

## THE STRATEGY OF STANDARDIZATION OF THERMAL INSULATION OF BUILDINGS IN POLAND

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### ABSTRACT

The scope of thermal insulation of buildings is covered now in Poland by only one standard PN-82/B-02020 Thermal Protection of Buildings. The standard deals with maximum U-values for building fabric, air infiltration coefficient for windows, rate of internal condensation in building structures as well as practical thermal properties for building materials. An analysis of the problem as well as a study of ISO and national standards has shown the necessity of introduction of 19 new standards covering: terminology, thermal insulation requirements, methods of calculations, methods of thermal diagnostics, methods of laboratory measurements, practical values of thermal coefficients and climatic data. The paper presents an overview of future standardization as well as of previous research work.

### INTRODUCTION

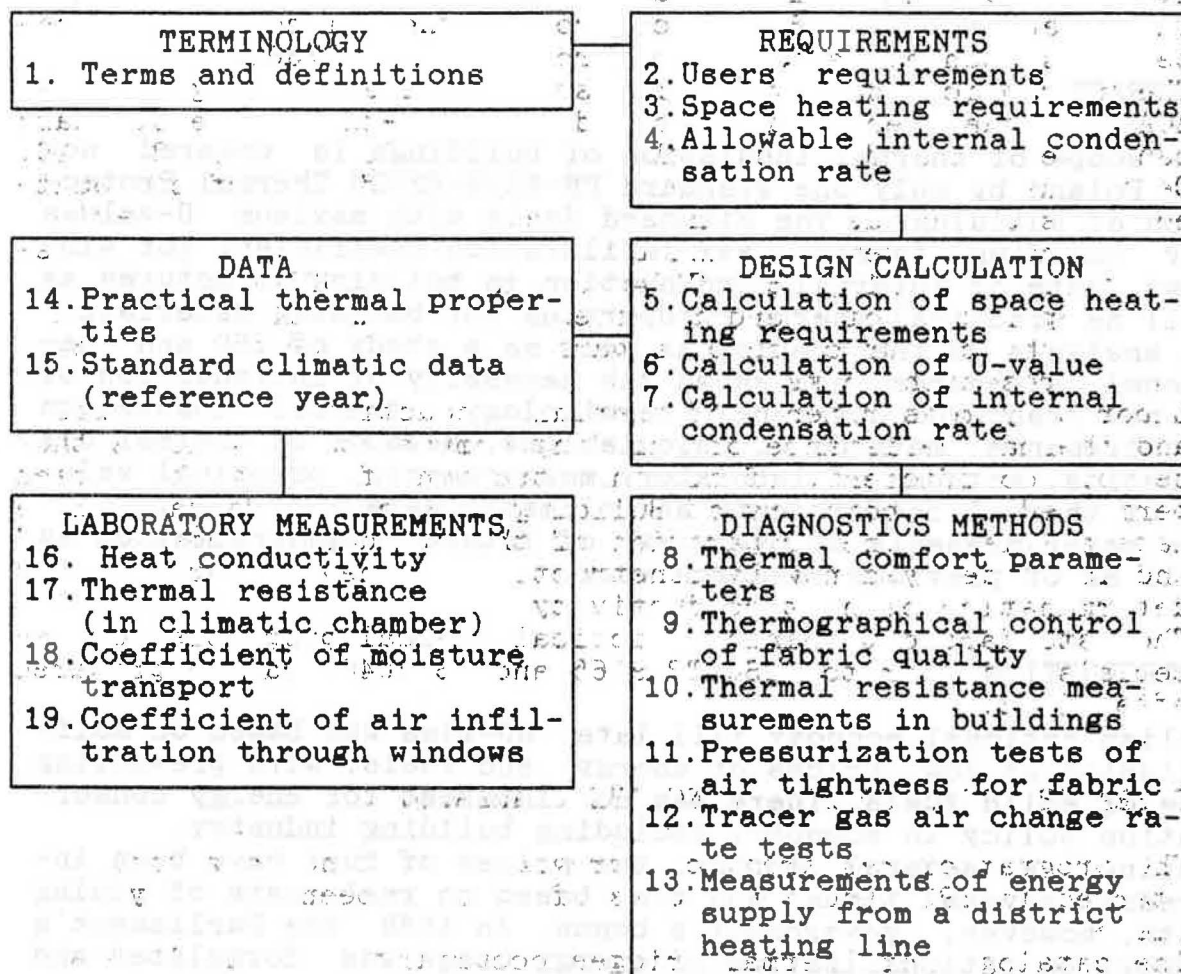
Polish national economy till late 80-ties was based on self-illusion of low prices of energy and fuels, with prevailing use of solid fuels. There was no interest for energy conservation policy in economy, including building industry. During last several months the prices of fuel have been increased several times, and are based on real costs of mining with, however, government's bonus. In 1989 the Parliament's report on rationalization of energy usage was formulated and preparation of the national program of energy conservation is only the question of time. This new situation calls for new strategy in standardization of thermal insulation of buildings, as the energy needs for heating and preparation of hot water exceed 30% of national usage of primary energy. The standards should cover primarily the following main technical areas:

- requirements for heated spaces and for building components,
- methods of calculation for design purposes,
- methods of in situ diagnostics used for check if the requirements are fulfilled.

The methods of calculation should be supported by practical values of thermal coefficients as well as climatic data. The set of standards is completed by standards covering the laboratory determination of hygro-thermal coefficients for materials and components and by standard on terminology. Most of the standards in question will be based on ISO standards, some on existing national standards of ECE members.

#### THE GENERAL SCHEME OF FUTURE STANDARDIZATION

The general scheme of future standardization is presented below.



The standard for "Terms and definitions" can be compiled with help of 3 existing ISO standards.

As the standard for expression of users' requirements future ISO 6242-1.2 can be immediately overtaken. It must be stated, however, that with technical solutions being now in use in Poland for heat production, transmission and distribution there is no possibility to meet requirements proposed in ECE Compendium of Model Provisions for Building Regulations. Therefore no emergency for preparation of such a standard occurs.

It is supposed, that the thermal insulation requirements for buildings will be in future expressed in terms of factor E, MJ/(m<sup>2</sup>.a), of energy required for space heating during the reference heating period. It is under discussion yet, whether the future standard will be mandatory.

The standard for calculation of space heating requirements will be based on ISO/DIS 9164 and NS 3031; standard set of climatic data is under preparation.

Calculation of U-value for external walls with thermal bridges using the concept of linear thermal bridges comes into Polish Standard in 1990.

Till now no effective mathematical model for the description of coupled heat and moisture flows in multi-layered building structures exists. It adjourns the elaboration of standards item 4, 7 and 18 till, perhaps, 1995.

The standard (item 8) for control of thermal comfort parameters has been already adopted from ISO (ISO 7730).

Thermographical detection of insulation flaws using cameras AGA 750 has been used in Poland since 70-ties. The standard can be elaborated accordingly with ISO 6781 and SIS 02 42 10. Determination of thermal resistance using flat surface mounted transducers has been known in Poland since early 60-ties. The standard (item 10) will be elaborated in 1990 on the basis of NT BUILD 215, ASTM C1046-85 and GOST 26254-84.

The preparation of standards items 11, 12 and 13 is conditioned by the construction of apparatus as well as the termination of research works.

Laboratory measurements of thermal conductivity of materials and thermal resistance of building components as well as those of coefficient of air infiltration of windows have been performed in Laboratory of Building Physics in Warsaw since late 50-ties. The preparation of the standards items 16, 17 and 19 is delayed now by construction of new apparatus, for determination of heat conductivity.

The standard determining practical thermal properties of materials, similar to ISO/TR 9165 and NS 8046, can be prepared after 1992.

#### RESEARCH WORKS CONDITIONING THE STANDARDIZATION

The program of research work previous to standardization was started in 1986 and some parts of it have been already completed.

The catalogue of thermal bridges occurring in typical details of large-panel buildings has been prepared for publication.

Three micro-computer programs for calculation of energy required for heating period have been already elaborated and their accuracy and performance are tested now by comparison with observations of experimental houses.

Due to high prices of research apparatus on European market it was necessary to develop the new constructions of several testing facilities:

- guarded hot-plate apparatus for heat conductivity determination,
- "blower-door",

- tracer gas facility for determination of total amount of ventilation air.

In last years some works were undertaken concerning the heat and moisture transfer in capillary-porous bodies.

The results of over 30 years of thermal conductivity measurements were statistically elaborated forming good basis for future development of the standard for practical thermal properties of building materials.