SLOVENSKI STANDARD
SIST EN 1606:2013

01-julij-2013

Nadomešča:
SIST EN 1606:1997
SIST EN 1606:1997/A1:2007
SIST EN 1606:1997/AC:1999

Toplotnoizolacijski proizvodi za uporabo v gradbeništvu - Ugotavljanje lezenja pod tlačno obremenitvijo

Thermal insulating products for building applications - Determination of compressive creep

Wärmestoffe für das Bauwesen - Bestimmung des Langzeit-Kriechverhaltens bei Druckbeanspruchung

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

Ta slovenski standard je istoveten z: **EN 1606:2013**

ICS:

91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials

SIST EN 1606:2013 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1606

March 2013

ICS 91.100.60

Supersedes EN 1606:1996

English Version

Thermal insulating products for building applications - Determination of compressive creep

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

Wärmestoffe für das Bauwesen - Bestimmung des Langzeit-Kriechverhaltens bei Druckbeanspruchung

This European Standard was approved by CEN on 15 December 2012.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 1606:2013) has been prepared by Technical Committee CEN/TC 88 “Thermal insulating materials and products”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2013 and conflicting national standards shall be withdrawn at the latest by September 2013.

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

This document supersedes EN 1606:1996.

The revision of this standard contains no major changes, only minor corrections and clarifications of an editorial nature.

This European Standard is one of a series of standards which specify test methods for determining dimensions and properties of thermal insulating materials and products. It supports a series of product standards for thermal insulating materials and products which derive from the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products (Directive 89/106/EEC) through the consideration of the essential requirements.

This European Standard has been drafted for applications in buildings, but it may also be used in other areas where it is relevant.

This European test standard is one of the following group of interrelated standards on test methods for determining dimensions and properties of thermal insulation materials and products, all of which fall within the scope of CEN/TC 88:

— EN 822, *Thermal insulating products for building applications — Determination of length and width*

— EN 823, *Thermal insulating products for building applications — Determination of thickness*

— EN 824, *Thermal insulating products for building applications — Determination of squareness*

— EN 825, *Thermal insulating products for building applications — Determination of flatness*

— EN 826, *Thermal insulating products for building applications — Determination of compression behaviour*

— EN 1602, *Thermal insulating products for building applications — Determination of the apparent density*

— EN 1603, *Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (23 °C/50 % relative humidity)*

— EN 1604, *Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions*

— EN 1605, *Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions*

— EN 1606, *Thermal insulating products for building applications — Determination of compressive creep*

— EN 1607, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*

— EN 1608, *Thermal insulating products for building applications — Determination of tensile strength parallel to faces*

— EN 1609, *Thermal insulating products for building applications — Determination of short-term water absorption by partial immersion*

— EN 12085, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*

— EN 12086, *Thermal insulating products for building applications — Determination of water vapour transmission properties*

— EN 12087, *Thermal insulating products for building applications — Determination of long-term water absorption by immersion*

— EN 12088, *Thermal insulating products for building applications — Determination of long-term water absorption by diffusion*

— EN 12089, *Thermal insulating products for building applications — Determination of bending behaviour*

— EN 12090, *Thermal insulating products for building applications — Determination of shear behaviour*

— EN 12091, *Thermal insulating products for building applications — Determination of freeze-thaw resistance*

— EN 12429, *Thermal insulating products for building applications — Conditioning to moisture equilibrium under specified temperature and humidity conditions*

— EN 12430, *Thermal insulating products for building applications — Determination of behaviour under point load*

— EN 12431, *Thermal insulating products for building applications — Determination of thickness for floating floor insulating products*

— EN 13793, *Thermal insulating products for building applications — Determination of behaviour under cyclic loading*

— EN 13820, *Thermal insulating materials for building applications — Determination of organic content*

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European 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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 826, *Thermal insulating products for building applications — Determination of compression behaviour*

EN 12085, *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 terms and definitions apply.

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

d is the original product thickness;

d_S is the thickness of the specimen;

d_L is the thickness of the specimen under the basic compressive stress of the loading device ('dead weight');

d_0 is the thickness of the specimen 60 s after the beginning of the loading process;

d_t is the thickness of the 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 specimen

3.3
deformation
X
reduction in thickness of the specimen

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

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

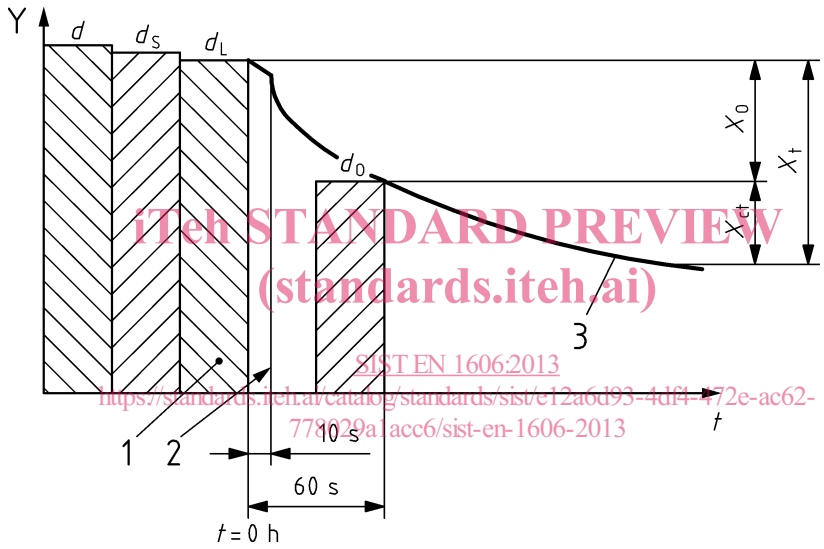
$$X_{ct} = X_t - X_0$$

where

X_t is the deformation at time t;

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

Note 1 to entry: An illustration of the different thicknesses and deformations is given in Figure 1.



Key

d_L reference value for deformation measurements
t time
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
3 deformation curve

In this figure, d_L is used as a reference value for deformation measurements. If d_S is used as the reference value, the figure 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

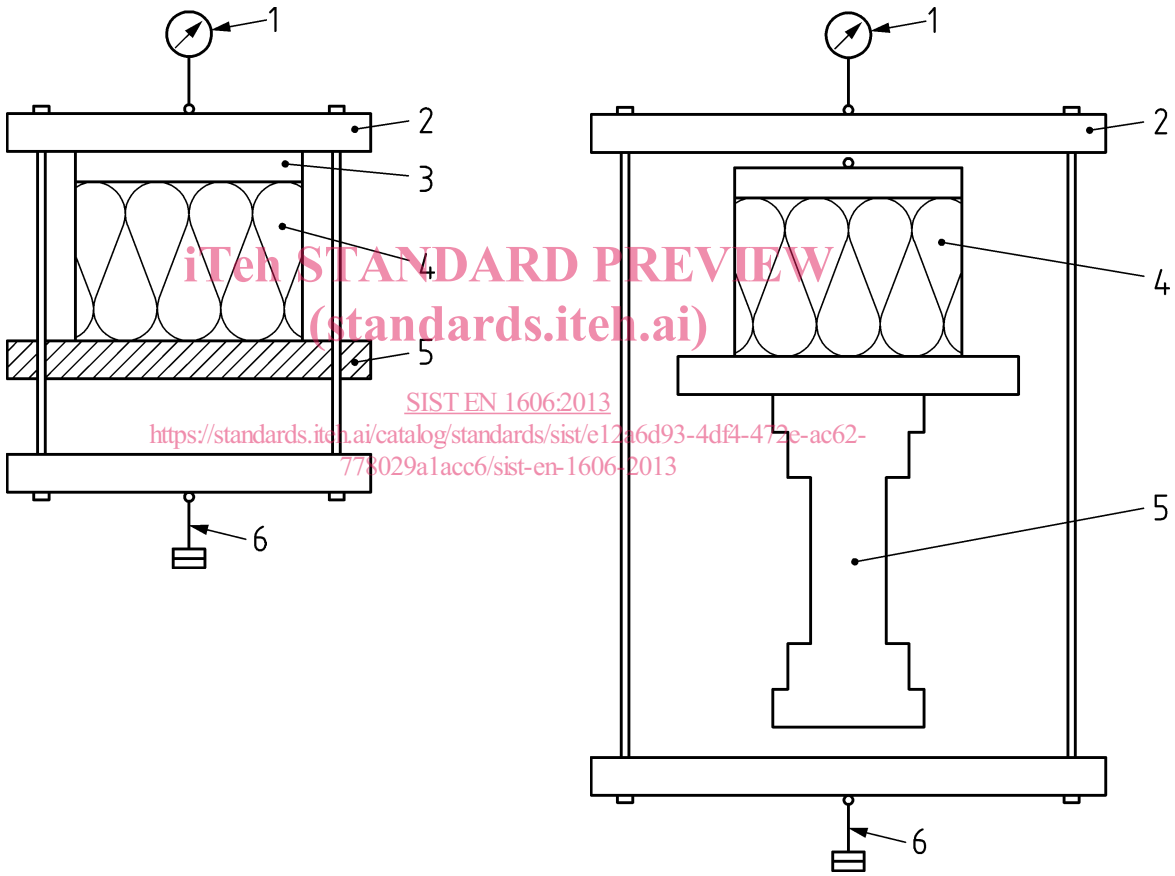
5.1 Loading device, consisting of two flat platens, one of which shall be movable, so arranged that they compress the specimen in a vertical direction.

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 minimise 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.

In the absence of a product standard or any other European Technical Specification, the method of selection of the test specimens may 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 its 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 squarely cut 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 EN 826. These are specified in the relevant product standard or agreed between parties.

The linear dimensions shall be determined in accordance with EN 12085, to an accuracy of 0,5 %.

The tolerance on 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.

In the absence of a product standard or any other European Technical Specification, the number of specimens may 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.

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.

7 Procedure

7.1 Test conditions

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

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

7.2 Stress selection

The test shall be carried out at three or more different stresses.

To verify one defined level of stress, only this level shall be used.

The alternative stresses for the creep test, σ_c, shall be based on either the compressive strength, σ_m, or the compressive stress, σ_{10}, at 10 % strain measured in accordance with EN 826, and shall be calculated as follows:

$\sigma_c = 0{,}15 \times \sigma_m$ or $\sigma_c = 0{,}15 \times \sigma_{10}$

$\sigma_c = 0{,}20 \times \sigma_m$ or $\sigma_c = 0{,}20 \times \sigma_{10}$

$\sigma_c = 0{,}25 \times \sigma_m$ or $\sigma_c = 0{,}25 \times \sigma_{10}$

$\sigma_c = 0{,}30 \times \sigma_m$ or $\sigma_c = 0{,}30 \times \sigma_{10}$

$\sigma_c = 0{,}35 \times \sigma_m$ or $\sigma_c = 0{,}35 \times \sigma_{10}$

If appropriate, other values of σ_c may be chosen.

7.3 Test procedure

If the thickness of a specimen, d_S, is to be determined without using the loading device, it shall be measured to an accuracy of 0,1 mm, in accordance with EN 12085.

Place the specimen carefully in the loading device, under the "dead weight" of the loading device. The thickness under this load, d_L, is to be considered the reference value for the deformation measurements. Determine d_L to the nearest 0,01 mm.

The stress imposed by the "dead weight" shall be less than 10 % of the minimum stress selected for the test.

If the thickness of the specimen, d_S, is determined using the loading device, the specimen shall be preloaded by applying a pressure of (250 ± 10) Pa and the thickness measured to an accuracy of 0,01 mm. This value shall then be used as the reference value for the deformation measurements.