METHODS AND MEANS OF MONITORING AND OPTIMIZATION OF THERMAL PHYSICAL PROCESSES

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The report generalizes the development of theoretical foundations, methodological apparatus and improvement of the reference base for ensuring the unity of measurements of the surface density of the heat flux in a wide range that meets the modern requirements for thermal measurements in various fields of scientific and applied research. The generalized methodology the unity of measuring the surface heat density of the heat flow has been formed and the concept of realization of the standard density of the heat flux at the modular principle has been developed. It involves the use of different methods for the formation and transmission of thermal energy and a single module for registration information and data processing. This allowed the order to extend lower and upper limits of the measurement range, which corresponds to the world level of metrological support for measurements of the surface density of the heat flux. Hardware and software tools that implement the concept of a modular construction of a heat flux density standard have been developed, which allowed to extend the range of values up 1 W/m^2 до 200 000 W/m^2.

The basic principles of integrated monitoring of the whole heat power cycle - from generation to consumption - are developed. Main principles of monitoring of heat and power equipment are generalized, the main types and tasks of monitoring systems in the heat power system are systematized, prospects of use of noise diagnostics in the systems of monitoring of objects of thermal power engineering are substantiated. At the stage of generation of thermal energy, an important task is to determine the quality of fuel. For this aim the method of multitraining quasi-differential calorimetry is proposed, which provides correction error, absence of external losses and reduction of mass loss. In order to ensure the economical use of heat energy, an automated intellectual system for controlling heat consumption with the use of solar collectors and heat accumulators and an optimization use of heat energy based on a minimax criterion, which reduces heat loss on 25-35%. For the monitoring of the thermal condition of structures and their thermophysical properties during the operation of buildings, a system for determining the thermal resistance of enclosing structures has been developed.

Conclusions. The developed methods and means of thermal processes monitoring and normative documents have been widely expected in enterprises and organizations of various economic activities, which promotes the establishment of general requirements for the unity and reliability of measurement in Ukraine and the EU countries.