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THEORETICAL ANALYSIS OF THE VENTILATION EMITTERS USED IN LOW-TEMPERATURE HEAT SUPPLY SYSTEMS, AND HEAT PRODUCTION OF THESE EMITTERS

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ABSTRACT

Currently, 60% of the total amount of energy consumed by the population falls on the heating system. To reduce this large amount of energy consumed, it is recommended to use energy-saving and low-temperature priority heating systems. In this article, we mainly analyze low-temperature heating systems, in particular (low-temperature heating systems and thermal pumps), as well as heat removal processes in the premises. Studies show that low-temperature heating systems are more energy efficient and environmentally friendly. This is of course, due to the use of renewable energy sources in thermal pumps, low-temperature heating systems and heat transfer equipment. In this report, we will consider the pros and cons of various low-temperature heat transfer devices.

Currently, the main part of the thermal energy consumed by the population is to heat supply and hot water supply, and this indicator is 40-60%. Taking into account the fact that in energy-efficient low-temperature heating systems for the heating of buildings, it is recommended to use ventilation channels and radiators together to increase the efficiency of low-temperature heating systems. Today, 90% of residential buildings are connected to the central heating system. This, in turn, will require the replacement of heat transfer equipment in buildings connected to the central heating system, which will result in additional costs. It is recommended to use ventilation radiators to prevent it and improve efficiency.

The use of a low-temperature heating system is not only energy efficient, but also is environmentally safe, as it reduces the amount of harmful gases. The CO_2 content decreases by 24% when the efficiency of the heat pump increases by 25%. The heat efficient radiators can cover heat in buildings with an area of 20 W / m2 and the temperature of the supplied water 40°C [1]. We can use the following expression to determine the effectiveness of existing heat transfer devices. Thermal radiator power (P) is a thermal conductivity coefficient (K), Surface surface (A) and the average difference between heat-insulating surfaces and ambient air (Δθm)

$$P = kA\Delta\theta_m \quad (1)$$

From the expression (1) it can be seen that the decrease in the radiator temperature

causes a decrease in the surface temperature ($\Delta\theta_m$), and the decrease in the surface temperature also reduces the convective heat exchange process with a radiant heat exchange to prevent it, we increase the efficiency of heat exchange equipment. One of the ways to increase the coefficient of heat transfer is a transition from natural convection to forced, which can be performed by combining ventilation consumption with radiator. To do this, you can increase the convective heat flux by connecting the ventilation pipe to the available radiators. We are discussing two types of low-temperature radiators, ventilation radiators and radiators with additional ventilation. The main principle of these two radiators is the strengthening of convection. The main function of this type of radiators is to combine the radiator into the ventilation air and the heating system, thereby enhancing the process of convective heat exchange.

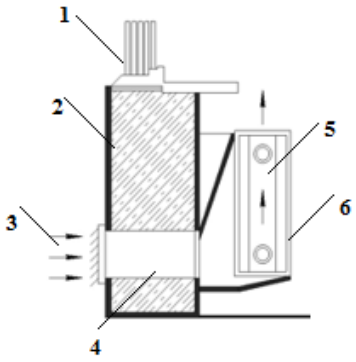

Figure 1. Ventilation radiator. 1-window, 2-reserved walls, 3-stream of hot air heated by a solar collector, 4-ventilation channel, 5-radiator, 6-outer radiator body

Combining these radiators and ventilation channels to increase the efficiency of radiators present in the heating system, it is possible to increase the convective heat transfer ability of radiators. To do this, the radiator and ventilation pipe connected to the external environment are connected (Fig. 1). The air duct is behind the radiator.

This combination increases the thermal power of the radiator before the ventilation air passes through the radiator panel, and then in the room before entering the room. In addition, the ventilation radiator is thermally more efficient than the usual radiator. Previous study [2] showed that ventilation radiators have the same heat transfer capacity as conventional radiators operating at a temperature of from 35 ° C to 55 ° C. This is due to the fact that the heated air is first sent to the radiator through the ventilation channel, which It is closed from a solar collector of air. [3.4.5.6.7] In this system, as in other heating systems, heat in the ventilation air can be obtained.

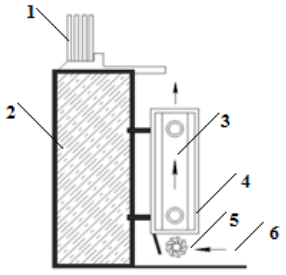

Figure 2. Ventilation radiator with an additional fan. 1-window, 2-reserved walls, 3-radiator, 4-external radiator body, 5-fan, 6-air flow

In the radiator with an additional fan, the fans are placed under the radiator panels. The previous study [8] showed that when installing 5 small fans, under the radiator, thermal power can almost double compared to a conventional radiator. This is due to the increased convective heat transfer through the surface of the radiator. Consequently, using equation (1), you can maintain the ability to transmit heat without reducing the heat flux in the radiator. It can be reduced heat in the system, and in this case the radiator heat transfer on the surface of the radiator decreases, but the ability to transmit heat is maintained due to increased convection [9]. Small fans placed under the radiator consume a very small amount of electricity, that is, the ratio of electricity consumed by a small fan to increase the thermal power of the radiator is 1-2%. However, small fans under the radiator when installing create some noise. What causes user complaints.

Conclusion:

In conclusion, it is important to increase the efficiency of heating systems, as well as use renewable energy sources in the heating system. This study examines the use of efficient and low-temperature heating systems, which are achieved by combining existing radiators and ventilation channels. The main focus is on the fact that the effectiveness of existing radiators can be summarized as a way to speed up the convective heat exchange process by connecting the ventilation channel and install additional fans.

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