

**Maintained and regulated thermal comfort available all year round**

## Technology infraclima

**The most efficient energy-saving and ecological system in Europe**



# General description of system INFRACLIMA

## Advantages, significance and benefits

### ***Principle in a nutshell***

The low-energy heating and cooling system **INFRACLIMA** uses full surface heat conduction and radiant heat or cold for indoor climate control by means of a heat carrier having an year-round temperature of 22 +/-1°C that flows through capillary mats installed in the rooms' floors, ceilings and walls, which seasonally either warm up or cool down surfaces of the building structures' inner walls, thus providing maintained and regulated thermal comfort all year round.

The thermal control of the inhabitants at these low temperatures is achieved by radiating heat from all directions.

***This is the only system where the thermal comfort can be achieved in residential buildings with a water temperature that is half of the human body's temperature, and it is this low temperature level that advances by revolutionary means the solar energy efficiency limits in the field of heating and cooling.***

***The change involved is so fundamental that the generally established terminology of the mentioned system ceases to be valid. From the INFRACLIMA viewpoint the terms heat and cold merge. In the given case and at this point in time there is no appropriate technical term for this phenomenon.***

### ***Historical perspective:***

Modern humans have been yearning to achieve the best living conditions for **over 600 000 years**. One of those basic conditions is thermal comfort, which reflects on ones physical and psychological state of wellbeing.

Initially the sun was the only source of heat used, and a few hundred thousand years later the first fire was made, which in various forms, e.g. by enclosing the fire place and providing an outlet for the smoke through a chimney in the form of fireplaces and stoves, has been used ever since.

**Heat radiation** – electromagnetic waves have heated the living places of humans since time immemorial, and the experience of the first sunrays of spring or relaxation around an open fire remain very pleasant occasions, especially nowadays.

**The recent historical trends** emphasize traditional methods of heat distribution to all rooms, which are usually fitted with radiators. The element of radiant heat transfer was suppressed considerably at the expense of convective hot air flow, which was a step backwards and a loss in terms of thermal comfort.

The system **INFRACLIMA** offers people the opportunity to return to the natural way of heat sharing with the following benefits:

- 1. healthy living and thermal comfort**
- 2. ecologically friendly and energy cost saving system**
- 3. economics of system**
- 4. regulation availability**
- 5. technological aspect**
- 6. universal use**

### **ad 1. Healthy living and thermal comfort:**

In times, when almost 50% of the population suffers from one or other form of allergy and when man spends on average  $\frac{3}{4}$  of his life indoors the effects affecting health should be one of the most important aspects considered in the course of building design. Regrettably this fact is quite often completely ignored, except when there is an allergic person in the close circle of family or friends.

The system **INFRACLIMA** brings the following advantages:

- heat transfer works without air circulation – it does not disturb the dust
- due to the heat carrier's low temperature, burning of dust and biological particles does not occur
- prevents occurrence of fungi and mite outbreak
- prevents allergic and respiratory disorders
- has a beneficial effect on the psyche – it evokes sanguine feelings similar to effects brought about by phototherapy or the spring sunshine
- uniform thermal distribution over the radiation surface area
- small difference (temperature gradient) between the temperature of the heat carrier and the surface temperature (only 2-3°C)

### **ad 2. Ecologically friendly and energy cost saving system:**

**fossil fuel reserves are limited**, and it is estimated that at the current rate of consumption they will be depleted within **a few decades**, notwithstanding the continuous growing energy consumption per capita. One of the current biggest "guzzlers" of energy on the global scale is, in addition to industrial production, operation of the building objects. There is an enormous **energy saving** potential based on these facts, which is achievable with the implementation of the system **INFRACLIMA**.

the system **INFRACLIMA** brings the following advantages:

- low-energy system that functions at the lowest possible heat levels
- **uniform temperature of the heat carrier – water, at 22+/-1°C year round**
- offers possibilities of using all low-temperature ecological sources of heat
  - o **using solar systems for heating all-season**
  - o improves considerably the heating factor in conjunction with heat pumps (approx. 6-7 kW of heat is produced per 1 input kWh, while it also provides natural cooling during summer operation)
  - o making use of low temperature waste heat from production technologies – direct usage - no heat pumps
  - o making use of the geothermal heat in thermal regions – direct usage - no heat pumps.

**By reorientation to renewable sources it preserves the fossil sources**

- **suitable for cooling large areas** by using the natural sources of coldness, such as well water or the earth's coolness – which implies **cooling with almost zero energy consumption** (only the power consumed by a circulation pump)
- passive implementation – solar architecture – **efficient usage of the passive solar gains to cover the heat demands** (transfer of the local gains to a central accumulation point)
- in contrast with the traditional systems it creates the same thermal comfort with approx. 2-5°C lower indoor temperature, by which a saving of 12-30% is made on the unproduced heat.
- IFRACLIMA components are made of **recyclable** new generation PP-R plastic.

### **ad 3. Economics of system:**

Determination of the real price of individual energies and fuels is highly complex. Often the calculations do not include all externalities, and the presented cost of the ecologically gained energy from renewable sources in a comparison appears quite absurd from an economic

aspect. In the absence of the ecological taxes and the financial support of the state it is very difficult to bring forward technologies that use renewable sources.

Another option is the full use of energy which we have had at our disposal **free** of charge and in adequate supply since the very start – the **Sun's energy**.

By implementing the system **INFRACLIMA** it is possible to reduce energy consumption to approx. 5-20% compared with the energy consumption used by the traditional heating methods, with the additional gain of improved comfort of living. The higher initial investment costs for the acquisition of the system are compensated for by savings made on unused energy. The return on investment period is between 5 – 8 years.

the system INFRACLIMA brings the following advantages:

- by focusing on the renewable sources of energy it uses heat that is free
- **advances the solar energy usable limits** by providing heating in buildings
- **savings of up to 98% of the operating costs**
- **cooling of premises for practically zero costs**
- **very fast economic return**

### **ad 4. Regulation:**

The nature of the low-energy design and the full surface application of the system **INFRACLIMA** allows the use of **very simple and rapid temperature regulation** in the object as well as **entirely automatic passive regulation** (without the use of electronics)

during local internal and external solar heat gains.

the system INFRACLIMA brings the following advantages:

- 10x faster than conventional floor or wall systems' response to regulation setting
- low heat accumulation
- combines the advantages of a fast reacting heating element ("radiator") and the thermal radiation transfer method
- exceptional self-regulating ability – the low temperature of the system allows automatic passive regulation

### **ad 5. Technological aspect:**

the system INFRACLIMA brings the following advantages:

- the system is installed very close to the surface of the building structure (directly under the plaster, tiling and/or paving)
- fast and easy installation
- eliminates the problem of cold corners and thermal bridges.

### **ad 6. Universal usage:**

the system INFRACLIMA brings the following advantages:

- usability in all structures (floor, ceiling, wall)
- **usable in new-buildings as well as reconstructions**
- the system features low installation depth – only 4 cm compared with the 12 cm usual for conventional under-floor heating
- utilises cooling and heating in one system – maintains the spatial indoor climate
- not dependent on the source of heat used