SLOVENSKI STANDARD
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Polimerni materiali - Nastajanje dima - 2. del: Določanje optične gostote s preskusom v eni preskusni komori (ISO 5659-2:2012)

Plastics - Smoke generation - Part 2: Determination of optical density by a single-chamber test (ISO 5659-2:2012)

Kunststoffe - Rauchentwicklung - Teil 2: Bestimmung der optischen Dichte durch Einkammerprüfung (ISO 5659-2:2012)

Plastiques - Production de fumée - Partie 2: Détermination de la densité optique par un essai en enceinte unique (ISO 5659-2:2012)

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Plastiques - Production de fumée - Partie 2: Détermination de la densité optique par un essai en enceinte unique (ISO 5659-2:2012)

Kunststoffe - Rauchentwicklung - Teil 2: Bestimmung der optischen Dichte durch Einkammerprüfung (ISO 5659-2:2012)

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Foreword

This document (EN ISO 5659-2:2012) has been prepared by Technical Committee ISO/TC 61 "Plastics" in collaboration with Technical Committee CEN/TC 249 “Plastics” the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by June 2013, and conflicting national standards shall be withdrawn at the latest by June 2013.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.

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Endorsement notice

The text of ISO 5659-2:2012 has been approved by CEN as a EN ISO 5659-2:2012 without any modification.

INTERNATIONAL STANDARD

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Plastics — Smoke generation —

Part 2: Determination of optical density by a single-chamber test

Plastiques — Production de fumée —

Partie 2: Détermination de la densité optique par un essai en enceinte unique

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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 5659-2 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 4, *Burning behaviour*.

This third edition cancels and replaces the second edition (ISO 5659-2:2006), which has been technically revised. It also replaces ISO 5659-1:1996 (*Plastics — Smoke generation — Part 1: Guidance on optical-density testing*), which will be withdrawn upon publication of this edition.

ISO 5659 consists of the following parts, under the general title *Plastics — Smoke generation*:

— *Part 2: Determination of optical density by a single-chamber test*

— *Part 3: Determination of optical density by a dynamic-flow method* (Technical Report)

Introduction

Fire is a complex phenomenon: its development and effects depend upon a number of interrelated factors. The behaviour of materials and products depends upon the characteristics of the fire, the method of use of the materials and the environment in which they are exposed (see also ISO/TR 3814[1] and ISO 13943).

A test such as is specified in this part of ISO 5659 deals only with a simple representation of a particular aspect of the potential fire situation, typified by a radiant heat source, and it cannot alone provide any direct guidance on behaviour or safety in fire. A test of this type may, however, be used for comparative purposes or to ensure the existence of a certain quality of performance (in this case, smoke production) considered to have a bearing on fire behaviour generally. It would be wrong to attach any other meaning to results from this test.

The term “smoke” is defined in ISO 13943 as a visible suspension of solid and/or liquid particles in gases resulting from incomplete combustion. It is one of the first response characteristics to be manifested and should almost always be taken into account in any assessment of fire hazard as it represents one of the greatest threats to occupants of a building or other enclosure, such as a ship or train, on fire.

The responsibility for the preparation of ISO 5659 was transferred during 1987 from ISO/TC 92 to ISO/TC 61 on the understanding that the scope and applicability of the standard for the testing of materials should not be restricted to plastics but should also be relevant to other materials where possible, including building materials.

Plastics — Smoke generation —

Part 2: Determination of optical density by a single-chamber test

1 Scope

1.1 This part of ISO 5659 specifies a method of measuring smoke production from the exposed surface of specimens of materials, composites or assemblies. It is applicable to specimens that have an essentially flat surface and do not exceed 25 mm in thickness when placed in a horizontal orientation and subjected to specified levels of thermal irradiance in a closed cabinet with or without the application of a pilot flame. This method of test is applicable to all plastics and may also be used for the evaluation of other materials (e.g. rubbers, textile-coverings, painted surfaces, wood and other materials).

1.2 It is intended that the values of optical density determined by this test be taken as specific to the specimen or assembly material in the form and thickness tested, and are not to be considered inherent, fundamental properties.

1.3 The test is intended primarily for use in research and development and fire safety engineering in buildings, trains, ships, etc. and not as a basis for ratings for building codes or other purposes. No basis is provided for predicting the density of smoke that might be generated by the materials upon exposure to heat and flame under other (actual) exposure conditions. This test procedure excludes the effect of irritants on the eye.

NOTE This test procedure addresses the loss of visibility due to smoke density, which generally is not related to irritancy potency (see Annex E).

1.4 It is emphasized that smoke production from a material varies according to the irradiance level to which the specimen is exposed. The results yielded from the method specified in this part of ISO 5659 are based on exposure to the specific irradiance levels of 25 kW/m^2 and 50 kW/m^2.

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.

ISO 13943, *Fire safety — Vocabulary*

ISO 14934-3, *Fire tests — Calibration and use of heat flux meters — Part 3:Secondary calibration method*

3 Terms and definitions

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

3.1
assembly
fabrication of materials and/or composites

NOTE 1 Sandwich panels are an example of an assembly.

NOTE 2 The assembly may include an air gap.

3.2
composite
combination of materials which are generally recognized in building construction as discrete entities

NOTE Coated or laminated materials are examples of composites.

3.3
essentially flat surface
surface which does not deviate from a plane by more than 1 mm

3.4
exposed surface
surface of the product subjected to the heating conditions of the test

3.5
irradiance
radiant flux incident on an infinitesimal element of the surface containing the point divided by the area of that element

3.6
material
basic single substance or uniformly dispersed mixture

NOTE Metal, stone, timber, concrete, mineral fibre and polymers are examples.

3.7
mass optical density
MOD
measure of the degree of opacity of smoke in terms of the mass loss of the material

3.8
optical density of smoke
D
measure of the degree of opacity of smoke, taken as the negative common logarithm of the relative transmission of light

3.9
product
material, composite or assembly about which information is required

3.10
specific optical density
D_S
optical density multiplied by a factor which is calculated by dividing the volume of the test chamber by the product of the exposed area of the specimen and the path length of the light beam

NOTE See 11.1.1.

3.11
specimen
representative piece of the product to be tested together with any substrate or surface coating.

NOTE The specimen may include an air gap.

3.12
intumescent material
dimensionally unstable material, developing a carbonaceous expanded structure of thickness > 10 mm during the test, with the cone heater 25 mm from the specimen

4 Principles of the test

Specimens of the product are mounted horizontally within a chamber and exposed to thermal radiation on their upper surfaces at selected levels of constant irradiance up to 50 kW/m^2.

The smoke evolved is collected in the chamber, which also contains photometric equipment. The attenuation of a light beam passing through the smoke is measured. The results are reported in terms of specific optical density.

5 Suitability of a material for testing

5.1 Material geometry

5.1.1 The method is applicable to essentially flat materials, composites and assemblies not exceeding 25 mm in thickness.

5.1.2 The method is sensitive to small variations in geometry, surface orientation, thickness (either overall or of the individual layers), mass and composition of the material, and so the results obtained by this method only apply to the thickness of the material as tested.

NOTE It is not possible to calculate the specific optical density of one thickness of a material from the specific optical density of another thickness of the material.

5.2 Physical characteristics

Materials submitted for evaluation by this method could have faces which differ or could contain laminations of different materials arranged in a different order in relation to the two faces. If either of the faces is likely to be exposed to a fire condition when in use, then both faces shall be evaluated.

6 Specimen construction and preparation

6.1 Number of specimens

6.1.1 The test sample shall comprise a minimum of 12 specimens if all four modes are to be tested: six specimens shall be tested at 25 kW/m^2 (three specimens with a pilot flame and three specimens without a pilot flame) and six specimens shall be tested at 50 kW/m^2 (three specimens with a pilot flame and three specimens without a pilot flame).

If fewer than four modes are to be tested, a minimum of three specimens per mode shall be tested.

6.1.2 An additional number of specimens as specified in 6.1.1 shall be used for each face, in accordance with the requirements of 5.2.

6.1.3 An additional 12 specimens (i.e. three specimens per test mode) shall be held in reserve if required by the modes specified in 10.9.

6.1.4 In case of intumescent materials, it is necessary to make a preliminary test with the cone heater at 50 mm from the specimen, so at least two additional specimens are required.

6.2 Size of specimens

6.2.1 The specimens shall be square, with sides measuring 75 mm ± 1 mm.