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INFRARED HEATING

**for
new builds and renovation projects**

**Independently proven:
The most economical floor heating!**

Warms quickly and optimal comfort

Maintenance free

Introduction

HSI supplies efficient and renewable heating. The heating systems are characterized by a fast emission of infrared (IR) heat and applicability in floors, walls as well as ceilings.

Proven economy

Independent research has shown that HSI's IR floor heating provides an equal level of comfort at a 35% lower energy consumption. The IR floor heating can be perfectly combined with sustainable energy, making the use of fossil fuels superfluous. Solar boilers or vacuum tubes can be used for hot water.

HSI heating systems are the most sustainable systems at present!

The IR heating system not only offers reduced energy consumption but is also, compared to other systems, produced with a minimum amount of materials. Only a few pounds of material are required to provide a total home with a heating installation. Other systems require several hundred kilograms of material. In conclusion: great for the environment and your wallet.

The HSI IR heating system is suitable for AC and DC. This means that at this moment the system can already be connected to someone's own sustainable energy resource (solar panels or windmill). The addition of an own storage battery later will be no problem.

Applications:

Housing

HSI's IR floor heating is an excellent choice for new builds as well as renovation projects.

New builds: at present one of the most important goals for new builds is to achieve zero energy houses and buildings. First measure to be taken is the application of a well insulated shell. This will ensure low energy consumption for the heating of rooms. Research has proved that the investment in a heat pump is not justified for these sorts of environments. The investments including the yearly maintenance required by these systems will never be earned back by the low energy consumption. The IR heating from HSI forms the perfect alternative in these environments.



Floor heating in a new build home, applied under non glued laminate



Renovation

Insulation and energy savings are nowadays also being taken into account in renovation projects. The IR heating from HSI can be an option when the heating system needs to be replaced. In this situation it is important however to provide the sub-floor with sufficient insulation. The better the insulation, the more radiant heat will be emitted directly to the room. One of the major advantages of the HSI heating is its minimum thickness of 1 mm. As a result of this a well insulated floor can already be created at a construction height of approx. 3 cm (1.0 inch). Other floor heating systems require a minimum construction height of 7 cm (2.75 inch) including insulation.



Wall and floor heating in a renovation project



Floor heating in a farmhouse



Flexible heating walls

A unique selling point of the HSI heating system is its application in flexible (movable) walls and the variation of nominal power. An ideal application for spaces which only require limited heating.



Prefab

Another fast growing trend in the construction world is prefab. Another area in which HSI's heating systems are widely adapted as plug and play solutions.



Prefab floor



Prefab floor



(Prefab) wall heating

Monuments and churches

Sustainability has become a key word in the renovation of cultural heritage buildings. How to create comfort in old buildings and ensure the optimal preservation at the same time? A sensitive area when it comes to structural and technical solutions.

Guidelines for sustainable renovation often include a number of recommendations and may comprise:

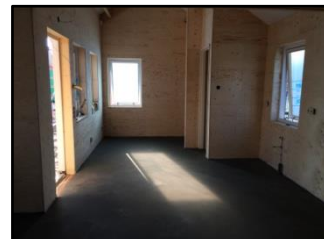
- smart compartment heating: no heating in non residential areas such as stairways and attics
- roof insulation, inside or outside
- ground floor insulation
- re-use of indoor window shutters
- double glazing
- building management system
- low temperature heating (floor heating)
- energy saving lighting with motion detectors
- water saving sanitary installations
- water and energy saving kitchen installations.

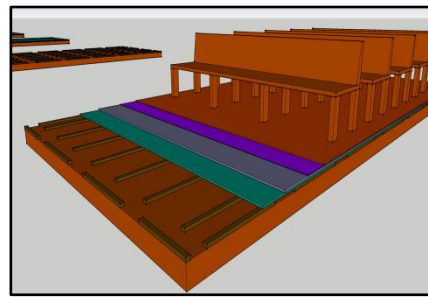
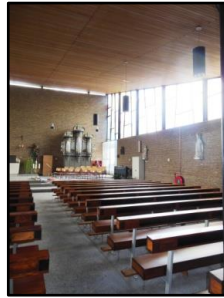
In the context of above mentioned guidelines the HSI heating systems have the following USP's:

- Insulation ground floor. The construction height for insulation is often limited. HSI's IR heating has a thickness of 1 mm only. This maximizes the application of insulation.
- The heating can be applied in floors as well as in walls, depending on the specific heat demand.
- The heating system is also efficient in rooms which only require partial or non-continuous heating. Movement detectors help to increase the efficiency. HSI's heating system is a low temperature system.
- HSI's heating systems can be connected to a building management system in order to manage the energy consumption in the most efficient way.



Mill house "De Salamander" in Leidschendam NL





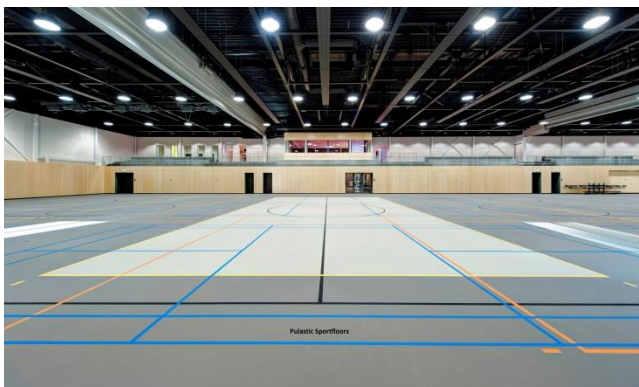
St. Servatius church in Oijen NL

The concrete floor of the St. Servatius church has been installed on a sand foundation. Due to the accumulation of water under the floor, the floor heating has been applied on an elevated construction provided with vent holes.



Valkenbos church The Hague NL

Sports and leisure facilities



Much of the energy to heat sports facilities is used inefficiently. A floor heating system optimizes the energy use; the radiant heat is emitted directly into the room/space. HSI's heating system provides an equal comfort at a lower - on average 2 degrees Celsius - ambient temperature compared to traditional heating. Our system creates radiant heat instead of air heating. This also decreases the perspiration of sportsmen. The HSI heating does not heat the entire premises but only up to a height of 2 meters. Our IR heating system offers nothing but advantages



for sports and leisure facilities.

Our heating systems also enables "local heating" in sports facilities, for instance a yoga studio where people sit on the floor.



The heating in this yoga studio has been installed in each participants place.

A soft insulation layer has been installed under the heating mats with laminate flooring on top.

Why choose HSI's heating solutions?

The energy consumption of the HSI IR heating systems can be reduced up to 35% in comparison to traditional (floor) heating. The major difference compared to traditional heating is the unique radiant heat production emitted by an amorphous metal ribbon.

As a result of their low mass the wide and ultra thin heating ribbons immediately start to emit radiant heat. The heating ribbons cover a larger floor surface than traditional heating systems. This means that the same level of comfort is reached with a lower temperature. This lower temperature also prevents top layers against damages and cracks.

Below figures show the difference in structure between two heating ribbons. A competitive heating ribbon and HSI's ribbon. The pictures were taken with an IR camera. Both pictures show the heat emissions of both systems being powered by the same wattage.

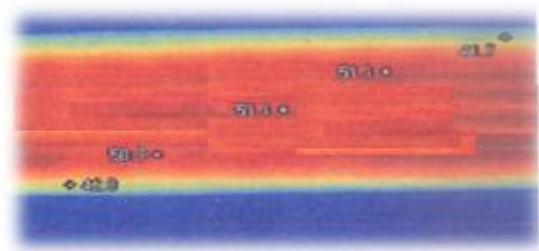
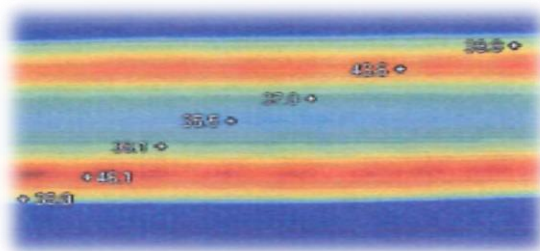


Wire heating ribbon



Amorphous metal glass heating ribbon

Below photos show the difference between both technologies (IR camera).





Conclusions external research agencies

Landstra Engineering (NL)

Calculations show a better temperature distribution in the floor. The variation at the floor surface is 23% smaller in comparison to other systems.



Sintef (Norwegian TNO/ TÜV):

- The chosen thin and relatively broad amorphous ribbons and their internal structure are beneficial compared to the conventional electric wires.
- The chosen DC technologies enable the possibility to supply more power to the ribbons than AC.



Prof. Dr Mark Geller

Hermon Laboratories Israël / Amorphous Competence Center. When the heating ribbons are placed at a depth of 4.0 to 2,5 cm below the surface the warm-up time of ribbons is twice as fast than the warm-up time of wires. The warm-up time can become 4 times faster than traditional copper wires or warm water tubes when the ribbons are placed at a depth less than 2.5 cm under the surface.



SGS Intron / Hogeschool Zuyd NL

The amorphous ribbon generates radiant heat in an efficient way. This results in a lower energy consumption of approx. 35%. A major step forwards in the achievement of sustainability goals when combined with renewable energy.

