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ANALYSIS OF THERMAL COMFORT IN THE ROOM OF EDUCATIONAL BUILDING №8 NULES OF UKRAINE AFTER THERMAL MODERNIZATION

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The value of the internal air temperature in a separate rooms in building number 8 after works of thermo building are determined. Equalization of temperature distribution inside air and reducing dependence of their values from fluctuations in ambient temperature are revealed.

The internal air temperature, thermal resistance, adjusting the parameters of the heat-transfer agent.

Residential and public buildings, which were built in Ukraine in the past using old materials and technologies do not meet modern requirements for energy efficiency. In particular, the consumption of thermal energy for heating buildings in Ukraine greatly exceeds the standards of developed countries [1]. Thus, the results of simplified energy school building №8 NULES of Ukraine, built in 1965, the actual heating costs exceed the statutory above 10% [2]. Measuring temperatures in some areas of educational building №8 in February and March 2012 showed discrepancy temperature normalized value and significant non-uniformity of temperature distribution in the rooms [3].

During 2013 the following work was done with thermo building frame:
- Limiting heat loss of the building, insulation of external walling;
- The introduction of automatic weather-control panel coolant individual heating unit.

The purpose of this study was to figure out how to influence the implementation of measures in terms of building thermo comfort in the rooms, including the magnitude of the internal air temperature in the coldest rooms and rooms with excess temperature.

Materials and methods of research. Measuring temperature in individual rooms hull number 8 was carried miniature temperature datalohherom RC-1 with an internal temperature sensor. Main Specifications given in [3].

To measure the thermal resistance of building fences at the stationary thermal regime applied heat flux transducer (HFT) HFT type - 1B.11.2.1.11.P.00.0. -DSTU 3756-98 (GOST 30619-98) [4].

HFT is made in the form of supporting wall has a thermoelectric multilayer bimetallic sensing element that converts heat flow in an electrical DC signal.

The range of heat flux density measurement device 10 ÷ 1000 W / m². Permissible basic relative error of ± 4%. Heat resistance - 80 ºC. Effective thermal conductivity coefficient of 0,8 ± 0,05 W / (m K). Conversion - 9.14 W / (m² mV).

To measure the coolant in the heating unit used a heat meter - CA 97 / 2M (with flow cross section DN 15). Accuracy class device - 4. The range of flow rate (m^3 / h): - maximum - 2.39; minimum - 1.32.

Adjust the temperature of the coolant supplying pipe with compensation for outdoor temperature carried controller heating and HWS RVD 115/109.

Results. By the thermo housing values of thermal resistance to heat exterior walls was located at 0.7 m^2 / (K·W), which is almost three times less regulatory (R = 2,8 m^2 / (K·W).) [5]. After the application of external insulation layer (basalt-fiber plate thickness = δ 100 mm) values of thermal resistance was brought to the standard.

During February and March 2013 are measured at room temperature №4 (ground floor, south facade) and room number 27 and 30 (second floor, south and north facade, respectively). Similar measurements were made in the same months of 2012 [3]. These measurements are shown in Fig. 1 and 2.

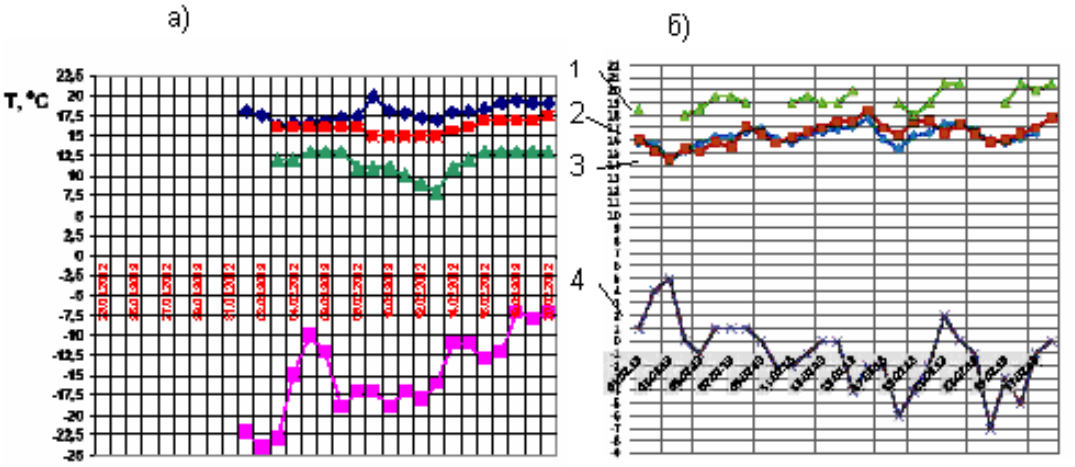

Fig. 1. Changing the temperature in individual rooms of building №8 in February

a) 2012; b) 2013:

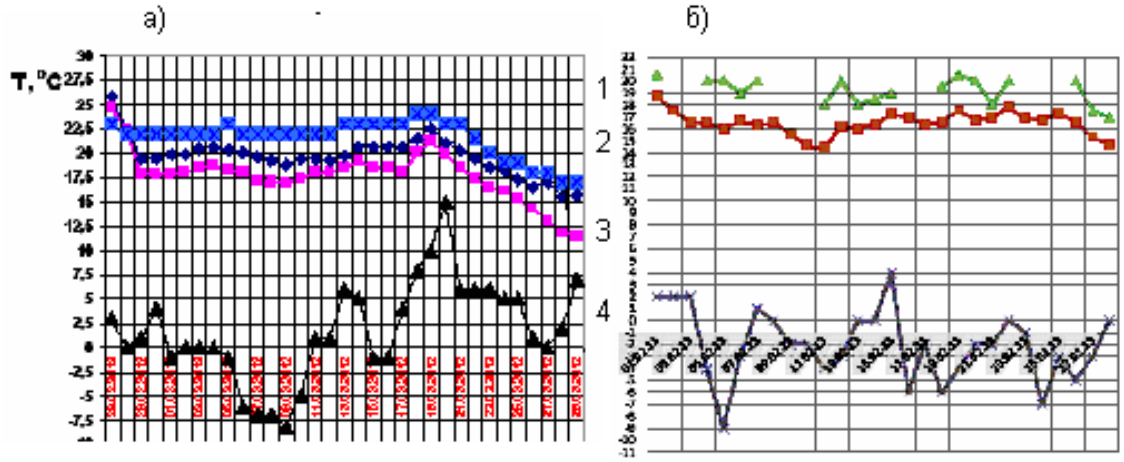

Fig. 2. The change in temperature in some areas of building №8 in March

a) 2012; b) 2013

1 - room №4; 2 - room №27; 3 - room №30;

4 - ambient air

It is seen that the temperature in the room №4, №27, oriented to the south, almost zero in 2012, and the temperature in the room №30, oriented north grew by an average of 2 - 4 ^{0}C and virtually became to comply with education facilities.

Upgrading heating unit within building number 8 of arranging automatic control system parameters allow coolant to reduce the cost of heat for heating

during periods of increasing ambient temperature as well as at night and on weekends (Fig. 3).

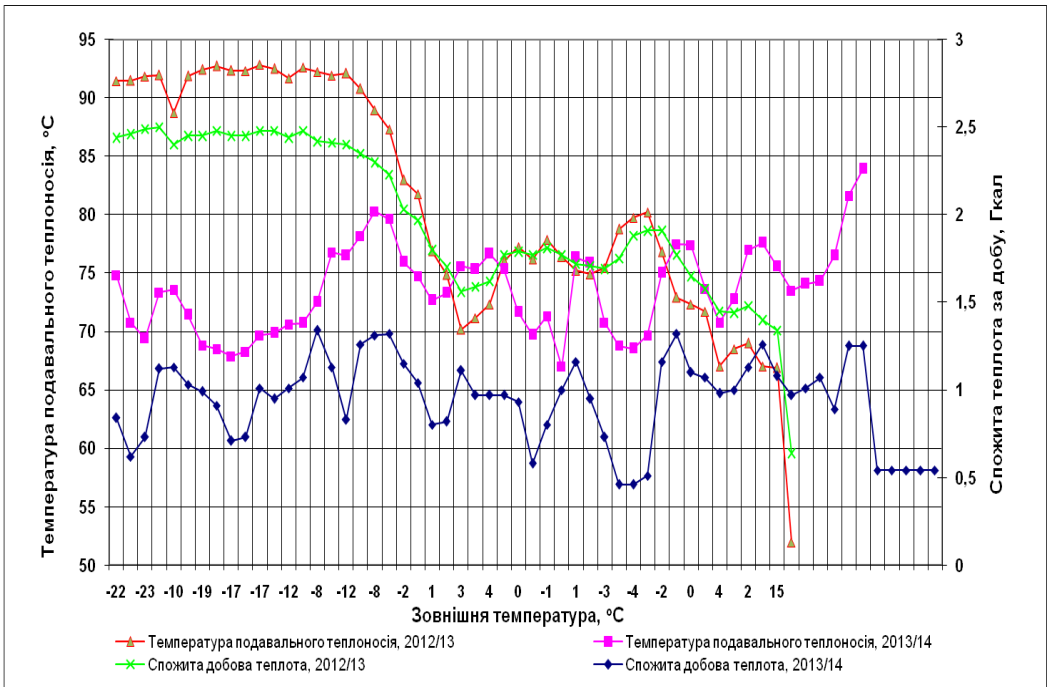

Fig. 3. The results of monitoring flow rate and heat

Conclusions

1. Improving the heat acumulation properties of the fence alignment caused internal air temperature profile on the floors as housing, and on the facades.

2. After thermo building internal temperature less dependent on fluctuations in ambient temperature.

3. Despite the reduction in the cost thermal energy for heating housing nearly doubled, meaning temperatures in rooms housing almost meet the standards for space education.