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EXPERIMENTAL EVALUATION OF THERMAL CONDUCTIVITY OF WATER HEATERS OF RESIDENTIAL BUILDINGS

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Formulation of the problem. The reduction of fuel consumption and, accordingly, the environmental risk of emissions from power plants, in particular boilers, is influenced by the technology of insulation the outer walls of houses with layers of various thermal insulation materials. The choice of material requires design according to regulatory methods. However, such insulators as polymeric sheet materials or cork wallpaper, etc. require prompt determination of their efficiency, and mainly only by the level of radiant heat radiation from their surfaces. Therefore, the report included a scientific task of operational assessment of the thermal conductivity of various wall insulation of residential buildings, which differ in the type of material, layer thickness, structure and color of surfaces.

General methodology for solving the problem. It is proposed to solve the problem on the basis of the dynamics of the radiation temperature of the surface of the insulation placed on a preheated electr infrared panel (IR). Measurement of the temperature of the surface of the ICP and the surface of the insulation in time is proposed to perform a portable pyrometer. At the same time, according to the received data of temperature changes over the time it is possible to define a thermal conductivity of certain insulation.

Main results. The theoretical basis of the proposed method is that the thermal conductivity of the material depends on its coefficient of thermal conductivity - λ, density - ρ and specific heat - **c**, according to the Fourier equation:

$$\frac{\partial T}{\partial t} = k\cdot B\,\frac{\partial T}{\partial t} = k\frac{\partial^2 T}{\partial z^2}$$

where $k = \frac{\lambda}{c\cdot\rho}$ is the coefficient of thermal conductivity of the material, m2 / s coefficient), λ here is the coefficient that characterizes the thermal conductivity of the material W / m2 degrees, to determine which are quite complex experimental methods.

When determining the change in temperature over time **T** only on the surface of the insulating material, the equation is simplified to the form $\frac{\partial T}{\partial t} = k\cdot B$, where **B** is a certain value.

The solution of this equation has the form of an exponent of the form:

***T*=(*T*ІЧП - To)(1 - e*bt*).**

(2)

where ***T*ІЧП** and **To** -accordingly, the temperature of the heated panel and in the premises, **oC** .

Model (2) allows giving an indirect estimate of the value of **k** through the characteristic value of each exponent **b**. It is proposed to identify equation (2) according to the obtained experimental data of the change in the temperature of the insulation determined by the pyrometer.

The temperature of the surfaces of the material and the **ICP** is proposed to be measured with a pyrometer in pairs, ie alternately on both sides of the boundary of the insulation with the panel until the established value. The general view of the **ICP** with the sheet insulation placed on it is shown on Pic.1.

Pic.1. General View of the ICP with insulation and a portable pyrometer
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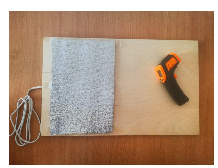

General conclusion and suggestion. Investigating the course of changes in the temperature of the insulation over time, it is possible to give an indirect assessment of the thermal conductivity of the insulation of the walls of residential buildings that differ in thickness, structure or colour. The obtained numerical estimates will allow comparing the efficiency of different insulation.

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