INTERNATIONAL STANDARD

ISO 12575-1

First edition
2012-10-15

Thermal insulation products — Exterior insulating systems for foundations —

Part 1: Material specification

Produits isolants thermiques — Applications externes aux murs des fondations —

Partie 1: Spécification des matériaux

Reference number
ISO 12575-1:2012(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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 12575-1 was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 3, *Thermal insulation products*.

ISO 12575 consists of the following parts, under the general title *Thermal insulation products — Exterior insulating systems for foundations*:

— *Part 1: Material specification*

— *Part 2: Principal responsibilities of installers*

Introduction

ISO 12575 (all parts) defines a number of types of foundation insulating systems and outlines the different roles the insulation plays within each system.

This part of ISO 12575 provides specifiers, designers and engineers of insulation systems with guidelines on what properties are to be considered for the thermal insulating materials for a building foundation insulating system where the insulation is in direct contact with ground soils. The designer shall consult the appropriate national regulations and application specifications for minimum requirements.

The designer selects the actual material in accordance with this part of ISO 12575 for the type of system to be used in a specific application. The designer also consults the appropriate material standard and national regulations for the material selected for added characteristics not specified in this part of ISO 12575.

The manufacturer produces the material according to any applicable material standards, declares that their material type meets the requirements of this part of ISO 12575, declares the fitness for the intended use, and labels the material according to this part of ISO 12575.

The installer follows the requirements of the designer, the manufacturer, local government regulations, ISO 12575-2 and assumes responsibility for installation.

Included as part of the development of ISO 12575 (all parts) is the review of applicable CEN documents; CEN standards were harmonized where appropriate.

Moisture control for this application is only partially addressed in the optional requirements in this part of ISO 12575.

Calculation methods are addressed in ISO 13793 and ISO 13370.

Thermal insulation products — Exterior insulating systems for foundations —

Part 1: Material specification

1 Scope

This part of ISO 12575 specifies the basic performance requirements for the insulating materials that form part of insulating systems used on the exterior of foundations and slabs where the insulation is in direct contact with the ground. This part of ISO 12575 does not address exterior insulating systems for foundations permanently immersed in water.

Minimum requirements are specified in the appropriate national regulations and application specifications.

The designer selects the actual material in accordance with this part of ISO 12575 for the type of system being considered. The designer also consults the appropriate material standard and national regulations for the product selected for added characteristics not specified in this part of ISO 12575.

NOTE This part of ISO 12575 requires the use of other International Standards specific for thermal insulation materials.

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 554, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 846, *Plastics — Evaluation of the action of microorganisms*

ISO 2896, *Rigid cellular plastics — Determination of water absorption*

ISO 8301, *Thermal insulation — Determination of steady-state thermal resistance and related properties — Heat flow meter apparatus*

ISO 8302, *Thermal insulation — Determination of steady-state thermal resistance and related properties — Guarded hot plate apparatus*

ISO 10456, *Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values*

ISO 11561, *Ageing of thermal insulation materials — Determination of the long-term change in thermal resistance of closed-cell plastics (accelerated laboratory test methods)*

ISO 12575-2, *Thermal insulation products — Exterior insulating systems for foundations — Part 2: Principal responsibilities of installers*

ISO 12576-1, *Thermal insulation — Insulating materials and products for buildings — Conformity control systems — Part 1: Factory-made products*

ISO 20392, *Thermal-insulating materials — Determination of compressive creep*

ISO 20393, *Thermal-insulating materials — Determination of long-term water absorption by diffusion*

ISO 20394, *Thermal-insulating materials — Determination of freeze-thaw resistance*

ISO 29469, *Thermal insulating products for building applications — Determination of compressive behaviour*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
footing
linear foundation
widened section, usually concrete, at the base or bottom of a foundation wall pier or column to transfer and spread the load of the buildings onto the supporting soil

3.2
water absorption increase by freeze-thaw cycling
maximum additional increase in water absorption above the long-term water absorption when the insulation is subject to freeze-thaw cycling

NOTE 1 Before the freeze thaw test, the material is exposed to the water absorption test by diffusion.

NOTE 2 The water absorption increase is expressed in units of volume percent.

3.3
compressive strength reduction by freeze-thaw cycling
maximum reduction of the average compressive strength in dry condition of the product as tested prior to freeze-thaw testing and after subjecting the test specimen to freeze-thaw cycling

NOTE The compressive strength reduction is expressed in units of percent.

3.4
frost insulation
insulation that is positioned in the ground so as to protect the foundation from frost-related movement

3.5
load bearing insulation
insulation that is capable of supporting the load of the building on the ground or load bearing slabs

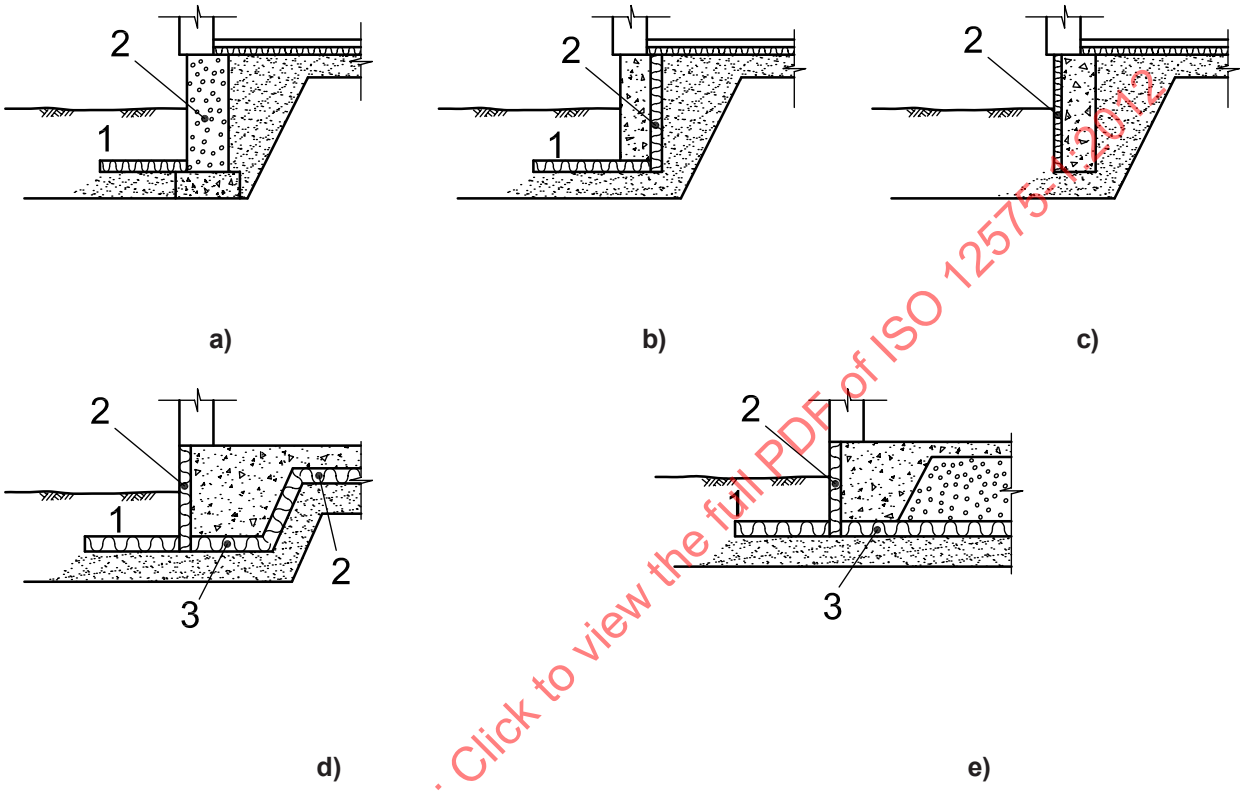
3.6
perimeter insulation
insulation installed against the vertical exterior surfaces of the perimeter foundation walls, linear footings and/or floors at or below ground level that is subject to soil loads only

4 Exterior-foundation insulation system applications

Table 1 defines four exterior-foundation insulation systems based on their application, together with the associated figure numbers showing examples of these applications for the different types of foundation systems.

Table 1 — Types of exterior insulation for foundations

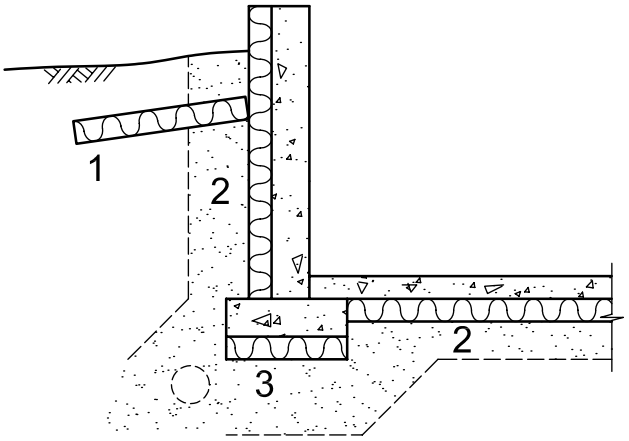
Application	Associated figures
Frost insulation	1 and 2
Perimeter insulation	1 to 3
Non-load-bearing under-slab insulation	1 to 3
Load- bearing insulation	1 to 3



Key

1 frost or ground insulation
2 perimeter insulation
3 load-bearing insulation

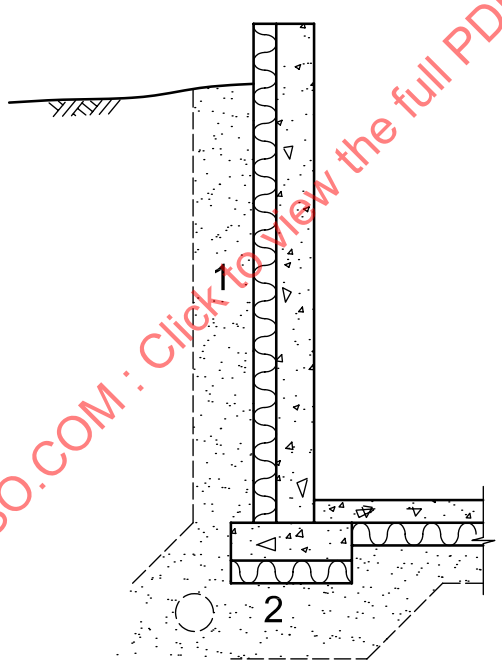
Figure 1 — Examples of vertical edge and ground insulation in foundation structures



Key

1 frost or ground insulation
2 perimeter insulation
3 load-bearing insulation

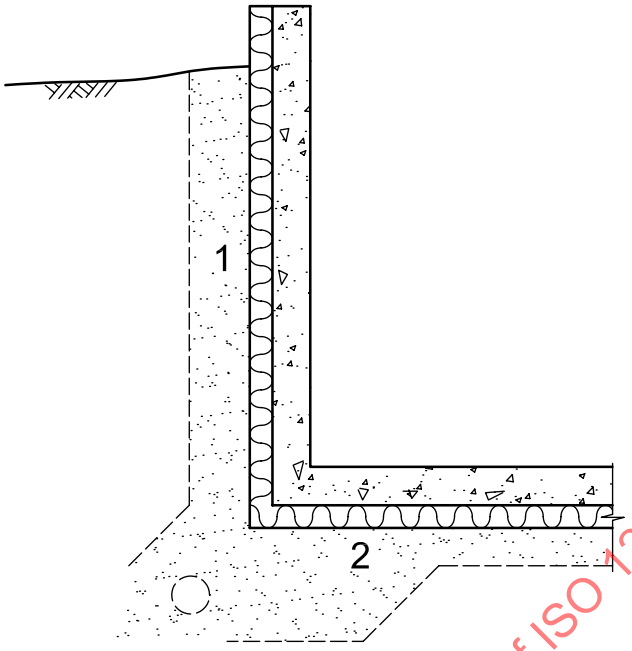
Figure 2 — Cross-section of a shallow basement foundation



Key

1 perimeter insulation
2 load-bearing insulation

Figure 3 — Cross-section of a full basement foundation



Key

1 perimeter insulation

2 load-bearing insulation

Figure 4 — Unitary basement foundation cross-section

5 Requirements

5.1 General

The material shall be installed in accordance with manufacturer's instructions and the requirements outlined in ISO 12575-2. The application and installation shall comply with all building and fire regulations.

Where specific material standards have different requirements from those included in this part of ISO 12575, the more stringent requirements shall be used.

Methods and tolerances for length, width and thickness shall be made according to appropriate material specifications.

Special applications can require properties other than, or in addition to, those specified in this part of ISO 12575. These properties, when agreed upon by the interested parties, may be added to the requirements of this part of ISO 12575.

5.2 Specific requirements

5.2.1 Thermal conductivity at standard mean temperature

The thermal conductivity shall be determined and declared in accordance with the test method in 6.3.1 and in accordance with Table 2, 3 or 4, depending on the application. Thermal properties shall be declared in accordance with the calculation method provided in ISO 10456 and the national requirements for fractile and confidence levels.

5.2.2 Compressive stress

The compressive stress shall be determined and declared in accordance with the test method in 6.3.2 and shall meet the national requirements for the application.

5.2.3 Compressive creep

The compressive creep shall be determined and declared in accordance with the test method in 6.3.3 and shall meet the national requirements for the application. For load bearing applications the thickness reduction shall not exceed 2 %.

The maximum thickness reduction for an extrapolated time of 50 years shall be a maximum of 5 %.

5.2.4 Long-term water absorption

The long-term water absorption shall be determined and declared in accordance with the test method in 6.3.4 and shall meet the national requirements for the application.

5.3 Optional requirements

5.3.1 General

As construction practices and requirements vary from country to country and by building type, the designer or user may specify the following requirements.

5.3.2 Water absorption by diffusion

Where resistance to the effects of water vapour diffusion is required, the water absorption by diffusion shall be determined and declared in accordance with the test method in 6.3.5 and shall meet the national requirements for the application.

5.3.3 Water absorption increase by freeze-thaw cycling

Where resistance to the effects of freeze-thaw is required, the water absorption increase by freeze-thaw cycling shall be determined and declared in accordance with the test method in 6.3.6 and shall meet the national requirements for the application.

5.3.4 Compressive strength reduction by freeze-thaw cycling

Where resistance to the effects of freeze-thaw is required, the compressive strength reduction by freeze-thaw cycling shall be determined and declared in accordance with the test method in 6.3.7 and shall meet the national requirements for the application.

5.3.5 Fungi/biological resistance

Where resistance to the effects of fungi/biological agents is required, the fungi/biological resistance shall be determined and declared in accordance with the test method in 6.3.8 and shall meet the national requirements for the application.

Table 2 — Frost insulation

Property	Unit	Subclause	Test Method	Requirement
Thermal conductivity	W/(m·K)	5.2.1	ISO 8301 or ISO 8302	Declare value
Thermal conductance or thermal resistance	$W/(m^2 \cdot K)$ or $m^2 \cdot K/W$	5.2.1	ISO 8301 or ISO 8302	Declare in accordance with ISO 10456
Long-term water absorption	volume %	5.2.4	ISO 2896	Declare value
Compressive stress	kPa	5.2.2	ISO 29469	Declare value

Table 3 — Perimeter insulation and non-load bearing slab insulation

Property	Unit	Subclause	Test method	Requirement
Thermal conductivity	W/(m·K)	5.2.1	ISO 8301 or ISO 8302	Declare value
Thermal conductance or thermal resistance	W/(m^2·K) or m^2·K /W	5.2.1	ISO 8301 or ISO 8302	Declare in accordance with ISO 10456
Long-term water absorption	volume %	5.2.4	ISO 2896	Declare value
Compressive stress	kPa	5.2.2	ISO 29469	Declare value

Table 4 — Load bearing insulation

Property	Unit	Subclause	Test method	Requirement
Thermal conductivity	W/(m·K)	5.2.1	ISO 8301 or ISO 8302	Declare value
Thermal conductance or thermal resistance	W/(m^2·K) or m^2·K /W	5.2.1	ISO 8301 or ISO 8302	Declare in accordance with ISO 10456
Compressive stress	kPa	5.2.2	ISO 29469	Declare value
Compressive creep	%; kPa	5.2.2	ISO 20392	Declare value
Long-term water absorption	volume %	5.2.4	ISO 2896	Declare value

Table 5 — Optional requirements

Property	Unit	Subclause	Test method	Requirement
Water absorption by diffusion	volume %	5.3.2	ISO 20393	Declare
Freeze-thaw (added water absorption)	volume %	5.3.3	ISO 20394	Declare
Freeze-thaw (reduction in compressive strength)	%	5.3.4	ISO 20394	Declare
Fungi biological resistance	n/a	5.3.5	ISO 846	Declare

6 Testing requirements

6.1 Sampling

Sample size shall be sufficient to cover all physical property determinations and dimensional measurements from a single sample lot.

6.2 Conditioning

Prior to dimensional measurements and physical property testing, the test specimens shall be conditioned, with all surfaces exposed, according to the material standard. Unless otherwise stated in the applicable material standard, the conditioning of the test specimens shall be carried out in accordance with the requirements of ISO 554. For precise measurement, test specimens shall be conditioned at:

(23 ± 2) °C and (50 ± 5) % relative humidity

or

(20 ± 2) °C and (65 ± 5) % relative humidity

or

(27 ± 2) °C and (65 ± 5) % relative humidity

for a minimum of 48h.

6.3 Test methods

6.3.1 Thermal conductivity at standard mean temperature

Thermal conductivity shall be determined according to ISO 8301 or ISO 8302 at a mean temperature of 27 °C, 23 °C or 10 °C. When measuring the thermal resistance, the mean temperature shall be within a minimum temperature difference across the test specimen of 10 °C. The thermal conductivity shall be tested at the mean temperature for which the value is reported.

All cellular plastic insulations manufactured with the intent to retain a blowing agent, other than air, for a period longer than 180 days, shall have the long-term thermal resistance (LTTR) determined in accordance with ISO 11561.

6.3.2 Compressive stress

Compressive strength or the compressive stress at 10 % deformation or yield, whichever occurs first, shall be determined according to ISO 29469. Test specimens shall be tested with natural skin integral to the final product, surface facing, lamination or coating, unless surface irregularities require removal of such surfaces for uniform loading.

Where applicable, the compressive strength shall be measured in the direction normal to the surface of the board.

6.3.3 Compressive creep

Compressive creep shall be determined according to ISO 20392. Where applicable, test specimens shall be tested with natural skin integral to the final product, surface facing, lamination or coating, unless surface irregularities require removal of such surfaces for uniform loading.

The compressive creep shall be measured in the direction normal to the surface of the board.

6.3.4 Long-term water absorption

Water absorption shall be tested in accordance with ISO 2896 except that the test period shall be for 28 days.

6.3.5 Water absorption by diffusion

Water absorption by diffusion shall be determined according to ISO 20393.

6.3.6 Water absorption increase by freeze-thaw cycling

Freeze-thaw (added water absorption) shall be determined according to ISO 20394.

6.3.7 Compressive strength reduction by freeze-thaw cycling

Freeze-thaw (reduction in compressive strength) shall be determined according to ISO 20394.

6.3.8 Fungi/biological resistance

Fungi/biological resistance shall be determined according to ISO 846.