INTERNATIONAL STANDARD

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Reaction-to-fire tests for façades —

Part 1: Intermediate-scale test

Essais de réaction au feu des façades —

Partie 1: Essai à échelle intermédiaire

Reference number
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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 3.

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 part of ISO 13785 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13785-1 was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 1, *Fire initiation and growth*.

ISO 13785 consists of the following parts, under the general title *Reaction-to-fire tests for façades*:

— *Part 1: Intermediate-scale test*

— *Part 2: Large-scale test*

Introduction

Fire is a complex phenomenon. Its behaviour and effects depend on a number of interrelated factors. The behaviour of materials and products depends on the characteristics of the fire, the method of use of the materials and the environment in which they are exposed. The theory of “reaction to fire tests” is explained in ISO/TR 3814[2].

The need for improved thermal insulation of buildings both for single and multi-storey dwellings and for industrial buildings has led to an increased use of insulated and often ventilated façades.

With these types of construction products, there are three primary fire threats to the walls and ceilings/roofs of a building:

a) an interior compartment fire venting through a window on to a façade;

b) an exterior fire in combustibles accumulated near a wall (e.g. rubbish, vegetation);

c) fire in an adjacent building.

Item a) is generally the most severe and substantially the most significant.

Fire can spread in several ways. The most significant is by spread over a combustible exterior surface or the fire travelling vertically and horizontally through air cavities between claddings or façades, or through the core of insulation itself.

The results may not, however, reflect the actual performance of exterior wall assemblies under all fire exposure conditions.

The test specified in this part of ISO 13785 covers a simple representation of one fire scenario with façade products, typified by a fire within a building venting through a window and impinging directly on to a façade.

The two parts of ISO 13785 provide two methods of test: an intermediate scale test specified in this part, which should only be used for screening or evaluation of sub-components or “families of products”, and a large scale test specified in Part 2, which should be used to provide the end-use evaluation of all aspects of the façade system.

These test methods are intended to evaluate assemblies that are not intended for use as an internal lining.

The test specified in this part of ISO 13785 may be used for comparative purposes or to ensure the existence of a certain quality of performance considered to have a bearing on the fire performance of the façades generally. No other meaning is attached to performance in this test. The large-scale test in Part 2 of ISO 13785 should be used to give a more realistic end-use assessment of performance.

The test specified in this part of ISO 13785 does not rely on the use of asbestos-based materials.

Reaction-to-fire tests for façades —

Part 1:
Intermediate-scale test

WARNING — So that suitable precautions may be taken to safeguard health, all persons involved in the fire tests should be aware of the possibility that toxic or harmful gases may be evolved during exposure of test specimens.

Hazards are encountered when assessing the fire performance of any product on an intermediate-scale and it is essential that adequate precautions be taken.

Particular attention should be paid to the potential evolution of smoke and toxic gases and to the fact that extensive flaming of specimens can occur sometimes with resultant mechanical failure of fixings and joints and possible structural collapse.

An adequate means of extinguishing the specimen should be provided.

1 Scope

This part of ISO 13785 specifies a screening method for determining the reaction to fire performance of products and constructions of façades or claddings when exposed to heat from a simulated external fire with flames impinging directly upon a façade. It is intended for use by producers to reduce the burden of testing in Part 2 of ISO 13785 by eliminating those systems that fail the tests described in this part of ISO 13785.

This test method is applicable only to façades and claddings that are not free standing and that are used as an addition to an existing external wall.

This test method also is only applicable to vertical elements and is not applicable to determining the structural strength of the façade or cladding.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 13785. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 13785 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 13943:2000, *Fire safety — Vocabulary*

IEC 60584-2, *Thermocouples — Part 2: Tolerances*

3 Terms and definitions

For the purposes of this part of ISO 13785, the terms and definitions given in ISO 13943:2000 and the following apply.

3.1
assembly
fabrication of materials and/or composites

EXAMPLE Sandwich panel.

NOTE An assembly may include an air gap.

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

EXAMPLE Coated or laminated product.

3.3
constant mass
state of a test specimen when two successive weighing apparatus operations carried out at an interval of 24 h do not differ by more than 0,1 % of the mass of the specimen or 0,1 g, whichever is greater

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

3.5
façade
cladding
products and constructions added to the external surface of an existing wall or frame

NOTE The structure can be of concrete, lightweight concrete blockwork, masonry, timber, etc. The cladding may be applied directly to the inner structure or may incorporate an air gap or an insulating layer.

3.6
material
single substance or uniformly dispersed mixture

EXAMPLE Substance made of metal, stone, timber, concrete, mineral fibre or polymers.

3.7
product
material, composite or assembly about which information is required

3.8
specimen
façade or cladding representing the material of the end-use façade, including joints and fixings

NOTE 1 The specimen does not include the lightweight concrete block wall of the test rig.

NOTE 2 The specimen may include an air gap.

3.9
surface product
any part of a building that constitutes an exposed surface on the walls and/or the ceiling/roof

EXAMPLE Panel or board.

4 Principle

The reaction to fire of a façade or cladding is assessed when exposed to flames impinging directly on the face of the façade or cladding in the intermediate scale. The specimen is constructed with a re-entrant angle of 90°, with the smaller wall parallel to the draught screens. This type of construction is common in practice and creates a worst-case situation.

The flame spread and mechanical behaviour of the specimen are assessed by indirect instrumental methods within the internal cavity of the façade, or directly by observation of the front face of the façade.

5 Test facility

5.1 General

The test apparatus shall consist of a specimen support frame and an ignition source. A schematic representation of the test apparatus is shown in Figure 1.

5.2 Specimen support frame

The specimen support frame (see Figure 1) shall consist of three walls, i.e. a three-part back wall and two side walls. The side walls shall be positioned perpendicularly on both sides of the back wall and a small 0,6 m wide perpendicular side wall. The test specimen shall be attached to a sample holder that is the middle part of the back wall. The height of all parts of the walls shall be 2,8 m.

The back wall shall consist of two slabs of stone wool with a thickness of 100 mm and a density of 100 kg/m^3, and a corner configuration sample holder with a width of 1,2 m, made of a non-combustible board (thickness 12 mm, nominal density 750 kg/m^3). The side wall of the sample holder shall also be constructed of non-combustible board with a width of 0,6 m. The sample holder shall be positioned centrally between the mineral wool slabs. The total width of the back wall shall be 2,4 m.

The test specimen shall be attached to the upper part of the sample holder so that the bottom edge of the test specimen is 0,4 m above floor level when the sample holder is positioned vertically.

The side walls of the specimen support frame shall be made of a non-combustible board. The width of the side walls shall be 2,4 m. The side walls shall meet the floor, with no air gaps formed.

The specimen support frame shall be located in an open laboratory environment in which adequate ventilation and adequate means of extracting the combustion products are provided.

6 Fire source and exposure

WARNING — All equipment (tubes, couplings, flowmeters, etc.) shall be approved for propane. The installation shall be performed in accordance with existing regulations. The burner shall, for reasons of safety, be equipped with a remote-control ignition device (e.g. a pilot flame or a glow wire). There shall 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.

The fire source shall be a propane gas burner with a right-angle top surface layer of a porous, inert material (e.g. sand). The size of the burner shall be 1,2 m × 0,1 m × 0,15 m (length × width × depth). The construction shall be such that an even gas flow is achieved over the entire opening area.

The burner shall be placed on the floor lengthwise below the test specimen with the ends of the burner lined up with the edges of the test specimen. The back wall of the burner shall be in contact with the sample holder.

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