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## **PREPARATION OF A FULL-SCALE EXPERIMENT TO STUDY THE THERMAL CHARACTERISTICS OF THE WALL IN THE GROUND**

The enclosing structures of premises bordering on the ground and used for civil protection should have a certain level of thermal comfort. During the inspection of a significant number of such premises, wetting of the wall structures bordering the ground and significant heat loss through them were observed (Fig. 1). A full-scale experiment is planned to study the distribution of heat flow and temperature in the thickness of the enclosing structure bordering the ground.



Figure 1 - Wetting of the wall structure



Figure 2 - Thermal insulation of the wall structure

The object of study is the building of an educational institution in Poltava. During the major overhaul of the underground premises, which are planned to be used for dual purposes, it became necessary to perform waterproofing and insulation of the walls bordering the ground. The structure consists of concrete foundation blocks 500 mm thick and external insulation with 150 mm thick polystyrene foam with a protective studded membrane (Fig. 2).

Thermal sensors were installed on the inside and outside of the structure, at the boundary of the layers, and in the soil of the foundation zone. For contact measurements of the heat flux density, a heat flux converter is installed on the inner surface of the wall in the center of the thermally homogeneous zone. The heat flux converter is attached to the surface of the object with plasticine using a viscous heat-conducting compound between the surfaces of the enclosing structure and the heat flux converter (Fig. 3).

Thermal tests of enclosing structures in full-scale conditions, which are performed to assess their thermal insulation performance, should be carried out in the presence of a temperature pressure of at least 15 K [1]. When inspecting buildings with a heat transfer resistance of  $2.0 \text{ m}^2 \cdot \text{K}/\text{W}$  or more, relative humidity of no more than 80% at a temperature of  $20 \text{ }^\circ\text{C}$ , atmospheric pressure from 84 kPa to 106.7 kPa (630 mm Hg to 800 mm Hg). The measurements are planned to be carried out using the measuring and recording complex “Теплограф-4” (Fig. 4).



Figure 3 - Mounting the heat flux converter and thermal sensors on the inside of the wall structure



Figure 4 - Measuring and recording complex “Теплограф-4”

The device is designed to determine the heat transfer resistance of enclosing structures, as well as for a comprehensive inspection of various objects to determine their thermal protection properties and identify thermal insulation defects. The device is based on a microprocessor-based central unit to which communication adapters with sensors are attached via a four-wire communication line.

During the study of objects, the device can perform long-term monitoring of several channels of temperature and heat fluxes with reference to time and date.

The measurement period is scheduled for 10 days. The device will record measurements at 15-minute intervals.

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