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Investigations of Solar Collector's in Latvian Conditions

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Abstract. Outdoor air temperature range in the Baltic region is below average values in Europe. Range of outdoor air temperature in the Baltic region is -3 °C in winter and +16 °C in summer. And solar radiation intensity is lower in comparison with the average European values. The average solar radiation intensity reaches 1100 kWh/m2 per year in Baltic region. Therefore, there is a particular need to optimize the solar thermal system in the Baltic region.

Solar collector's operation methods investigated on the IPE solar energy polygon according different parameters. The most common types of solar collector's operation were investigated and compared: by the time, by the heat carrier temperature differences of input and output, by the solar radiation intensity and operation control methods in various combinations.

Theoretical and practical advantages and disadvantages of using each control methods were analyzed. Solar collector's operation system could be regulated in accordance with the solar radiation intensity, by the boiler lower temperatures and by the outdoor air temperature to determine precisely the solar collector efficiency of the parameter changes. This may help to avoid the previous operation systems testing regime deficiencies.

The precision of solar collectors operation depends on the type of operation systems: heat losses and the collector efficiency calculation accuracy, the sensor is accuracy, the time between the regulation regimes, and the range of heat carrier pumps action operation sensors.

Currently, companies that offer solar collectors, offer solar collectors complete set with all necessary equipments for the solar collector connection for hot water supply system, or for home heating operation system by the temperature difference of input and output. And no one of them does not offer solar collectors operation systems by the various parameters.

Key words

Solar energy, solar collectors, operation methods, efficiently increasing.

1. Introduction

On the IPE solar energy polygon investigated solar collectors control methods according different parameters. Were investigated and compared the most common types of solar collector's types. There were analyzed theoretical and practical advantages and disadvantages of using each control methods.

Currently, a large number of companies that offer solar collectors, one-third of them offer solar collector complete set with all necessary equipments to the solar collector connection for hot water supply systems, or home heating. Only a few of them offered two or three solar collector operating control modes, where many differences are in the heat carrier pumps action operating range. And not one of them nor offers solar collectors control systems by the various parameters.

2. Methods and Results

A. The operation methods of solar collectors

The solar collector control systems are designed for solar collector circulation pump control according changing weather conditions.

1) Operation by time

Apart from the manual operation system the weakest solar collector's operation system is the operation system by time. Usually equipments of the operation systems are primitive and those could not used for individual program for each day, therefore one program is used for all days of the solar collector's operation time.

Thereby the fact that the weekly average value of solar radiation varies, and changes the sun sunshine hours, then it is not possible fully use the obtaining solar energy in