

HEAT PUMPS AT GROUND WATERS FOR CLIMATE OF EUROPE**Denysova A.E., Zhaivoron O.S., Ostapenko L.Y.***National University "Odessa Polytechnic", Odessa*

The coefficient of performance of HP is not constant. Performance of heat pump (HP) is sensitive to design of heating system. HP efficiency is influenced by a lot of factors such as outdoor air temperature, humidity, etc. The heat pump performance suffers from great number of circumstances especially when the mode of heating is not permanent [1]. Perfection of the HP efficiency rises due to their possibility of utilization the renewable sources. The foreign decisions lack the methods, which would recommend rational practical application HP for intermediate mode of heating systems for the environmental conditions of Europe. The estimation of the replacing possibilities of the HP using ground waters is shown at Fig. 1. Intermediate mode of heating at outdoor temperature – 18 °C is typical for environmental conditions of Europe.

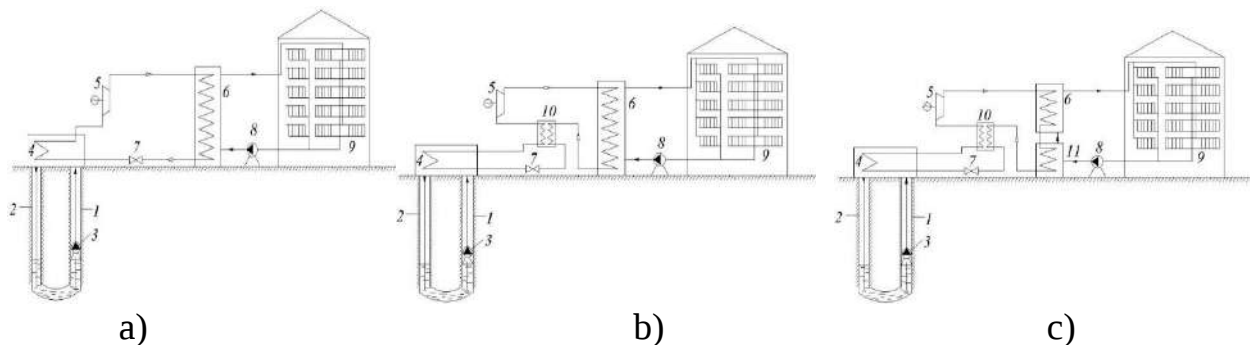


Fig. 1. HP using groundwater: a) usual design; b) with heat exchanger; c) with heat exchanger and subcooler

The estimation of the efficiency of the HP at base of ground waters was performed using the CoolPack. The analysis of the energy efficiency of HP for environmental conditions of Europe in winter season shows that HP system (Fig. 1, a) is advisable to be used in intermediate mode of heating when temperature in inlet of evaporator equals 20 °C. The HP design (Fig. 1, b) is recommended for intermediate mode of heating when outside temperatures not lower than minus 6,5 °C. The HP design (Fig. 1, c) is advisable to be used when the outdoor air temperatures not lower than minus 10,5 °C. The analysis of results of numerical modelling of the coefficient of performance of HP at intermediate mode of heating shows indicates that in case of less temperature difference between low potential source and high potential source of energy, then more efficient HP installation.

References:

1. Denysova A.E., Klymchuk O.A., Ivanova L.V., Zhaivoron O.S. Energy Efficiency of Heat Pumps Heating Systems at Subsoil Waters for South-East Regions of Europe /Problemele energeticii regionale, 2020. no. 4 (48), pp. 78–89.