



Structure and Efficiency Indicators of Solar Water Heater Collectors

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Abstract: the article presents classifications and advantages and disadvantages about solar water heater collectors. The types of solar water heater collectors have low hydraulic resistance due to this high energy efficient solar water heater collector expression graph is built.

Keywords: hydraulic, solar collector, pipe, temperature, collector, hydraulic resistance, harp, two harp, mender, flat collector, vacuum collector, thermosiphon.

Introduction.

Solar energy is the largest source of energy on Earth, the amount of heat provided per 1 square meter, estimated at 3.16×10^9 kJ per year. The total amount of solar energy is 20 thousand times higher than the current energy consumption of the world economy. Technical and economic calculations for the use of solar systems show that with the existing prices for fossil fuels growing in recent years, the self-justification period of solar devices is from 2 to 5 years, taking into account the operating costs, while their service life is 25-30 years. Thus, the use of the system at the end of the payment period allows you to get all the energy generated by the installation of solar energy for free. At the same time, solar power plants are an environmentally friendly source of energy, and in contrast to conventional boilers, the term "return period" can be applied.

Types of solar water heater collectors

Flat solar collectors:

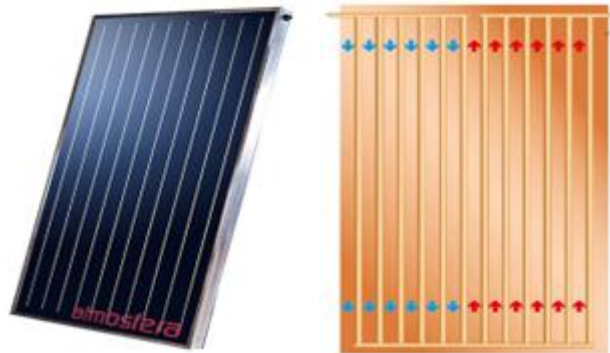


Harp-type solar collector - Harp-type solar collector is the most common type of solar collector and is the most recommended system in heliotism.





The Mender-type solar collector - The Mender-type solar collector has bent chutes through which a heat-carrying fluid moves and is heated by the solar collector's absorber.



Two harp type solar collectors - Two Arp type solar collectors are distinguished by Ease of installation due to the two connections at the top of the body.

Advantages and disadvantages of a flat solar collector:

Advantages- lack of snow at the expense of slope, high performance in summer, high efficiency for southern latitudes and hot climate, can be set at any angle, lower starting cost. **Disadvantages-** high heat loss, poor performance in the cold season, the complexity of installing the assembled collector on the roof, high wind resistance.

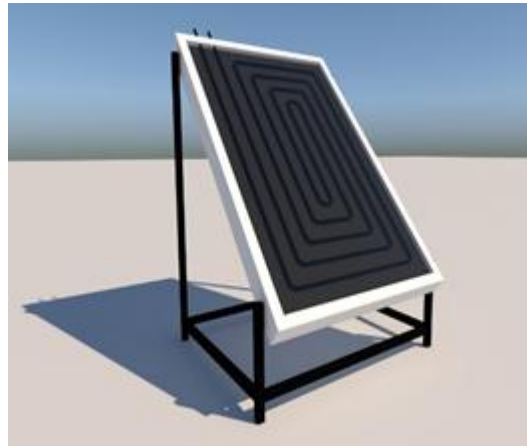
Vacuum solar collectors:



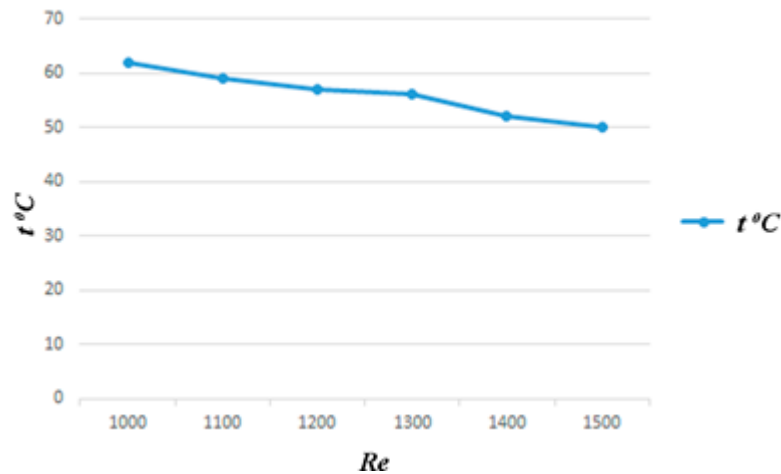
Thermosiphon- type tubular vacuum solar collectors-in vacuum tubes of direct heating, the heat-carrying fluid (usually water) is heated by direct heat exchange with the internal heat-absorbing wall.

Advantages and disadvantages of a vacuum solar collector: **Advantages-** low heat loss, give efficiency in the cold season up to -30 0C, the ability to create high temperatures, long working time during the day, ease of installation, noiseless noise, moderate latitudes and comfort for cold climates.

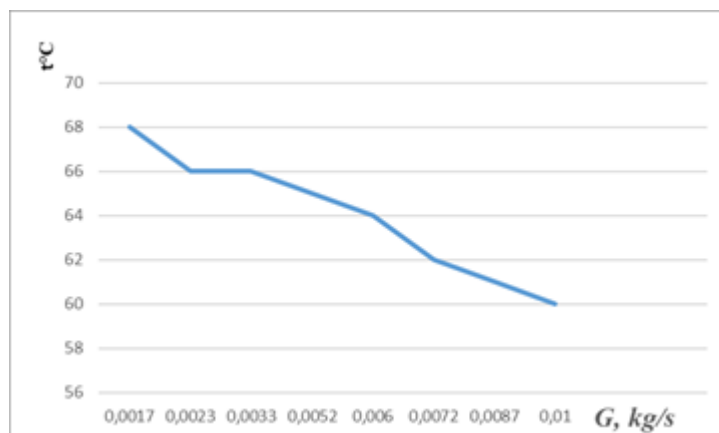
Disadvantages- the inability to self-clean from Snow, the design value of the winch is relatively high, the operating angle of the slope is not less than 20°.



The experimental results indicator on the device of the solar water heat collector with high thermal efficiency, which has low hydraulic resistance due to solar water heaters with different geometric shapes, is presented below. The length of the tubes in which the supplied collector was located was about $l = 18m$ in length when placed by calculation, while the length of the Collector surface by $h = 1,4m$ by width by $a = 0,7m$ gave the Surface $S = 1m^2$.



Reynolds number is a graph of dependence on the temperature of heated water.



Low hydraulic resistance temperature of heated water in solar water heater collectors with high thermal efficiency.

Conclusion: The following article proposes an energy-efficient scheme of a solar water heater with low hydraulic resistance. By changing the circuit of the internal pipes of the Collector



recommended in the article, its pressure loss is reduced due to the circulation process and Mahal resistance. The results of the holiday experiment from which the Abundant originated are graphically obtained for the sunniest time of the day.

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