

Air Source Heat Pump Reviews

Ground source heat pump A ground source heat pump (also geothermal heat pump) is a heating/cooling system for buildings that use a heat pump to transfer heat to or from the ground. A ground source heat pump (also geothermal heat pump) is a heating/cooling system for buildings that use a heat pump to transfer heat to or from the ground, taking advantage of the relative constancy of temperatures of the earth through the seasons. Ground-source heat pumps (GSHPs)—or geothermal heat pumps (GHPs), as they are commonly termed in North America—are among the most energy-efficient technologies for providing HVAC and water heating, using less energy than that consumed by resistive electric heaters.

According to the second law of thermodynamics, heat cannot spontaneously flow from a colder location to a hotter area; mechanical work is required to achieve this. An air conditioner requires work to cool a living space, moving heat from the interior being cooled (the heat source) to the outdoors (the heat sink). Similarly, a refrigerator moves heat from inside the cold icebox (the heat source) to the warmer room-temperature air of the kitchen... Air-to-air heat pumps provide hot or cold air directly to single rooms, but do not usually provide hot water. Air-to-water heat pumps use water pipes and radiators or underfloor heating to heat a whole house and are often also used to provide domestic hot water. Efficiency is given as a coefficient of performance (CoP) which is typically in the range 3–6, meaning that the devices provide 3–6 units of heat for each unit of electricity used. Setup costs are higher than for other heating systems due to the requirement of installing ground loops over large areas or of drilling bore holes. Air-source heat pumps have lower set-up costs but have a lower CoP in very cold or very hot weather. A typical run-around coil system comprises two or more multi-row finned tube coils connected to each other by a pumped pipework circuit. The pipework is charged with a heat exchange fluid, normally water, which picks up heat from the exhaust air coil and gives up heat to the supply air coil before returning again. Thus heat from the exhaust air stream is transferred through the pipework coil to the circulating fluid, and then from the fluid through the pipework coil to the supply air stream. Altenkirch performed a detailed theoretical study identifying the cycle as having a significant energy saving potential.

Solar-assisted heat pump In this system the solar thermal panel acts as the low temperature heat source, and the heat

produced feeds the heat pump's evaporator. A solar-assisted heat pump (SAHP) is a system that combines a heat pump and thermal solar panels and/or PV solar panels in a single integrated system. Air source heat pumps, which are preheated by solar air collectors, have an additional benefit of lower maintenance as the outside fan unit can be protected from the harsh winter environment. Heat pumps require a low temperature heat source, which can be provided by solar energy. Typically, these two technologies are used separately (or only placing them in parallel) to produce warm air or hot water. In this system the solar thermal panel acts as the low temperature heat source, and the heat produced feeds the heat pump's evaporator. warm air or hot water. The goal of this system is to get high coefficient of performance (COP) and then produce energy in a more efficient and less expensive way.

With the oil crisis in the 70s, the energy saving potential of... Heat pumps use the same vapor-compression refrigeration process and much the same equipment as an air conditioner, but in the opposite direction, or rather source and target can be exchanged, vice versa. With ambient air accessible nearly everywhere, ASHPs are the most common type of heat pump and, usually being small, tend to be used to heat individual houses or flats rather than blocks, districts or industrial processes. == Thermal properties of the ground == Energy recovery ventilation (ERV) is the energy recovery process in residential and commercial HVAC systems that exchanges the energy contained in normally exhausted air of a building or conditioned space, using it to treat (precondition) the incoming outdoor... An ASHP can typically gain 4 kWh thermal energy from 1 kWh electric energy, thus its coefficient... The first absorption-compression heat pump cycle concept was patented by Osenbrück. Little research on it was done in the following years. Ground-source heat pumps take advantage of the difference between the ambient temperature and the temperature at various depths in the ground. Many colder countries consume more energy for heating than for supplying electricity. For example, in 2005 the United Kingdom consumed 354 TWh of electric power, but had a heat requirement of 907 TWh, the majority of which (81%) was met using gas. The residential sector alone consumed 550 TWh of energy for heating, mainly derived from methane. Almost half of the final energy consumed in the UK (49%) was in the form of heat, of which 70% was used by households and in commercial and public buildings. Households used heat mainly for space heating (69%). Geothermal energy originates from the heat retained within the Earth since the original formation of the planet, from radioactive decay of minerals, and from solar energy absorbed at the surface. Most high temperature geothermal heat is harvested in regions close to tectonic plate boundaries where volcanic activity rises close to the surface of the Earth. In these areas, ground and groundwater can be found with temperatures higher than the target temperature of the application. However, even cold ground contains heat. Below 6 metres (20 ft), the undisturbed ground temperature is

consistently at the mean annual air temperature... 4a51de8585

Air source heat pump An air source heat pump (ASHP), the most common type of heat pump, can absorb energy (heat) sourced from cold ambient air outside a building, and release An air source heat pump (ASHP), the most common type of heat pump, can absorb energy (heat) sourced from cold ambient air outside a building, and release the energy at a higher temperature to heat the building, either via hot air or hot water. Electricity powers the mechanical pump (compressor), the used electric energy providing typically 3 or 4 times more pumped thermal energy than simple resistive Joule heating 4a51de8585

== History == 4a51de8585 In a typical vapor-compression heat pump, a gaseous refrigerant is compressed so its pressure and temperature rise. When the pump operates as a heater in cold weather, the warmed gas flows to a heat exchanger in the indoor space, where some of its thermal energy is transferred to that space, causing the gas to condense into a liquid. The liquified refrigerant flows to a heat exchanger in the outdoor space, where the pressure falls, the liquid evaporates, and the temperature of the gas falls. Now colder than the temperature of the outdoor space being used as... 4a51de8585

Heat pump and refrigeration cycle A heat pump is a mechanical system that transmits heat from one location (the "source") at a certain temperature to another location (the "sink" or "heat sink") at a higher temperature. The operating principles in both cases are the same; energy is used to move heat from a colder place to a warmer place. heat pump cycles or refrigeration cycles are the conceptual and mathematical models for heat pump, air conditioning and refrigeration systems. Thus a heat pump may be thought of as a "heater" if the objective is to warm the heat sink (as when warming the inside of a home on a cold day), or a "refrigerator" or "cooler" if the objective is to cool the heat source (as in the normal operation of a freezer). A heat Thermodynamic heat pump cycles or refrigeration cycles are the conceptual and mathematical models for heat pump, air conditioning and refrigeration systems 4a51de8585

By recovering the residual heat in the exhaust gas, the fresh air introduced into the air conditioning system is preheated (or pre-cooled) before it enters the room, or the air cooler of the air conditioning unit performs heat and moisture treatment. A typical heat recovery system in buildings comprises a core unit, channels for fresh and exhaust air, and blower fans. Building exhaust air is used as either a heat source or heat sink, depending on the climate conditions, time of year, and requirements of the building. Heat recovery systems typically recover about 60-95% of the heat in the exhaust air and have significantly improved the energy efficiency of buildings. 4a51de8585 ==

Thermodynamic cycles == 4a51de8585 == **Description** == 4a51de8585 The relative competitiveness of renewable electricity and renewable heat depends on a nation's approach to energy and environment policy. In some countries renewable heat is hindered by subsidies for fossil... 4a51de8585 1950-1951 4a51de8585 In winter, a heat pump can move heat from the cool outdoors to warm a house; in summer, it may also be designed to move heat from the house to the warmer outdoors, functioning in the same manner as an air conditioner. As it transfers rather than generates heat, it is more energy-efficient than heating by gas boiler. 4a51de8585

Geothermal heating Thermal efficiency is high since no energy conversion is needed, but capacity factors tend to be low (around 20%) since the heat is mostly needed in the winter. Humans have taken advantage of geothermal heat this way since the Paleolithic era. In contrast, an air source heat pump draws heat from the air (colder outside air) and thus requires more energy. seasonally moderate temperatures. 07% of global primary energy consumption. As of 2007, 28 GW of geothermal heating capacity is installed around the world, satisfying 0. Approximately seventy countries made direct use of a total of 270 PJ of geothermal heating in 2004. GSHPs circulate Geothermal heating is the direct use of geothermal energy for some heating applications 4a51de8585

Run-around coil The pipework is charged with a heat exchange fluid, normally water, which picks up heat from the exhaust air coil and A run-around coil is a type of energy recovery heat exchanger most often positioned within the supply and exhaust air streams of an air handling system, or in the exhaust gases of an industrial process, to recover the heat energy. Generally, it refers to any intermediate stream used to transfer heat between two streams that are not directly connected for reasons of safety or practicality. other by a pumped pipework circuit. It may also be referred to as a run-around loop, a pump-around coil or a liquid coupled heat exchanger 4a51de8585

Heat recovery ventilation By recovering the residual heat in the Heat recovery ventilation (HRV), also known as mechanical ventilation heat recovery (MVHR) is a ventilation system that recovers energy by operating between two air sources at different temperatures. It is used to reduce the heating and cooling demands of buildings. It is used to reduce the heating and cooling demands of buildings. between two air sources at different temperatures 4a51de8585

Renewable heat Insulation is almost always an important factor in how renewable heating is implemented. types of heat pump are air source heat pumps (ASHP) and ground-source heat pumps (GSHP), depending on whether heat is transferred from the air or from Renewable heat is an application of renewable energy referring to the generation of heat from renewable sources; for example, feeding radiators with water warmed by focused solar radiation rather than

by a fossil fuel boiler. Renewable heat technologies include renewable biofuels, solar heating, geothermal heating, heat pumps and heat exchangers 4a51de8585

1970-2000 4a51de8585

Absorption-compression heat pump Depending on the configuration, the system can maximize heating and cooling production from a given amount of fuel, or can improve the temperature (hence the quality) of waste heat from other processes. An absorption-compression heat pump (ACHP) is a device that integrate an electric compressor in an absorption heat pump. Thanks to this integration, the device can obtain cooling and heating effects using both thermal and electrical energy sources. In some cases this is obtained An absorption-compression heat pump (ACHP) is a device that integrate an electric compressor in an absorption heat pump. This second use is the most studied one and has been applied to several industrial applications. This type of systems is well coupled with cogeneration systems where both heat and electricity are produced. In some cases this is obtained by combining a vapor-compression heat pump and an absorption heat pump. It is also referred to as a hybrid heat pump which is however a broader field 4a51de8585

The thermal properties of the ground near the surface can be described as... 4a51de8585 The use of this system is generally limited to situations where the air streams are separated and no other type of device can be utilised since the heat recovery efficiency is lower than other... 4a51de8585

Heat pump The mechanical heat pump uses electric power to transfer heat by compression. other types include ground source heat pumps, water source heat pumps, and exhaust air heat pumps. Large-scale heat pumps are also used in district heating A heat pump is a device that uses mechanical or thermal energy to transfer heat from one space to another. Specifically, it transfers thermal energy by means of a heat pump and refrigeration cycle, cooling one space and warming the other 4a51de8585

Solar PV energy can power the heat pump electrically to enable electrification of heating buildings and greenhouses. These systems enable electrification of heating/cooling and are normally driven by economics and decarbonization goals. Such systems have been shown to be economic in the Middle East, North America, Asia and Europe. 4a51de8585 It is possible to use any type of solar... 4a51de8585

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