INTERNATIONAL STANDARD

ISO 16534

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Thermal insulating products for building applications — Determination of compressive creep

Produits isolants thermiques destinés aux applications du bâtiment — Détermination du fluage en compression

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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 16534 was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*.

ISO 16534 includes the original EN 1606 prepared by Technical Committee CEN/TC 88 “Thermal insulating materials and products”, with the following clauses modified to reflect the conditions for tropical countries:

— Clause 6.5: Conditioning of test specimens;

— Clause 7.1: Test conditions;

— Clause 10: Test report.

Introduction

ISO 16534 is one of a series of existing European Standards on test methods which were adopted by ISO. This group of International Standards comprises the following group of interrelated standards:

ISO	Title	Respective EN standard
12344	Thermal insulating products for building applications — Determination of bending behaviour	EN 12089
12968	Thermal insulation products for building applications — Determination of the pull-off resistance of external thermal insulation composite systems (ETICS) (foam block test)	EN 13495
29465	Thermal insulating products for building applications — Determination of length and width	EN 822
29466	Thermal insulating products for building applications — Determination of thickness	EN 823
29467	Thermal insulating products for building applications — Determination of squareness	EN 824
29468	Thermal insulating products for building applications — Determination of flatness	EN 825
29469	Thermal insulating products for building applications — Determination of compression behaviour	EN 826
29470	Thermal insulating products for building applications — Determination of the apparent density	EN 1602
29471	Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (23 degrees C/50 % relative humidity)	EN 1603
29472	Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions	EN 1604
29764	Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions	EN 1605
29765	Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces	EN 1607
29766	Thermal insulating products for building applications — Determination of tensile strength parallel to faces	EN 1608
29767	Thermal insulating products for building applications — Determination of short-term water absorption by partial immersion	EN 1609
29768	Thermal insulating products for building applications — Determination of linear dimensions of test specimens	EN 12085
29769	Thermal insulating products for building applications — Determination of behaviour under point load	EN 12430
29770	Thermal insulating products for building applications — Determination of thickness for floating-floor insulating products	EN 12431

29771	Thermal insulating materials for building applications — Determination of organic content	EN 13820
29803	Thermal insulation products for building applications — Determination of the resistance to impact of external thermal insulation composite systems (ETICS)	EN 13497
29804	Thermal insulation products for building applications — Determination of the tensile bond strength of the adhesive and of the base coat to the thermal insulation material	EN 13494
29805	Thermal insulation products for building applications — Determination of the mechanical properties of glass fibre meshes	EN 13496
16534	Thermal insulating products for building applications — Determination of compressive creep	EN 1606
16535	Thermal insulating products for building applications — Determination of long-term water absorption by immersion	EN 12087
16536	Thermal insulating products for building applications — Determination of long-term water absorption by diffusion	EN 12088
16537	Thermal insulating products for building applications — Determination of shear behaviour	EN 12090
16546	Thermal insulating products for building applications —Determination of freeze-thaw resistance	EN 12091
16544	Thermal insulating products for building applications — Conditioning to moisture equilibrium under specified temperature and humidity conditions	EN 12429
16545	Thermal insulating products for building applications — Determination of behaviour under cyclic loading	EN 13793

A further group of existing European Standards on test methods for products used to insulate building equipment and industrial installations comprises the following group of interrelated International Standards:

ISO 12623	Thermal insulating products for building equipment and industrial installations — Determination of short-term water absorption by partial immersion of preformed pipe insulation	EN 13472
ISO 12624	Thermal insulating products for building equipment and industrial installations — Determination of trace quantities of water soluble chloride, fluoride, silicate, sodium ions and pH	EN 13468
ISO 12628	Thermal insulating products for building equipment and industrial installations — Determination of dimensions, squareness and linearity of preformed pipe insulation	EN 13467
ISO 12629	Thermal insulating products for building equipment and industrial installations — Determination of water vapour transmission properties of preformed pipe insulation	EN 13469

Thermal insulating products for building applications — Determination of compressive creep

1 Scope

This International Standard specifies the equipment and procedures for determining the compressive creep of specimens under various conditions of stress. It is applicable to thermal insulating products.

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

ISO 29768, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*

ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

3 Terms and definitions

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

3.1
thickness
linear dimension measured perpendicular to the length and width plane

3.1.1
thickness
d
original product thickness

3.1.2
thickness
d_s
initial thickness of the test specimen

3.1.3
thickness
d_L
thickness of the test specimen under the basic compressive stress of the loading device (‘dead weight’)

3.1.4
thickness
d_0
thickness of the test specimen 60 s after the beginning of the loading process

3.1.5
thickness
d_t
thickness of the test specimen at a given time, t

3.2
compressive stress
σ_c
ratio of the compressive force to the initial surface area of the cross-section of the test specimen

3.3
deformation
X
reduction in thickness of the test specimen

3.4
relative deformation
ε
ratio of the deformation of the test specimen X, and its thickness d_s, measured in the direction of loading

3.5
compressive creep
X_{ct}
increase in deformation of the test specimen under a constant stress with time under specified conditions of temperature and humidity

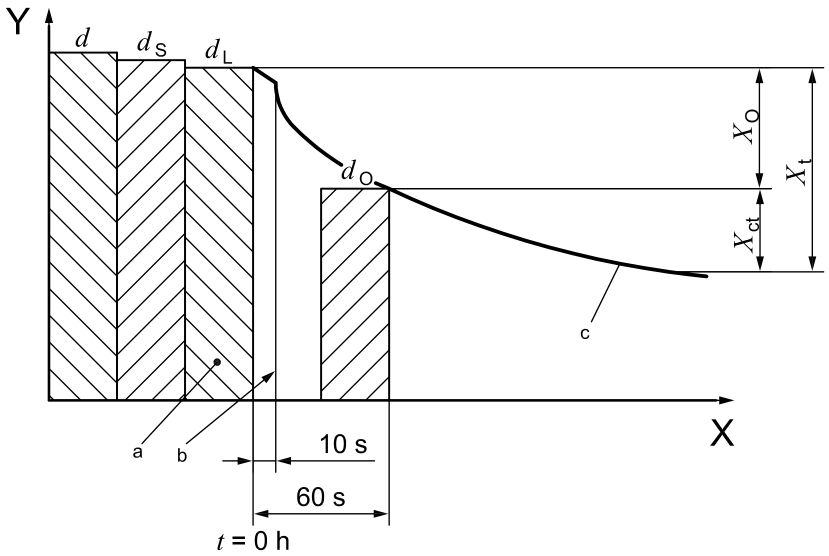
$$X_{ct} = X_t - X_0$$

where

X_t is the deformation at time t;

X_0 is the initial deformation (after 60 s from the beginning of loading).

An illustration of the different thicknesses and deformations is given in Figure 1.



Key

a thickness

b time, *t*

c deformation curve

d_L reference value for deformation measurements

1 'Dead weight' of the loading device (<10 % of the smallest stress chosen for the creep test).

2 Load applied in the compressive creep test.

NOTE In the illustration, d_L is used as a reference value for deformation measurements. If d_S is used as the reference value, the illustration can be used, omitting the column for d_L (see 7.3).

Figure 1 — Illustration of the different thicknesses and deformations

4 Principle

The compressive creep is determined by measuring the increase in deformation of a specimen under constant compressive stress and specified conditions of temperature, humidity and time.

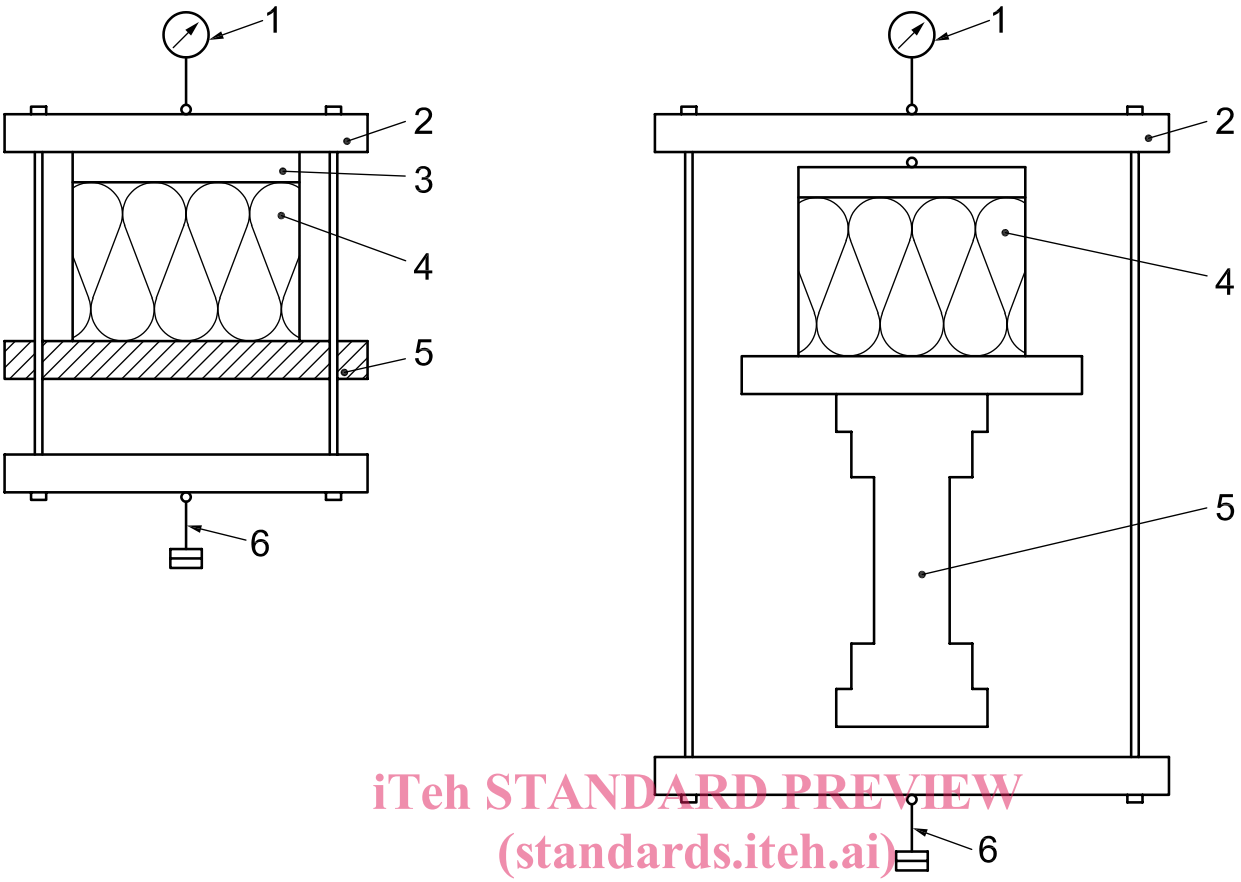
5 Apparatus

5.1 Loading device, consisting of two flat platens, one of which shall be movable, arranged so that they compress the specimen in a vertical direction. The movable platen shall be guided in such a manner as to be self-aligning. The platens shall be capable of being loaded smoothly and without distortion so that, during the test, the static stress does not change by more than ± 5 %.

5.2 Measuring device (e.g. dial gauge), capable of determining the distance between the two platens, i.e. the deformation of the specimen, to an accuracy of 0,01 mm.

5.3 Suitable damping measures, to minimize the effects of external vibration (e.g. substantial foundation of the apparatus support).

Examples of the testing apparatus are given in Figure 2.



a) b)

Key

1 displacement transducer or dial gauge
2 loading bridge
3 load distribution plate (movable, self-aligning)
4 test specimen
5 support beam
6 loading by weights

Figure 2 — Examples of test apparatus

6 Test specimens

6.1 Selection of test specimens

The specimens for determining the compressive creep shall be taken from the same sample, with the same preparation as the specimens used for the compression test as specified in EN 826.

The method of selecting the specimens shall be as specified in the relevant product standard.

NOTE In the absence of a product standard or any other technical specification, the method of selection of the test specimens can be agreed between parties.

6.2 Dimensions of test specimens

The thickness of specimens shall be equal to the original product thickness. The width of the specimens shall not be less than their thickness. Products with facings or integrally moulded skins which are retained in use shall be tested with these faces or skins intact.

Test specimens shall not be layered to produce a greater thickness for testing.

The specimens shall be cut squarely and have sides with the following recommended dimensions:

— 50 mm × 50 mm; or

— 100 mm × 100 mm; or

— 150 mm × 150 mm; or

— 200 mm × 200 mm or

— 300 mm × 300 mm.

The dimensions of specimens shall be the same as used in the compression test as described in ISO 29469. These are specified in the relevant product standard or agreed between parties.

The linear dimensions shall be determined in accordance with ISO 29768, to an accuracy of 0,5 %.

The tolerance and parallelism and flatness between the upper and lower face of the specimen shall not be greater than 0,5 % of its side length, with a maximum of 0,5 mm.

If the specimen is not flat, it shall be ground flat or an adequate coating shall be applied to prepare the surface for the test. Where it is coated, no significant creep should occur in the coating or it shall be taken into account by deducting the creep of the coating.

6.3 Number of test specimens

The number of specimens shall be as specified in the relevant product standard. If the number is not specified, then at least three specimens shall be used for each compressive stress selected from 7.2.

NOTE In the absence of a product standard or any other technical specification, the number of specimens can be agreed between parties.

6.4 Preparation of test specimens

The specimens shall be cut so that the direction of loading applied to the product will correspond to the direction in which the compressive forces are applied to the product in use.

The specimens shall be cut by methods that do not change the original structure of the product.

For products with non-parallel faces, the parallelism of the upper and lower face of the specimen shall be in accordance with 6.2.

NOTE Special methods of preparation, when needed, may be given in the relevant product standard.

6.5 Conditioning of test specimens

The specimens shall be conditioned for at least 24 h under the test conditions. In case of dispute, the time for conditioning (equilibrium of moisture content) shall be as specified in the relevant product standard.

In tropical countries, different conditioning and testing conditions can be relevant. In this case, the conditions shall be (27 ± 5) °C and (65 ± 5) % relative humidity (RH), and be stated clearly in the test report.

7 Procedure

7.1 Test conditions

The test shall be carried out at (23 ± 2) °C and (50 ± 5) % RH.

NOTE Other conditions can be given in the relevant product standard or can be agreed between parties.