SLOVENSKI STANDARD
SIST EN 14390:2007

01-julij-2007

Požarni preskus - Referenčni preskus v naravnem merilu za obložne materiale

Fire test - Large-scale room reference test for surface products

Brandverhalten von Bauprodukten - Referenzversuch im Realmaßstab an Oberflächenprodukten in einem Raum

Essais au feu - Essai de référence dans une pièce à grande échelle pour les produits de surface

Ta slovenski standard je istoveten z: EN 14390:2007

ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements

SIST EN 14390:2007 **en;fr;de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14390

January 2007

ICS 13.220.50

English Version

Fire test - Large-scale room reference test for surface products

Essais au feu - Essai dans une pièce en vraie grandeur pour les produits de surface

Brandverhalten von Bauprodukten - Referenzversuch im Realmaßstab an Oberflächenprodukten in einem Raum

This European Standard was approved by CEN on 13 October 2006.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Ref. No. EN 14390:2007: E

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Foreword

This document (EN 14390:2007) has been prepared by Technical Committee CEN/TC 127 “Fire safety in buildings”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by July 2007, and conflicting national standards shall be withdrawn at the latest by July 2007.

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

Introduction

This method is intended to describe the fire behaviour of a product under controlled laboratory conditions.

The test method may be used as part of a fire hazard assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a product in a particular end use.

WARNING — So that suitable precautions can be taken to safeguard health, the attention of all concerned in fire tests is drawn to the possibility that toxic or harmful gases can be evolved during combustion of test specimens.

The test procedures involve high temperatures and combustion processes from ignition to a fully developed room fire. Therefore, hazards can exist for burns, ignition of extraneous objects or clothing. The operators should use protective clothing, helmet, face-shield and equipment for avoiding exposure to toxic gases.

Means of extinguishing a fully developed fire should be available.

1 Scope

This European Standard specifies a test method to evaluate the reaction to fire performance of building products. A fire is simulated which under well-ventilated conditions starts in a corner of a small room with a single open doorway.

The method is intended to evaluate the contribution of a surface product to fire growth in a room configuration, using a specified ignition source. It constitutes a reference test for this type of product within the European classification system for reaction to fire performance of construction products.

The method is particularly suitable for construction products which cannot be tested in their end use application in a small or intermediate laboratory scale. The method can also be used to assess the effect of an insulating substrate on the product performance.

A test performed in accordance with the method specified in this European Standard provides data for the early stages of a fire from ignition up to flashover.

The method is not intended to evaluate floor coverings. It may not be suitable for some free-standing products because their integrity, when exposed to fire, could have a decisive influence on their behaviour.

NOTE The term "surface product" as used in the title and scope of this European Standard specifically relates to internal surface linings, assemblies, pipes and pipe insulation products used in buildings.

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.

EN 13238, *Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates*

EN 13501-1:2002, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

EN ISO 13943:2000, *Fire safety — Vocabulary (ISO 13943:2000)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 13943:2000 and the following apply.

3.1
exposed surface
surface of the product subjected to the heating conditions of the test

3.2
material
single substance or uniformly dispersed mixture

EXAMPLE metal, stone, timber, concrete, mineral fibre or polymers

3.3
product
material, composite or assembly about which information is required

3.4
test specimen
representative piece of the product which is to be tested together with any substrate or treatment

NOTE The test specimen may include an air gap.

3.5
surface product
any part of a building that constitutes an exposed surface on the interior walls and/or the ceiling

3.6
flashover
point in the fire history when the sum of the rate of heat release from the ignition source and the product reaches 1 000 kW

3.7
***FIGRA*$_{RC}$**
FIre Growth RAte
growth rate of the fire during a specified time period

3.8
***SMOGRA*$_{RC}$**
SMOke Growth RAte
growth rate of the production of smoke during a specified time period

3.9
burning droplets
continuous occurrence of flaming droplets/particles from the test specimen for at least 10 s or a pool fire formed on the floor

4 Principle

The hazard of fire growth is evaluated in a fire test room by the measurement of the rate of heat release of the fire based on calculation of oxygen consumption. See also Annex B.

The hazard of reduced visibility is estimated by the measurement of the production of light-obscuring smoke.

Phenomena attributed to the fire growth, for example flame spread and emission of burning droplets, are visually documented by photographic and/or video recording.

NOTE If further information is required, measurements for example of heat flux to the floor, toxic gas species, the gas temperature in the room and the mass flow in and out the doorway may be performed, see also ISO/TR 9705-2:2001 (Bibliography [2]).

5 Fire test room

5.1 Dimensions

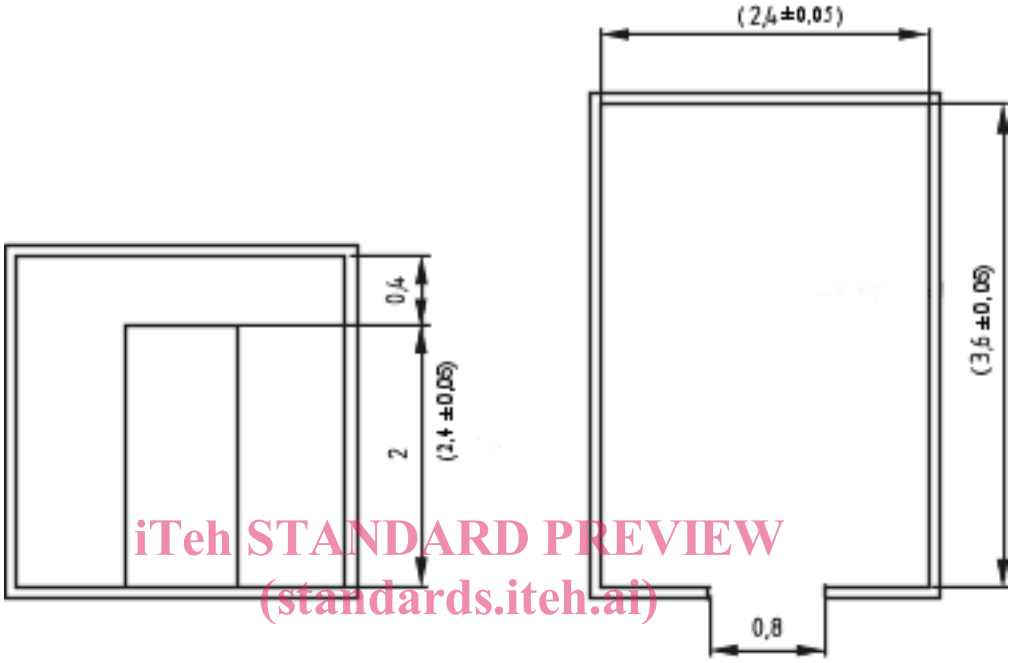
The room (see Figure 1) shall consist of four walls at right angles, a floor and a ceiling and shall have the following inner dimensions:

a) length: (3,6 ± 0,05) m;

b) width: (2,4 ± 0,05) m;

c) height: (2,4 ± 0,05) m.

Dimensions in metres



Key

1 front view

2 top view

Figure 1 — Fire test room

The room shall be placed indoors in an essentially draught free, heated space, large enough to ensure that there is no influence on the test fire. In order to facilitate the mounting of the instruments and of the ignition source, the test room may be placed so that the floor can be accessed from beneath.

5.2 Doorway

There shall be a doorway in the centre of one of the 2,4 m × 2,4 m walls and no other wall, floor or ceiling shall have any openings that allow ventilation. The doorway shall have the following dimensions:

a) width: 0,8 m ± 0,02 m;

b) height: 2,0 m ± 0,02 m.

The distance between the top of the doorway and the ceiling shall be (0,4 ± 0,02) m.

5.3 Construction material

The test room shall be constructed of Class A1 material according to EN 13501-1:2002, with a density of (600 ± 200) kg/m^3. The minimum thickness of the construction shall be 20 mm.

6 Ignition source

6.1 General

The ignition source design is specified in Annex A.

The ignition source shall be a propane gas burner having a top surface layer of sand. The construction shall be such that an even gas flow is achieved over the entire opening area.

The ignition source is a propane gas burner that consumes relatively large amounts of gas. Attention is therefore drawn to the following warning.

All equipment such as tubes, couplings and flowmeters, should be approved for propane. The installations should be performed in accordance with existing regulations.

The burner should, for reasons of safety, be equipped with a remote-controlled ignition device, for example a pilot flame or a glow wire. There should be a warning system for leaking gas and a valve for immediate and automatic cut-off of the gas supply in case of extinction of the ignition flame.

6.2 Location

The burner shall be placed on the floor in a corner opposite to the doorway wall. The top of the burner shall be 145 mm from the floor level. The burner walls shall be in contact with the test specimen.

6.3 Gas

The burner shall be supplied with commercial grade propane of at least 95 % purity. The gas flow to the burner shall be measured with an accuracy of at least ± 3 %.

6.4 Heat output

The net heat output shall be 100 kW during the first 10 min after ignition and then shall be increased to 300 kW for a further 10 min. The heat output from the burner shall be controlled within ± 5 % of the prescribed value.

7 Hood and exhaust duct

The system for collecting the combustion products shall have sufficient capacity and be designed in such a way that all of the combustion products leaving the fire room through the doorway during a test are collected. The system shall not disturb the fire-induced flow in the doorway. The maximum exhaust capacity shall be at least 3,5 m^3/s at normal pressure and a temperature of 25 °C. Exhaust systems based on natural convection shall not be used.

NOTE An example of one design of hood and an exhaust duct is given in Annex B.

8 Instrumentation in the exhaust duct

8.1 General

This clause specifies minimum requirements for instrumentation in the exhaust duct. Additional information and designs can be found in Annex C.

8.2 Volume flow rate

The volume flow rate in the exhaust duct shall be measured to an accuracy of at least ± 5 %.

8.3 Gas analysis

8.3.1 Sampling line

The gas samples shall be taken in the exhaust duct at a position where the combustion products are uniformly mixed. The sampling line shall be made from an inert material which will not influence the concentration of the gas species to be analysed (see Annex C).

8.3.2 Oxygen

The O_2 analyser shall be of the paramagnetic type or equivalent in performance and capable of measuring a range of at least 0 Vol % to 21 Vol % oxygen ($Volume_{oxygenO2}/Volume_{air}$). The uncertainty of measurement shall be ≤ 0,1 Vol % O_2 when measured as recommended. The stability of the analyser shall be within 0,01 Vol % O_2 over a period of 30 min (measured in accordance with C.3.2). The output from the analyser and also the data acquisition system shall have a resolution of 0,01 Vol % O_2 or better.

8.3.3 Carbon dioxide

The CO_2 analyser shall be of the IR type or equivalent in performance and capable of measuring a range of at least 0 Vol % to 10 Vol % carbon dioxide. The uncertainty of measurement shall be ≤ 0,1 Vol % CO_2 up to 5 Vol % CO_2 and ≤ 0,2 Vol % CO_2 from 5 Vol % to 10 Vol % CO_2. The linearity of the analyser shall be 1 % of full scale or better. The output from the analyser and also the data acquisition system shall have a resolution of 0,01 Vol % CO_2 or better. It is sufficient to show linearity of the CO_2 analyser by using three calibration points over the measuring range.

8.4 Optical density

8.4.1 General

The optical density of the smoke is determined by measuring the light obscuration with a system consisting of a lamp, lenses, an aperture and a photocell (see Figure 2).

8.4.2 Lamp

The lamp shall be of the incandescent filament type and shall operate at a colour temperature of (2 900 ± 100) K. The lamp shall be supplied with stabilized direct current, stable within ± 0,5 % (including temperature, short-term and long-term stability).

8.4.3 Lenses

The lens system shall align the light to a parallel beam with a diameter, *D*, of at least 20 mm.