

THE RESULTS OF AN EXPERIMENTAL STUDY OF A SUPER-EFFICIENT HEAT PUMP FOR THE NEEDS OF HEATING THE PREMISES

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The aim is the experimental studies determining the effectiveness of heat and mass exchange in an apparatus with dry air channels and channels with a water film on their surface, with heat transfer between air flows taking place at negative temperatures.

Results of work.

The experimental studies have been done on heat and mass exchanger for recover heat of air heating systems in buildings, which implements the Maisotsenko thermodynamic cycle.

The specificity of this method of heat recovery is evaporating non-adiabatically the water film from the surface of wet channel, and recovering additional heat through condensing water vapor in the air stream with a higher potential.

As the result of the experiments, an efficiency of the heat and mass exchanger of this type for heat recovering of the air systems based on air heating was equal to 85% with the possibility of further improvements.

№	Ambient air		Air after the heat pump		Emissions from the premises		Properties of air that is removed into the atmosphere		Efficiency of utilization of heat, %	COP installation
	t, °C	φ, %	t, °C	φ, %	t, °C	φ, %	t, °C	φ, %		
1	-8	65,0	20,8	40,0	18,4	36,0	0,7	100	67	8,91
2	0,9	63,5	25,7	42,0	21,2	42,7	3,9	100	85,2	9,73
3	2,4	51,0	24	42,0	18,2	46,0	5,1	100	82,9	8,74

The heat exchanger of this type shows a much higher efficiency in comparison with the energy recovering system with dry channels the efficiency of which does not exceed 70%.

In case of recovering heat for the systems of air heating, the heat and mass exchanger performs the function of wetting the heated air.

Conclusions :

This method of recovering heat allows operating air heating systems without adding any secondary air, which positively affects both the room microclimate and human health.