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Analysis on energy saving measures of heat exchange station in central heating system

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Abstract

In view of the current situation of high energy consumption in the heat exchange station, analyzing the heat exchange station from four aspects: the heat exchanger in the design stage, the selection of the heat exchanger, circulating water pump, the automatic control system of the heat exchange station, the operation and management, then obtaining the reasons for the high-energy consumption of each part. Proposing the configuration to optimize the equipment, and improving the level of operation and management. taking into account all aspects to achieve the purpose of energy conservation.

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Keywords: Heat exchanger, circulating water pump, automatic control system, operation and management

Nomenclature

Q	space-heating load, KW
F	the area of heat-supply service, m ²
q_f	thermal load of per unit area, W/m ²
G	the flow of water pump, t/h
t_l	the temperature of supply water, °C
t_1	the temperature of supply water, °C
t_2	the temperature of return water, °C

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K_t	the temperature coefficient of the loss of the heat-supply network, generally 1.05~1.10
H_1	the pressure loss of the heat exchange station, KPa
H_2	the pressure loss of the heat external pipe network, KPa
H_3	the pressure loss of consumer heating system, KPa
H_l	the margin of the system head, KPa, generally 30~50 KPa

1. Introduction

The “13th Five - Year” plan for energy puts forward to promote the supply side structural reform as the main line, meeting the needs of economic and social development and people's well-being demand as the foothold, improving the quality and efficiency of the energy development as the center, and striving to optimize the energy system. The heat exchange station is an important link connected the heat source and heat consuming installation, playing an important role in the whole heating system. Central heating exchange station need to meet three basic requirements: ensure production quality, meet the needs of industrial production and heating of civil buildings, prolong the service life of the equipment; provided with the characteristics of energy saving, high efficiency and low labor intensity [1]. Because of involving a broader area, the thermal inertia of the system is very large and the disturbance factors are more. The heating system is in a changing condition, and the whole system is difficult to coordinate with each other. What's more, the quality of management staff is low generally. So, we can achieve energy-saving operation by doing the effective control for the heat exchange station.

2. Composition of the heat exchange station

Heat exchange station and hot-water pipe network are important links of heat source and heat consuming installation, playing important roles in the whole heating system. The working principle of heat exchange station is transfer the high temperature water that come from cogeneration power plant to low temperature water, transporting water to heat consuming installation by secondary heat-supply network, and conducting heat exchange among heat consuming installation, the low temperature return water returning to the heat exchange station by circulating water pump. The flowchart of the heat exchange station is shown in Fig. 1. The heat exchange station exists some disadvantages, for example high energy consumption, poor efficiency and so on. The running quality of heat exchange station will influence heating quality.

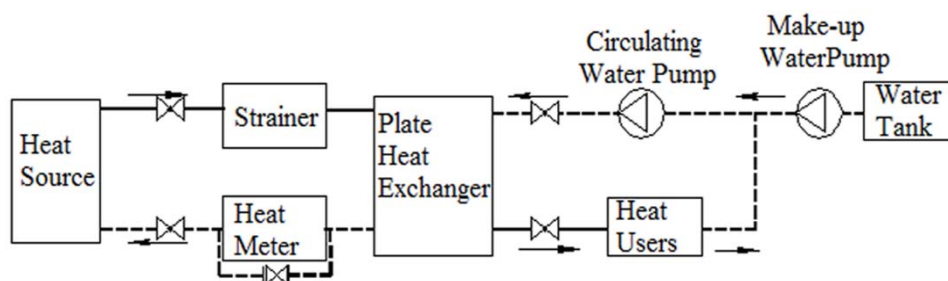


Fig.1. The flow chart of heat exchange station system

3. Energy saving measures for heat exchange station

3.1. The calculation of heating load and selection of heat exchanger

The selection of heat exchanger is mainly based on the user's heating load. In the design stage, the heat index is too large so that the calculation of heating load increased. Heating load is the basis data for the design which plays an important influence on the selection of the heat exchanger and water pump. For the new heat exchange station,

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