



indecal[®]
RADIANT CONDITIONING SYSTEM

Spring all year around



www.indecal.it

THE COMPANY

DEVELOPMENT, INNOVATION AND QUALITY FOR OVER 50 YEARS



Indecal is a company specialised in the production of plasterboard and gypsum fibre radiant panels for ceiling, wall and floor radiant air conditioning.

The company is located in the industrial area of Gravina in Puglia and has a 10,000m² premises where production facilities, offices and warehouses are located. The strategic geographical location allows quick access to major roads, railways, ports and airports, ensuring on-time delivery of our products.

A company with over 50 years of expertise in the sector, which has always been committed to human well-being and environmental protection.

Certifications:

Quality	ISO 9001	
Environment	ISO 14001	
Workplace security	OHSAS 18001	



Fully automated production lines and seamless monitoring of the process and material ensure high productivity and constant quality monitoring at limited costs.

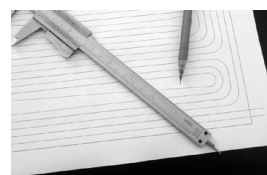
The company has been collaborating for years with various research centers, universities and test laboratories.



The products are all CE marked and the thermal performances are certified by the HLK Institute in Stuttgart. Today Indecal is a partner of the most important national and European companies in the radiation sector and also manufactures its own branded products.

SERVICE

- technical support for design and installation
- assistance during installation
- after-sales technical support
- wide availability of products in stock
- direct deliveries
- remote system monitoring



OUR PRODUCTS

RADIANT PLASTERBOARD PANELS WITH INSULATION

For wall and ceiling radiant air conditioning

Dimensions:

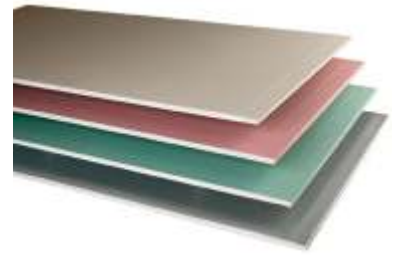
2000 x 1200 mm
2000 x 600 mm
1000 x 1200 mm
500 x 1200 mm

Customization options

Plasterboard
Insulation
Pipe
Circuit

Types:

Standard
Fire-retardant
Water resistant
Euroclass A1
Output with multilayer pipe
Ionising
Reinforced
Acoustic



PRE-COATED GYPSUM RADIANT PANELS FOR INSPECTABLE AND SOUND-ABSORBING CEILINGS

Dimensions

600 x 600 mm
600 x 1200 mm



RADIANT PANELS WITH METAL FINISH FOR INSPECTABLE AND SOUND-ABSORBING CEILINGS

Dimensions:

600 x 600 mm
600 x 1200 mm



GYPSUM FIBRE PANELS FOR DRY RADIANT FLOORS WITH REDUCED THICKNESS

Dimensions

600 x 1200 mm

Thickness:

18 mm
25 mm



Square or tapered edge available; coupling with insulation boards of all types possible.

INSPECTABLE RAISED RADIANT PANELS

Dimensions

600 x 600 mm





INDECAL RADIANT CEILING

RADIANT CEILING

Eco-friendly products with low environmental impact



The ceiling heating and cooling system represents a system innovation that uses a large heat exchange surface with much lower flow temperatures than conventional systems (heating between 127° and 145° - cooling between 116° and 120°).

This feature **ensures considerable energy savings of up to 75 %**, so that the investment is automatically recovered within a few years and the environment is relieved.

The concept of heating or cooling is translated into comfort in the environment, which does not mean that a higher or lower temperature than the environment is produced, as is the case with conventional systems.

The term indoor comfort refers to the satisfaction of a series of thermohygrometric factors, i.e. the exchange of heat between the body and the outside world, relative humidity, air speed, etc., all aspects that regulate the amount of energy exchanged by the human body with the outside world.

The **INDECAL** plasterboard radiant ceiling is currently **the best solution in technical, economic and practical terms**. This involves plasterboard panels with a plastic pipe coil suitable for the flow of hot or cold water, with a quick-connect system that is easy to install using the normal dry lining techniques that plasterboard installers normally use, and with simplified distribution of the water pipes.

Installation is usually on the ceiling, wall or false ceiling and does not take up any useful furnishing space.

With this system there is **no air movement and therefore no dust, resulting in unparalleled environmental health; equipment that is often aesthetically unattractive in rooms becomes superfluous; expensive and uncomfortable construction work is not required for installation.**

It replaces plaster, **increases thermal and acoustic insulation** and avoids structural weakening as the masonry does not have to be cut open to allow the pipes to pass through.



INDECAL | RADIANT CEILING AIR CONDITIONING

We spend most of our time at home or at work. Creating adequate comfort in these environments is a basic requirement for our well-being and depends mainly on the room temperature, humidity level and air quality.

The more satisfying these factors are, the more our productivity and our good mood towards the things and people around us increase.

Good thermal and sound insulation is certainly a good starting point for achieving ideal comfort conditions and, at the same time, considerable savings in management costs.

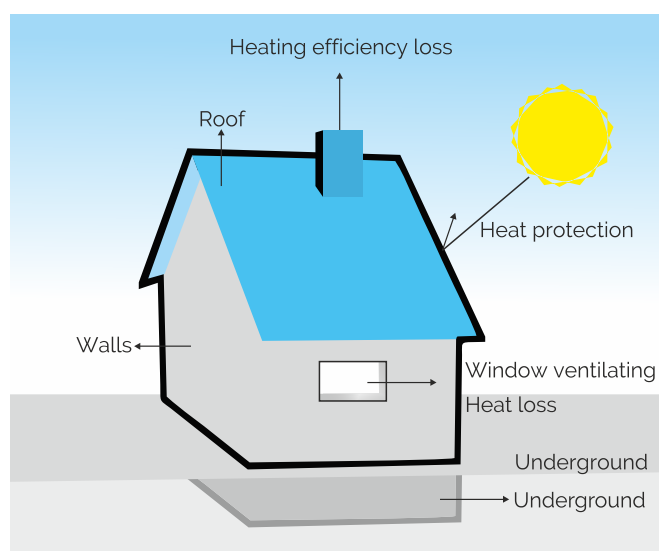
This is usually done on the outer walls of the structure by applying the traditional exterior insulation finishing system.

However, this is not always an option: for example, it is impossible to coat the walls of buildings in historic centers whose aesthetic appearance cannot be changed.

In these cases, though, it is possible to operate from the inside of the structure to achieve even better results and reduce costs.

To this end, **INDECAL** has **developed an integrated system that makes it possible to achieve the following with the installation of a single product:**

Thermal insulation
Sound insulation
Heating system
Cooling system
False ceiling or partition wall



The INDECAL system, in combination with renewable energy sources (photovoltaic, solar thermal, heat pumps), allows a reduction in atmospheric emissions by optimally implementing the concept of NET ZERO ENERGY BUILDING, i.e. buildings where the total annual consumption of primary energy must be equal to or less than the energy produced on site with renewable sources.



The energy renovation system proposed by INDECAL pursues precisely this goal: to make the housing unit energy-independent with the help of renewable energy sources.

The INDECAL system can be used anywhere, in residential buildings, offices, hotels, wineries, industries, hospitals, nurseries, schools, museums, shopping centers, etc. There are no operational or functional limits, as the system is extremely flexible and can be adapted to all requirements.



The terminal units are made of plasterboard radiant panels that are totally **INVISIBLE** in the environment, can be installed on ceilings and walls and do not take up furnishing space; they do **NOT PRODUCE AIR MOVEMENT** and therefore no dust; they are powered by a low-temperature heat pump (between 25° and 40° for heating and between 15° and 20°C for cooling), allowing a drastic reduction in consumption and thus

guaranteeing a high level of comfort 365 days a year.

Radiant **heating** and **cooling** are not felt as local thermal sources, but as a **physiological, homogeneous and natural climate**, an environment in which our body can naturally exchange its metabolic heat. Radiant panels can **replace plaster** and create useful spaces for the installation of water and electricity pipes.

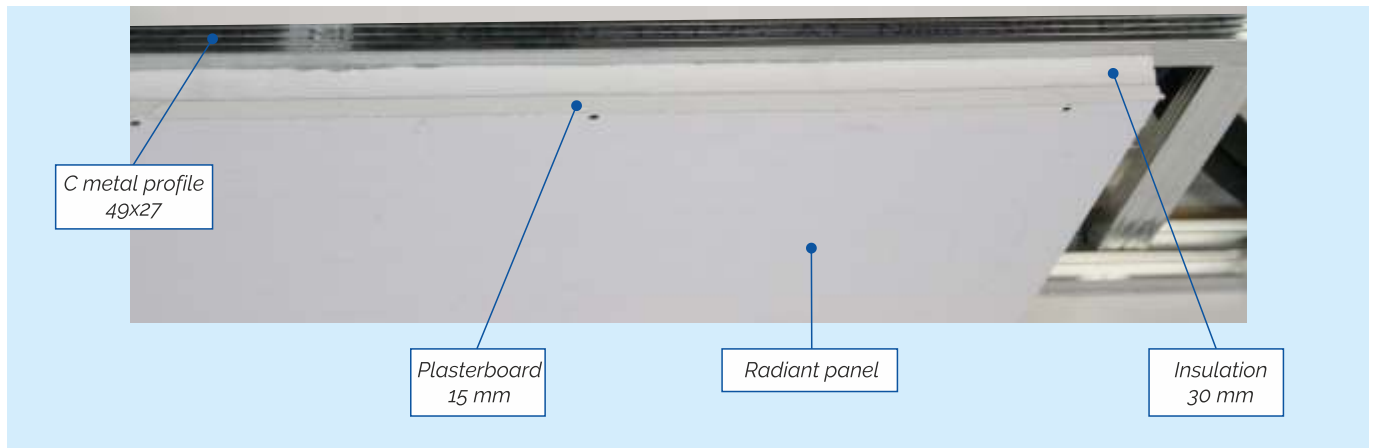
Their **LOW THERMAL INERTIA** makes them ideal for rooms that are not occupied all the time or only occasionally and for short periods of time (e.g. hotel rooms, meeting rooms, etc.), as they get to full capacity within a few hours of being switched on, so it is not essential to keep the system running all the time.



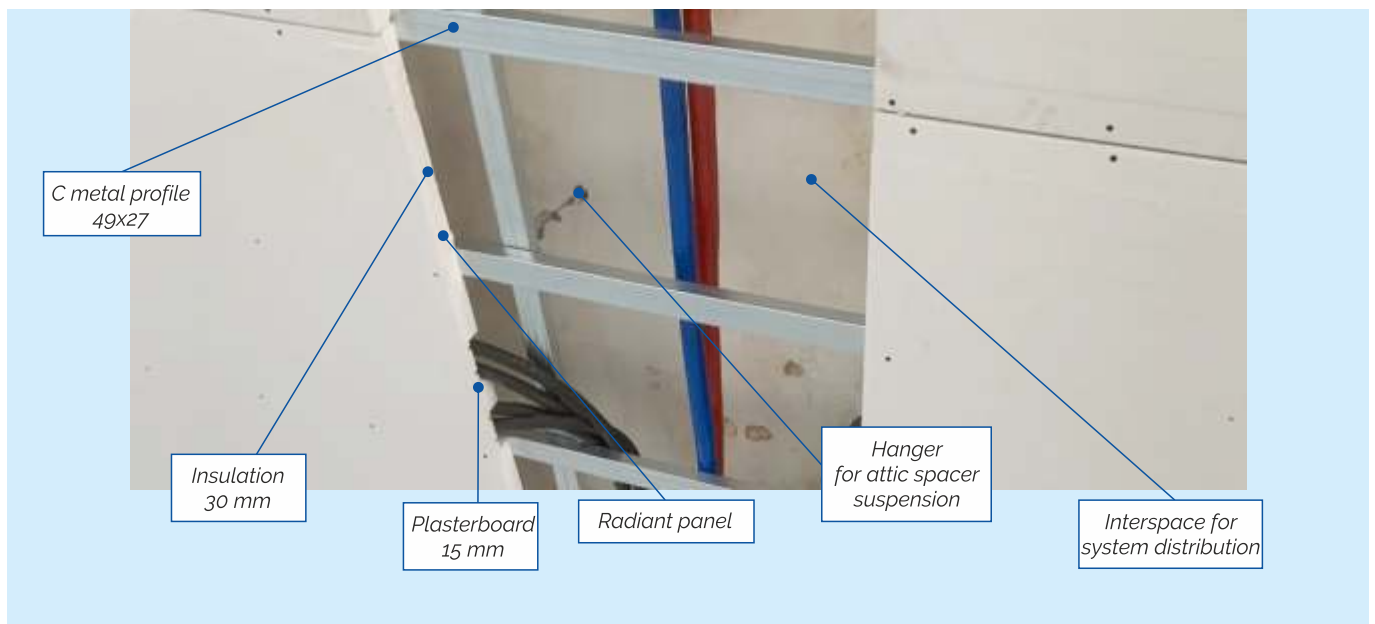
The INDECAL system is made up of a few simple and natural products which, when combined, allow an environmentally friendly **ENERGETIC RENOVATION** in just a few days, thanks to the high degree of prefabrication of the system and the dry construction method, which makes it possible not to have to leave the home.



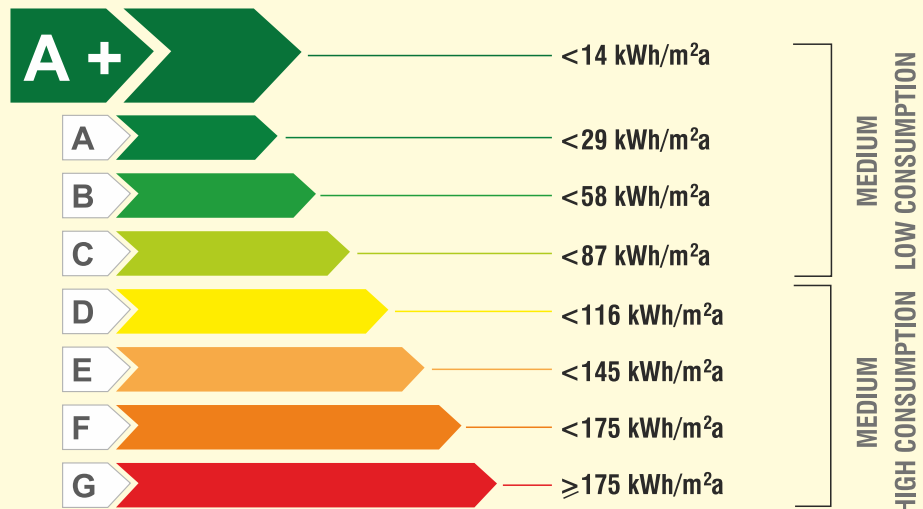
WALL/ CEILING



FALSE CEILING



LOW CONSUMPTION



HIGH CONSUMPTION

Optimising consumption will **increase the energy efficiency** class and inevitably the market value of the property.

The **typical question** when it comes to ceiling heating is: **doesn't the hot air rise upwards?**

Heat transfer can take place in three ways: conduction, convection and **radiation**.

The traditional heating culture, based mainly on **convective motion** (convection and conduction) induced by radiators and fan coils, has accustomed us to confuse heat with air.

Warm air, which has a lower density than cold air, tends to rise upwards, while cold air falls downwards. **Radiant ceilings are based on the principle of heat transfer by radiation.**

When we are in the sun, we simply feel the warmth coming down on us. What affects us are electromagnetic waves that vibrate mainly in the infrared and light range.

By taking advantage of this property, the radiation causes the colder body to absorb the heat from the warmer body so that, when fully operational, the ceiling as well as the floor and walls have a uniform temperature above room temperature.

Radiant ceiling heating/cooling can also be installed in high buildings where the temperature must be constant, without air movement, and where there must be no fluctuations in the relative

humidity in the room.

Since it is infrared radiation, it is not the distance that has to be taken into account, but the dispersion.

In new buildings, the radiant air conditioning and the water heating can also be realised in a few days after the sale. This guarantees optimised financial management for the contractor, as he does not have to make any advance payments and the execution of all other work is not jeopardised.

In renovations, it is possible to completely renew the installations without having to remove the old ones, preserving the existing floors and avoiding the disposal of debris and the associated costs of demolition and reconstruction.

With the Indecal system, many of the additional burdens of conventional systems can be avoided:

- » **Building an external scaffold**
- » **Use of public land**
- » **Chimney**



Renovating your home with the INDECAL system also means achieving good thermal and sound insulation at the same time as equipping it with an air ionisation system that eliminates 70% of the VOCs present in the environment

ACTIV'AIR®

In a residential context where the climate is not suitable for the development of controlled mechanical ventilation systems, the end user is accustomed to controlling the ventilation of the rooms by himself and the window opening is arbitrary and often insufficient (in terms of frequency rather than duration).

Where indoor air quality cannot be left to chance and where the habit of using installations is implemented reluctantly, ACTIV'AIR® can be the solution.



SERVICE SECTOR

Office buildings are managed by huge systems that automatically regulate air flows in a mechanical way. Centralised control of indoor air quality in such an environment is complex and expensive, especially during the maintenance phase (cleaning of ducts and filters, control of pollutant levels).

In this context, it also becomes difficult to keep any indoor plants for air purification; that's where Activ'Air® could be the solution.

Activ'Air® technology harnesses the ability to metabolise and inactivate chemicals without releasing them into the environment and ensuring their long-term effectiveness.

Each surface square metre covered with Activ'Air® solutions captures up to 80 percent of the formaldehyde present in a cubic metre of air through a chemical reaction and converts it into a non-volatile component.

Activ'Air® solutions use a special component that has no impact on the environment and is able to trigger a chemical reaction that converts formaldehyde into inert substances.

The overall performance of Activ'Air® has been validated by tests carried out by CSTB and Eurofind, i.e. independent, internationally recognised laboratories in the field of environmental, agricultural and pharmaceutical bioanalysis.





1

Photovoltaic panels



2

Dehumidifier with controlled mechanical ventilation



3

Ducts for air distribution



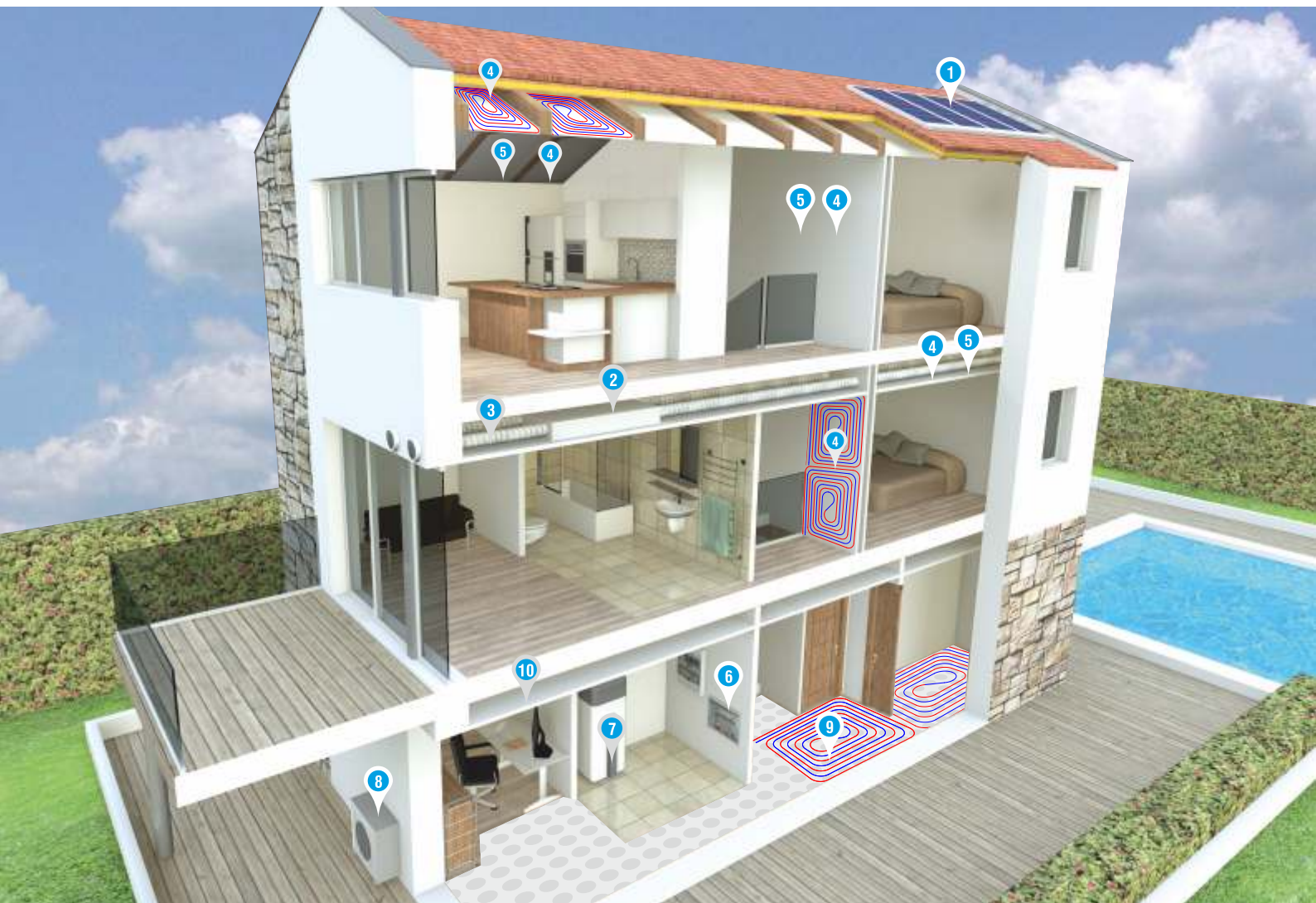
4

Plasterboard radiant panel for heating, cooling, thermal and sound insulation



5

Press fittings without O-ring for connecting the panels to the collector



6

Main manifold

7

Indoor unit
Heat pump for heating and cooling with integrated boiler for hot water storage

8

Outdoor unit
Air/water heat pump

9

Dry floor

10

Exposed metal radiant panel

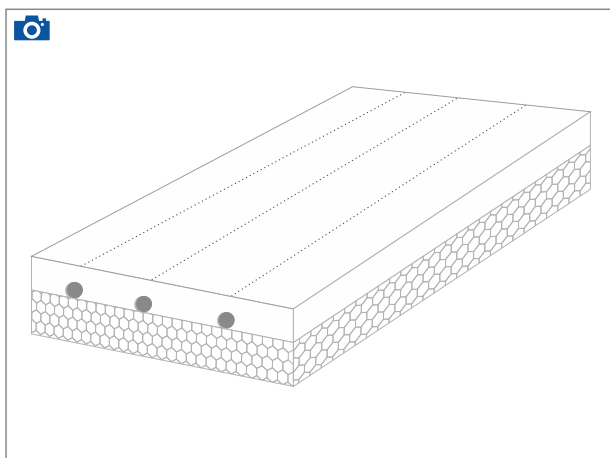




PRODUCT DATA SHEETS

DURAD

Special prefabricated radiant panel with glass and wood fibre additives that provide the product with a high degree of surface HARDNESS, mechanical strength, moisture resistance and fire protection; consisting of a 15 mm thick gypsum board, paired with a 30 mm insulation of expanded polystyrene EPS 150 and PE-RT pipe 8x1 mm with EVAL oxygen barrier in spiral circuit with a spacing of 50 mm.



APPLICATION FIELD

RESIDENTIAL

INDUSTRIAL

TIMBER COSTRUCTION

INSTALLATION TYPE

CEILING

FALSE CEILING

WALL

DATA AND TOLERANCES

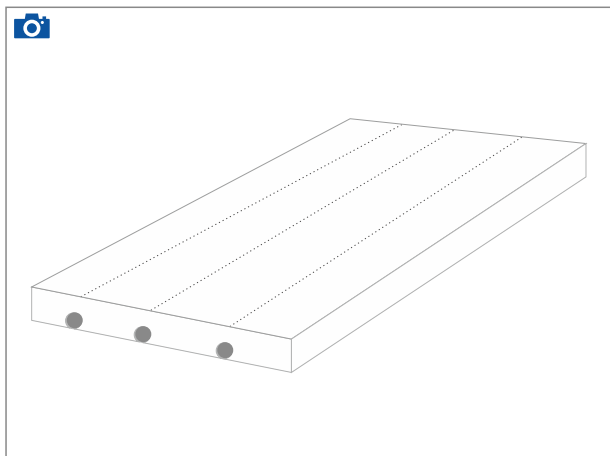
PLASTERBOARD TYPE	Special board type with increased core density, whose gypsum is additionally added with glass and wood fibres to obtain high surface hardness and mechanical strength. Plasterboard type H1 with reduced water absorption rate, suitable in high humidity environments and plasterboard type f with high fire resistance.	
PANEL THICKNESS	45 mm	
PLASTERBOARD THICKNESS	15 mm	
INSULATION THICKNESS	30 mm	
POLYSTYRENE DENSITY	30 kg/m ³	
INSULATION THERMAL CONDUCTIVITY (λ_0)	w/mk 0,033	
BOARD THERMAL CONDUCTIVITY (λ_0)	w/mk 0,25	
PIPE DIAMETER	8 mm	
PIPE MATERIAL	PE-RT with EVAL oxygen barrier	
LAYING SPACING	50 mm	
LAYING FORM	Spiral	
REACTION TO FIRE CLASSIFICATION	A1 (B)	
LONGITUDINAL EDGE	Thin	
HEAD EDGE	Straight	
TOLERANCE	± 0,5	
OPERATING TEMPERATURE	Heating 27-32 °C	Cooling 15-20 °C

TECHNICAL DETAILS

Lenght (mm)	Width (mm)	Thickness (mm)	Weight (kg)	Circuit lenght (mt)	Water content (kg)	Packages (mq)
2000	600	45	14	19.4	0.9	60
2000	1200	45	29	41	1.8	60
1000	1200	45	14	19.5	0.9	60
500	1200	45	7	9.1	0.4	60

DUR

Special prefabricated radiant panel with glass and wood fibre additives that provide the product with a high degree of surface **HARDNESS**, mechanical strength, moisture resistance and fire protection; consisting of a 15 mm thick gypsum board **WITHOUT INSULATION** paired with PE-RT pipe 8x1 mm with EVAL oxygen barrier in spiral circuit with a spacing of 50 mm. The panel can also be fastened by a nail gun for wood.



APPLICATION FIELD

RESIDENTIAL

TIMBER COSTRUCTION

INSTALLATION TYPE

CEILING

WALL

DATA AND TOLERANCES

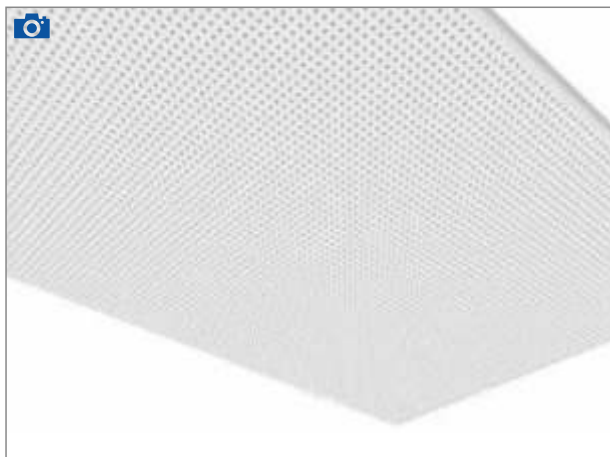
PLASTERBOARD TYPE	Special board type with increased core density, whose gypsum is additionally added with glass and wood fibres to obtain high surface hardness and mechanical strength. Plasterboard type H1 with reduced water absorption rate, suitable in high humidity environments and plasterboard type f with high fire resistance.	
PANEL THICKNESS	45 mm	
PLASTERBOARD THICKNESS	15 mm	
POLYSTYRENE DENSITY	30 kg/m ³	
INSULATION THERMAL CONDUCTIVITY (λ_0)	w/mk 0,033	
BOARD THERMAL CONDUCTIVITY (λ_0)	w/mk 0,25	
PIPE DIAMETER	8 mm	
PIPE MATERIAL	PE-RT with EVAL oxygen barrier	
LAYING SPACING	50 mm	
LAYING FORM	Spiral	
REACTION TO FIRE CLASSIFICATION	A1 (B)	
LONGITUDINAL EDGE	Thin	
HEAD EDGE	Straight	
TOLERANCE	± 0,5	
OPERATING TEMPERATURE	Heating 27-32 °C	Cooling 15-20 °C

TECHNICAL DETAILS

Lenght (mm)	Width (mm)	Thickness (mm)	Weight (kg)	Circuit lenght (mt)	Water content (kg)	Packages (mq)
2000	600	15	14	19.4	0.9	60
2000	1200	15	29	41	1.8	60
1000	1200	15	14	19.5	0.9	60
500	1200	15	7	9.1	0.4	60

AKUSTIC 8-18

Prefabricated ACUSTIC radiant panel, suitable for environments with high noise levels; consisting of a 12.5 mm thick double plasterboard with regular circular perforation and a dust protection felt fixed on the back, paired with PE-RT pipe 8x1 mm placed between the panels, with EVAL oxygen barrier in spiral circuit with a spacing of 50 mm.



APPLICATION FIELD

INDUSTRIAL

SERVICES

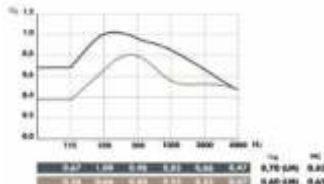
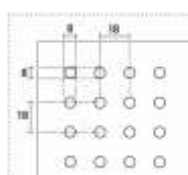
INSTALLATION TYPE

FALSE CEILING

WALL

DATA AND TOLERANCES

PLASTERBOARD TYPE	Decorative plasterboard with regular round continuous holes that can be coated with a roller after installation. The ACTIVE AIR version, which reduces pollutants in the environment by 70%, is also possible.	
PANEL THICKNESS	25 mm	
MOISTURE RESISTANCE	RH 70	
BALL IMPACT RESISTANCE	according to DIN 18032-3	
BOARD THERMAL CONDUCTIVITY (λ_0)	w/mk 0,25	
PIPE DIAMETER	8 mm	
PIPE MATERIAL	PE-RT with EVAL oxygen barrier	
LAYING SPACING	50 mm	
LAYING FORM	Spiral	
REACTION TO FIRE CLASSIFICATION	A2-s1,d0(B) according to EN 13501-1	
LONGITUDINAL EDGE	Straight	
HEAD EDGE	Straight	
TOLERANCE	$\pm 0,5$	
OPERATING TEMPERATURE	Heating 27-32 °C	Cooling 15-20 °C

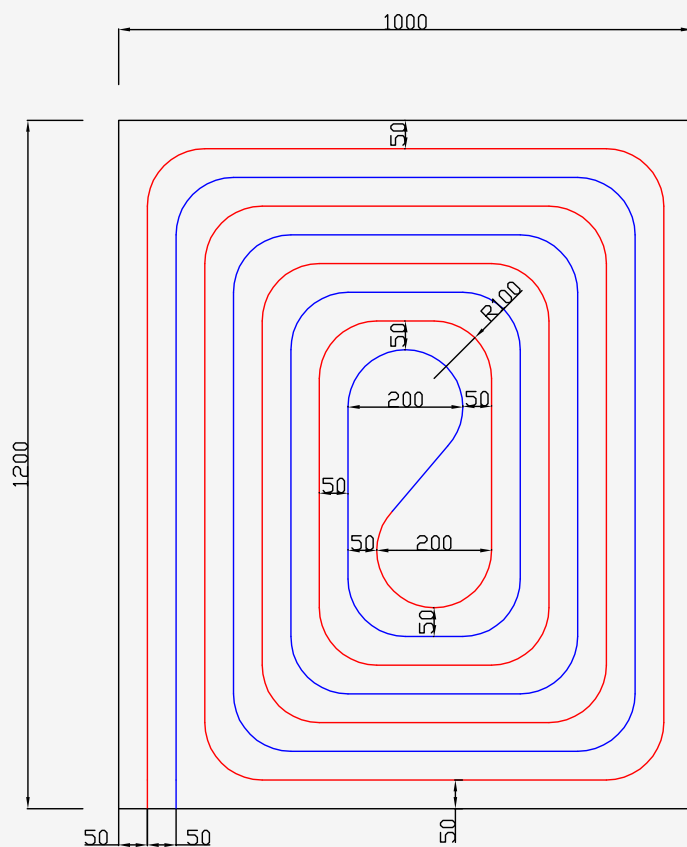


- Plenum 200 mm with mineral wool
- Plenum 200 mm without mineral wool

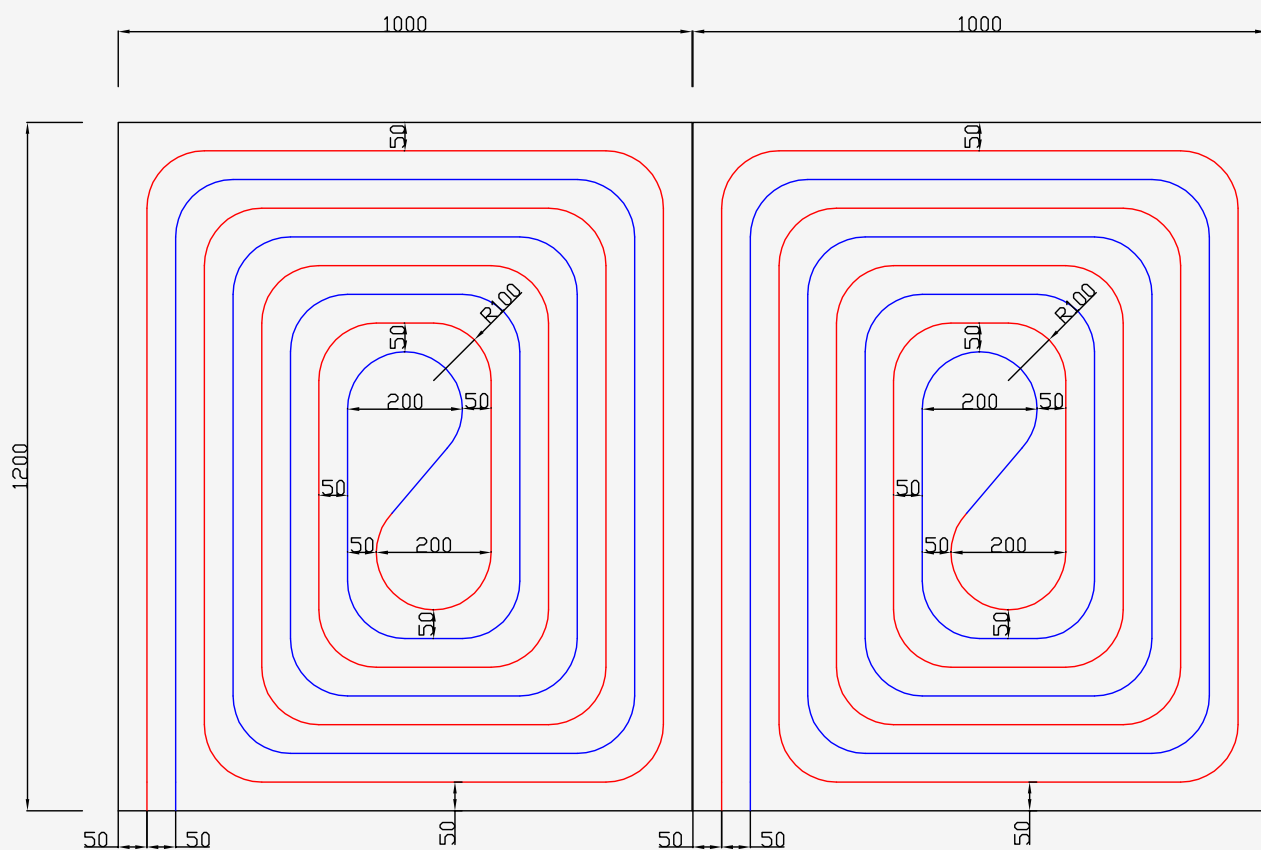
TECHNICAL DETAILS

Lenght (mm)	Width (mm)	Thickness (mm)	Weight (kg)	Circuit lenght (mt)	Water content (kg)	Packages (mq)
1998	1188	25	20	40	1.7	100,80

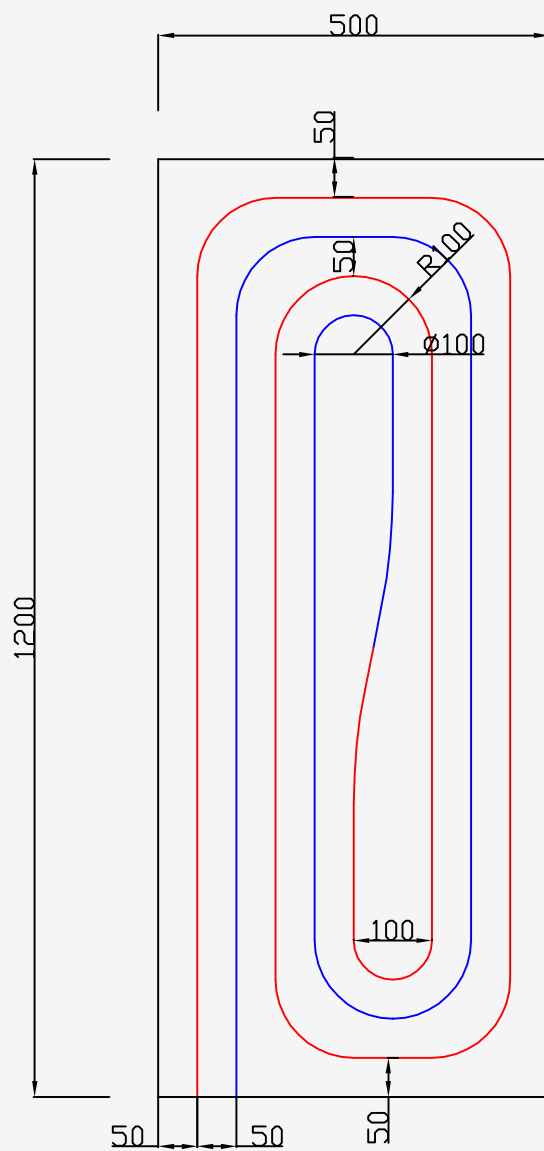
CIRCUIT TYPES



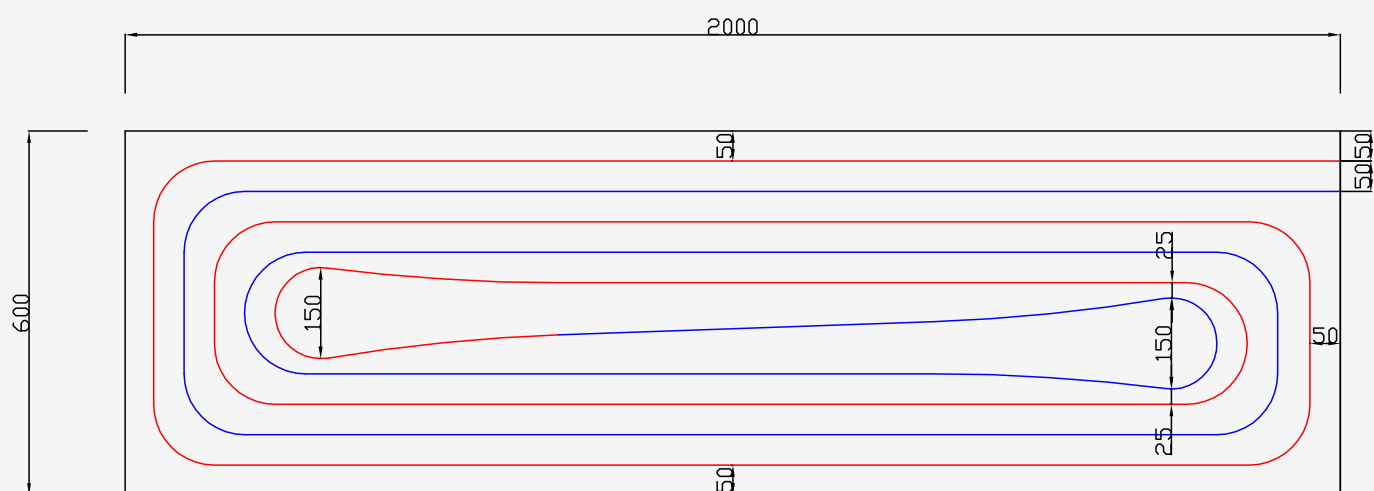
Circuit: **mt 19,46**
Product code: 03120100



Circuit: **mt 38,92**
Product code: 03120200



Circuit: **mt 9,10**
Product code: 120050



Circuit: **mt 19,40**
Product code: 103060200



CERTIFICATIONS AND WARRANTIES

HEATING PERFORMANCE

Test report
for the determination of the heating capacity
of hot surface for rooms

heating ceiling

Type: Pannello Radiante in Cartongesso
Soffitto / parete: PRC 5.0

closed heating ceiling,
PEX-tubes (8 x 1mm) integrated in plasterboard panel
distance between the tubes: 50mm

Indecal s.r.l.
I – 70024 Gravina in Puglia (BA)

Test report

No.: DF10 H26.2856

heating capacity: 72 W/m² (Δt : 15K)

(referring to the active area: 7,20m²)



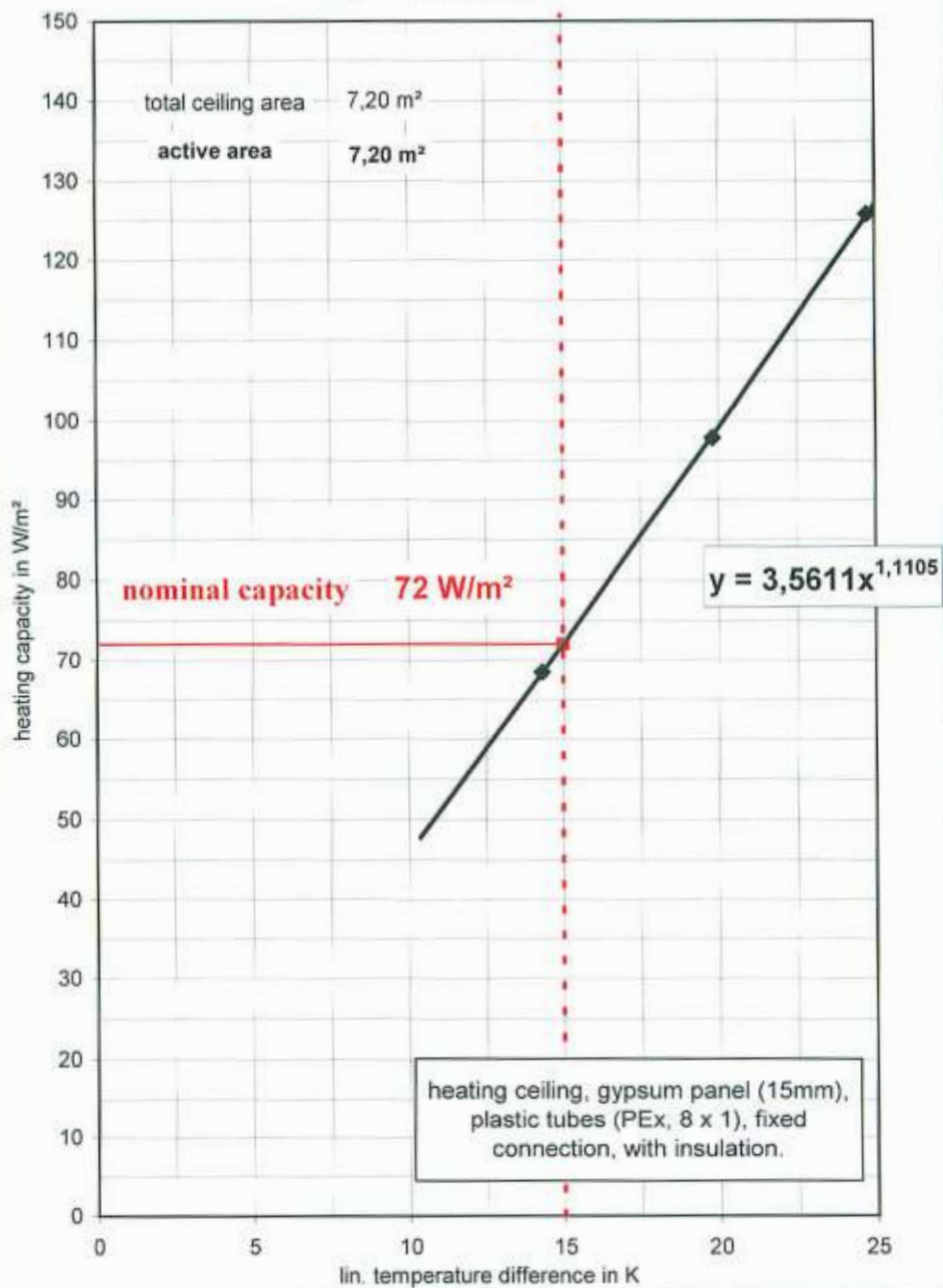
This test report consists of 6 pages and it may be reproduced only in its integral form.
The results of the test refer only to the test samples.

The HVAC Institute, Lehrstuhl für Heiz- und Raumlufttechnik (LHR), is from DAR accredited according to ISO/IEC 17025 and is from DINCERTCO recognised as an independent test laboratory. Further on the Institute is also an accredited inspection body according to EN 45004.

test report no. DF10 H26.2856

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Typ: Pannello Radiante in Cartongesso
soffitto/parete: PRC 5.0



COOLING PERFORMANCE

Test report
for the determination of the cooling capacity
of cooling surfaces for rooms according to EN 14240

closed ceiling

Type: Pannello Radiante in Cartongesso
soffitto / parete: PRC 5.0

plasterboard panel, PEx - tubes (8 x1 mm),
distance between the tubes: 50mm

Indecal s.r.l.
I – 70024 Gravina in Puglia (BA).

Test report

No.: VF10 K26.2855

nominal capacity: 316 W resp. 44 W/m² (Δt : 8K)

(active area ratio: 100%; active area: 7,20m²)

capacity in acc. to DIN 4715 - old: 56 W/m² (Δt : 10K)
(active area: 7,20m²)



This test report consists of 9 pages and it may be reproduced only in its integral form.
The results of the test refer only to the test samples.

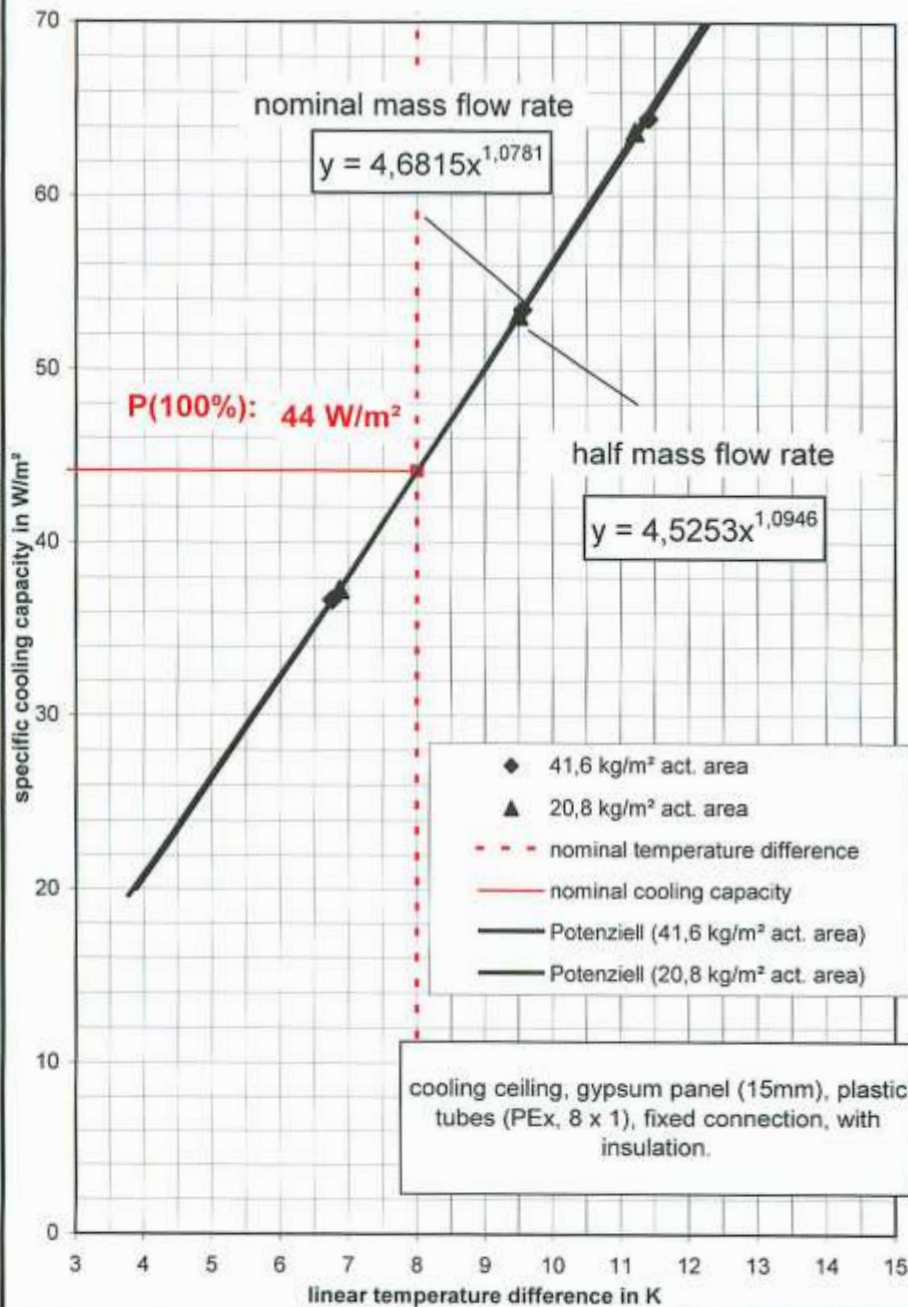
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test report no.: VF10 K26.2855

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applicant: Indecal s.r.l.

type: Pannello Radiante in Cartongesso



Der Prüfbericht umfasst 9 Seiten. Er darf ohne Genehmigung der Prüfstelle nur in vollem Umfang vervielfältigt werden.



INSTALLATION INSTRUCTION

INSTALLATION INSTRUCTIONS FOR RADIANT CEILING SYSTEM WITH PREFABRICATED PLASTERBOARD PANELS



The INDECAL radiant climate system with prefabricated plasterboard is perfectly suited for all kinds of construction, from new buildings to renovations, and the application field includes residential construction as well as services sector, industry, hospital, hotel, etc.

The combination of the individual system components allows a wide range of solutions for the most various requirements.

The creation of an "active" ceiling involves two professionals:

- **the plasterer**, responsible for the construction of

the metal support structure, for fixing the panels to the previously made structure according to the laying plan, for filling the joints and then levelling the entire surfaces.

- **the water plumber**, responsible for fixing the main manifold, for laying and connecting the supply and return pipes in the various rooms to the manifold in accordance with the laying plan; for connecting the circuits of the panels to the supply and return pipes; setting up any dehumidifiers and/or heat recovery systems for air treatment with appropriate air routing in accordance with the design plan.



Positioning and fixing the metal structure

Determining the installation height

The support frame for fixing the panels is created by suitably suspending the profiles from the metal frame. Before starting the installation of this frame, the final height of the ceiling on the perimeter walls must be determined and marked using traditional systems or modern laser markings

Suspensions, profiles and relative spacing

The profiles forming the frame are made of sheet steel with a nominal thickness of at least 0.60 mm and a zinc coating of at least Z200 quality.

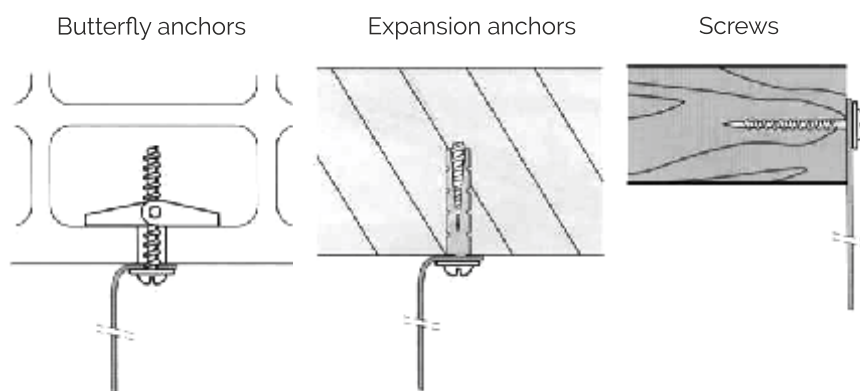
The distance between the profiles depends on the thickness of the panels used and their laying direction, which can be parallel or perpendicular to the profiles; perpendicular laying is when the long side of the panel is orthogonal to the frame; it is recommended as it matches the direction of the greater mechanical strength of the panels.

Selecting the type of suspension and fixing

The choice of suspension depends on the planned ceiling sinking and the type of profile used; its fixing must be determined according to the type of slab. In general, it is necessary to check the condition of the support structure, especially if it is wood.

The INDECAL system can be suspended from any type of support, be it concrete, brick or wood. The anchor must be selected according to the support structure. In particular, the following anchors are used:

- **butterfly anchors**, if anchoring is to be done on slab with hollow elements, e.g. brickwork;
- **expansion anchors** used by screwing if the anchoring is to be made on solid ceiling. If a fire protection solution is also required, the anchor must be made exclusively of steel;
- **screws** with a length of 50 mm or more, fixed to the side of the joist, if a wooden structure is present.



Realisation options of the support structure

Suspended ceiling

The main benefit of choosing a suspended ceiling includes not only the need to lower the ceiling in the room from a design point of view, but also the possibility of using the empty space as a technical room and equipping it with various systems (e.g. electrical, ventilation, etc.) or improving thermal and sound insulation by filling the cavity with a specific product depending on the services required.

False ceiling

This solution makes it possible to create a dry cladding directly under the ceiling by using the reduced installation distances.

Two installation systems are available:

- Omega system (with hat profile)
- C 27/48 and Cav system

The Omega profile installation system is recommended when the ceiling surface to be covered is perfectly level: in fact, the profile, which is laid in adherence, follows its course even in the event of irregularities.

A close fixing makes it possible to compensate for any irregularities in the substrate and thus to use an optimal finishing solution for the restoration of existing deteriorated situations.

Handling

The prefabricated INDECAL plasterboards are carefully packed on pallets; they should be placed horizontally on a flat base in a dry, covered place for both storage and transport, with no more than three pallets stacked on top of each other.

Storage outdoors and in direct contact with the weather for extended periods should be avoided. Any handling of the panels should be done carefully on the long, vertical side of the panel and abrupt bending should be avoided.



Selecting the installation system and profile assembling

Determining the installation height

After fixing the suspension, proceed with the assembly of the structure by connecting the primary and secondary structures in an appropriate way, checking the centre distances according to the profile used, the number of panels used and the installation method. Two fixing systems of the metal substructure are recommended:

- C-profile systems 27/48
- Style Prim systems

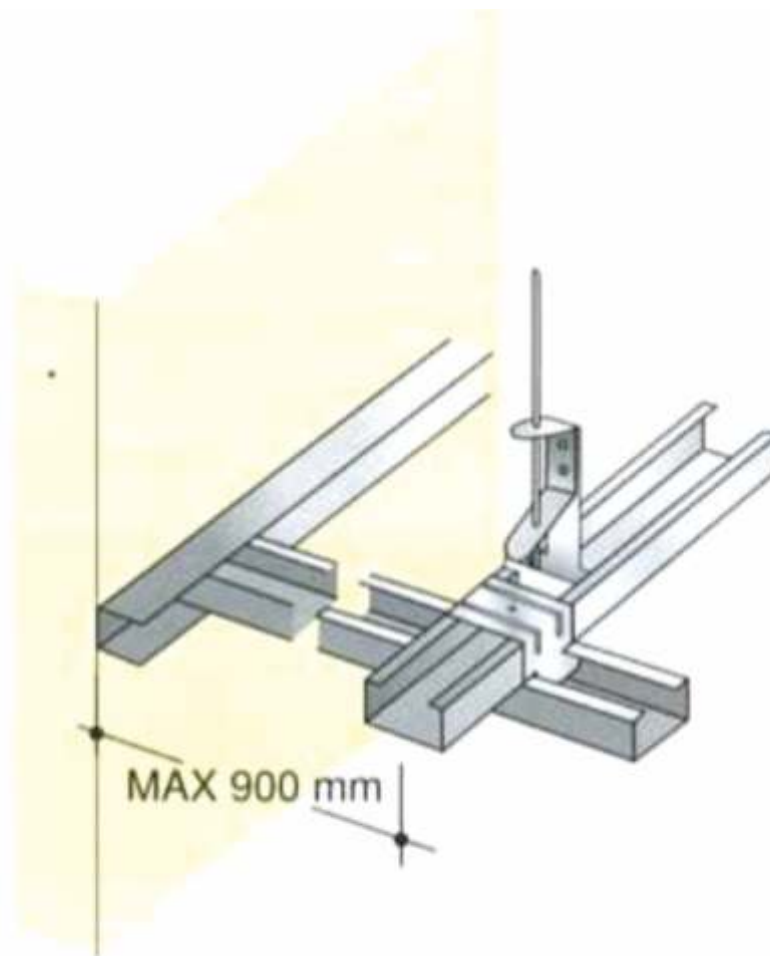
The assembly system with the C-profiles 27/48 involves the use of special suspension accessories that are plugged directly into the primary profile; the connection between the primary and secondary structure is made by specially designed accessories called Cav.

Ceilings with one or two structures can be realised with this installation system. However, a metal substructure with double profiled grating is to be preferred as it gives the construction more stability.

The solution with the Stil Prim system offers the advantage of eliminating the need to draw and adjust the secondary structure by positioning the Stil Prim profiles.

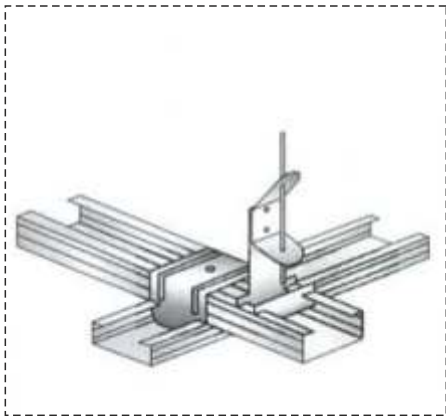
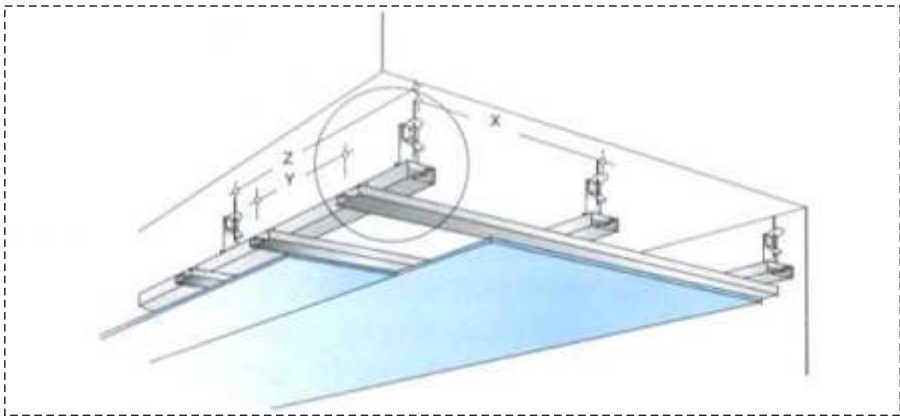
Regardless of the type of system chosen, an edge profile is placed perpendicular to the secondary frame on the masonry: in this case, the primary frame is positioned no further than 90 cm from the wall. If the secondary frame is installed without support on the edge profile, the maximum distance to the wall of the primary profile is 30 cm.

If the secondary support profiles are laid parallel to the walls, they must not be more than 10 cm away from these walls.



Assembly model of a double structure C-profiles 27/48 and 18/48

Suspended ceilings Connection details



Assembly elements

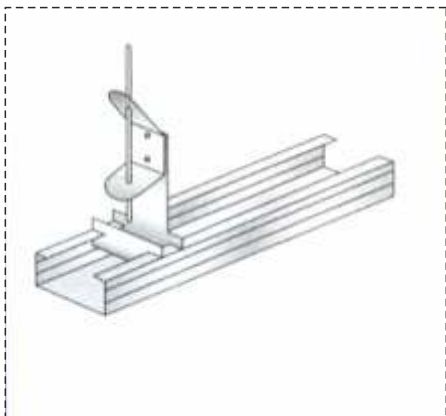
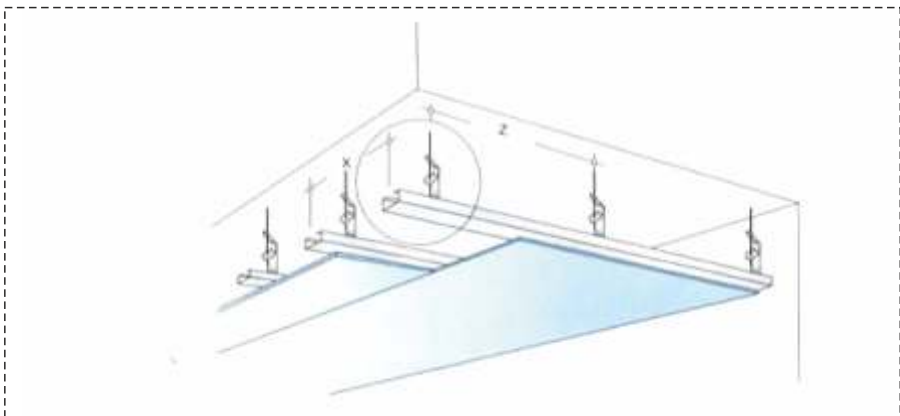
Advantage

Metal profiles and connectors	Suspension hangers
 C-profile 27/48	 Hanger wire
 C-profile 18/48	 Quick hanger
 Linear connector for C-profile 27/48	 Cav
 Linear connector for C-profile 18/48	
 Edge U-profile	

Special connectors, called cavs, are used between the primary and secondary structures, making assembly easier and faster

Assembly model of a simple structure C profiles 27/48

Suspended ceilings Connection details



Note on assembly

It may be necessary to provide a joint between the profiles if the maximum length cannot cover the distance between the opposing walls.

The joint is made with linear connectors specifically designed for each profile type. It is advisable to stagger the joints between the profiles.

The realised frame surface must not have any unevenness of more than 5 mm and this is measured by applying a 2 m long straightedge moved perpendicularly to the elements of the frame.

As far as horizontality is concerned, the level deviation from the reference plane must be less than 3 mm/m without ever exceeding 20 mm.

Fastening the panels

The INDECAL panels are fixed to the structure in accordance with the manufacturer's execution drawings, which indicate the number, type and format of the panels to be installed in each individual room.

Horizontal shifting of the panels (from right to left or vice versa) is permitted for construction site reasons, but the radiant panels provided in the execution drawing must be installed.

The panels are fixed to the ceiling or wall with self-drilling screws with flat head and cross recess, specially designed for plasterboard, using an electric screwdriver.

The screw heads must be flush with the surface of the panels after screwing on, which facilitates subsequent plastering.

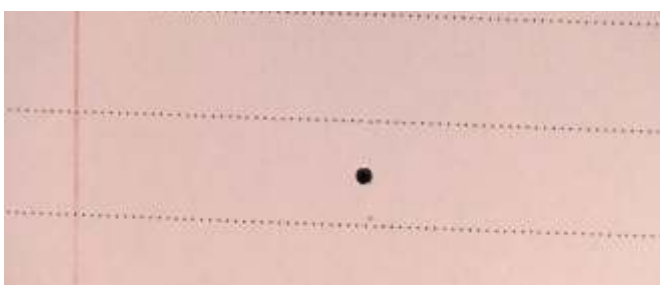
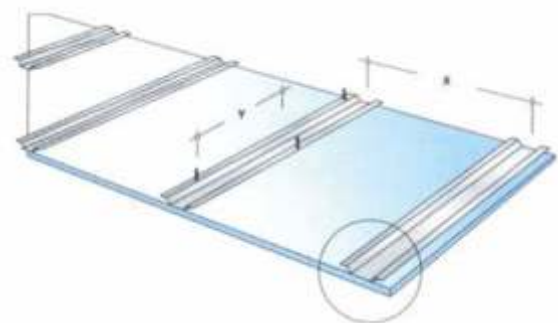
The length of the screws must be at least 1 cm greater than the thickness of the panel to be installed for metal supports and at least 2 cm greater for wooden supports.

The fixing points must be 1 cm from the longitudinal edges and 1.5 cm from the transverse edges, all others must be positioned centrally in relation to the serigraphy on the exposed side of the panel.

which represents the hydraulic circuit inside the panel.

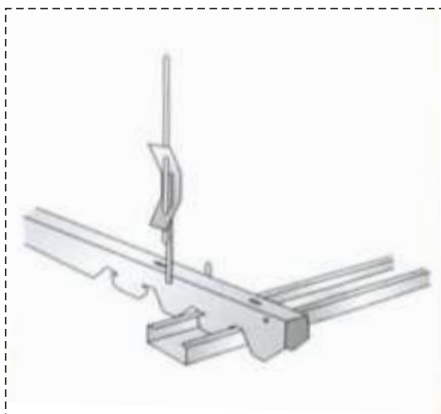
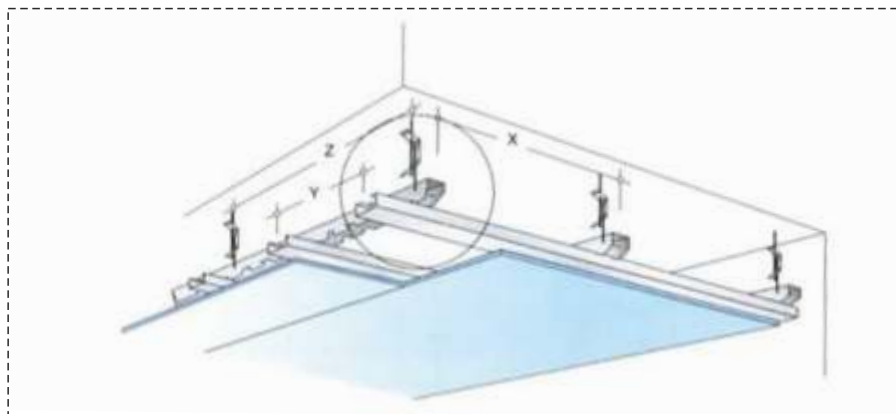
When building a radiant ceiling, a non-visible expansion joint must be provided at the perimeter walls and/or at the construction joints; for large ceilings, an expansion joint must be provided every 15 m².

After the panels have been laid, the hydraulic connections between the panels and the main manifold are made; then the supply and return distribution to the radiant panels can be started according to the installation plan provided.



Assembly model of a double structure STIL PRIM 50

Suspended ceilings Connection details



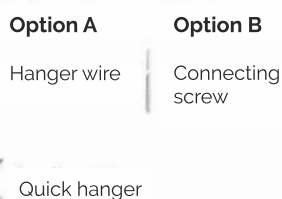
Assembly elements

Advantage

Metal profiles and connectors



Suspension hangers

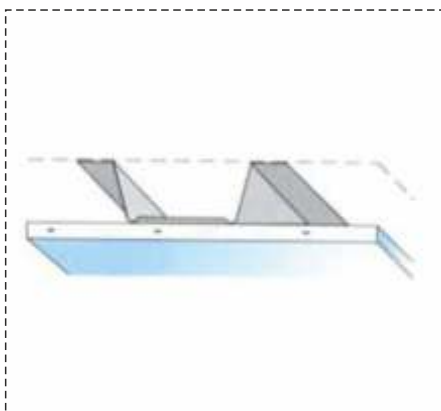
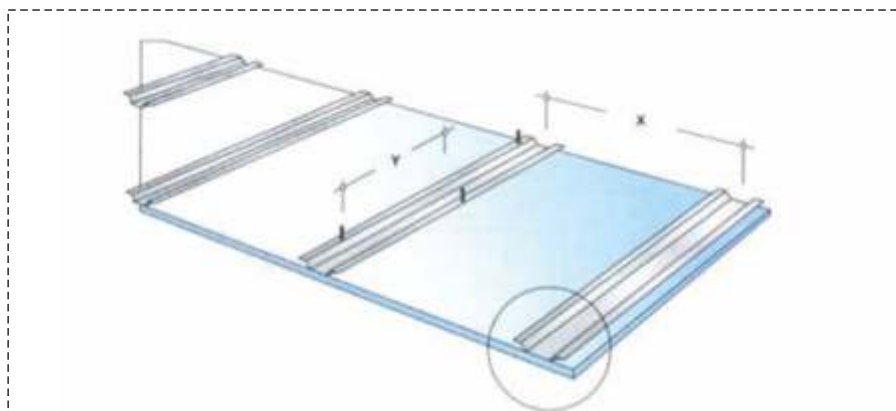


The special shape of the primary profile facilitates the installation of the ceiling, as

- the secondary profile does not need to be adjusted after checking the flatness of the primary profile.
- it snaps into the primary profile thanks to its special shape, which also determines the centre distance for assembly

Assembly model of a simple structure Hat Profiles ("Omega")

False ceilings Connection details



Assembly elements

Advantage

Metal profiles



In this way, the false ceiling can be perfectly placed against the ceiling, minimising the distances to the existing height.

For a good balancing of the system, we recommend connecting five 2000 mm panels, ten 1000 mm panels or twenty 500 mm panels to each supply and return circuit, also in mixed form, but not more than 12 m² of radiant surface (according to the instructions supplied by INDECAL in each room).

The pipes to be used for distribution between the panels must be a 20x2 mm multi-layer, suitable for cold and hot water and fitted with 6 mm thick thermal insulation.

For the connection between the panel circuits and the distribution of two flows or two returns, an INDECAL press fitting must be provided near the pipe outlet of the panels, as indicated in the installation plan.

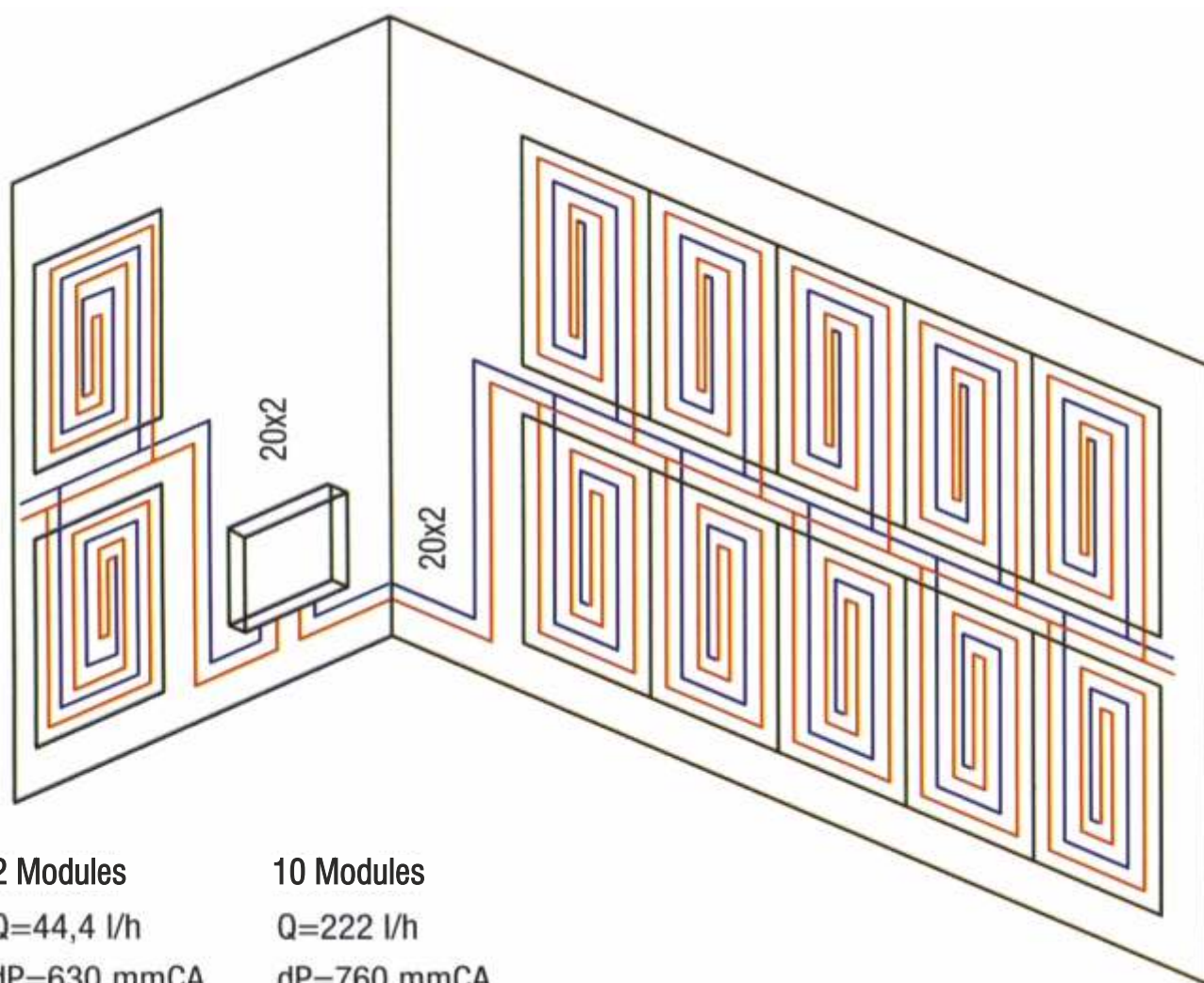
It is recommended to cut off the excess pipe with a pipe cutter that makes a right-angled cut without

damaging the pipe diameter; remove any protrusions.

After all the fittings have been installed, the system pressure test must be carried out; first check at a maximum pressure of 1 bar for about 2 to 3 hours and check all connections for leaks, then check again at a pressure of 5 bar and check again for leaks.

After ensuring that the hydraulic connections have been made properly, proceed to vent all circuits, carefully filling one circuit at a time and venting from the return until it is certain that there is no air left in the circuit. It is advisable to equip the installation with automatic venting devices, which are normally supplied with the main manifold.

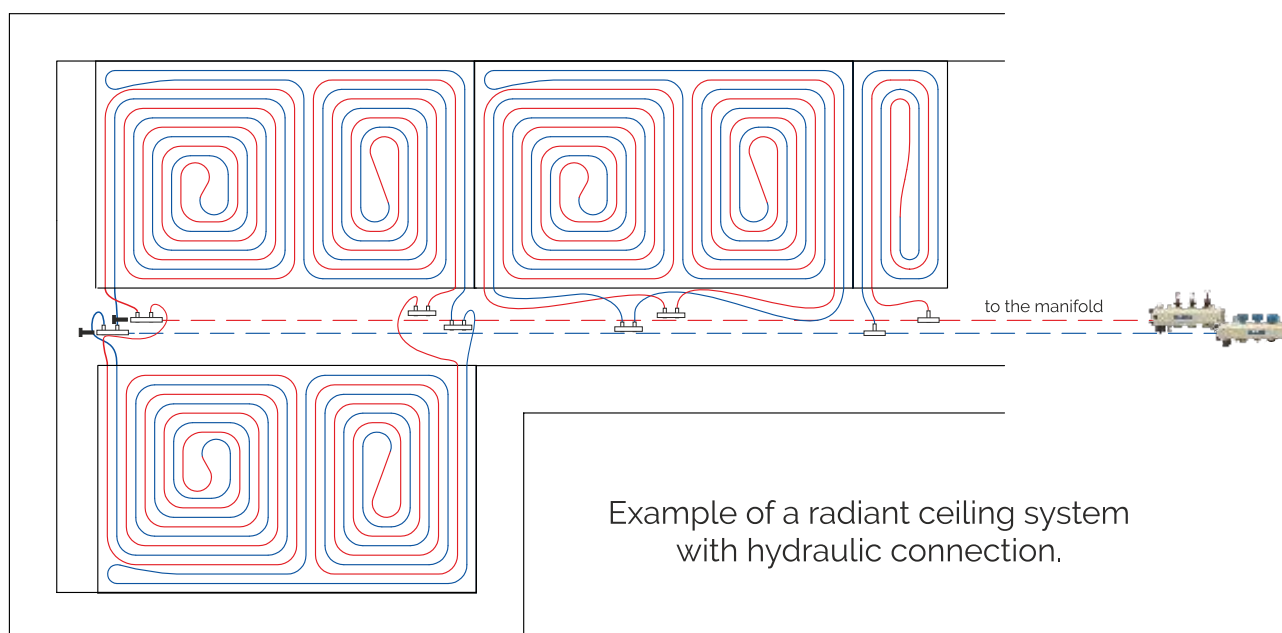
After the above steps, insulate the not yet insulated parts through which water flows with suitable pipe insulation and bandaging material.



This completes the installer's work and the plasterer must intervene again to close the system with the infill panels, which must be installed in the same way as the radiant panels, but with the holes drilled for inserting

the light fittings.

If there are sensitive areas in the ceiling that require subsequent access for maintenance (e.g. ceiling dehumidifiers), inspection holes must be provided.



After the infill panels have been laid, the joints must be treated with the technique and products intended for this purpose.

The treatment of the joint between the panels is facilitated by the special profile of the panel itself, which has a thinning at the edge specifically designed for this purpose.

This process has the precise function of concealing the joints so that they are aesthetically homogeneous with the finished ceiling surface.

The joints are treated with microperforated paper-reinforced tape in four stages:

sticking of the reinforcing tape;

covering the filling tape in the edge thinning;

first smoothing of the joint surface;

second smoothing of the joint surface.

After treating the joints and especially after the plaster has dried and the surface of the INDECAL panels has been cleaned of dust and residues, they are suitable for painting.





OUTLINES SPECIFICATION

Ceiling radiant system

The radiant ceiling system is realised with ionising plasterboard panels of the INDECAL 'Active Air' type, which consist of a 15 mm thick gypsum board, paired with a 30 mm insulation of expanded polystyrene EPS 150 (according to UNI-IIP standards) and PE-RT pipe 8x1 mm with EVAL oxygen barrier in spiral circuit with a spacing of 50 mm.

The DURAD Active Air radiant panel not only fulfils the function of heating and cooling, but also that of air purification, eliminating 70% of the VOCs present in the rooms. It must be shatterproof as it is additivated with wood and cellulose fibres, mechanically resistant, moisture resistant (H1 class) and fire resistant.

It can be installed on suspended ceilings or false ceilings, as well as on walls, with an installation technique typical of drywall construction and with metal profiles commonly used by plasterboard builders. The panels have different formats to adapt to the dimensions of the different rooms and to meet the thermal requirements in any situation.

The hydraulic distribution between the different panels will be done through pre-insulated multilayer pipes with a diameter of 20*2 mm and plastic press fittings for connecting the different panel circuits to the riser.

The plate will be able to ensure a uniform heat distribution, low inertia and low heat jump between the exchange surface and the critical condensation point in the cooling function.

The pressure drop remains constant even if the number of modules supplied varies, so that self-balancing of the circuits is possible without the need for reverse recirculation and calibration of the main manifold control valves, which can remain fully open.

It shall be possible for the pressure drops to increase as a function of the desired flow rate according to a non-asymptotic curve over a wide range of variation to allow even higher thermal performances than the nominal values.

The finishing of the radiant surface must be done in the usual way for plasterboard (plastering and reinforcing the joints with fabric or paper tape, impregnating primer, finishing coat, filling, etc.).

In cooling mode, the system must be equipped with an isothermal dehumidifier with refrigeration circuit that distributes the supply and extract air via insulated pipes, linear outlets and return air grilles with adjustable fins.

The manifold for the radiant system must be made of technopolymer with an air chamber to prevent the formation of condensation during cooling and equipped with control valves with electrothermal heads.

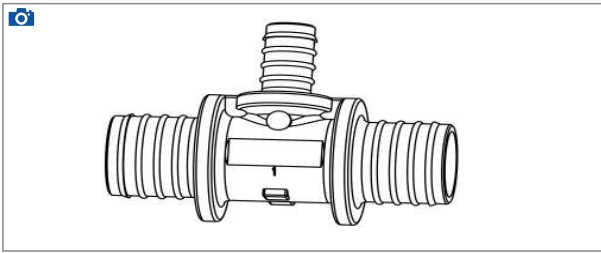
The installation shall be controlled by the Indecal home automation system.

Thermal yields must be certified by accredited and internationally recognised institutes in the field of radiation.



FITTINGS

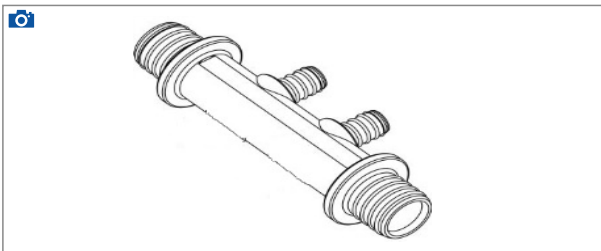
TEE PIECE WITH 1 CONNECTION



DESCRIPTION

Pressfitting Tee piece for multilayer pipe Ø 20x2 mm with connection Ø 8x1 mm

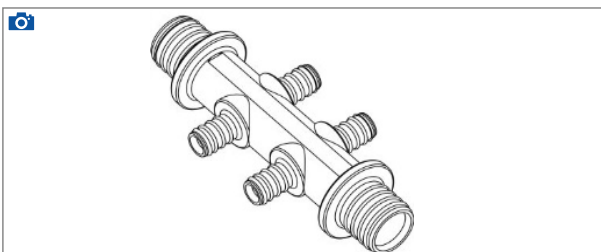
TEE PIECE WITH 2 CONNECTIONS



DESCRIPTION

Press fitting Tee piece for multi-layer pipe Ø 20x2 mm with 2 connections for PE-RT pipe Ø 8x1 mm

TEE PIECE WITH 4 CONNECTIONS



DESCRIPTION

Pressfitting Tee piece for multi-layer pipe Ø 20x2 mm with 4 connections for PE-RT pipe Ø 8x1 mm

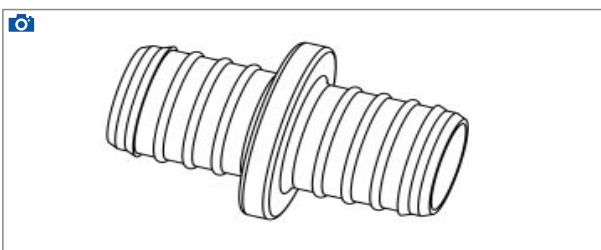
PLUG



DESCRIPTION

Press-fitting plug for multi-layer pipe Ø 20 mm

COUPLING



DESCRIPTION

Coupling Ø 8 mm

INSULATION



DESCRIPTION

Elastomer foam insulation for Ø 8 mm pipe insulation

MANIFOLD



DESCRIPTION

Modular pre-assembled technopolymer double chamber manifold with terminal unit and flow indicator, valve, air vent, thermometer and drain cock Ø 1" x 3/4". Flow rate from 1Lt/min to 5Lt/min.

02 to 15 circuits

230 V ACTUATOR



DESCRIPTION

Thermal actuator, On-Off type, suitable for manifolds with return valve, with limit switch, integrated auxiliary contact, normally closed

BYPASS VALVE



DESCRIPTION

Adjustable differential by-pass valve with graduated scale from 0 to 0.5 bar.

MICRO-BUBBLE DEAERATOR 1"



DESCRIPTION

Device for eliminating bubbles and micro-bubbles in the circuit.

ADAPTER



DESCRIPTION

Adapter Eurocone Ø 20 x 3/4 for connecting the multilayer pipe to the manifold.

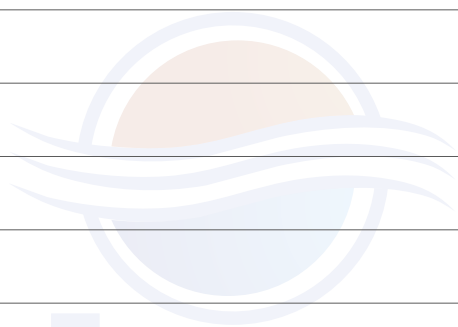


NATIONAL AND INTERNATIONAL REFERENCES

1. Smart, city library, Modugno - Italy
2. Lavagna Hospital, Genoa - Italy
3. Ex Manufactures, Rovereto - Italy
4. EdilMea construction showroom, Matera - Italy
5. Vestas SpA, Taranto - Italy
6. Sports Hall, Ruvo - Italy
7. Vim, pharmaceutical wholesale, Matera - Italy
8. Fiat factory, Melfi - Italy
9. Caputo Associated Tax Consultants, Gravina in Puglia - Italy
10. Residential complex, Saint Priest - France
11. Metal Prove Precision Mechanics, Palese - Italy
12. Residential complex, Piatra Neamt - Romania
13. Residential complex, Kamnik - Slovenia
14. Logistics centre, Haßfurt - Germany
15. Residential complex, Neu-Ulm (Schwaighofen) - Germany
16. Hausandmore management centre, Friesenheim - Germany
17. Royal Car showroom for cars - Republic of San Marino
18. Buffetti office supplies franchise network, Bologna - Italy
19. Tezenis clothing franchise shop, Foggia - Italy
20. Kindergarten, Ruffano - Italy
21. Residential complexes, Rome - Italy
22. Dukes park chelmsford - England
23. Management centre, Manchester - England
24. Educational institution, Casal Velino - Italy
25. Town hall, Casal Velino - Italy
26. Town hall, Cuccaro Vetere - Italy
27. Educational institution, Perdifumo - Italy
28. Fratello Sole Social Cooperative, Santa Maria d'Irsi - Italy
29. School, Montevarchi - Italy
30. Simpro SpA, Brandizzo - Italy

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NOTE



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