

Oleksandr Guk
V.I. Samusya, research supervisor
O.D. Shvets, language adviser
SHEI «National Mining University», Dnipropetrovsk

Investigation of the Main Heat Pump Design Parameters Influence on its Dimension and Weight Values

Due to the depletion of fossil fuels in the Earth, the problems of rational consumption of fuel resources have become more urgent. In recent years, heat pump technologies have been spreading, which increase the potential temperature waste heat or heat from natural sources to be used in heating and hot water systems.

The important advantage of heat pump technology is its environmental friendly capacities, which improve the perspectives of using heat pumps in mines. Therefore, the reduction of the heat pumps cost and parameter optimization of heat pump systems is the urgent task.

The aim of this paper is to study the impact of main constructive parameters of the heat pump evaporator on the values of its weight and size. To do this, it is necessary to perform mathematical modeling of processes occurring in heat pump, and set their influence on its construction parameters.

The simulation mathematical model was developed in order to assess the influence of parameters such as the outer diameter of the pipes, the number of mine water running cycles in the evaporator and the number of pipes in the evaporator.

After carrying out the research, it was determined that:

- increase of pipe number will increase the rate of power efficiency and reduce heat transfer coefficient of mine water;
- increase of the water running cycle through the evaporator increases the velocity of water in the evaporator pipes;
- it is necessary to increase the length of the pipes to obtain the required heat transfer area while reducing the number of running cycles, which increases the energy efficiency ratio;
- due to the increase of pipe diameter the heat transfer coefficient on the inside surface of the pipe is reduced and on the outside surface is increased.

To sum up, the obtained relationships will help to reduce the consumption of materials in evaporator production, and to reduce the size of equipment that helps to choose the optimal parameters of the heat pump system.