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EFFICIENCY OF WINDOW RECUPERATOR IN RESIDENTIAL PREMISES

V. Pavlenko, Ph.D., Associate Professor

Kyiv National University of Technologies and Design

O. Volianyk

Kyiv National University of Technologies and Design

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One of the main characteristics of energy efficiency of buildings is considered to be the specific energy consumption of heating and ventilation systems per year. Unfortunately, we are significantly behind the majority of European countries from these indicators. Lack of massive construction of modern energy-saving technologies leads to high energy costs. Considering the urgency of the issue ensuring the conditions of the internal environment in living premises, the research task is to evaluate the efficiency of using the heat recuperator to improve comfortable in-apartment conditions.

According to the applicable standards, premises for living in houses, apartments etc. should be equipped with heating, air conditioning, or forced and ventilated system.

In those kind of premises at homes, there are optimum parameters of the microclimate are to be ensured: temperature, relative humidity and air mobility in accordance with norms and rules.

As it's known, in home premises the air temperature should be 22-25° C, the relative humidity of the air – 40-60%, the speed of the air – not more than 0,1 m/s. When exceeding the permissible values, apartments and living premises should be immediately closed and provided urgent repair of ventilation systems.

If the room is not ventilated, the air in it has a very high concentration of carbon dioxide and other harmful substances (evaporation of household chemicals, cigarette smoke, evaporation from low-quality furniture or coverings, etc.). This leads to poor health, decreased attention, headaches, sleep disorders.

In order to maintain the permissible values of the microclimate and the concentration of positive and negative ions, it is necessary to provide installations or devices for hydrating or artificial ionization, air conditioning. In Ukraine, there are no legally approved maximum levels of carbon dioxide in the air for personal, office and public buildings.

One of the high-tech aggregates that provide energy-saving are recuperative heat exchangers, the use of which represents a great practical interest as the most affordable means of introducing energy-saving technologies in the reconstruction of ventilation systems. The use of a recuperative heat exchanger is possible without replacing the main components of the existing ventilation system. Depending on the design, they are divided into plate, rotary, recirculation water recuperators.

Ventilation recuperator is a device in which the warm air, that is removed from the room, is heated by the cold air coming from the street. There are recuperators with copper plate or aluminum heat exchangers (coefficient of performance – 65-80%) and with regenerative ceramic plates (coefficient of performance – 75-91%). The disadvantage of plate heat exchangers is the complexity of manufacturing, respectively, a higher price, and regenerative – low performance. In summer, the use of a recuperator will reduce the need the installation of an air conditioner, or 2 to 5 times reduce the cost of electricity during its operation. In winter – it will significantly reduce the energy costs of heating the premises.

For rooms where sealed plastic windows are installed, the most effective ventilation systems and to prevent condensation are built-in recuperation systems.

In Fig. 1 shows a diagram of the passage of air embedded in a plastic window ventilation valve with recuperator, which provides a natural influx of heated fresh air in the cold season.

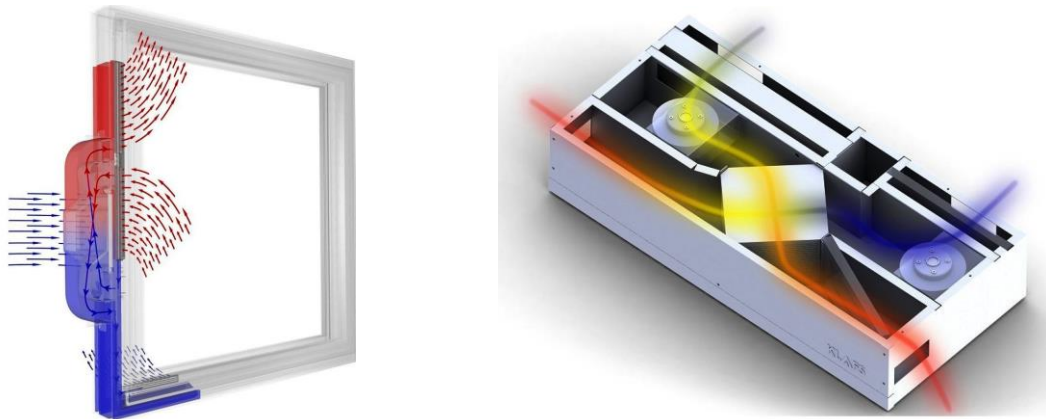


Fig. 1 – Built-in plastic window ventilation valve with recuperator

The inflow is provided mainly by window frames, or rather by conventional or folding shutters with or without intake grilles, and by microventilation. Before entering the room, fresh air from the outside enters the ventilation system, where a small amount of heat is extracted from the room by the heat exchanger.

In the cold season, the heat exchanger provides the heating of the air supplied by the heat exchange between the incoming cold flow and the heat exited from the room.

References

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