HEATING SOLUTIONS INTERNATIONAL BV
Torenstraat 3
5258 ET Berlicum
The Netherlands
T +31 (0) 88 1300200

P.O. Box 47
5258 ZG Berlicum
The Netherlands

Info@heatingsolutionsinternational.com
www.heatingsolutionsinternational.com

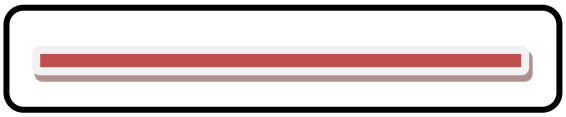
Why HSI's heating solutions: the advantages of HSI's radiant heating systems
With HSI's heating technology it is feasible to achieve de-icing of roads with at least a 30% lower energy consumption compared with traditional heating systems like liquid or electricity.

The main distinctiveness of HSI's radiant heating system is the unique method of heat production which is generated by an amorphous metal glass ribbon. The ribbon enables an optimal (IR wavelength approx. 10 micrometer) heat radiation which melts ice on road surfaces. This combined with an intelligent control unit leads to the most efficient heating system worldwide.

Characteristics of our amorphous metal glass heating ribbons
Due to the shape of the amorphous heating element the structure of the total heating ribbon is different. Some competitors have already copied the unique patented structure of the HSI heating ribbon into their own heating wire ribbon. Although both heating ribbons show a similar exterior design there is a huge difference in efficiency and effectiveness in both ribbons.

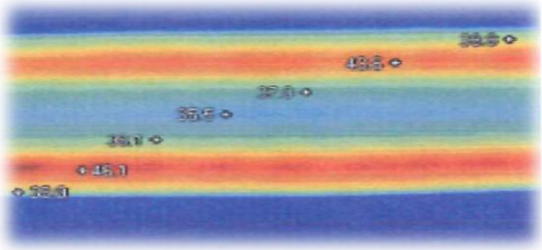
Below images show the difference in structure of both heating ribbons and also the difference when using an IR camera. They show the heat output of both systems while powering with the same wattage.

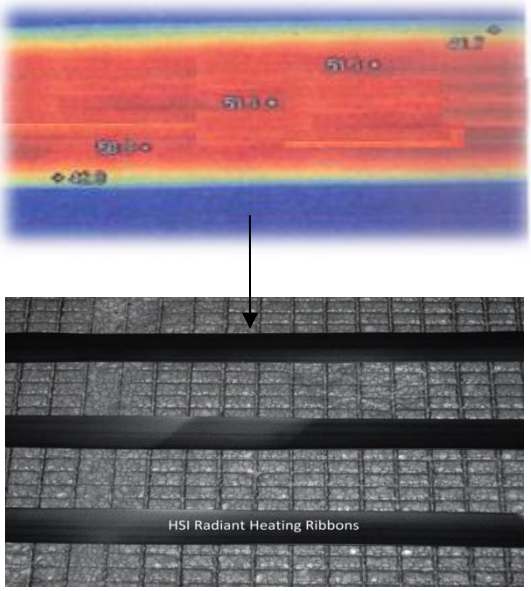
Copper wire heating ribbon



Amorphous metal glass heating ribbon

The images below visualize the difference between both technologies (IR camera).





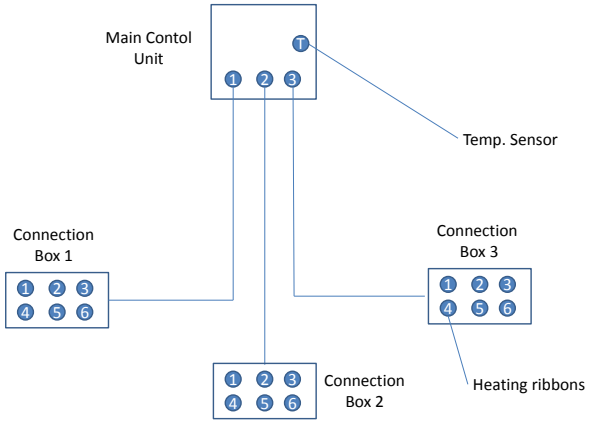
Design of the amorphous metal glass ribbon
Due to the structure of the amorphous ribbon the energy will be turned into radiant immediately. There is no loss of energy by heating up the material itself. This ensures the difference in performance as shown in the above image.

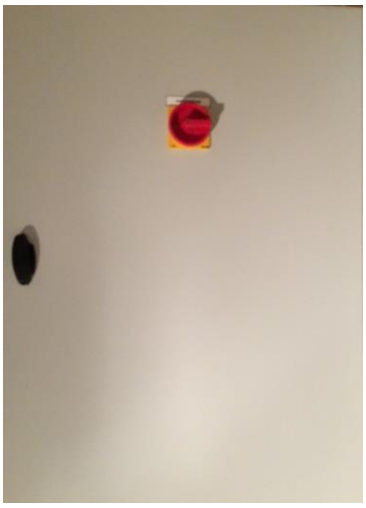
Combination with a high performance Control Unit
The heating ribbons will be connected to an operating system which will manage the energy consumption in the most efficient way. Modulating and heating cyclically based on the environmental requirements. The system is able to define the optimal way of energy consumption according to the climatic/weather/road conditions. This also results in substantial savings on energy costs compared to traditional hydronic/water based systems.

In addition, the control unit can be combined with the power supply of other energy demanding systems, e.g. the lighting installation. This decreases the peak power consumption and can also result in strong additional cost savings.

Required amperage (energy connection) and power consumption
HSI BV will provide the required amperage based on the amount of heating ribbons and the required temperature. Special software enables the use of a heating cycle, thus reducing the total power required.

Application when and where?
One of the biggest advantages of HSI's heating system is flexibility of use. The heating system consists of separate heating ribbons which are joined to connection boxes. The connection boxes are connected to the control unit by central cables. The power can be generated by a generator or the fixed electricity net.
Below an example of a main Control Unit.





External research conclusions

Landstra Engineering
Calculations show that a better temperature distribution in the floor is obtained. At the surface, the temperature variation is 23% smaller than with 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. If the ribbons are situated between 4 cm to 2.5 cm from the surface the warm up time of the ribbons is twice as fast then the wire and when the ribbons are situated less then 2.5 cm from the surface the warm up time could became 4 times faster then traditional copper wires or liquid heating systems.

SGS Intron / Hogeschool Zuyd
The amorphous ribbon generates highly efficient IR radiation. This results in a 35% less energy consumption. In conjunction with renewable energy generation a big step in achieving sustainability objectives can be realized.