



SLOVENSKI STANDARD

SIST ISO 5658-2:2018

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SIST ISO 5658-2:1999

Preskusi odziva na ogenj - Širjenje plamena - 2. del: Vzdolžno širjenje plamena po pokončnih gradbenih in transportnih proizvodih

Reaction to fire tests -- Spread of flame -- Part 2: Lateral spread on building and transport products in vertical configuration

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Essais de réaction au feu -- Propagation du feu -- Partie 2: Propagation latérale sur les produits de bâtiment et de transport en position verticale

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Ta slovenski standard je istoveten z: ISO 5658-2:2006

ICS:

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

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INTERNATIONAL STANDARD

ISO
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Second edition
2006-09-15

Reaction to fire tests — Spread of flame —

Part 2: Lateral spread on building and transport products in vertical configuration

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*Partie 2: Propagation latérale sur les produits de bâtiment et de
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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 5658-2 was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 1, *Fire initiation and growth*.

This second edition of ISO 5658-2 cancels and replaces the first edition (ISO 5658-2:1996), which has been technically revised.

ISO 5658 consists of the following parts, under the general title *Reaction to fire tests — Spread of flame*:

- *Part 1: Guidance on flame spread* [Technical Specification]
- *Part 2: Lateral spread on building and transport products in vertical configuration*
- *Part 4: Intermediate-scale test of vertical spread of flame with vertically oriented specimen*

Introduction

This part of ISO 5658 is based on the method of the International Maritime Organization (IMO) published as IMO Resolution A.653 (16)^[4], and has been developed as an International Standard in order to allow its wider use. The major differences between ISO 5658-2 and the IMO test are that ISO 5658-2 is limited in scope to testing the spread of flame over vertical specimens and does not include the stack for estimating heat release rate. The second edition of this part of ISO 5658 avoids the use of acetylene for the pilot flame and uses the propane pilot flame in an impinging mode. The current IMO flame spread procedure is still based on ISO 5658-2:1996.

ISO/TS 5658-1^[2] describes the development of standard tests for flame spread and explains the theory of flame spread for various orientations. This part of ISO 5658 provides a simple method by which lateral surface spread of flame on a vertical specimen can be determined for comparative purposes. This method is particularly useful for research, development and quality control purposes.

Fire is a complex phenomenon: its behaviour and its 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 to which they are exposed. The methodology of “reaction-to-fire” tests is explained in ISO/TR 3814^[1].

A test such as is specified in this part of ISO 5658 deals only with a simple representation of a particular aspect of the potential fire situation typified by a radiant-heat source and flame; it cannot alone provide any direct guidance on behaviour or safety in fire.

Annexes A and F form integral parts of this part of ISO 5658. Annexes B to E are for information only. A precision statement based on inter-laboratory trials using this test method is given in Annex E.

This test procedure does not rely on the use of asbestos-based materials.

The attention of all users of the test is drawn to the introductory caution statement.

Reaction to fire tests — Spread of flame —

Part 2:

Lateral spread on building and transport products in vertical configuration

CAUTION — 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 exposure of test specimens. The advice on safety given in Annex A should also be noted.

1 Scope

This part of ISO 5658 specifies a method of test for measuring the lateral spread of flame along the surface of a specimen of a product orientated in the vertical position. It provides data suitable for comparing the performance of essentially flat materials, composites or assemblies that are used primarily as the exposed surfaces of walls in buildings and transport vehicles, such as ships and trains. Some profiled products (such as pipes) can also be tested under specified mounting and fixing conditions.

This part of ISO 5658 is applicable to the measurement and description of the properties of materials, products or assemblies in response to radiative heat in the presence of a pilot flame under controlled laboratory conditions. It is not suitable to be used alone to describe or appraise the fire hazard or fire risk of materials, products or assemblies under actual fire conditions.

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 13943:2000, *Fire safety — Vocabulary*

3 Terms and definitions

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

3.1

assembly

fabrication of materials, products and/or composites

EXAMPLE Sandwich panels.

NOTE The assembly may include an air gap.

3.2

average heat for sustained burning

average of the values of heat for sustained burning, measured at a number of specified positions

NOTE The average heat for sustained burning is expressed in megajoules per square metre (MJ/m²).

ISO 5658-2:2006(E)**3.3****backing board**

non-combustible board with the same width and length as the test specimen and $(12,5 \pm 3)$ mm thick, used in every test to back the specimen

NOTE 1 See 9.7.

NOTE 2 A non-combustible board is one that, when tested to ISO 1716^[10], yields a gross calorific potential (PCS) of $\leq 2,0$ MJ/kg.

3.4**composite**

combination of materials that are generally recognized in building construction as discrete entities

EXAMPLE Coated or laminated materials.

3.5**critical heat flux at extinguishment****CFE**

incident heat flux at the surface of a specimen at the point along its horizontal centreline where the flame ceases to advance and may subsequently go out

NOTE 1 The heat flux value reported is based on interpolations of measurements with a non-combustible calibration board.

NOTE 2 The critical heat flux at extinguishment is expressed in kilowatts per square metre (kW/m²).

3.6**exposed surface**

that surface of the specimen subjected to the heating conditions of the test

3.7**flame front**

furthest extent of travel of a sustained flame centrally along the length of the test specimen

3.8**flashing**

existence of flame on or over the surface of the specimen for periods of less than 1 s

3.9**heat for sustained burning**

product of the time from the start of exposure of a specimen to the arrival of the flame front at a specified position and the incident radiant heat flux corresponding to that position measured on a non-combustible calibration board

NOTE 1 The heat for sustained burning is expressed in megajoules per square metre (MJ/m²).

NOTE 2 The positions are specified in Table 1.

3.10**irradiance**

⟨at a point of a surface⟩ quotient of the radiant heat flux incident on an infinitesimal element of surface containing the point, by area of that element

3.11**material**

single substance or uniformly dispersed mixture

EXAMPLES Metal, stone, timber, concrete, mineral fibre and polymers.

3.12**product**

material, composite or assembly about which information is required

3.13**radiant heat flux**

power emitted, transferred or received in the form of radiation

3.14**specimen**

representative piece of the product that is tested together with any substrate or treatment

NOTE The specimen may include an air gap.

3.15**spread of flame**

propagation of a flame front over the surface of a product under the influence of imposed irradiance

3.16**substrate**

material that is used, or is representative of that used, immediately beneath a surface product

EXAMPLE Skimmed plasterboard beneath a wall-covering.

3.17**sustained flaming**

existence of flame on or over the surface of the specimen for periods of more than 4 s

3.18**transitory flaming**

existence of flame on or over the surface of the specimen for periods of between 1 s and 4 s

3.19**lateral spread of flame**

progression of the flame front in a lateral direction over the specimen length

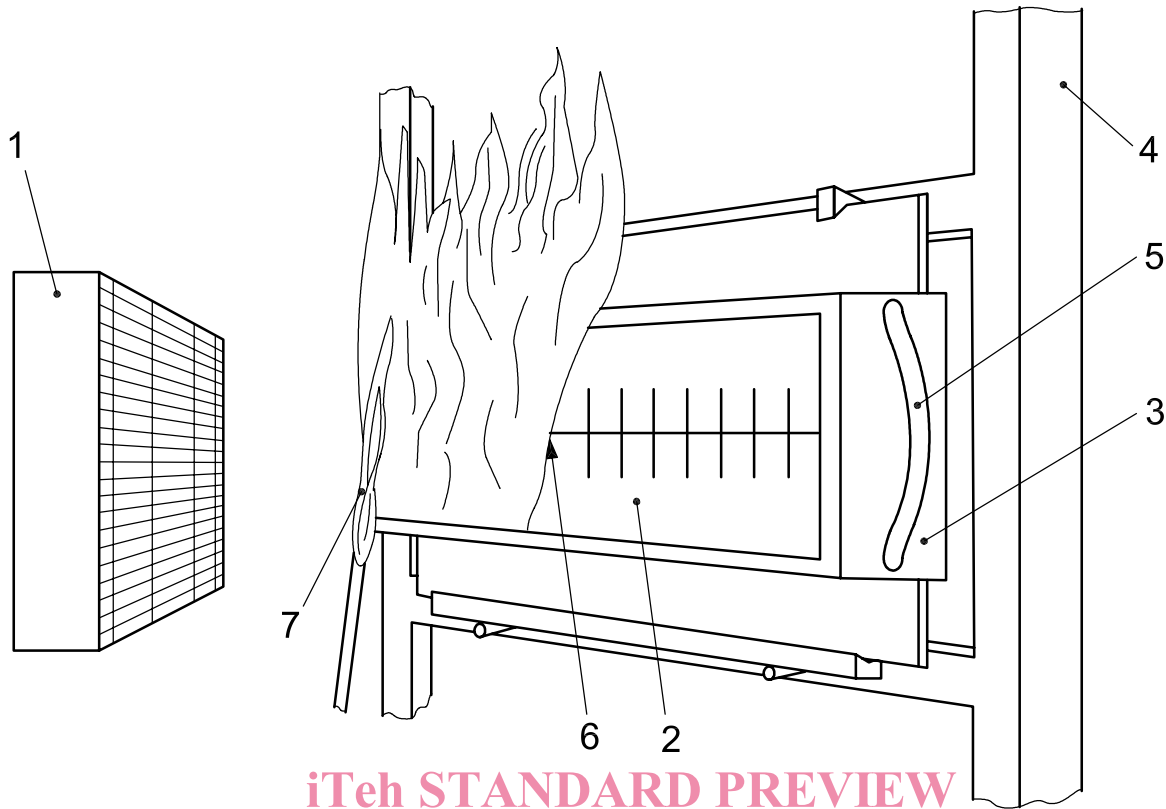
4 Principle

4.1 The test method consists of exposing conditioned specimens in a well-defined field of radiant heat flux and measuring the time of ignition, the lateral spread of flame and its final extinguishment.

4.2 A test specimen is placed in a vertical position adjacent to a gas-fired radiant panel where it is exposed to a defined field of radiant heat flux. A pilot flame is sited close to the hotter end of the specimen to ignite volatile gases issuing from the surface (see Figure 1).

4.3 Following ignition, any flame front that develops is noted and a record is made of the progression of the flame front horizontally along the length of the specimen in terms of the time it takes to travel various distances.

4.4 The results are expressed in terms of flame spread distance versus time, flame front velocity versus heat flux, the critical heat flux at extinguishment and the average heat for sustained burning.



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Key

- 1 vertical radiant panel at an angle of 15° to the specimen
- 2 specimen
- 3 specimen holder
- 4 framework supporting specimen holder
- 5 handle
- 6 flame front
- 7 pilot flame

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Figure 1 — Schematic of test

5 Suitability of a product for testing

5.1 Surface characteristics

5.1.1 A product having one of the following characteristics is suitable for evaluation using this method:

- a) an essentially flat exposed surface, i.e. all surface irregularities are within ± 1 mm of plane;
- b) a surface irregularity that is evenly distributed over the exposed surface provided that
 - 1) at least 50 % of the surface of a representative square area, 155 mm \times 155 mm, lies within a depth of 6 mm from a plane across the highest points of the exposed surface, and/or
 - 2) any cracks, fissures or holes do not exceed 8 mm in width or 10 mm in depth and the total area of such cracks, fissures or holes at the surface does not exceed 30 % of a representative square area, 155 mm \times 155 mm, of the exposed surface.

5.1.2 Where a product has areas of its surface that are distinctly different, but each of these separate areas satisfies the surface characteristics specified in 5.1.1, then each of these separate areas shall be tested to evaluate the product fully.

5.1.3 When an exposed surface does not comply with the requirements of either 5.1.1 a), or 5.1.1 b), the product may be tested in a modified form with an essentially flat exposed surface. The modification shall be stated in the report.

5.2 Thermally unstable products

The test method may not be suitable for assessing products that react in particular ways under exposure to the specified heating conditions (see 11.12). Products showing these characteristics should be assessed using other test methods, as given in, for example, ISO 9705^[3].

6 Test specimens

6.1 Exposed surface

The product shall be tested on that face that is normally exposed in use, taking account of the following.

- a) If it is possible for either or both of the faces to be exposed in use then, if the core is asymmetrical, both faces shall be tested.
- b) If the face of the product contains a surface irregularity that is specifically directional, e.g. corrugations, grain or machine-induced orientation that can, in use, run horizontally or vertically, the product shall be tested in both orientations.
- c) If the exposed face contains distinct areas of different surface finish or texture, then the appropriate number of specimens shall be provided for each distinct area of such finish or texture to be evaluated.
- d) Textile materials shall be tested for spread of flame in both the warp and the weft directions.

If a bright, metallic-faced specimen is to be tested, it shall be tested both as-received and also finished with a thin coat of lamp black or colloidal graphite, applied before conditioning for test. Alternatively, spray the exposed top surface of the specimen with a single coat of flat black paint that is designed to withstand temperatures of $(540 \pm 10) ^\circ\text{C}$. Prior to testing, cure the paint coating by conditioning the specimen at a temperature of $(23 \pm 3) ^\circ\text{C}$ and a relative humidity of $(50 \pm 5) \%$ for 48 h. This coating is applied to ensure surface absorption of the imposed radiant heat flux.

6.2 Number and size of specimens

6.2.1 At least six specimens shall be provided for test.

6.2.2 Three specimens shall be tested for each potentially exposed surface or orientation.

With products that can be exposed from either side and that also have directional irregularities on one side only, at least nine specimens are needed (see 11.10).

6.2.3 The specimens shall be (800 _{-5}^0) mm long \times (155 _{-5}^0) mm wide and shall be representative of the product.

6.2.4 The thickness of specimens of products with irregular surfaces (see 6.1) shall be measured from the highest point of the surface. Products of a thickness of 50 mm or less shall be tested using their full thickness. For products of normal thickness greater than 50 mm, the unexposed face shall be cut away to reduce the thickness to (50 _{-3}^0) mm.

For products of thicknesses in the range of 50 mm to 70 mm, it is necessary to use an extension clip or restraint at the rear of the specimen holder (see Figure 2).