EXPERIMENTAL STUDY HEAT EXCHANGER NEW DESIGN

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Annotation. *Designed and built an experimental setup based on heat exchangers of a new design with a compact placement of tube bundles in which the coolant is used as cooling water from underground wells. A comparison of the results of a numerical calculation of mathematical modeling and experimental data on heat transfer tube bundle by statistical analysis.*

Keywords: ***heat exchanger, heat exchanger, experimental research, cooling fluid, numerical modeling, new design.***

To determine the thermal state of the tube bundle heat exchangers and temperature values necessary heat transfer coefficients on the surface of the beam. These results can be obtained in the experimental studies. However, the preparation and processing of experimental results rather laborious process. The second way - getting distribution parameters for real design by computer mathematical modeling. This modeling helps in the process to improve the design to obtain the desired results.

The purpose of research - experimental studies of new heat exchanger design with compact bundles of tubes and placing their comparison with numerical mathematical modeling.

Materials and methods of research. Through a numerical simulation of transfers heat and mass transfer and calculation of local hydrodynamic and thermal characteristics of the heat exchanger, heat exchanger using a packet CAD ANSYS Fluent 14. The calculations and the general concept of computer modeling allowed us to develop new setting and tube regenerative heat exchanger with variable - tangent by placing the beam pipe.

Experimental studies for cooling supply air underground water wells. Scheme of the experimental setup shown in Fig. 1. As the working environment used heated air to cooled water.

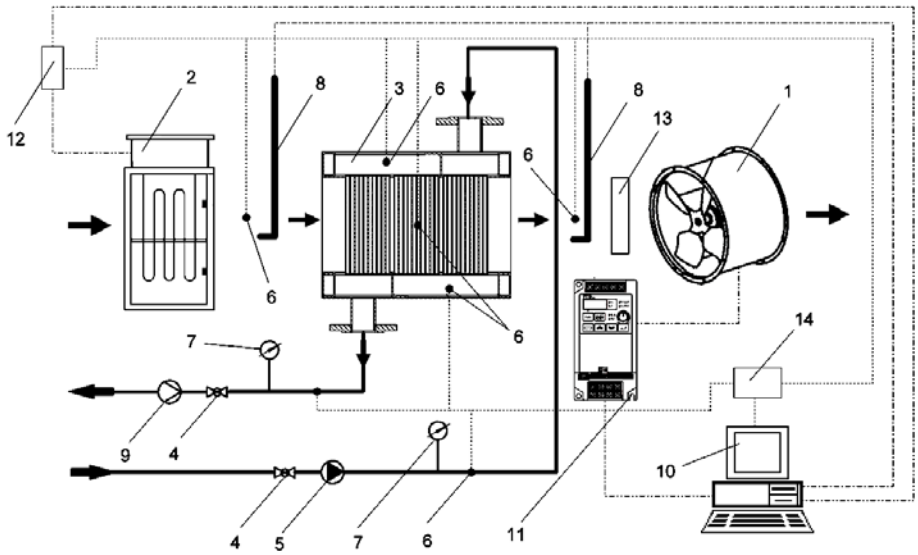

Fig. 1. Heat hydraulic diagram of the experimental setup:
1 - Fan, 2 - heater, 3 - heat exchanger, heat exchanger, 4 - Valve,
5 - Circulation pump, 6 - Overhead temperature sensors, 7 - Pressure gauge, 8 - Prandtl- pitot tube, 9 - Flow, 10 - PC, 11 - frequency converter, 12 - the actuator,
13 - anemometer, 14 - digital thermometer.

Results. For identification of mathematical modeling of heat exchanger conducted experimental research.

When conducting a pilot study of air that enters the installation and fueled using heaters to temperatures of +27, + 41 ° C, with input speed 9.25, 11.1 and 12.85 m / s. Simultaneously, the heat exchanger for cooling supply air temperature of the water received in the range of 12 to 13 °C with a flow rate of 40, 45 and 50 l/min.

As a result, processing of measurement results obtained graphic dependences. In addition, these graphs shows the results of numerical modeling.

Findings

Developed and manufactured in the experimental setup for the study of smooth heat-pipe bundles of heat-energy recovery where new construction as cooling the coolant water from underground wells. The experimental data on the thermal performance of the heat exchanger new design.

A comparison of the results of numerical calculation of mathematical modeling and experimental data on heat transfer tube bundle by using statistical analysis. The obtained results of numerical modeling of error does not exceed 6%.