

ANALYSIS EVAPORATOR OPERATION OF THE THERMAL SCHEME TURBINE UNIT 50 MW

Mykhailova I., Lytvynenko O., Tarasov O., Ismaylov V.

National Technical University «Kharkiv Polytechnic Institute», Kharkiv

Currently, the evaporator units are used in thermal and nuclear power plants to compensate for steam and condensate losses. Evaporator units consist of a surface heat exchangers system with a heating section (evaporator and evaporator condenser) and are used to produce secondary steam from chemically purified water. The steam is sent to internal or external users and the condensate of the heating steam is stored in the station cycle. It is used in the main cycle of a power plant.

The work considers evaporator units that are used at thermal power plants and nuclear power plants. It is known that the efficiency of a power unit is one of the main indicators of the efficiency of a power plant. Losses of the working fluid (steam and condensate) in the power plant cycle lead to a deterioration of this indicator, which in turn of cause a corresponding heat loss. Therefore, the question recovery working fluid losses in the power cycle is important. An analysis of effect of the amount liquid evaporated on the efficiency of the evaporator and the quality distillate was made.

The thermal and hydrodynamic calculations of the evaporator of a turbine units with a capacity of 50 MW were performed and the following indicators were determined: heat transfer surface 194 m², circulation rate 0,24 m/s, heat transfer coefficient 312 W/(m² °C) and the salt proportion in the distillate (secondary steam) equal 0,108 mkg/kg, which is within the standards for the quality of the distillate.

In the calculation, the evaporator productivity varied 1,667 kg/s from 2,5 kg/s. It was found that an increase in the amount of evaporating water leads to a deterioration in the separation and transfer of non-evaporated drops of water to the

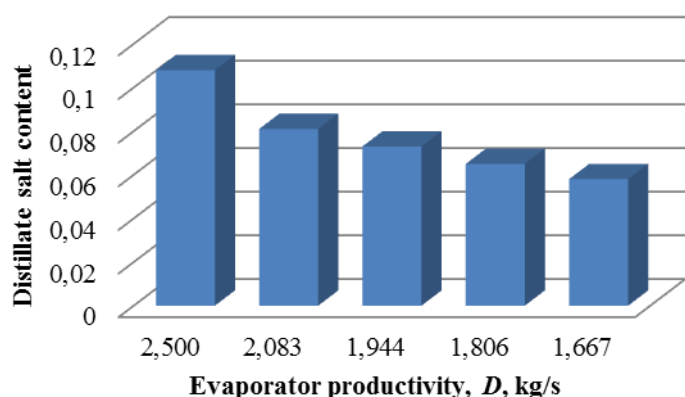


Fig. 1 Dependence quality of the distillate from evaporator productivity

evaporator condenser. At the same time, the salt content of 1 kg of steam, which is supplied to the steam treatment unit, increases by 42,8 %, the salt content of the wash water on the steam treatment unit increases by 1,3 %, in the distillate salt content increases by 46 %. Since when the evaporator capacity changes, the thermal load of the heating section of the evaporator changes also, in order to maintain the

quality of the distillate, it is necessary to maintain a stable thermal load of the heating section of the unit.