

Innovative heating systems in historical buildings

2012-04-12 Vilnius

Lecture summary

- Types of traditional heating systems, loss of energy in these methods
- Innovative heating systems: heat pumps, solar heating, radiation heating
- Overview of innovative heating solutions
- Application examples of different heating systems in historic buildings, to make the heating more effective

Types of traditional heating systems and main innovations actual for historical buildings

Traditional heating systems:

- Centralised
- Local – gas, electric space heaters

Innovations:

- Geothermal
- Heat pumps
- Radiation

Space heaters

- Space heaters are used to heat a small area. They are often looked upon as complementary heat source and can be used on its own, or as an addition to central heating, to bring more warmth, as and when required. There are advantages of using space heaters. They help in cutting down the energy costs. There are many different types of space heaters available in the market. Before we turn towards the question what is the most energy efficient space heater, we will see the different types of space heaters available in the market.



- **Types of Space Heaters**

The most common types of space heaters are fuel based space heaters, convection based space heaters and radiant space heaters.

- **Fuel Based Space Heaters**

the fuel based space heaters use fuels like natural gas, kerosene or propane, and are considered to be the most efficient space heater. They are good at heating up rooms, but they emit a lot of carbon monoxide and carbon dioxide, which are dangerous to health. At the same time with the spiraling cost of natural fuels, it is not a viable option.



Convection Space Heaters

Fan or blower from the space heaters are used to propel heated air, which helps in even distribution of heat within enclosed area. These space heaters use oil, where electricity is used to heat up the oil. When the oil heats up, with the internal heating system, the heat is radiated into the room. They are among the energy efficient space heaters, however they will not give instant results, as they take longer to heat up the room.



Radiant Space Heaters

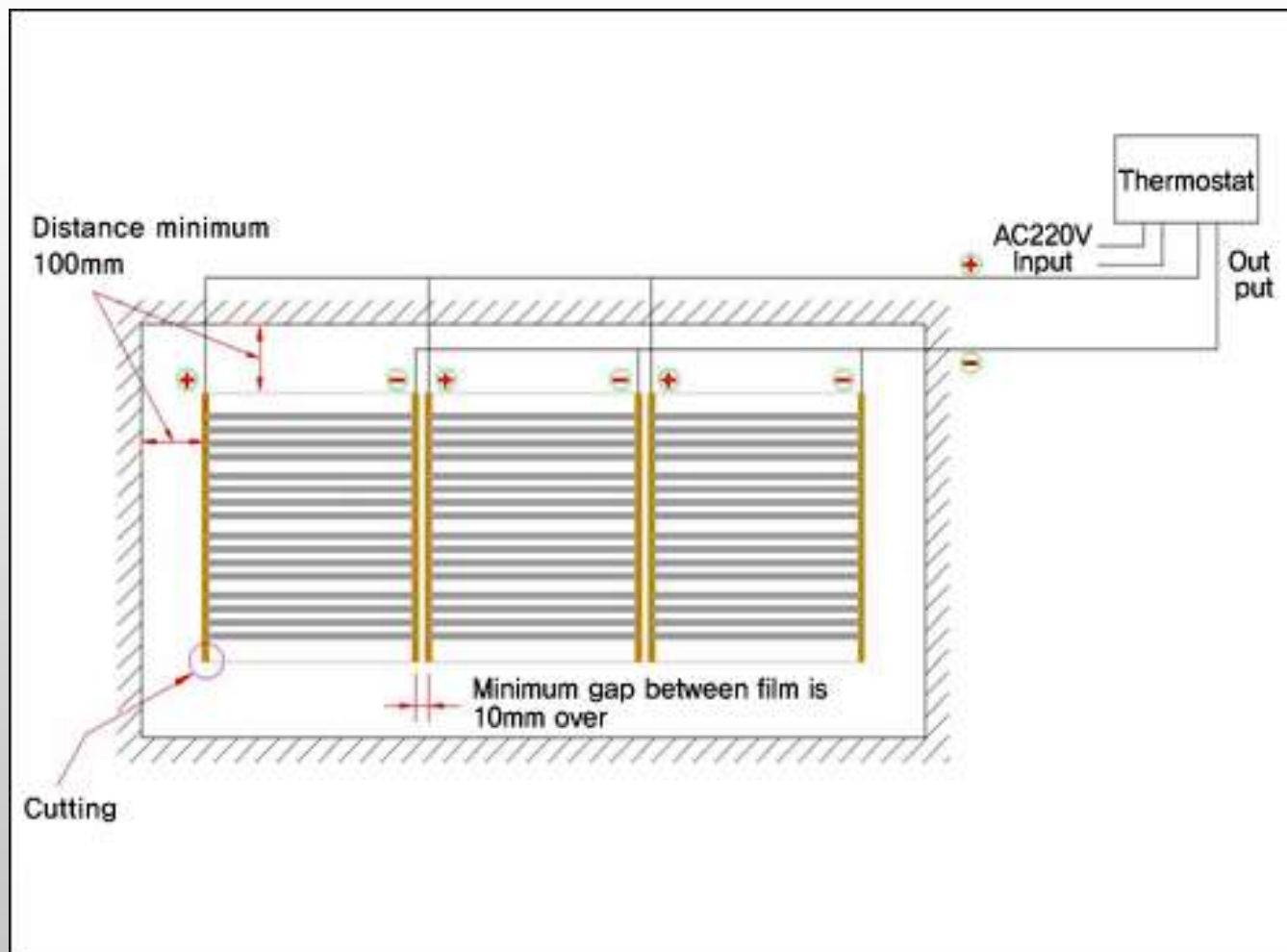
They are often referred to as most energy efficient space heaters. The heating element used in these space heaters is enclosed in a glass tube. The infrared radiation reflection from the heating element is used to heat the space. There are many different types of heating elements used in radiant heating, like carbon tubes, quartz tubes, metal coils, halogen lamps, etc. It is due to the heating elements used, these types of space heaters are also called infrared, ceramic, parabolic reflective heaters. These space heaters are best for direct or spot heating.



What is The Most Energy Efficient Space Heater?

If one has to look at the different space heaters available, you will see that all the types of space heaters are energy efficient. However, there are some points to be considered, when one decides to buy a space heater. It is best to buy a current space heater, whether you opt for a brand new piece or a used piece. Make sure that the model has Underwriter Laboratory (UL) label attached to it. The thermostat should be accurate, which ensures efficient energy consumption. Choose a space heater appropriate for the room, you are going to install the space heater. If you use a small heater, there are chances that the heater will use more energy, likewise if you use a big heater for small room, then there is waste of energy. After reading the basics, we will now see which are the most energy efficient space heaters available.

Radiant film heat system



Benefits of radiant heating

- **Biologically it is optimal heat for our body.** The infrared radiation consists of several types of waves.
- The foil **heatflow proves anti-bacteria effect** due to air saturation by means of anions.
- room humidity is maintained because the air is not dried out.
- The foil **heatflow is not a source of undesired electromagnetic radiation**

Heat pumps



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- For many consumers, heat pumps have become the preferred technology for heating and cooling their houses. Heat pump technology offers effective and reliable temperature control coupled with significant energy savings. However, selecting the appropriate heat pumps for your unique needs and individual budget can be somewhat complicated, with many competing offerings on the market

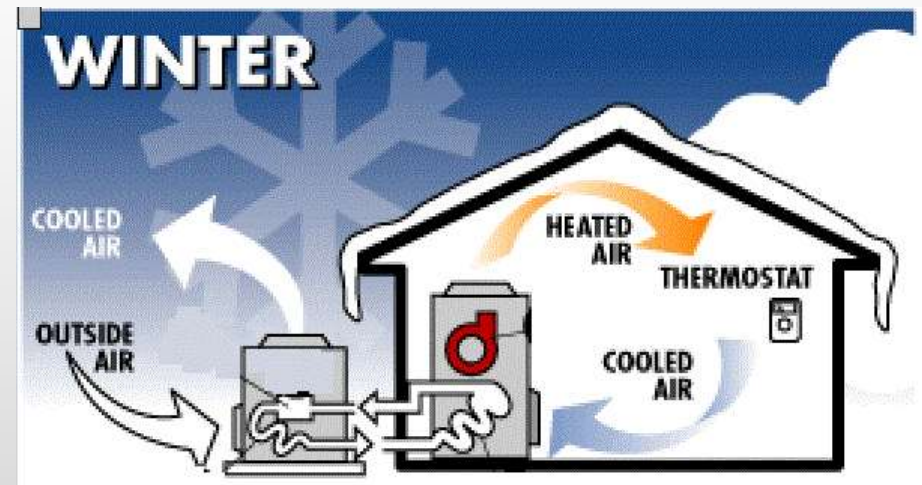
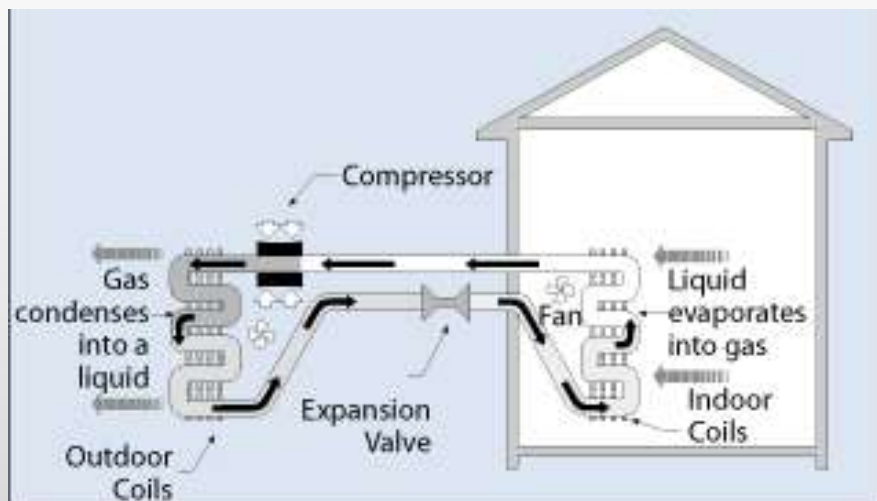
Types of heat pumps

There are two main types of heat pumps. The key difference between the two types has to do with the way in which heat is transferred between the inside and the outside of the home and this, in turn, affects their suitability for particular climates and geographical areas.

By far the most popular and least expensive type of heat pump is air-based. During the winter, such a pump pulls the heat from the outside air and pumps it inside. In the summer, the pump reverses direction and actually pulls heat from the air inside the house and pumps it back outside.

The main drawback of an air-based heat pump is that it is dependent on the temperature of the outside air. Thus, in winter, when the air outside is cold, the heat pump has a difficult time pulling heat from that air. Similarly, in summer, when the air outside is hot, the heat pump has a difficult time pulling cold air into the home. Consequently, such a heat pump is best for temperate climate zones.

Air heat pumps



Geothermal heat pumps



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A geothermal heat pump uses a ground source instead of the air as either a source of heat or a place to deposit heat. Regardless of the season, the ground under your feet has a pretty steady temperature. A geothermal heat pump uses this steady state to keep the temperature in the home cool in the summer and warm in the winter.

A ground source can be the earth, a rock formation or a water tank. The heat pump works to either transfer heat to that source or pull heat from it. Although geothermal heat pumps tend to be more powerful and efficient, they are also more expensive and more challenging to install.

A geothermal heat pump can offer the versatility of not only providing heating for the air in the home, but also for the water flowing through the plumbing system. Most traditional storage tank water heaters can be modified to work with a heat pump. In addition, a number of brand manufacturers offer hybrid systems in which the heat pump comes with a water heating component that can replace old water heater.

Geothermal heat pumps



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Conservation and Restoration

With Heat Innovation you can have following benefits :

- no radiators
- easier and quicker installation
- elimination of condensation
- elimination of particle-dust
- complete radiant warmth
- controllable warmth
- healthier environment
- greater comfort
- lower running costs
- cheaper maintenance
- improved energy conservation



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