INTERSECTII
INTERSECTIONS
http://www.ce.tuiasi.ro/intersections

Young Scientists' Researches

Contributions to the Study of the Hygrothermal Characteristics of the Thermal Insulation Materials

Monica - Lilioara Putina

URBAN INCD INCERC Filiala Iaşi

- Date of submission: (28.03.2008)
- PhD. Supervisor: ADRIAN RADU, Faculty of Civil Engineering and Buildings Services, "Gheorghe Asachi" Technical University of Iasi, Romania
- President: NICOLAE TARANU, Dean, Faculty of Civil Engineering and Buildings Services, "Gheorghe Asachi" Technical University of Iasi, Romania
- Scientific Board:
  - MACEDON DUMITRAS, Faculty of Civil Engineering, Technical University of Cluj Napoca, Romania
  - MIHAELA GEORGESCU, Faculty of Architecture, „Ion Mincu" University of Architecture and Urbanism, Bucuresti, Romania
  - DAN PREDA STEFANESCU, Faculty of Civil Engineering and Buildings Services, "Gheorghe Asachi" Technical University of Iasi, Romania

Summary

It is known the very important role of the thermal insulation materials in the construction of the civil and industrial buildings. Owing to the specific hygrothermal characteristics, these materials decisively contribute to the assurance of the construction life duration, realization of the optimal conditions of the interior microclimate, important reduction of the building exploitation costs, energetical efficiency of the buildings and thus to the environment protection.

The theme of the work takes part in this important field regarding the energy economy through the utilization of the efficient construction materials, the principal goal being linked to a very good knowledge of the traditional and new

ISSN 1582-3024

materials properties, through the verification of the hygrothermal characteristics of these in order to a correctly utilization in exploitation.

Into a first step is represented the importance of the humidity of the materials and construction elements for the energetic efficiency, comfort/hygiene state in the rooms and building durability. Also, is represented a synthesis of the previous researches regarding the moist construction materials and are described different laboratory methods used for the determination of the thermal conductivity of the construction materials, classified in steady or unsteady state methods.

Then, starting from the critical analysis of the actual methods, the author brings to actuality a method proposed in the years '50 by the professor Theodor Câmpan, performing thermotechnical experimentations on the laboratory samples and virtual experimentations through numerical simulation, in order to make it accessible for the constructors. The experimentations effectuated on the samples of expanded polystyrene, extruded polystyrene, beech wood, autoclave cellular concrete and ceramic brick having various humidity, have confirmed the validity of the Campan method and underlined the advantages respectively some particularities and sensibilities of this.

The laboratory experimental data have been completed with bidirectional numerical simulations in unsteady state of the in stationary thermal field in experimentally tested materials, in order to clarify the temperature distribution to the surfaces contact, as to validate the method for various dimensions of the samples, which the professor Câmpan couldn't realize in the years '50 because of the possibilities lack of the automated computation.

The results of the research open the way to standardization. More than that can be imagined methods and simple devices for indestructible investigation, in the building site, of the materials humidity in order to establish if these can be implemented.

KEYWORDS: thermal insulation materials, thermal conductivity, materials relative humidity, contact method, indestructible investigation device, experimental research, heat transfer, unsteady state, contact temperature evolution, virtual experimentation, numerical simulation, construction energetic efficiency.

ISSN 1582-3024