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Thermal insulation for building applications — Guidelines for selecting properties

Produits isolants thermiques pour le bâtiment — Lignes directrices pour le choix des charactéristiques

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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9774 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 10, *Cellular plastics*.

It cancels and replaces ISO/TR 9774:1990, which has been technically revised.

Thermal insulation for building applications — Guidelines for selecting properties

1 Scope

This International Standard gives guidelines to the standards writer in selecting thermal-insulation material properties for standards used in building applications.

These guidelines are not intended to prove the suitability of any particular product for any given application.

When standards are established or existing specifications are revised on the basis of these guidelines, the performance characteristics in these guidelines should be translated into product requirements (specified values) in the International Standard for a product or application, together with appropriate test methods, which must be fulfilled at the time of delivery, in order to ensure that the product provides the performance requirements in service. This relationship between specified values for the product and the service performance characteristic of the product in use can be different for different insulating products, depending on the characteristic of the material (e.g. ageing or time-dependent behaviour).

This International Standard applies only to prefabricated thermal-insulation products, i.e. manufactured mats and boards including any facings or coverings which may be present, although the basic characteristics may also be applied to other insulation products, e.g. *in situ* in systems or components, where appropriate.

The International Standard covers only thermal-insulation products for use in buildings within normal climatic conditions. It does not cover insulation products for building services, e.g. plumbing and heating, nor insulation products for industrial use.

Acoustic properties are not included in the properties given in this International Standard, although these may be additionally required for some fields of application.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/TR 9165, *Practical thermal properties of building materials and products*

3 Applications of thermal-insulation products in buildings

A review of the most common applications of thermal-insulation products in different roof, wall, ceiling and foundation structures is given in Table 1. The applications are illustrated in more detail in Figure 1.

The purpose of Figure 1 is only to illustrate the applications for the various insulation products and to assist in relating the performance characteristics of the products to their application. The figure will also assist in determining requirements for other applications not listed.

The sketches are for illustration only and are not intended as construction drawings: for example, water vapour barriers and air infiltration barriers which may be necessary are not shown. Waterproofings in the roof

or foundation area are only shown to clarify the position of the insulation layer — in the area affected by precipitation or ground water or in the area protected against the penetration of water.

4 Performance characteristics of products according to their application

Table 2 lists those properties — for different applications — which need to be considered when preparing standards and specifications for different products. The performance characteristics necessary for these properties to ensure serviceable and durable thermal insulation are explained and some values are suggested in Table 4.

Derived from Table 2, Table 3 gives specific properties which may be necessary only for certain applications.

For additional applications in building, not shown in Figure 1, the properties of the insulation products may be determined using the information in Tables 2, 3 and 4.

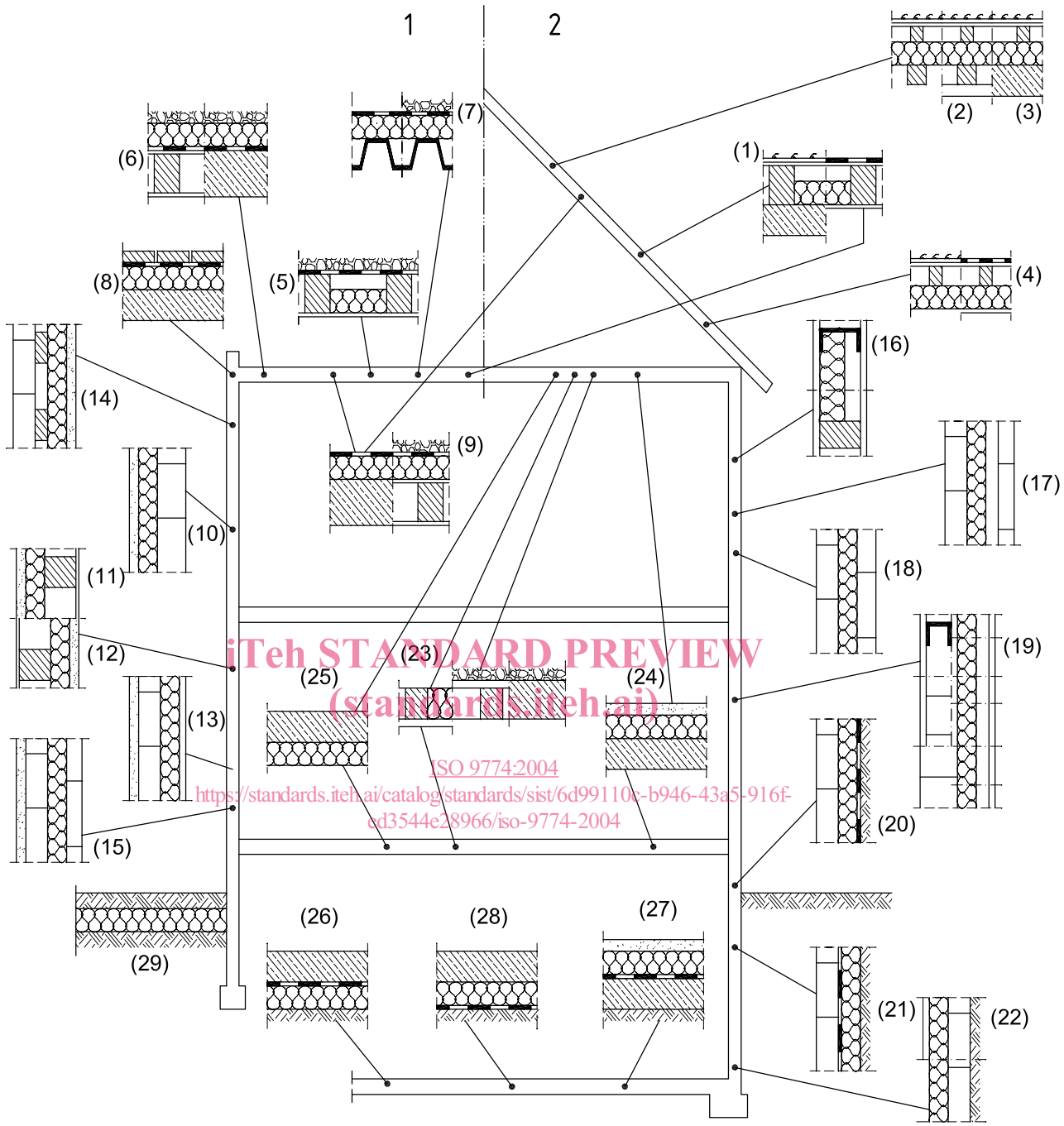
Insulation products used in two or more applications as indicated in Figure 1 shall have all relevant properties for all the intended applications.

For certain constructions, the knowledge of the water vapour transmission rate and the permeability to air is necessary. In such cases, the values for these shall be included in the product specification.

For some applications, additional performance criteria may be relevant, e.g. dimensional stability when in contact with solvents. In such cases, the product specification shall include these additional properties.

5 Application categories

For simplicity, the various applications for insulating products shown in Figure 1 may be grouped into categories having common performance requirements. It is then the task of the insulation material standards or specifications to define these categories and the applications which are covered by the categories.



For key, see next page.

NOTE The numbers in parentheses are for use with Tables 1, 2 and 3.

Key

1 flat roof
2 pitched roof

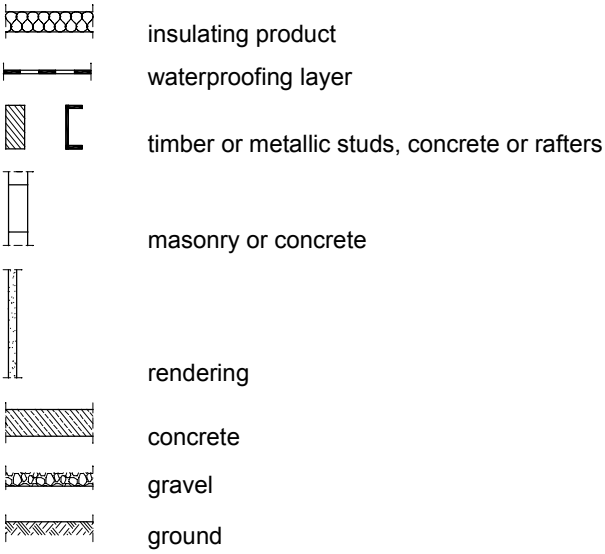


Figure 1 — Examples of the most common applications of thermal-insulation products in buildings

Table 1 — Examples of the most common applications of thermal-insulation products in buildings
(for additional information, see sketches in Figure 1)

Application			Sketch No.
Roof	Pitched roof	Unloaded insulation between rafters, fully supported	1
		Insulation separating rafters and outer covering	2
		Insulation separating supporting construction and outer covering	3
		Insulation beneath rafters	4
	Flat roof	Insulation between rafters or beams	5
		Inverted, insulation above roofing membrane including roof gardens and parking decks	6
		On steel deck, insulation beneath roofing membrane	7
		Accessible to light or heavy traffic or loads from roof garden (soil layer, plants, etc.) and parking decks (concrete pavers or slabs), insulation beneath roofing membrane	8
		Accessible only to maintenance personal, insulation beneath roofing membrane	9
Wall		Masonry or concrete wall, external insulation covered by rendering	10
		Timber stud construction, outside insulation and rendering directly supported by the studs	11
		Timber stud construction, insulation at the internal side with rendering	12
		Masonry or concrete wall, fully supported internal insulation supporting light protective internal facing (e.g. gypsum board)	13
		Masonry or concrete wall, internal insulation supporting light protecting facing, partly supported by studs	14
		Masonry or concrete wall, internal insulation with heavy self-supported protective internal facing (e.g. tiles at roomside)	15
		Timber or metal stud construction with boards covering, insulation between the studs	16
		Cavity wall construction, insulation between the leaves, cavity ventilated	17
		Cavity wall construction, cavity fully filled with insulation, outer leave not watertight	18
		Timber or metal stud construction with boards covering, insulation supported by boards; or masonry or concrete wall, supporting the insulation with ventilated exterior covering	19
		Wall under ground, external insulation behind waterproof membrane with mechanical protection	20
		Wall under ground, external insulation with direct contact to the ground	21
		Cellar or crawlspace hall, internal insulation with or without covering	22
Ceiling/floor		Insulation over the supporting construction or between the beams	23
		Insulation under load distributing flooring, fully supported	24
		Insulation under the construction	25
Foundation		Concrete, insulation under the slab with direct contact to the ground	26
		Concrete, insulation supported by the slab, above waterproof membrane, beneath load distributing flooring	27
		Concrete, insulation under the slab above waterproof membrane	28
		Frost insulation in or against the ground	29