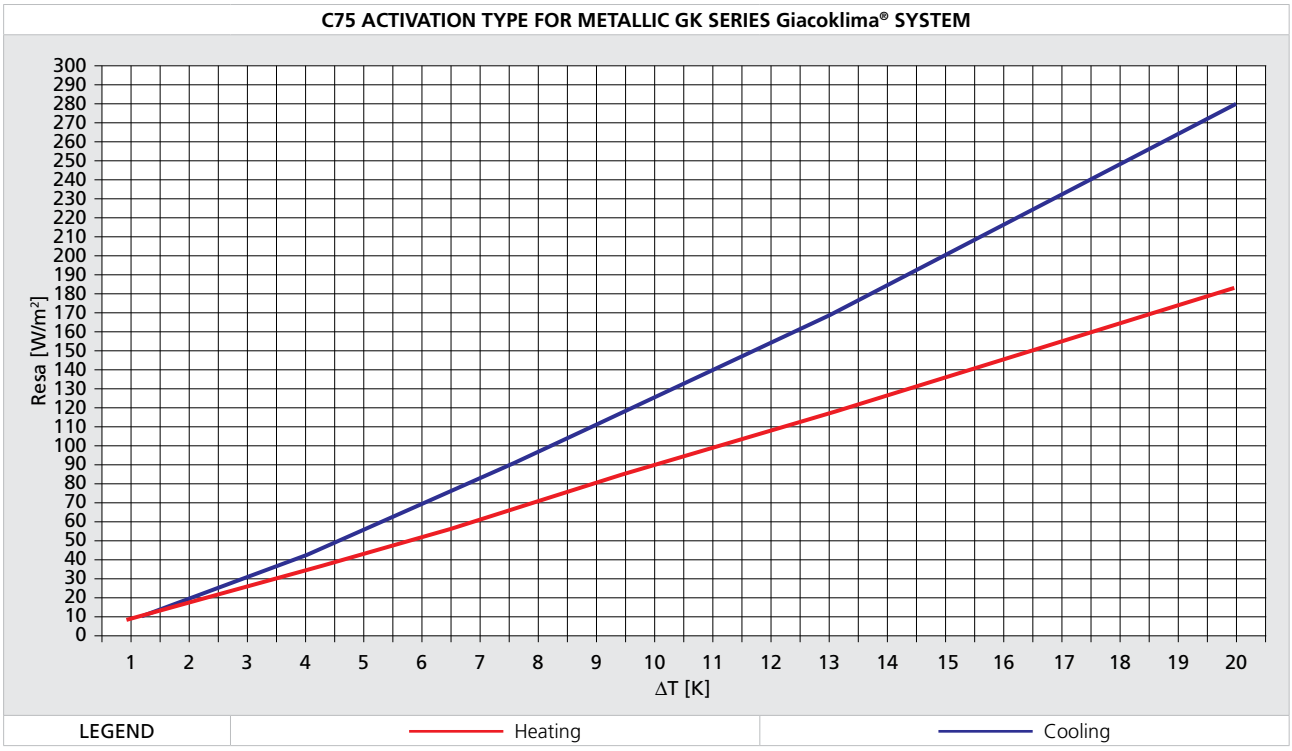
C75 activation

## Thermal outputs

The thermal outputs reported as follows are certified according to the standards EN14240 for cooling and EN14037 for heating. For the various activation types, the output results are different: in the following graphs the outputs in heating and in cooling respectively for A220 and C75 activation types are reported.




Heating and cooling outputs of the GK series radiant ceiling with A220 activation type.




Heating and cooling outputs of the GK series radiant ceiling with C75 activation type.

The characteristic equations to obtain the outputs in analytic mode are the following:

$$q_H = C_H \cdot \Delta T^{nH}$$ [W/m²] specific heating output

$$q_C = C_C \cdot \Delta T^{nC}$$ [W/m²] specific cooling output

where:

$$\Delta T = \left| T_a - \frac{T_r + T_m}{2} \right|$$

In the following table the coefficient values for the two activation types are indicated:

| Coefficient | A220 activation type | C75 activation type |
|---|---|---|
| $C_H$ | 4,222 | 7,689 |
| $n_H$ | 1,04 | 1,055 |
| $C_C$ | 4,510 | 8,719 |
| $n_C$ | 1,097 | 1,158 |

Value of the coefficient for the A220 and C75 activation types.

Where:
$T_a$ room working temperature
$T_m$ delivery temperature
$T_r$ return temperature

The specific output in W/m² refers to the active surface $S_A$ of the considered panel, evaluated according to the directions at paragraph 6 of EN14240 standard (see also the following paragraph).

| Project temperature (summer standards) | Project temperature (winter standards) |
|---|---|
| $T_m$=16 °C | $T_m$=36 °C |
| $T_r$=19 °C | $T_r$=33 °C |
| $T_a$=26 °C | $T_a$=20 °C |
| ΔT=8,5 K | ΔT=14,5 K |

Summer and winter project temperatures

## Note about EN14240 standard

The standards EN14240 and EN14037 define how the output tests for radiant ceilings shall be carried out respectively in cooling and in heating.

| Norm | Title |
|---|---|
| EN 14240:2004 | Ventilation for buildings - Chilled ceilings - Testing and rating |
| EN 14037:2003 | Ceiling mounted radiant panels supplied with water at temperature below 120 °C |

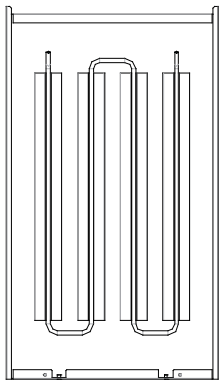
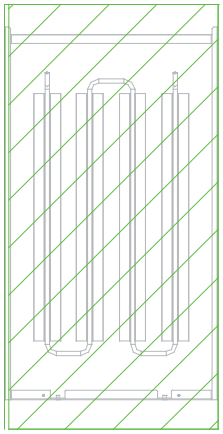
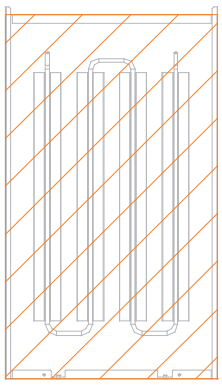
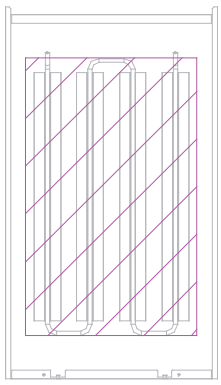
EN standards concerning radiant ceiling systems

This time we do not intend to go into the technical details of the laboratory test, but we wish to clarify the meaning of the data deductible from the effected tests and therefore from the obtained output certificates.

The aim of the test in thermostatic room is to measure the total output of the radiant false ceiling installed in the conditions imposed by the standard; to reach this result the flow of the circulating water and the temperature difference between delivery and return are measured.

At this point to derive the output value in W/m² , the total measured power shall be divided for the total "active area", as defined by the table 1 of Annex 2, according to the directions of paragraph 6 of EN14240 standard.

In the following figure, we report the example of the active area definition for the GK60 panels with C75 activation type.

| **GK60 panel** C75 activation | **Module** 600x1200 mm **area** | **Panel** 596x1030 mm **area** | **Active area** 480x782 mm |
|---|---|---|---|
|  |  |  |  |

Active area for GK60 panel

In the subject radiant panel various areas can be defined:

- **module area**, corresponding to 600x1200 mm = 0,720 m². In practice it is the area occupied by the panel and and by the part of the carrying structure of its competence;
- **panel area,** corresponding to 596x1030 mm = 0,614 m² that is the panel surface;
- **active area**, corresponding to 480x782 mm = 0,375 m², as defined by the EN14240.

It is evident that the reference to a surface or to another one does not bring equivalent results. In this documentation, when we talk about outputs in W/m² , we refer therefore to the output for unit of active surface, as defined by the reference standards. But for the design, it is easier to reason in terms of W/panel, afterwards defined as $Q_C$ and $Q_H$ where:

$$\dot{Q}_C = q_C \cdot S_A$$

$$\dot{Q}_H = q_H \cdot S_A$$

In the following table, the active $S_A$ surfaces for the various panel and activation types are reported.

| Panel type | Activation type and distance between the axis | Diffusers | $S_A$ active surface [m²] |
|---|---|---|---|
| GK60x60 PSV | C75 - 120 mm | 4x350 mm | 0,207 |
| GK60x120 PSV | C75 - 120 mm | 4x700 mm | 0,335 |
| GK30 | C75 - 120 mm | 2x700 mm | 0,188 |
| GK60 | C75 - 120 mm | 4x700 mm | 0,375 |
| GK120 | C75 - 120 mm | 6x700 mm | 0,563 |
| GK60x60 PSV | A220 - 260 mm | 2x350 mm | 0,268 |
| GK60x120 PSV | A220 - 260 mm | 2x700 mm | 0,450 |
| GK30 | A220 - 260 mm | 1x700 mm | 0,225 |
| GK60 | A220 - 260 mm | 2x700 mm | 0,450 |
| GK120 | A220 - 260 mm | 4x700 mm | 0,900 |

Active surfaces of the GK and GK PSV series

For the outputs in W/panel of the single panels, please consult the respective technical sheets too.

## Corrective factors of the output

The outputs previously indicated have been obtained in testing room by following the directions given by the standards. In order to obtain the outputs to be used in the design, three corrective factors shall be considered:

- $F_a$ height factor

The tests are effected at a determined height (normally between 2,6 and 2,7 m). To bring the output back to the real installation height , the $F_a$ height factor is used, calculated as:

$$F_a = a - b \cdot H$$

where:
H [m] is the real installation height
a = 1,117 (constant)
b = 0,045 (constant)

for H = 2,7 m, you have Fa = 0,9955; the formula is valid for installations up to 5 m.

- $F_V$ ventilation factor

The standards for the output tests impose maximum limits to the air speed in the testing room; this because the air motions around the false ceiling increase the output of the radiant system itself. Therefore, the standards impose precise limits to have uniformity and repeatability of the tests.

With the air motion of a mechanically ventilated room, the factor becomes $F_v = 1,15 \div 1,05$, from experimental tests effected at HLK University Institute (Heizung-Lüftung-Klimatechnik GmbH, Stuttgart), according to the air flow incidence on the false ceiling surface. If the room is not ventilated or the ventilation has no interaction with the false ceiling, you have $F_v = 1$.

- $F_f$ front factor

During the tests, the wall temperature of the room must be controlled; the temperature of the other surfaces has really an important influence on the outputs of the radiant ceiling. In reality the walls, above all the glazed ones, constitute the principal source of sensible thermal load. To calculate this, the front factor is used. It depends from the thermal asymmetry between the ceiling and the walls. It is experimentally calculated with the following function:

$$F_f = \frac{(\text{internal q} + \text{recess q})}{(\text{internal q} + 0{,}5 \text{ q from outside})}$$

In case of thermal contributions due to internal contributions for 45 W/m² and to external contributions for 45 W/m² , you have $F_f = 1,33$. According to the experimental tests of HLK Institute, such increase depends on the relationship between the surface of the windows and their height as regards to the room wall. From the examined experimental data, a maximum increase of 20% is opportune, prudentially and in absence of direct experimental measures; normally it is therefore recommended to use $F_f = 1,05 \div 1,2$.

## Summer dimensioning

The number of radiant panels needed to satisfy the summer sensible thermal load is obtained from:

$$P_R = \frac{Q_{S\,max}}{q_C \cdot S_A}$$

where:

$P_R$ = number of needed radiant panels [pieces]

$Q_{smax}$ = sensible thermal load dependent on the radiant ceiling (W)

$q_c$= specific output requested in cooling (W/m²)

$S_A$ = active surface of a single panel (m²)

At this point, in graphical or analytical way, you can find the requested ΔT value, according to the qc value obtained. Consequently, known the $T_a$ room temperature, you can determine the $T_m$ delivery temperature; it shall be not lower or too close to the dew point (normally a difference of 1,5 K is considered safe); with metallic panels in precautionary way, the minimum superficial temperature is considered equal to the delivery temperature.

The radiant panels shall be uniformly distributed, if necessary with a higher density in the surroundings of external walls and glazed surfaces. In this phase you have to consider also the presence in the false ceiling of other systems (lighting, sound diffusion, fire alarms, etc.) to determine the number of radiant panels to be really installed.

**NOTE:**
As per all radiant systems, for the correct summer functioning an auxiliary system of air treatment shall be expected, to cut down the latent charge.

## Winter dimensioning

The number of needed radiant panels PR is obtained from:

$$P_R = \frac{Q_{I\,max}}{q_H \cdot S_A}$$

where:

$P_R$ needed radiant panels [pieces]

$Q_{Imax}$ peak winterl load [W]

$q_H$ specific output requested in heating [W/m²]

$S_A$ radiant surface of a single panel [m²]

At this point, in graphical or analytical way, you can find the requested ΔT value, according to the qH value obtained. Consequently, known the $T_a$ room temperature, you can determine the $T_m$ delivery temperature; it shall be not as such to lead to excessive high superficial temperature. For false ceilings installed between 2,7 and 3 m height in rooms at 20°C, we recommend not to exceed 35-36°C on delivery.

The radiant panels shall be uniformly distributed, if necessary with a higher density in the surroundings of external walls and glazed surfaces. In this phase you have to consider also the presence of other systems (lighting, sound diffusion, fire alarms, etc.) to determine the number of radiant panels to be really installed.

## Summer and winter dimensioning

If the system is expected to work either in heating or in cooling, you shall effect the dimensioning for the season with the heaviest thermal load for the radiant ceiling and then determine the operation condition in the other season with the same number of radiant panels.

## Water capacity

The water capacity of a circuit is calculated as:

$$Q_{circuit} = Q \cdot n$$

$$G = \frac{Q_{circuit}}{\Delta t} \cdot 0{,}86$$

Where:

| | |
|---|---|
| G | water capacity of the circuit [l/h] |
| n | number of panels in series in the circuit |
| Q | thermal circuit of no.1 circuit panel[W] |
| $Q_{circuit}$ | total thermal output of the circuit [W] |
| $\Delta T=\|Tm-Tr\|$ | temperature difference of water [°C] |

In order that the water flow will be turbulent (and the indicated outputs are therefore valid), the capacity of a single ring shall be at least 180 l/h for the A220 activation and 80 l/h for C75 activation. This way you also have the benefit that the water circulates into the connection pipes at a speed higher than the critical ones, therefore it it is able to drag eventual air bubbles, that grow up inside the pipe themselves.

## Loss of pressure

The calculation of the loss of pressure is effected by using $K_v$ coefficients, that for the various panels are reported in the following table:

| Panel type | C75 activation $K_v$ | A220 activation $K_v$ |
|---|---|---|
| GK60x60 PSV | 0,95 | 2,3 |
| GK60x120 PSV | 0,77 | 2,11 |
| GK30 | 1,7 | 4,1 |
| GK60 | 0,86 | 2,11 |
| GK120 | 0,73 | 1,52 |

$K_v$ coefficient for the panels of the GK and GK PSV series

Known the G [l/h] capacity of a panel series, the Δp loss of pressure (mm water gauge) of the same series is given by:

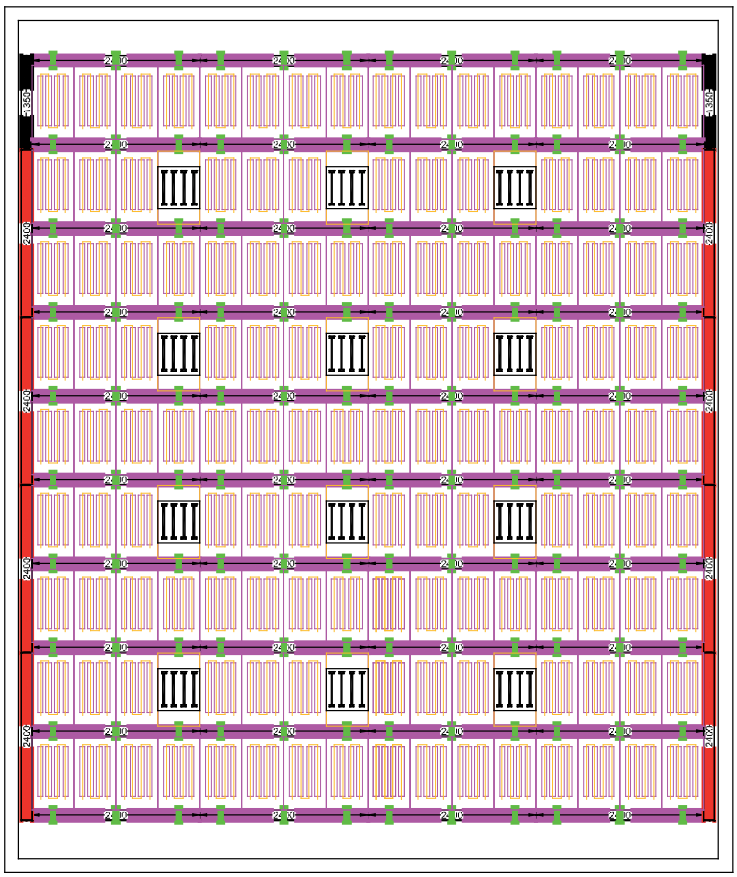
$$\Delta p = \left(\frac{G}{K_V}\right)^2 \cdot \frac{n}{100}$$

G circuit capacity [l/h]
n number of panels in series

Normally it is recommended not to exceed a loss of pressure of 2500-2800 mm water gauge in a single series.

## Dimensioning example

To clarify what has been described up now, we report a dimensioning example of the radiant ceiling system for a standard room. The example considers an entrance hall of 10x12 m dimensions (surface:120 m²) with a height of 3,2 m (cubing: 384 m³); the drawing is reported as follows. The expected type of radiant ceiliung is of the GK60 series with carrying elements at sight base 150 mm. The drawing of panels and structure follows.



144 modules of false ceiling are present in total, 12 of which are occupied by lighting apparatus.
The thermal loads are the following:
SUMMER ($T_{room}$ = 26 °C, U.R. = 50%): 8.200 W (sensible)
600 W (latent)
WINTER ($T_{room}$ = 20 °C):5.600 W

In this area a system of primary air is expected for the ventilation and dehumidification in cooling, and only for the ventilation in heating. The expected quantity of air change is 2 vol/h (768 m³/h) and it is sufficient to treat the summer latent load (conditions of air input in summer $T_{inp}$ = 15°C, $x_{inp}$ =9 g/kg); it supplies moreover a sensible contribution of 2.900 W. Instead it does not supply any contribution in heating, as the air introduced in room at neutral temperature ($T_{inp}$ = 20°C. The powers required by the radiant ceiling are the following:
SUMMER 5.300 W
WINTER 5.600 W

| Supposed operation data | Summer | Winter |
|---|---|---|
| Delivery temperature | 16 °C | 36 °C |
| ΔT water | 3 K | 3 K |
| Room temperature | 26 °C | 20 °C |
| ΔTwater-room | 8,5 K | 14,5 K |

The supposed corrective factors of the output are the following:
Height factor $F_a$ 0,973
Front factor $F_f$ 1,05
Ventilation factor $F_V$ 1,1

In these conditions, the specific outputs are:
$q_C$ (ΔT = 8,5 K) = 103,93 W/m²
$q_H$ (ΔT = 14,5 K) = 129,16 W/m²

Therefore the panels of the supposed technologies have the following outputs:

$$Q_C\,[W/panel] = q_C\,[W/m] \cdot S_A\,[m^2] \cdot F_a \cdot F_V \cdot F_f$$

$$Q_H\,[W/panel] = q_H\,[W/m] \cdot S_A\,[m^2] \cdot F_a \cdot F_V \cdot F_f$$

$Q_C$ = 43,8 W/panel
$Q_H$ = 54,4 W/panel

It follows that to obtain the requested winter output, 103 active panels are needed; for the summer output instead, 121 are necessary. Consequently the active radiant panels must be 121; as the available panels for the activation were 132, it follows that it is possible to cover the loads.

Obviously the radiant panels remains 121 in winter too, but a lower output as regards to the maximum one previously defined is required to each panel. It is equal to:

$Q_H$ = 46,3 W/pannel

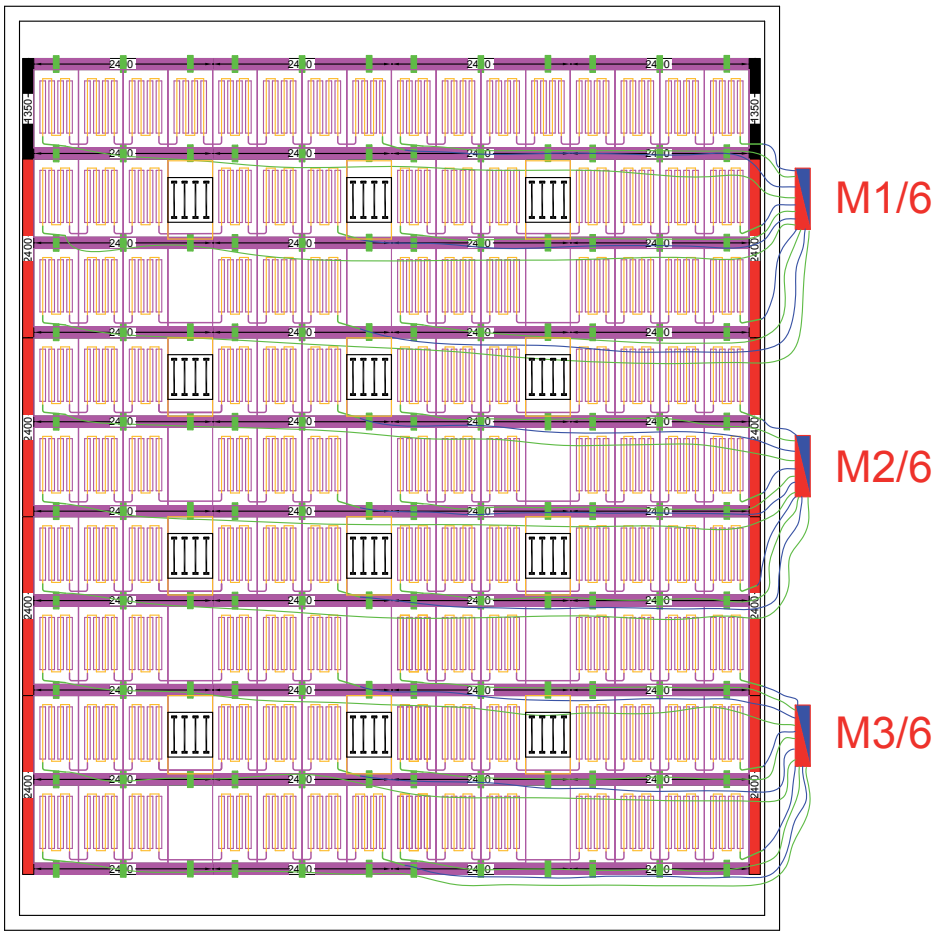
This output , making the previous calculations in reverse, is obtained with the following operation conditions:

ΔT = 12,5 K

Therefore, as the room temperature is 20°C, with an average water temperature of 32,5°C and with a ΔT of 3 K winter water, the maximum delivery temperature in the project conditions will be equal to 34°C.

Let's pass now to the calculation of deliveries and loss of pressures; the calculation is effected in cooling, as from the previous calculations, this resulted as the most critical season.
In the following drawing we report the scheme of the hydraulic connections expected for panels and circuits.

**HYDRAULIC CONNECTION SCHEME**




**LEGEND**

| | | | |
|---|---|---|---|
| | Delivery and return distribution manifold | | **K85RCY002**<br>Preassembled kit for circuit connection |
| | **K85RCY001**<br>Preassembled kit for panel connection | | **R996IY113**<br>Circuit connection pipes.<br>Preinsulated 16x1,5 mm polybutylene |

The total system capacity will be given by the formula:

$$G_{tot} = \frac{Q_{C-tot}}{\Delta t} \cdot 0{,}86$$

Where:

| | |
|---|---|
| $G_{tot}$ | water capacity in l/h to the radiant ceiling |
| $Q_{C-tot}$ | 5.300 W total summer output in W to the radiant ceiling |
| Water ΔT | 3 K temperature difference delivery and return of the radiant ceiling |

The total $G_{tot}$ capacity is so 1.519 l/h.

To calculate the loss of pressure is necessary determining the most unfavorable series; it is constituted by 8 panels.

The capacity of this series is then calculated as:

$$G_{series} = \frac{Q_{C-series}}{t} \cdot 0{,}86$$

where:

| | | |
|---|---|---|
| $G_{series}$ | | capacity of the series in l/h |
| $Q_{C-series}$ | 350 W | summer output in W of the series panels |
| Δt water | 3 K | delivery and return temperature difference of the radiant ceiling |

Therefore the $G_{serie}$ capacity is equal to 100,3 l/h.

Known the capacity of most unfavorable panel series, the Δp loss of pressure [w.a. mm] of the same series is given by:

$$\Delta p_{serie} = \left(\frac{G_{serie}}{K_V}\right)^2 \cdot \frac{n}{100}$$

where

| | |
|---|---|
| n | number of panels in series (8) |
| $K_v$ | see loss of pressure table |

And therefore the loss of pressure of the panel series is equal to 1088 water gauge

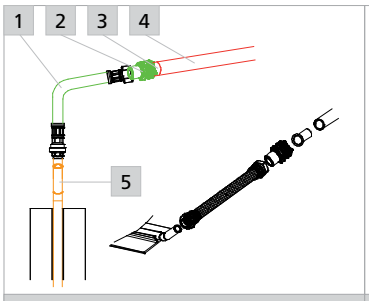
To this one, you shall add the loss of pressure of the flow-pipes, that with 100 l/h in a plastic material pipe of 16x1,5 mm diameter is equal to 10 mm/m.

From the connection drawing, it is to deduce that the connection sections are equal to 15 m in all (flow and return): the loss of pressure to be added up is thus 150 mm.

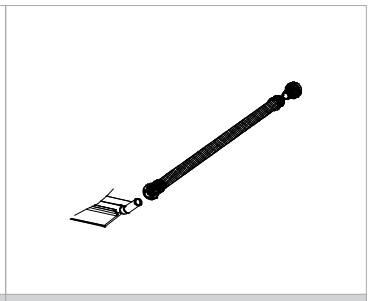
The complete loss of pressure of the series can therefore be brought near to 1250 mm water gauge

## Connection

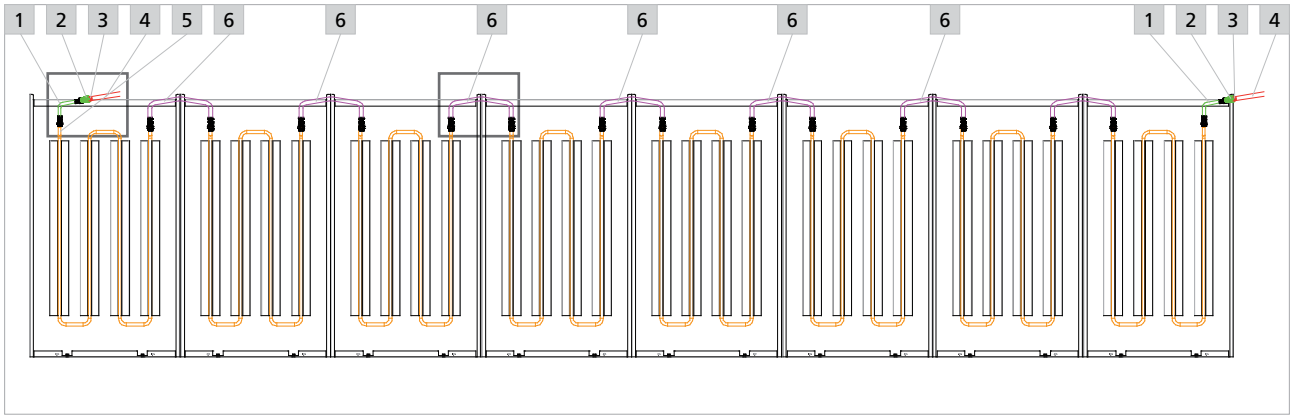
| | |
|---|---|
| 1 | K85RCY002 |
| 2 | RC16-1/2"F - RC107X017 fitting |
| 3 | RC16 - RC900X016 sleeve |
| 4 | 4 Manifold connection pipe – preinsulated PB 16x1,5 |
| 5 | 5 Copper ø 12 mm panel pipe |
| 6 | K85RCY001 RC12 |




Circuit connection detail

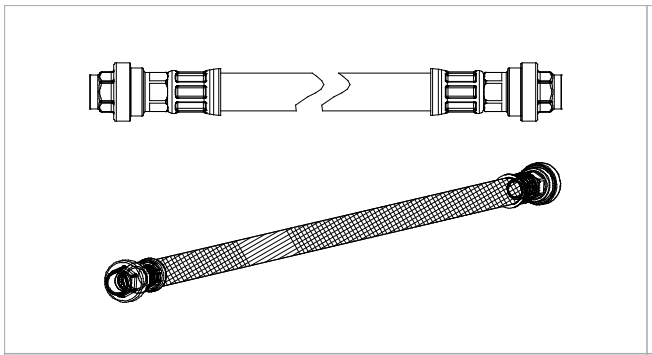


Panel-panel connection detail

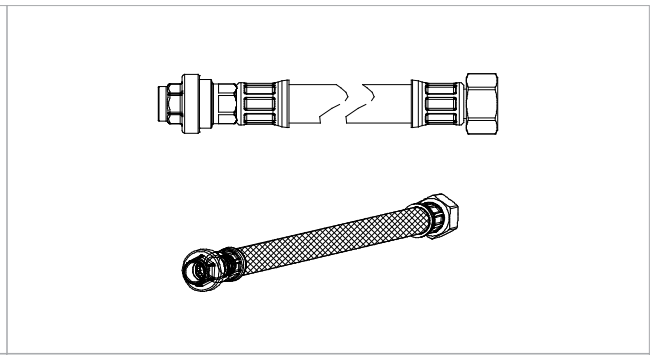



Circuit connection and connection among panels.

In order to effect the connections, the use of the K85RC preassembled kit has been expected for the connection among panels and of the circuits; in the following figures the detail of the K85RC kit.



Kit for K85RCY001 panel connection – **RC12xRC12 L 750 mm**

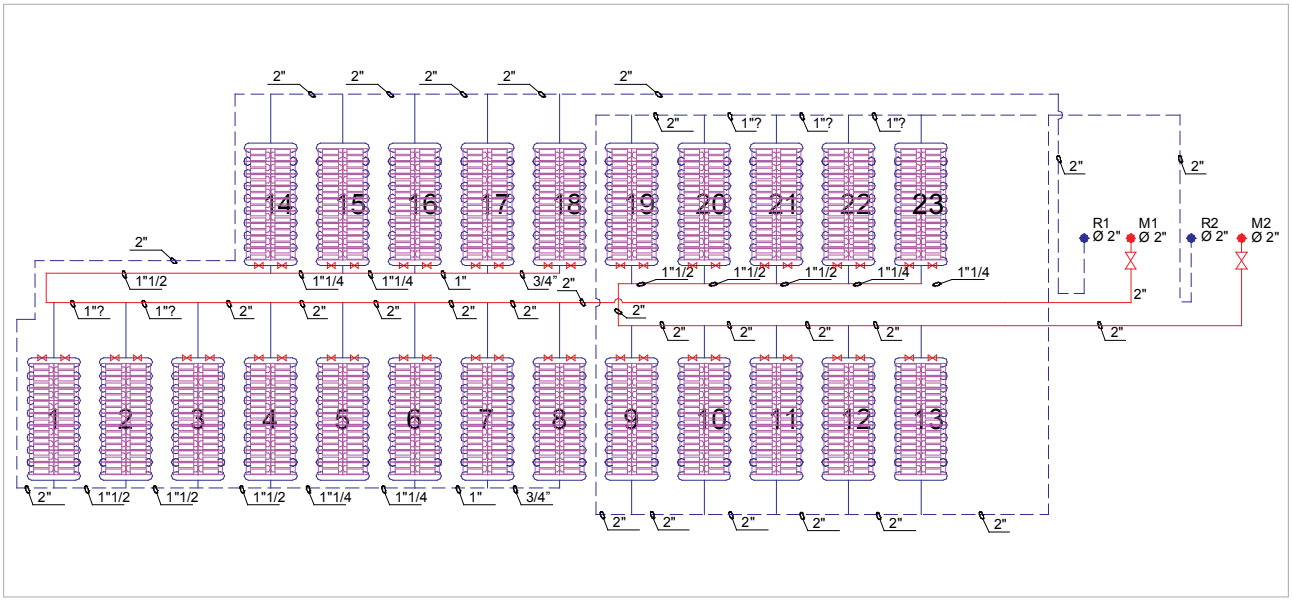


Kit for K85RCY002 circuit connection **K85RCY002 - RC12x1/2" L 400 mm**

K85RC connection kit

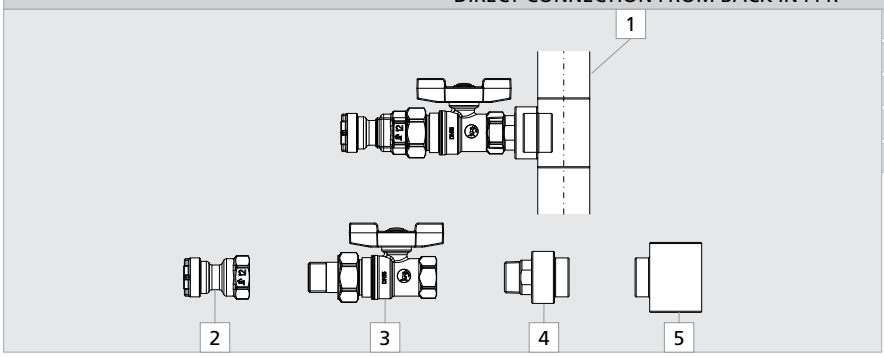
## System scheme

The hydraulic distribution can be effected according to various techniques; normally a distribution with direct connection from the back or to manifolds is made. From the regulation point of view, instead it is possible to have a distribution with two or four pipes; in this last case the distribution with manifolds is recommended. The distribution with direct connection from the back is normally used for large rooms with zone regulation for wide areas having uniform characteristics. For the optimal balancing of the various series, normally the technique of the inverse return (called also Tichelmann) is usually used. In the following figure, an example of this distribution typology is reported.



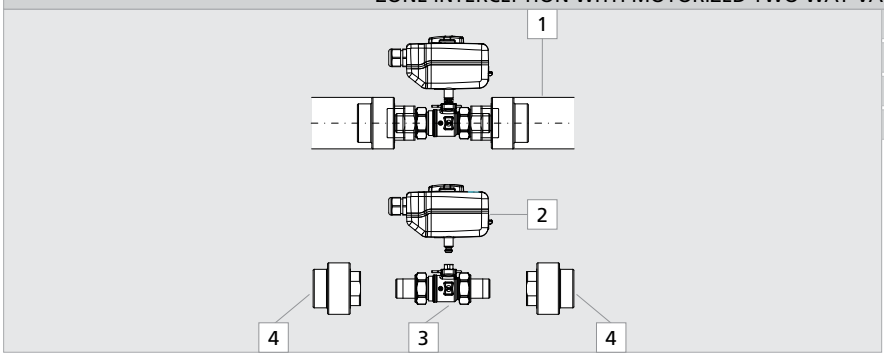

Connection of the circuits and connection among panels.

DIRECT CONNECTION FROM BACK IN PPR




| | |
|---|---|
| 1 | **H100** PPR pipe |
| 2 | **RC109** Fitting |
| 3 | **R259** Ball valve |
| 4 | **H107** Fitting |
| 5 | **H151** T Fitting |

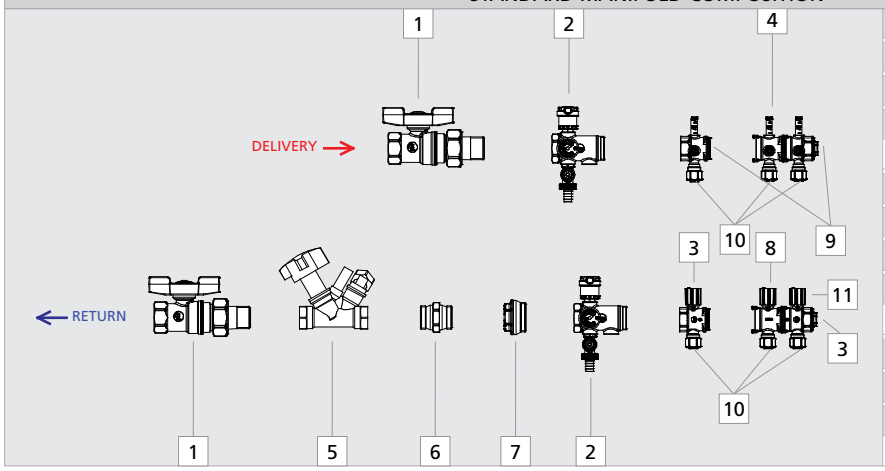
ZONE INTERCEPTION WITH MOTORIZED TWO WAY VALVE




| | |
|---|---|
| 1 | **H100** PPR pipe |
| 2 | **K270 or K272** Motor |
| 3 | **R277Y004** Zone valve |
| 4 | **H109Y024** Fitting |

When the capillary control of the room temperature is required (for example for a series of offices of small and medium dimension), the preferable distribution is instead that one with manifolds; it permits to have in a single inspection point interceptions, balancing and regulations for many rooms; the rooms, even if connected to only one manifold, are independent from the secondary regulation point of view thanks to the use of electrothermal actuators on the single connections.
The used manifold is normally modular (if necessary with flow meter on the delivery) with electrothermal actuators on the return.

STANDARD MANIFOLD COMPOSITION



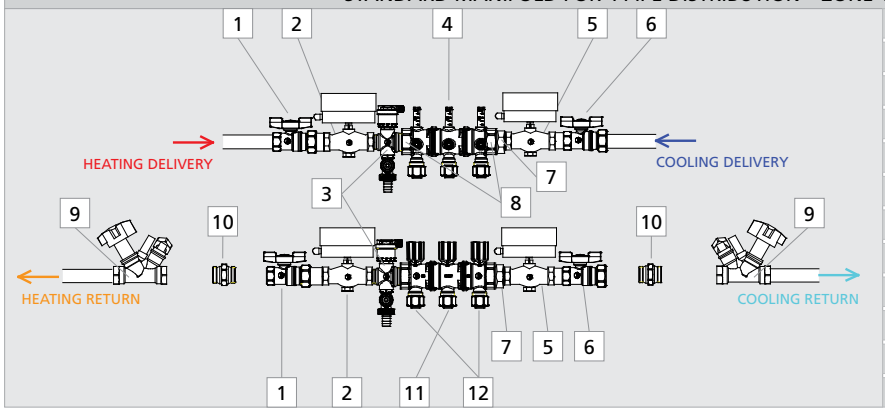

| | |
|---|---|
| 1 | **R259** Ball valve |
| 2 | **R554D** Intermediate fitting |
| 3 | **R53VT** End manifold |
| 4 | **R53MM** Modular manifold (to reach the number of needed connections) |
| 5 | **R206** Balancing valve |
| 6 | **R189D** Nipple |
| 7 | **R593D** Reduction |
| 8 | **R53VM** Modular manifold (to reach the number of needed connections) |
| 9 | **R53MT** End manifolds |
| 10 | **R179** Adaptors |
| 11 | Manual interceptions to be replaced by **R478** or **R473** electrothermal actuators |

Composition of the distribution manifold

If the manifold supplies a single zone, instead of the electrothermal actuators, you can use two or three way zone valves, by keeping the manual interceptions on the return for the filling phase.

In the following figures, two options for the distribution with four pipes.

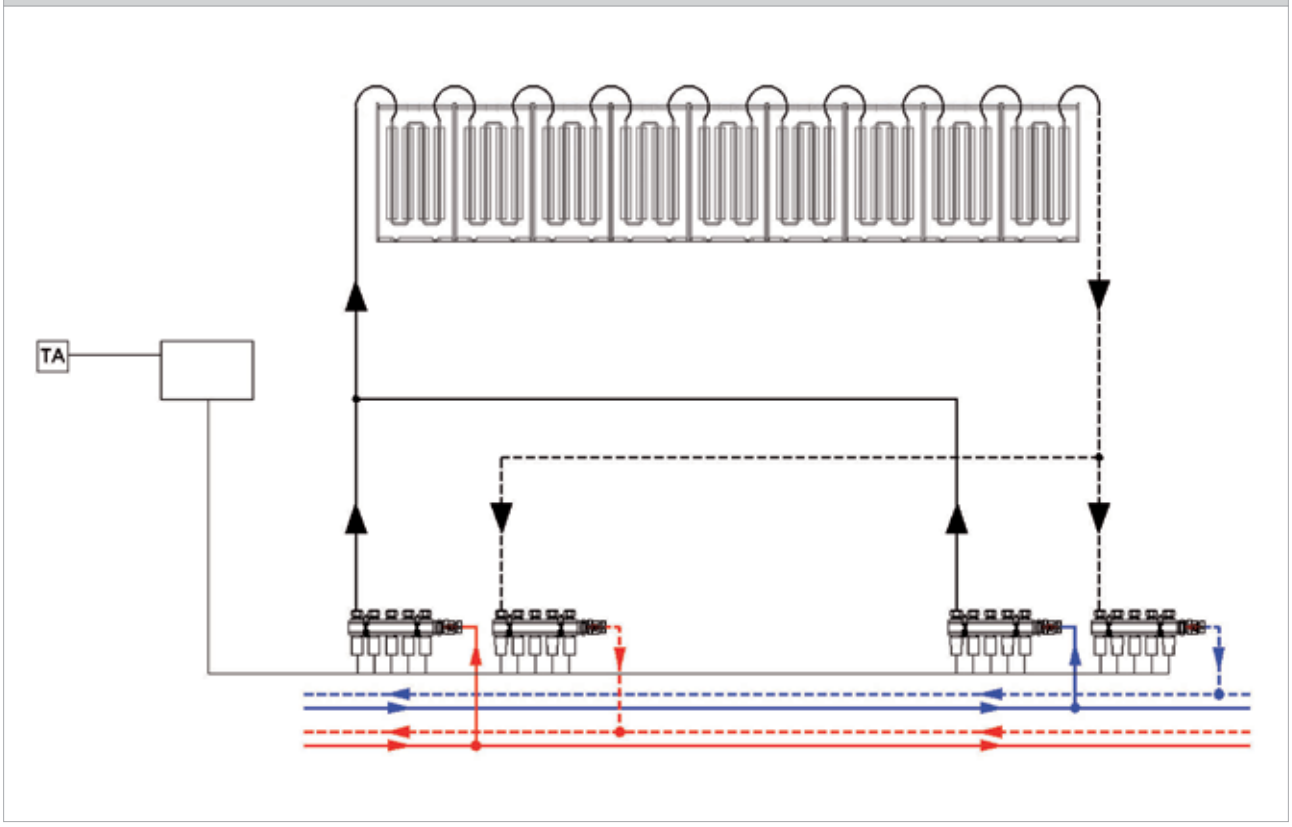
STANDARD MANIFOLD FOR 4 PIPE DISTRIBUTION – ZONE VALVES




| | |
|---|---|
| 1 | **R259D** Ball valve |
| 2 | **R276** Way zone valve |
| 3 | **R554A** Intermediate fitting |
| 4 | **R53MM** Modular manifold |
| 5 | **R277** Way zone valve |
| 6 | **R251** Ball valve |
| 7 | Reduction |
| 8 | **R53MT** End manifolds |
| 9 | **R206Y105** Balancing valve |
| 10 | **R189DY005** Nipple |
| 11 | **R53VM** Modular manifold |
| 12 | **R53VT** End manifolds |

Scheme with 2 manifolds and four 2 way zone valves

PIPE DISTRIBUTION – ELECTROTHERMAL ACTUATORS ON THE SINGLE CONNECTIONS




Scheme with 4 manifolds and electrothermal actuators on each connection

## Themoregulation

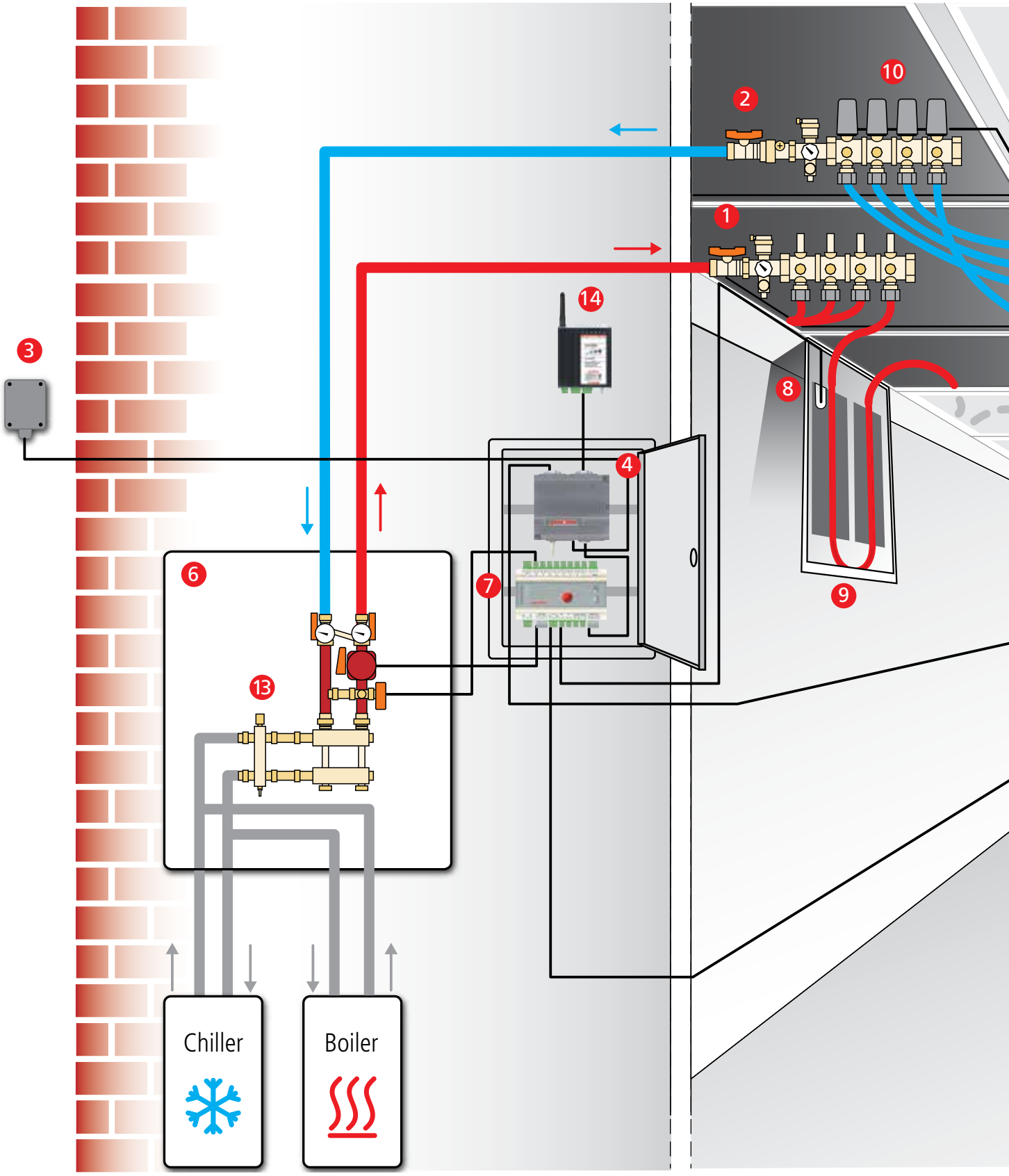
To satisfy the requirements of a more elevated comfort, a sensible energy saving and higher safety, the giacoklima® thermoregulation system has been developed. It is expressly orientated to the climatic regulation of floor and ceiling radiant panel systems. The devices of the giacoklima® thermoregulation range have bigger intelligence and can exchange information thanks to the modern bus technology; the devices are connected by means of a wiring that is used to transfer opportunely codified messages. In a bus technology system, a "point to point" connection between room thermostats and the fulfillment devices (electrothermal actuators or motors for zone valves) is no more needed; it is sufficient to connect room thermostats and drive and adjustment regulators to the bus, without respecting a prearranged sequence. The system can be configured for different regulation types (fixed point and/or climatic compensation) so it is possible to reply in a targeted way to the different adjustment requirements in heating and cooling. The information availability and the possibility to interface the bus system on site or remotely offer new opportunities to optimize the system operation, its maintenance and the handling of events and alarms. As each device can communicate on the bus, centralized functions can be comfortably effected and more information can be visualized for the final user, the maintenance man or the building owner either on site or remotely.

Giacomini thermoregulation components:

| | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| **R296, R298, K297** Mixing valves | | | **KM²03** Control and supervision unit | **KPM²0** Regulation unit |
|  |  |  |  |  |
| **K274, K274J, K281, K282** Motors for mixing valve | | | | **KD300** Touch-screen control unit |
|  |  |  |  |  |
| **K485** Room sensor | **K481** Thermostat | **K483** Thermostat | **KD200** Display unit | **KSMS** Remote control module |

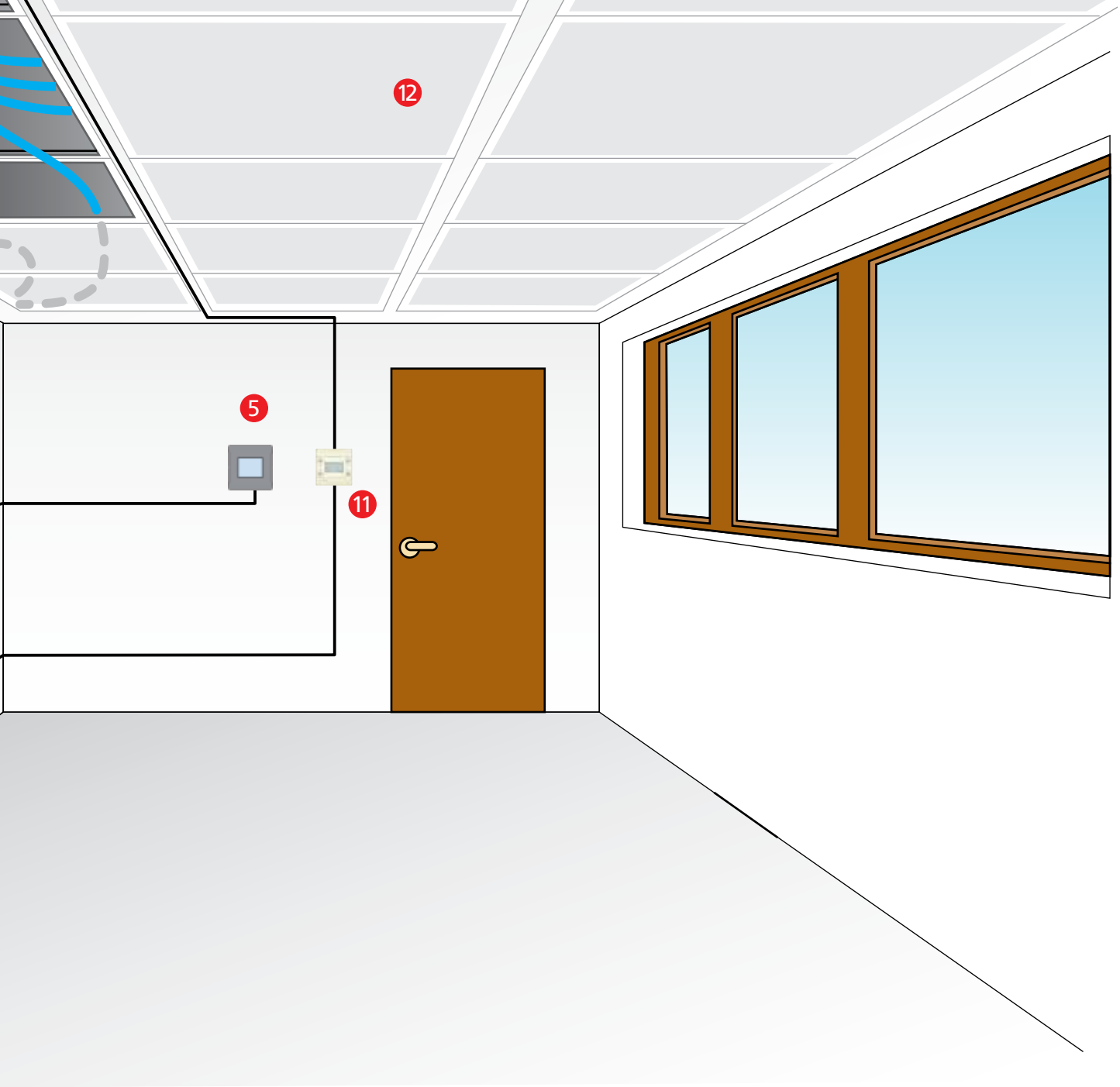
See the features of the single products on the respective technical sheets

## Applicatory example in tertiary building: giacoklima® thermoregulation system in combination with heating and cooling radiant ceiling system



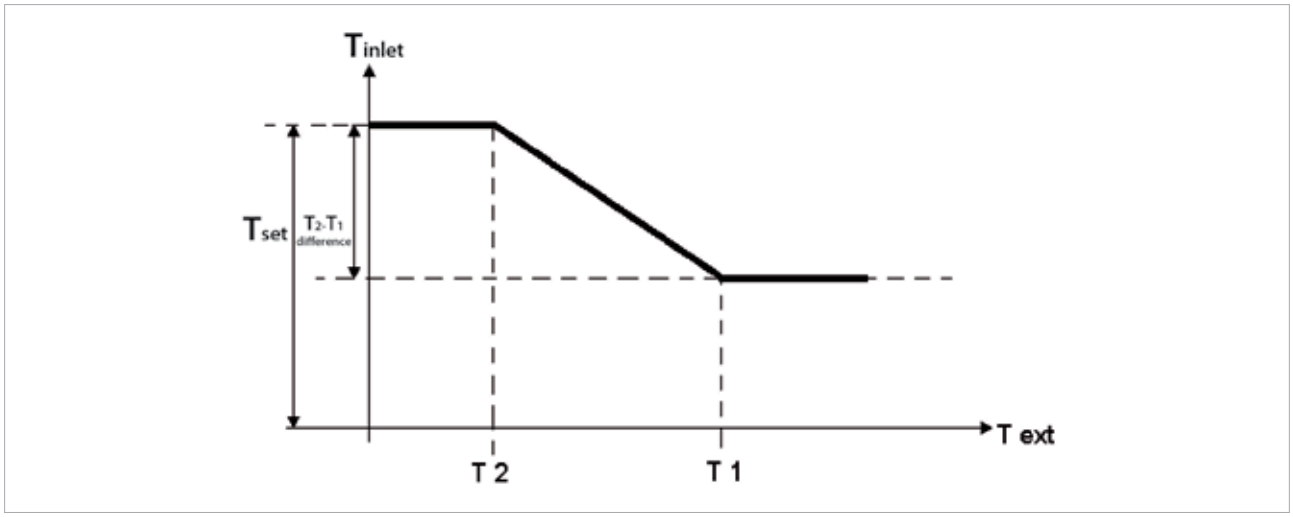
## LEGEND

1. Delivery manifold
2. Return manifold
3. K365P External temperature sensor
4. KM203 Control and supervision unit
5. KD200 Display unit
6. Power plant group
7. KPM20 Input/output unit
8. K366A Dew point sensor
9. GK radiant panel to be inspected
10. R473 or R478 Electrical actuators
11. K481 Projecting thermostat
12. Radiant ceiling
13. R146 hydraulic separator
14. KSMS remote control module



## Winter regulation

The delivery temperature is defined according to a climatic compensation curve of the type represented in the following figure.




Climatic compensation curve for the operation of the radiant ceiling in heating

The secondary regulation is controlled by the giacoklima® room thermostats that drive the opening and the closing of the zone actuators according to the achievement or not of the defined set-point.

## Summer regulation

K481AY002 and K483AY002 giacoklima® room thermostats have an integrated relative humidity sensor and can transmit the detected value on the communication bus to which are connected: due to this, the system is able to know the dew point of all rooms where these thermostats are installed; it so possible to effect the feedback on the regulation of the delivery temperature: it is such to allow the maximum possible output without the risk of superficial condensate forming. The Km² 03 control and supervision unit uses the following algorithm for this aim:

$$T_m = \max (T_{DP} + K_c; T_{min})$$

The standard values of the temperatures to be used in the algorithm are reported in the following table.

| Symbol | Description | Standard value for metallic radiant ceiling |
|---|---|---|
| $T_m$ | Delivery temperature | 16 °C |
| $T_{DP}$ | Dew temperature | 14,5 °C (a 26 °C con 50% u.r.) |
| $K_C$ | Shifting from $T_{DP}$ | + 1,5 K |
| $T_{min}$ | Minimum delivery temperature | 15 °C |

Coefficient value for A220 and C75 activations

The K481AY002 room thermostats works also as anti-condensate safety: they compare the dew point in room with the delivery temperature and, if this is too low, they close the hydraulic supply to the room. The same typology of thermostat is available also in blind sensor version (K485AY002).

## Panels

| Model | Structure type | Steel sheet thickness [mm] |
|---|---|---|
| GK30 | Parallel (at sight or hidden) | 0,8 |
| GK60 | Parallel (at sight or hidden) | 0,8 |
| GK120 | Crossed | 0,8 |
| GK60x60* | PSV base 24 mm | 0,6 |
| GK60x120* | PSV base 24 mm | 0,6 |

* The data are valid also for the German market versions (625x625 mm or 625x1250 mm) and for the US market ones (2”x2” or 2”x4”)

## Materials

The panels are made of steel sheet 0,8 mm thickness (GK series) or 0,6 mm (GK PSV series), according to the table above; for all typologies, the panels are available either in micropunched, or in plain version. The standard punching is R2516 (2,5mm diameter holes on the 16% of the surface). For other punching, please contact Giacomini technical department.

## Typology and dimensions of the thermal diffusers

| Panel type | A220 activation type | C75 activation type |
|---|---|---|
| GK30 | No. 1 diffuser, 700x220 mm | No. 2 diffusers, 700x75 mm |
| GK60 | No. 2 diffusers, 700x220 mm | No. 4 diffusers, 700x75 mm |
| GK120 | No. 4 diffusers, 700x220 mm | No. 6 diffusers, 700x75 mm |
| GK60x60* | No. 2 diffusers, 350x220 mm | No. 4 diffusers, 350x75 mm |
| GK60x120* | No. 2 diffusers, 700x220 mm | No. 6 diffusers, 700x75 mm |

* The data are valid also for the German market versions (625x625 mm or 625x1250 mm) and for the US market ones (2”x2” or 2”x4”)

## Weight

GK series

- active surface 16 kg/m² (carrying structure included)
- inactive surface 11 kg/m² (carrying structure included)

GK PSV series

- active surface 12 kg/m² (carrying structure included)
- inactive surface 11 kg/m² (carrying structure included)

## Water content

| Panel type | A220 activation (litres) | C75 activation (litres) |
|---|---|---|
| GK30 | 0,31 | 0,144 |
| GK60 | 0,64 | 0,288 |
| GK120 | 1,18 | 0,432 |
| GK60x60* | 0,31 | 0,160 |
| GK60x120* | 0,64 | 0,240 |

* The data are valid also for the German market versions (625x625 mm or 625x1250 mm) and for the US market ones (2”x2” or 2”x4”)

## Thermal output certifications according to EN14240 and EN14037

A220 activation type

- Cooling Cert. No. 08.58.GIA.011 WSP Stuttgart
- Heating Cert. No. 08.58.GIA.012 WSP Stuttgart
- Reaction to fire Class 0

C75 activation type

- Cooling Cert. No. 08.58.GIA.013 WSP Stuttgart
- Heating Cert. No. 08.58.GIA.014 WSP Stuttgart
- Reaction to fire Class 0

## Product specifications

### K6C panel for GK60x60 PSV series radiant ceiling

Prepainted steel sheet panel for laying on T structure having 24 mm base for 600x600 mm modular false ceiling. Active panel with 4 thermal diffusers made of anodized aluminium of 75 mm width, factory glued on the panels. Hydraulic circuit made through copper serpentine with 12x1 mm pipe. Possibility of thermal insulation by means of K820 thermoacoustic panel in polyester fibre.

**Main features**

- Laying on T structure having 24 mm base
- Zinc coated steel sheet size 0,6 mm
- 600x600 mm false ceiling module
- C75 activation type
- Suspension by means of wires
- 575x575 mm (LxH) panel dimensions

**hnical data**

e reaction class 0
0,95 with l/h capacity and loss of pressure in mm water column
inal outputs:
(according to EN14240): 96,9 W/m2 with ΔT water-room of 8 K
(according to EN14037): 87,3 W/m2 with ΔT water-room of 10 K

**odes:**

2516 perforated, RAL9003 white
at, RAL9003 white
516 perforated, RAL9006 silver
RAL9006 silver
omini S.p.A

PRODUCT SPECIFICATIONS

## GK60 series

Metallic radiant ceiling GK60 type, composed by:

- Carrying elements and panels, that permit to create a 600 x 1200 mm module;
- Steel sheet carrying elements 150 mm width and 0,8 mm thickness;
- Panels in steel sheet with the following dimensional features: width 1030 mm and length 596 (module 1200 x 600), thickness 0,8 mm.
  The panels are plain or punched (with 2,5 mm diameter hole on all surface, except for a perimeter area 20 mm width; a puncture percentage of 16% is so obtained)
- Zinc coated and stove enameled carrying elements and tiles – RAL 9010 color

On a side, each panel has two hooks, that are fixed into the buttonholes of the carrying elements during the mounting, and that guarantee the good positioning of the panel. Moreover around these hooks the panel can always effect a 90° rotation up to the vertical position, even during the system operation.
You can so reach the plenum above the false ceiling, without the impediment of the panels or of the carrying structure. On the other panel side, two safety springs keep the panel on seat e allow the panel opening, with the help of a simple key, and closing.

### C75 activation type

In the version with C75 activation type, the active panels have no. 4 thermal diffusers in extruded aluminium having 75 x 700 mm dimensions, glued on panels on the factory. The circuit is made by means of copper serpentine with 12x1 mm pipe. For the connection among panels, it is expected the use of EPDM flexible pipes with sleeve in stainless steel mesh of 750 mm length, complete with 12 mm push-fitting. For the connection of the panels to distribution pipes or to the manifolds, it is expected the use of EPDM flexible pipes with sleeve in stainless steel mesh of 400 mm length, complete with 12 mm push-fitting on one side, and a ½" threaded fitting on the other.
The radiant panels can be covered by thermo-acoustic insulation of the same dimensions of the panel, so as to stick in it.
Cooling output certified into testing thermostatic room according to EN14240:
96,9 W/m$^2$ without thermal insulation and at the nominal capacity with ΔT water-room of 8 K.
Heating output certified into testing thermostatic room according to EN14037:
87,3 W/m$^2$ without thermal insulation and at the nominal capacity with ΔT water-room of 10 K.

### A220 activation type

In the version with A220 activation type, the active panels have no. 2 thermal diffusers in extruded aluminium having 220 x 700 mm dimensions, glued on panels on the factory. The circuit is made with a 16x1,5 mm polybutylene pipe with anti-oxygen barrier. By means of rapid straight or angle push fittings, the connection in series of the various panels and the connection to manifolds or to the distribution pipes is effected.
The radiant panels can be covered by thermo-acoustic insulation of the same dimensions of the panel, so as to stick in it.
Cooling output certified into testing thermostatic room according to EN14240:
44,1 W/m$^2$ without thermal insulation and at the nominal capacity with ΔT water-room of 8 K.
Heating output certified into testing thermostatic room according to EN14037:
46,3 W/m$^2$ without thermal insulation and at the nominal capacity with ΔT water-room of 10 K.

## GK120 series

Metallic radiant ceiling GK120 type, composed by:
- Carrying elements and panels, that permit to create a 1200 x 1200 mm module;
- Steel sheet carrying elements 150 mm width and 0,8 mm thickness;
- Panels in steel sheet with the following dimensional features: width 1030 mm and length 1030 (module 1200 x 1200), thickness 0,8 mm. The panels are plain o punched (with 2,5 mm diameter hole on all surface, except for a perimeter area 20 mm width; a puncture percentage of 16% is so obtained)
- Zinc coated and stove enameled carrying elements and tiles – RAL 9010 color

On a side, each panel has two hooks, that are fixed into the buttonholes of the carrying elements during the mounting, and that guarantee the good positioning of the panel. Moreover around these hooks the panel can always effect a 90° rotation up to the vertical position, even during the system operation.
You can so reach the plenum above the false ceiling, without the impediment of the panels or of the carrying structure. On the other panel side, three safety springs keep the panel on seat e allow the panel opening, with the help of a simple key, and closing.

### C75 activation type

In the version with C75 activation type, the active panels have no. 6 thermal diffusers in extruded aluminium having 75 x 700 mm dimensions, glued on panels on the factory. The circuit is made by means of copper serpentine with 12x1 mm pipe. For the connection among panels, it is expected the use of EPDM flexible pipes with sleeve in stainless steel mesh of 750 mm length, complete with 12 mm push-fitting. For the connection of the panels to distribution pipes or to the manifolds, it is expected the use of EPDM flexible pipes with sleeve in stainless steel mesh of 400 mm length, complete with 12 mm push-fitting on one side, and a ½" threaded fitting on the other.
The radiant panels can be covered by thermo-acoustic insulation of the same dimensions of the panel, so as to stick in it.
Cooling output certified into testing thermostatic room according to EN14240:
96,9 W/m² without thermal insulation and at the nominal capacity with ΔT water-room of 8 K.
Heating output certified into testing thermostatic room according to EN14037:
87,3 W/m² without thermal insulation and at the nominal capacity with ΔT water-room of 10 K.

### A220 activation type

In the version with A220 activation type, the active panels have no. 4 thermal diffusers in extruded aluminium having 220 x 700 mm dimensions, glued on panels on the factory. The circuit is made with a 16x1,5 mm polybutylene pipe with anti-oxygen barrier. By means of rapid straight or angle push fittings, the connection in series of the various panels and the connection to manifolds or to the distribution pipes can be made.
The radiant panels can be covered by thermo-acoustic insulation of the same dimensions of the panel, so as to stick in it.
Cooling output certified into testing thermostatic room according to EN14240:
44,1 W/m² without thermal insulation and at the nominal capacity with ΔT water-room of 8 K.
Heating output certified into testing thermostatic room according to EN14037:
46,3 W/m² without thermal insulation and at the nominal capacity with ΔT water-room of 10 K.

## GK60x60 PSV series

Metallic radiant ceiling GK 60x60 PSV type, composed by:
- Carrying elements and panels, that permit to create a 600 x 600 mm module;
- Steel sheet carrying elements 24 mm width;
- Panels in steel sheet with the following dimensional features: width 575 mm and length 575 mm (module 600 x 600), thickness 0,6 mm. The panels are plain o punched (with 2,5 mm diameter hole on all surface, except for a perimeter area 15 mm width; a puncture percentage of 16% is so obtained)
- Zinc coated and pre-painted carrying elements and tiles – RAL 9003 color

Each panel has two suspension cables that are fixed to the carrying elements during the mounting and that guarantee the opening and the ease of inspection; the panel can always be released and vertically positioned remaining hanged to the cables, even during the system operation.
You can so reach the plenum above the false ceiling, without the impediment of the panels or of the carrying structure.

### C75 activation type

In the version with C75 activation type, the active panels have no. 4 thermal diffusers in extruded aluminium having 75 x 350 mm dimensions, glued on panels on the factory. The circuit is made by means of copper serpentine with 12x1 mm pipe. By means of a brass straight or angle push fitting and the use of a 12x1,5 polybutylene pipe with anti-oxygen barrier, the connection in series of the various panels is effected; for the connection to distribution manifolds RC push fittings and 16x1,5 mm plastic material pipes are used. The pipe are preinsulated to reduce the loss of pressure and the thermal dispersions.
The radiant panels can be covered by thermo-acoustic insulation of the same dimensions of the panel.
Cooling output certified into testing thermostatic room according to EN14240:
96,9 W/m² without thermal insulation and at the nominal capacity with ΔT water-room of 8 K.
Heating output certified into testing thermostatic room according to EN14037:
87,3 W/m² without thermal insulation and at the nominal capacity with ΔT water-room of 10 K.

### A220 activation type

In the version with A220 activation type, the active panels have no. 2 thermal diffusers in extruded aluminium having 220 x 350 mm dimensions, glued on panels on the factory. The circuit is made by means of a 16x1,5 polybutylene pipe with anti-oxygen barrier. The connection in series of the various panels and the connection to manifolds or to the distribution pipes is effected by means of brass straight or angle push fittings.
The pipe are preinsulated to reduce the loss of pressure and the thermal dispersions.
The radiant panels can be covered by thermo-acoustic insulation of the same dimensions of the panel.
Cooling output certified into testing thermostatic room according to EN14240:
44,1 W/m² without thermal insulation and at the nominal capacity with ΔT water-room of 8 K.
Heating output certified into testing thermostatic room according to EN14037:
46,3 W/m² without thermal insulation and at the nominal capacity with ΔT water-room of 10 K.

## GK60x120 PSV series

Metallic radiant ceiling GK 60x120 PSV type, composed by:
- Carrying elements and panels, that permit to create a 600 x 1200 mm module;
- Steel sheet carrying elements 24 mm width;
- Panels in steel sheet with the following dimensional features: width 575 mm and length 1175 mm (module 600 x 1200), thickness 0,6 mm. The panels are plain o punched (with 2,5 mm diameter hole on all surface, except for a perimeter area 15 mm width; a puncture percentage of 16% is so obtained)
- Zinc coated and pre-painted carrying elements and tiles – RAL 9003 color

On one side, each panel has two suspension cables that are fixed to the carrying elements during the mounting and that guarantee the opening and the ease of inspection; the panel can always be released and vertically positioned remaining hanged to the cables, even during the system operation.
You can so reach the plenum above the false ceiling, without the impediment of the panels or of the carrying structure.

### C75 activation type

In the version with C75 activation type, the active panels have no. 6 thermal diffusers in extruded aluminium having 75 x 350 mm dimensions, glued on panels on the factory. The circuit is made by means of copper serpentine with 12x1 mm pipe. By means of a brass straight or angle push fitting and the use of a 12x1,5 polybutylene pipe with anti-oxygen barrier, the connection in series of the various panels is effected; for the connection to distribution manifolds RC push fittings and 16x1,5 mm plastic material pipes are used. The pipe are preinsulated in order to reduce the loss of pressure and the thermal dispersions.
The radiant panels can be covered by thermo-acoustic insulation of the same dimensions of the panel.
Cooling output certified into testing thermostatic room according to EN14240:
96,9 W/m$^2$ without thermal insulation and at the nominal capacity with ΔT water-room of 8 K.
Heating output certified into testing thermostatic room according to EN14037:
87,3 W/m$^2$ without thermal insulation and at the nominal capacity with ΔT water-room of 10 K.

### A220 activation type

In the version with A220 activation type, the active panels have no. 2 thermal diffusers in extruded aluminium having 220 x 700 mm dimensions, glued on panels on the factory. The circuit is made by means of a 16x1,5 polybutylene pipe with anti-oxygen barrier. The connection in series of the various panels and the connection to manifolds or to the distribution pipes is effected by means of brass straight or angle push fittings.
The radiant panels can be covered by thermo-acoustic insulation of the same dimensions of the panel.
Cooling output certified into testing thermostatic room according to EN14240:
44,1 W/m$^2$ without thermal insulation and at the nominal capacity with ΔT water-room of 8 K.
Heating output certified into testing thermostatic room according to EN14037:
46,3 W/m$^2$ without thermal insulation and at the nominal capacity with ΔT water-room of 10 K.

## Running test procedure for metallic radiant ceiling

Giacoklima® radiant ceilings, as all systems containing fluids, shall be subjected to hydraulic running test after the mounting, preliminarily to the use of the rooms in which they are installed.
The running tests phases that shall be scrupulously followed are the following:

1) Tightness test in pressure with air
2) Tightness test in pressure with room temperature water
3) Tightness test in pressure with reheated water
4) Tightness test in pressure with chilled water

### 1) Tightness test in pressure with air

After completion of the connection of the single panels of a series, and to the supply lines it is opportune to effect a first tightness test in pressure with compressed air at least at 4 relative bar (if a compressor with sufficient power is available, the running test at the nominal working pressure equal to 6 bar is to be preferred). All installed rings of the radiant ceiling shall be subjected to tightness test. In order to effect correctly the test, it is necessary to intercept the air automatic discharges and supply one at a time the system circuits. In case of localized losses inside a ring, proceed by intercepting the ball valves placed on the supply lines and act to determine and eliminate the loss cause.
The tightness test in pressure with air can be effected either with closed panels or with open panels.
The circuit under testing shall be kept in pressure for not less than 24 hours, then proceed by discharging the air so as to bring the circuits back to the atmospheric pressure.

### 2) Tightness test in pressure with room temperature water

Supply the principal distribution lines with water at room temperature and eliminate all present air, then proceed by supplying the radiant circuits one by one, letting to the air present in the rings the time to come out from the automatic vents. When all circuits are filled up with water, increase the pressure to the working value, by checking that there are no leaks. Later start the system circulators in order to let the last air pockets coming out from the circuits. To effect this operation correctly on big systems, you shall previously proceed with a balancing of the rings to avoid that the water will flow only on those having less loss of pressure, and that flows little or nothing in the rings having high loss of pressure. When the air has completely came out from the system (after about 24 hours), it is possible to stop the circulators and bring the pressure to 1,5 times the working pressure with a minimum of 6 bar. The system shall be left in these conditions for at least other 24 hours, the tightness of the circuits shall be checked. In case of localized loss of pressure inside a ring, proceed by intercepting the ball valves placed on the supply lines and act to determine and eliminate the loss cause. After completion of the testing cycle, bring the pressure back to the working value.
To aid the air discharge, the tightness test in pressure with water shall be effected with open panels in case of four spring types, while with closed panels in case of two spring standard types or with suspension chain. When the circuits are filled up with water and the initially present air has been completely discharged, the panels are closed for each activation type.

### 3) Tightness test in pressure with reheated water

By keeping the system pressure at the working value with operating circulators, slowly bring the water temperature at the value of 40°C, and let the system working for about 24 hours. Afterwards always with operating circulators, let the water cool up to the room temperature value.
This test is usually effected with closed panels.
Its purpose is to verify the water circulation inside all rings connected to the main supply lines, as well as to subject the pipes and fittings to a thermal heating cycle that allows to eliminate the mounting stresses by stabilizing the joinings.

### 4) Tightness test in pressure with chilled water

By keeping the system pressure at the working with operating circulators, slowly bring the water temperature to the value of 15°C and let the system working for about 24 hours. Afterwards always with operating circulators, let the water warm up to the room temperature value.
This test is usually effected with closed panels.
In order to avoid superficial condensation phenomenon over the panels, low values of absolute humidity in the installation rooms are needed to make this test. In case of high humidity values that involve dew temperatures higher than 13°C, it is opportune to start the air treatment machines, to control the room humidity by keeping it to values that do not consent the superficial condensation.

The running tests expressed at points 1) and 2) are to be considered indispensable.
The running tests expressed at points 3) and 4) are strongly recommended because they subject the system components to a cyclic temperature test therefore they guarantee a very high safety level after the running test.

# General prescriptions for the realization of radiant ceiling systems

Directions for the phases preceding the installation

- Verify available spaces and installation height;
- Verify the stability of the anchorage surface of the hangers;
- Verify that the project drawings correspond to the real construction site situation;
- Verify that all surfaces correspond to the project drawings

Directions for the material storage

- At the supply moment check the good status of the provided material;
- Deposit the material in a dry place, not exposed to the sun light;
- Move the material with care to avoid scratches, bending or ruptures.

Directions for the installation steps

- Before proceeding with the installation, analyze the project drawing and read the instructions contained either in the project or in the various instruction sheets attached to the single products;
- Follow the project drawings; for eventual changes contact the management of works;
- While making the connections with RC push-fittings, remember to use the RC900 support sleeves and verify the introduction depth of the pipes (see attached instructions);
- If not previously agreed, use only the material supplied by Giacomini S.p.A. for the bracketing;
- In case of components having protective film (for example prepainted elements) remove the film itself at the installation moment.

Directions for the running test and system start up

- Follow the directions for the pressure testing and system filling up (if not available, ask them to Giacomini S.p.A.);
- Put in the system the K375 protective liquid, following the conditions and batching indicated in the attached instructions.

Panel cleaning

For a correct panel cleaning, remove the dust from the painted surfaces with a clean and soft cloth. Grease and imprints shall be removed with a delicate cleansing suitable to this use. Do not use abrasive cleansings and do not scratch the surfaces in any way.

# Other available technical documentation

| Panel | Series | Technical sheet |
|---|---|---|
| K6A | GK60x60 PSV | K6A 0343EN |
| K6C | GK60x60 PSV | K6C 0344EN |
| K12A | GK60x120 PSV | K12A 0345EN |
| K12C | GK60x120 PSV | K12C 0346EN |
| K60A | GK60 | K60A 0347EN |
| K60C | GK60 | K60C 0348EN |
| K120A | GK120 | K120A 0349EN |
| K120C | GK120 | K120C 0350EN |

## QUALITY CERTIFICATIONS

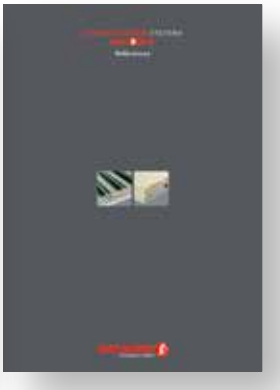


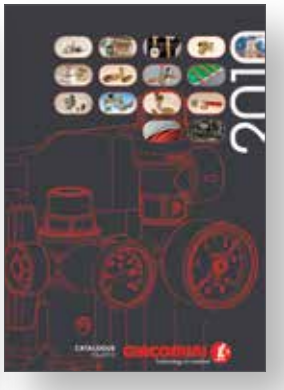
## FURTHER INFORMATION

The technical documentation and the product specifications of the giacoklima® GK radiant ceiling system are available also in electronic format on **www.giacomini.com/ceiling**

For more information about giacoklima® GK radiant ceiling, consult also the Product Catalogue 0153EN and the References brochure 0300EN.

For information about the other Giacomini components and systems, ask for the last issue of the general catalogue/price list.





**OCTOBER 2010**

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