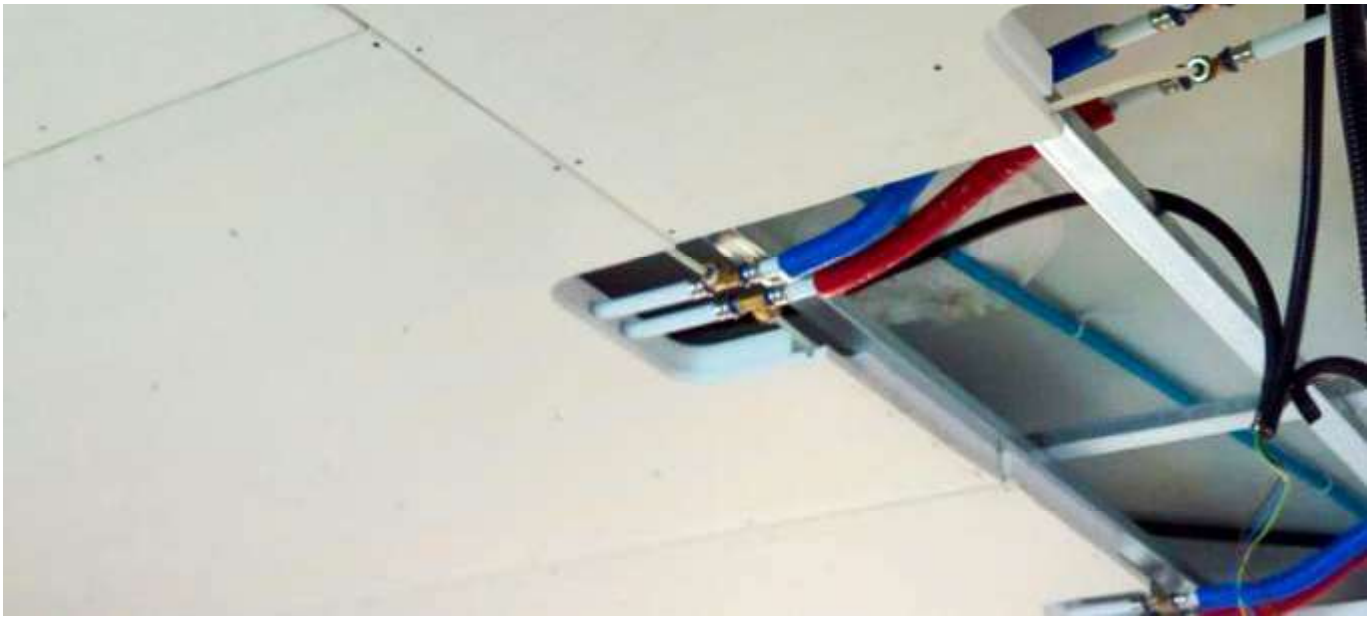
RADIANT CEILING

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 |27° and |45° - cooling between |16° and |20°.

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.

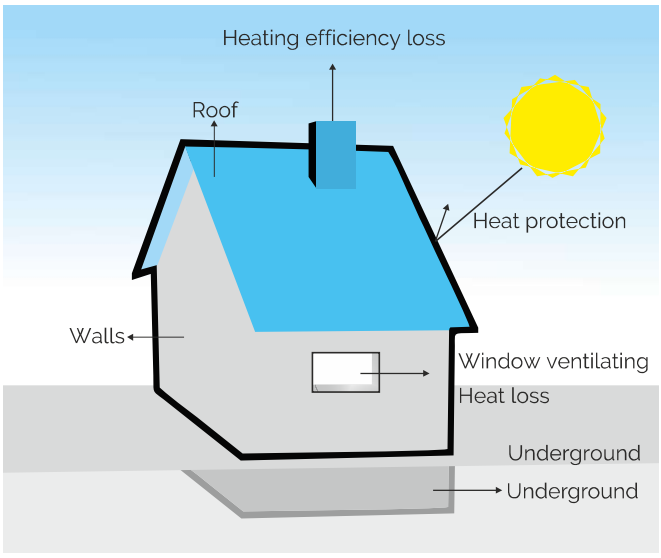
This is usually done on the outer walls of the structure by applying the traditional exterior insulation finishing system.

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.

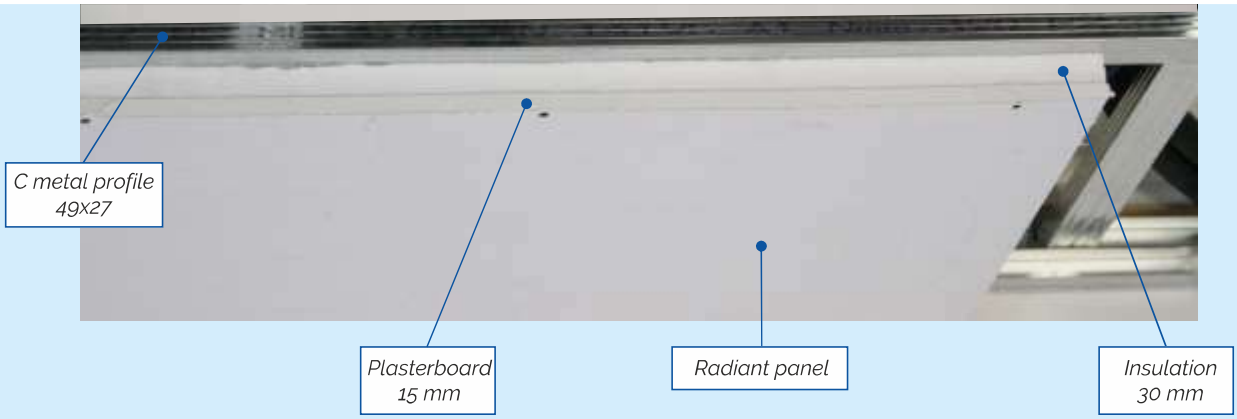
The terminal units are made of plasterboard radiant panels that are totally INVISIBLE in the environment, can be installed on ceilings and walls and do not take up furnishing space; they do NOT PRODUCE AIR MOVEMENT and therefore no dust; they are powered by a low-temperature heat pump (between 25° and 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.

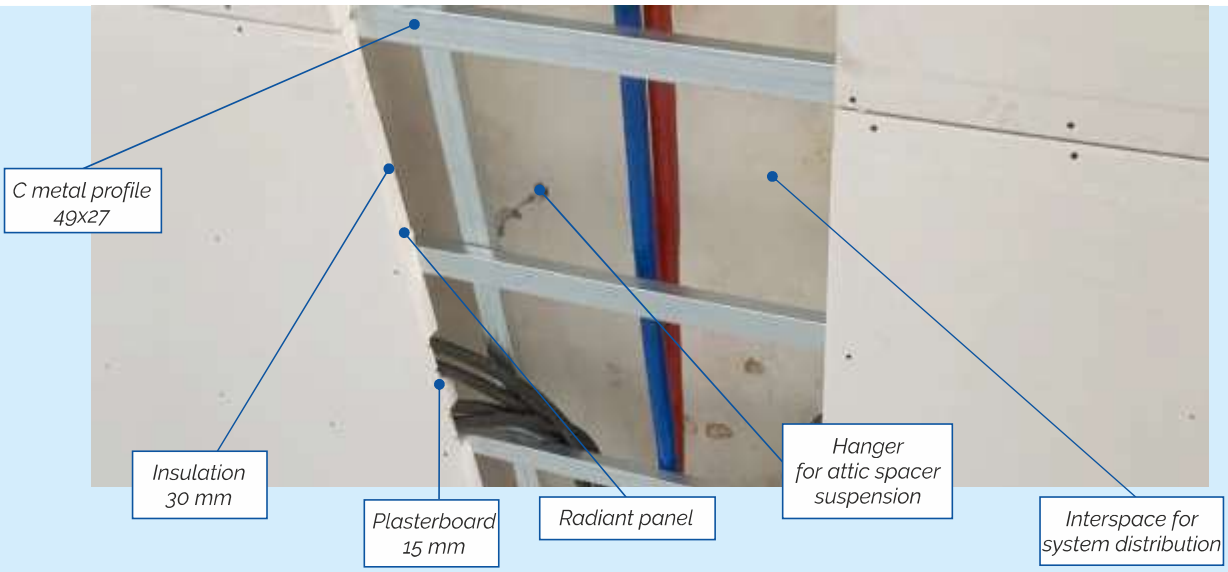
Their **LOW THERMAL INERTIA makes** them ideal for rooms that are not occupied all the time or only occasionally and for short periods of time (e.g. hotel rooms, meeting rooms, etc.), as they get to full capacity within a few hours of being switched on, so it is not essential to keep the system running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

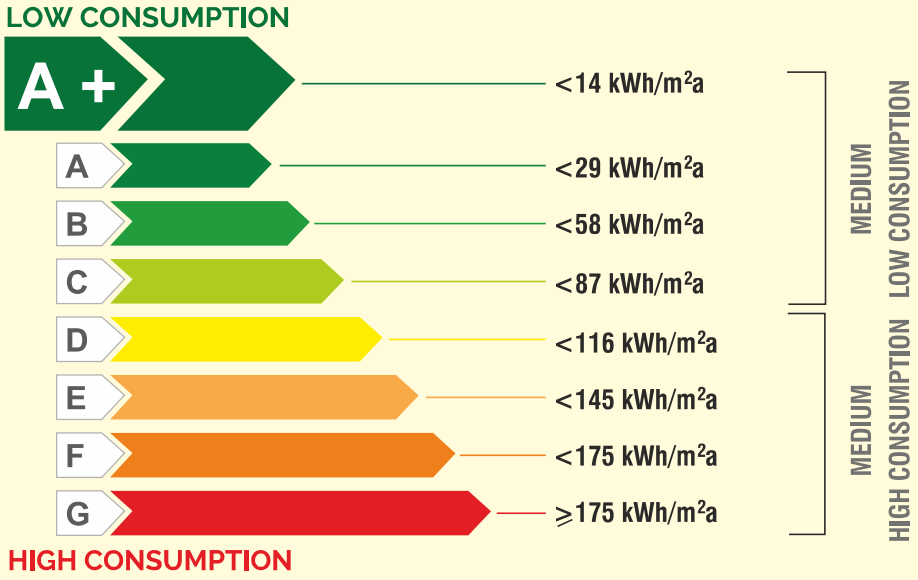
The INDECAL system is made up of a few simple and natural products which, when combined, allow an environmentally friendly **ENERGETIC RENOVATION** in just a few days, thanks to the high degree of prefabrication of the system and the dry construction method, which makes it possible not to have to leave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

WALL/ CEILING



FALSE CEILING





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**